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Recommendations and offers for adult influenza vaccination, 2011–2012 season, United States

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Abstract

Background—Provider recommendations and offers for influenza vaccination improve adult influenza vaccination coverage. Analysis was performed to describe receipt of influenza vaccination recommendations and offers among adults who visited a healthcare provider (HCP) during the 2011–2012 influenza season and describe differences between those receiving and not receiving recommendations and offers for influenza vaccination. Associations between influenza vaccination and receipt of recommendations and offers were examined.

Methods—Respondents to a random digit dial telephone survey who had visited a HCP since July 1, 2011 were asked if they had received a recommendation for influenza vaccination. Those receiving a recommendation were asked if they received an offer for vaccination. Participants were characterized by demographic and access to health care variables. Logistic regression was used to examine the relationships between participant characteristics and recommendation alone, between participant characteristics and recommendation and offer, and between influenza vaccination and recommendation and offer.

Results—Of those who reported visiting a HCP, 43.8% reported receiving a recommendation for influenza vaccination. Of those who reported receiving a recommendation, 76.6% reported receiving an offer for influenza vaccination. Persons with high-risk conditions and persons over 65 years were more likely to receive recommendations for influenza vaccination when compared to those without high-risk conditions and 18–49 year olds, respectively. Those reporting receipt of a recommendation and offer for influenza vaccination were 1.76 times more likely and those reporting receipt of a recommendation but no offer were 1.72 times more likely to report being vaccinated for influenza controlling for all patient characteristics.

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Conclusions—Less than half of respondents reported receipt of recommendations and offers of influenza vaccination during the 2011–2012 influenza season and disparities exist between groups. All healthcare providers seeing adults should recommend or offer influenza vaccination for all patients at every visit during the influenza season.

Keywords

Influenza; human; vaccination; adult; logistic models; population based interventions; practice guidelines; preventive health services

Introduction

The Advisory Committee on Immunization Practices (ACIP) recommended routine annual influenza vaccination for all persons ≥ 6 months, including all adults, for the first time in 2010 [1]. Prior to this universal recommendation, specific adult groups were targeted for annual influenza vaccination. These groups included persons ≥50 years and persons with medical conditions that increase the risk for influenza-related complications [2]. Despite the universal recommendation, influenza vaccination remains well below the Healthy People 2020 target of 70% for adults [3].

Actions recommended by ACIP and found to improve adult influenza vaccination include provider recommendation and offer of influenza vaccination [1, 4]. Both recommendations and offers have also been found to reduce racial/ethnic disparities in adult influenza vaccination [5, 6]. Previous research has found that recommendation alone is associated with vaccination and recommendation coupled with offer of vaccination is associated with coverage approximately twice as high as recommendation alone in pregnant women. [7–10]. Disparities in receiving recommendations and offers for influenza vaccination have been found in these studies of pregnant women, but to our knowledge, no studies have evaluated such disparities in the general population of adults.

The purpose of this study was to investigate differences in receipt of recommendations and offers for influenza vaccination during the 2011–2012 influenza season in adults who visited a health care provider, defined as a doctor or other health care provider (HCP), since July 1, 2011 by sex, age, education, race/ethnicity, receipt of reminder for influenza vaccination, having a usual health care provider, number of HCP visits, health insurance status, and having a medical condition which would place them at higher risk for influenza-related complications. Additionally, the association between influenza vaccination and recommendations and offers of influenza vaccination was explored while controlling for all of these variables.

Methods

Data Source

The National Flu Survey (NFS) was sponsored by Centers for Disease Control and Prevention (CDC) and conducted by NORC at the University of Chicago using a list-assisted random digit-dial sample of both landline and cellular telephones.. Households were screened into the survey based on the presence of a household member 18 years or older.

Cellular telephone respondents were screened into the survey if they were a “cell telephone only” household (i.e., they reported that they do not maintain a landline telephone in their household) or a “cell telephone mostly” household (i.e., they maintain a landline but nonetheless make and receive most of their calls on a cell telephone). Details regarding the data sources and methods for the NFS conducted during the 2011–12 influenza season in the United States have been previously reported [11, 12]. For this study, all adults who responded to the March 2012 NFS were included in this analysis. Missing responses, refusals, and responses of “don’t know” for each variable were excluded from analyses.

Survey Instrument

Interviews for the March 2012 NFS were conducted from March 1, 2012 to March 29, 2012. Adults were asked if they had received an influenza vaccination since July 1, 2011. Participants who reported at least one HCP visit since July 1, 2011 were further asked if they received a recommendation for influenza vaccination during the visit(s) regardless of whether or not they reported receiving an influenza vaccination. Only those reporting receiving a recommendation were also asked if they received an offer for influenza vaccination. Participants who reported getting a recommendation for influenza vaccination were asked who provided the recommendation. Specifically, these questions were asked as follows: 1) “Since July 1st, 2011 have you had a flu vaccination? It could have been a shot or a spray, drop, or mist in the nose.” 2) “Since July 1st, 2011, have you visited a doctor or other health professional about your own health at a doctor’s office, hospital, clinic, or some other place?” 3) “At one or more of these visits, did your doctor or other health professional recommend that you should get a flu vaccination, should not get a flu vaccination, or did not give a recommendation either way?” For the purposes of analysis, this variable was dichotomized into “recommendation” and “no recommendation.” No recommendation included those who were given a recommendation to *not* get an influenza vaccination (2.4%, 95%CI: 2.0–2.9) and those who were not given a recommendation either way (53.8%, 95%CI: 52.0–55.5). 4) “What type of health professional communicated the recommendation? (choices: Doctor, Nurse, Physician Assistant, Pharmacist, Other, Don’t Know, Refused)” 5) “During your visits to the doctor or other health professional, did your doctor or other health professional offer the flu vaccination to you?” [13].

Demographic questions asked of participants included their age, sex, race/ethnicity, and level of education. Participants were also asked if they received a reminder to get the influenza vaccination since July 1st, 2011 [14], if they had a place they usually go for routine or preventive medical care (has usual HCP), if they had health insurance, or if they currently had a medical condition which would place them at higher risk for influenza related complications (high-risk condition). To classify someone as having a high-risk condition, participants were asked a series of related questions. First, participants were asked if a doctor, nurse, or other health professional had ever said the survey participant had asthma, diabetes, or heart disease ; participants answering that they had ever been told they had the condition were then asked if they still had the condition. Participants were also asked if they were ever told they had one or more of a list of additional health conditions, which included: a lung condition other than asthma, a kidney condition, obesity, sickle cell anemia or other anemia, a neurological or neuromuscular condition, a liver condition, or a weakened immune

system caused by chronic illness or by medications taken for chronic illness. Participants who answered they had at least one of these conditions were further asked if they still have one of these conditions. Anyone indicating that they currently had asthma, diabetes, heart disease, or any one of the additionally listed conditions was considered to have a high-risk condition in this analysis.

Statistical methods

Relative to July 1, 2011, the percentage of adults visiting a HCP and the percentage of adults receiving recommendations and offers for influenza vaccination were calculated overall and by demographic characteristics with associations tested with Wald chi-square and pair-wise comparison t-tests. The percentages of type of HCP who provided the recommendation were also calculated.

Bivariable analyses were conducted to investigate associations between receipt of a recommendation and receipt of an offer and each independent variable. Adjusted associations were investigated using multivariable logistic regression models. For respondents who had visited a HCP since July 1, 2011, a multivariable model was analyzed with recommendation for influenza vaccination as the dependent variable; a separate multivariable model was analyzed with offer of influenza vaccination as the dependent variable. Independent variables included in each adjusted model were sex, age (18–49 years, 50–64 years, 65+ years), education (<12 years, 12 years, some college, college graduate), race/ethnicity (Hispanic, Black non-Hispanic, White non-Hispanic, Asian non-Hispanic, Other or multi-racial non-Hispanic), report of receipt of reminder for influenza vaccination (yes, no), having a usual HCP (yes, no), number of HCP visits during the 2011–12 influenza season (0 visits, 1 visit, 2–3 visits, 4–9 visits, or ≥10 visits), health insurance status (yes, no), and high-risk condition (yes, no). Influenza vaccination coverage was modeled as a dependent variable controlling for the independent variables described above with an additional independent variable for recommendation and offer of influenza vaccination variable; the levels included 1) recommendation and offer, 2) recommendation and no offer, and 3) no recommendation.

Unadjusted and adjusted prevalence of receipt of recommendation, prevalence of receipt of offer, and vaccination coverage were reported with 95% confidence intervals (95% CI) based on predictive marginals. Similarly, unadjusted prevalence ratios and adjusted prevalence ratios (APR) were reported with 95% CIs. All differences emphasized in the results section were statistically significant at a P-value<0.05. Analyses were conducted using SAS release 9.3 (SAS Inc. Cary, NC) and SUDAAN release 11.0.0 build 308 (Research Triangle Park, NC) statistical software to take into account the complex survey design. All estimates were weighted based upon probability of selection of the telephone number, adjustments for non-response at the household level and screening stage, probability of selecting the adult of interest in the household, person non-response, and a ratio adjustment to population controls (age, sex, race/ethnicity, and geographic area).

Results

Study Population

The Council of American Survey Research Organizations (CASRO) response rate was 31.4% for landline and 18.3% for cellular telephones [15]. Of the 15,630 interviews conducted for adults, 12,503 (80.0%) were from landlines and 3,127 (20.0%) were from cellular only or mainly households. Only adults ≥ 18 years who reported visiting a HCP at least once since July 1, 2011 (n=x, 72.8%) were included in these analyses (Table 1). Interview participants who were missing responses (n=57, 0.36%) to the question regarding visits to a HCP since July 1, 2011 were treated as participants reporting no visits to a HCP since July 1, 2011 (n=3,529, 22.6%) and excluded from analyses.

Proportions of study participants visiting a HCP since July 1, 2011 varied by demographic factors (Table 1). Seventy-eight percent of women had a HCP visit while 67.4% of men visited a HCP since July 1, 2011. The age group that had the highest proportion of adults visiting a HCP since July 1, 2011 were those in the age group 65+ years (86.9%). The proportion of college graduates (75.9%) and the proportion of non-Hispanic whites (75.5%) visiting a HCP were both higher than adults with 12 years and <12 years of education (70.5% and 69.2%) and Hispanics (62.7%), respectively. The proportion of adults who visited a HCP since July 1, 2011 and reported receiving reminders for influenza vaccination (76.3%) was greater than those not receiving reminders (71.9%). Proportions of adults visiting a HCP since July 1, 2011 and having a usual provider (77.3%), having health insurance (78.2%), and having a high-risk condition (86.9%) were greater than those without them.

Descriptive analysis for Receipt of Recommendations and Offers

Among adults visiting a HCP since July 1, 2011, 43.8% (95% CI: 42.1–45.6) reported receiving a recommendation for influenza vaccination. Of those who reported visiting a HCP and receiving a recommendation, 76.6% (95% CI: 74.2–78.8) reported receiving an offer for influenza vaccination. Doctors (88.5%, 95% CI: 86.7–90.0) were most frequently reported as the HCP communicating the recommendation for influenza vaccination. Other HCP reported to provide a recommendation were nurses (7.4%, 95% CI: 6.2–8.8), physician assistances (2.8%, 95% CI: 2.0–4.0), and pharmacists (0.5%, 95% CI: 0.2–1.1) (data not shown).

Regardless of sex, age category, education, or race/ethnicity, the majority of adults (56.5%) visiting a HCP since July 1, 2011 reported not receiving a recommendation (Table 2). Females (35.2%) and older age groups (50–64 years: 37.4% and 65+ years: 42.7%) reported receiving recommendations and offers in higher proportions than males (31.1%) and adults 18–49 years (27.8%), respectively. College graduates (28.9%) reported receiving recommendations and offers in lower proportions than adults with <12 years of education (41.3%), 12 years of education (35.7%), or some college (33.2%). The proportion of non-Hispanic whites (31.6%) that reported receiving a recommendation and offer for influenza vaccination was statistically lower than the 42.3% of non-Hispanic blacks reporting receipt of a recommendation and offer. Of adults visiting a HCP since July 1, 2011, those receiving

reminders for influenza vaccination, having a usual provider, with health insurance, and with a high-risk condition were more likely to report receiving recommendations and offers for influenza vaccination compared to the other subgroup in each category. The proportions of adults receiving recommendations and offers increased as the number of HCP visits increased (Table 2).

Association with Receipt of Recommendations and Offers

Compared to 18–49 year olds, both 50–64 year olds (APR=1.22) and individuals ≥ 65 years (APR=1.42) were more likely to report receipt of a recommendation for influenza vaccination controlling for all other variables (Table 3). Adults with some college education (APR=0.83) or college graduates (APR=0.82) were less likely than those with less than 12 years of education to report receiving a recommendation for influenza vaccination. Compared to non-Hispanic whites, Hispanics were more likely to report receiving a recommendation for influenza vaccination (APR=1.21). Adults reporting receiving reminders for influenza vaccination (APR=1.60) and those with a usual HCP (APR=1.45) were more likely to report receiving a recommendation for influenza vaccination than those not receiving reminders or those not having a usual HCP, respectively. Compared to adults visiting a HCP only once since July 1, 2011, adults with 2–3 HCP visits, 4–9 HCP visits, or ≥10 HCP visits were all more likely to report receiving a recommendation (APR=1.26, 1.34, and 1.47, respectively). Adults reporting a high-risk condition were more likely than those not reporting a high-risk condition to report receiving a recommendation (APR=1.31). Sex and health insurance status were not associated with report of receiving a recommendation for influenza vaccination in the multivariable model.

Compared to 18–49 year olds, 50–64 year olds (APR=1.10) were more likely to report receiving offers for influenza vaccination; adults ≥ 65 years did not differ in report of receipt of an offer compared to 18–49 year olds controlling for all other variables (Table 4). Compared to non-Hispanic whites, non-Hispanic blacks were more likely to report receiving an offer for influenza vaccination (APR=1.10). Adults reporting receiving reminders for influenza vaccination (APR=1.09) and those with a usual HCP (APR=1.35) were more likely to report receiving an offer for influenza vaccination than those not receiving reminders or those not having a usual HCP, respectively. Sex, education level, number of HCP visits since July 1, 2011, health insurance, and high-risk condition were not associated with report of receiving an offer for influenza vaccination in the model.

Descriptive analysis for and Association with Vaccination Coverage

Among adults ≥ 18 years, 45.5% (95% CI: 44.0–47.0) reported receiving an influenza vaccination since July 1, 2011; of respondents visiting a HCP since July 1, 2011, 51.7% (95%CI: 50.0–53.5) reported receiving an influenza vaccination during that same time period, compared to 28.6% (95% CI: 26.0–31.3) of respondents who did not visit a HCP. Vaccination coverage was higher among those receiving a recommendation but no offer (69.9%) and those receiving a recommendation and offer (71.4%) compared to those not receiving a recommendation (36.4%) (Table 5). Vaccination coverage did not differ for respondents reporting receipt of a recommendation only when compared to respondents who reported receipt of a recommendation and offer.

Adults reporting receipt of recommendations and offers (APR=1.76) for influenza vaccination were more likely to report being vaccinated for influenza compared to those reporting not receiving recommendations, controlling for sex, age, race/ethnicity, level of education, receipt of reminders for influenza vaccination, having a usual HCP, health insurance status, and high-risk condition (Table 5). Those reporting receipt of recommendations but no offers (APR=1.72) were also more likely to report being vaccinated for influenza than those reporting not receiving recommendations.

Discussion

Less than half of respondents reported to have received recommendations and offers of influenza vaccination during the 2011–2012 influenza season. In addition, disparities existed between groups that reported receiving recommendations and offers. Some of these disparities may reflect influenza vaccination recommendations prior to the universal recommendation when adults 18–49 years or without a high risk condition were not recommended for influenza vaccination [1]. For example, older age groups were more likely to report receiving a recommendation or offer for influenza vaccination than younger age groups. Similarly, persons with high-risk conditions were also more likely to report receiving a recommendation for influenza vaccination. These findings indicate that adults not in categories previously recommended for influenza vaccination may not have been included in provider efforts to recommend or offer influenza vaccination two years after the universal recommendation. However, when providers were reported to make recommendations and offers, adults were more likely to be vaccinated.

Previous studies have found higher influenza vaccination coverage among specific adult groups who received a provider recommendation compared to those who did not receive a recommendation [1, 4]. Pregnant women who reported receipt of a recommendation and offer for influenza vaccination have been shown to have higher influenza vaccination coverage compared to pregnant women who reported receipt of a recommendation without an offer during multiple influenza seasons [7–10]. However, our study did not detect a difference between vaccination coverage in adults who reported receipt of a recommendation but no offer compared to adults that received a recommendation and an offer. Differences between our results and results found in pregnant women could be because pregnant women may be less likely than the general population to get vaccinated in non-medical settings. Therefore, if their provider recommends but does not offer vaccination, pregnant women might be less likely to go somewhere else to be vaccinated. Additionally, providers of the general population may be more likely to stock and thus offer vaccination than obstetrician-gynecologists [16, 17].

Adult influenza vaccination coverage has been found to be higher among non-Hispanic whites when compared to other race/ethnicity groups [18]. Previous work suggests that disparities in access to care or provider discrimination contribute little to these rachial/ethnic disparities in influenza vaccination [19]. Compared to non-Hispanic whites, Hispanics in this study were more likely to report receiving recommendations for influenza vaccination and non-Hispanic blacks were more likely to report receiving offers for influenza vaccination. Due to the skip-logic of the questions, reports of recommendations could only

be indicated if the survey participant visited a HCP since July 1, 2011. During the 2011–2012 influenza season, non-Hispanic whites received influenza vaccinations most often in nonmedical settings such as stores (e.g., supermarket, drug store) or the workplace [20]. Therefore, non-Hispanic whites could achieve higher coverage levels without having seen a HCP and therefore not report receiving a recommendation for vaccination in our study if they did not consider pharmacists or occupational health worker a HCP. Further, beliefs and attitudes about influenza vaccination differ between race/ethnicity groups. Specifically, negative beliefs and attitudes about influenza vaccination have been found to be more prevalent among African-Americans than whites [5]. Although patients with negative beliefs are more likely to be vaccinated if they receive a recommendation, they could be less likely to act on a recommendation or offer of influenza vaccination from their providers.

In our study, high-risk individuals, even when controlling for respondents with multiple HCP visits, were more likely to report receiving a recommendation for influenza vaccination. This is likely due to providers continuing to follow previous influenza vaccination recommendations before adults 18–49 without high-risk conditions were recommended to receive influenza vaccination. The Standards for Adult Immunization Practice call on all HCPs to ensure that their adult patients are fully immunized by assessing immunization status for every patient at every visit, strongly recommending needed vaccines, and administering vaccines or referring patients to a vaccination provider [21]. All HCPs need to take every opportunity to assess, recommend, and offer needed vaccinations to all patients. Proven provider and system based strategies that help increase vaccination rates, such as provider reminders and standing orders, should be incorporated to assist providers with providing influenza vaccination recommendations and offers [22]. Pharmacists and occupational health clinics may have contact with individuals who do not have regular doctor visits during the influenza season and could be the only HCP types with the opportunity to recommend and offer influenza vaccination to some individuals [23].

This study had several limitations due to the design and short time frame for collection of the information. First, vaccination coverage was measured via self-report and not validated with medical records. Second, sampling bias may be present due to low response rate. Third, households that did not have telephone service or that did not respond to early call attempts were excluded, which could result in non-response bias. Fourth, selection bias could occur if individuals agreeing to participate had particularly strong feelings for or against influenza vaccination. Fifth, recall bias could have been present since vaccinated individuals may have been more likely to remember receipt of vaccination recommendations or offers, and since it may have been difficult to recall if a respondent visited a HCP, received a recommendation or received an offer early in the season. Sixth, although influenza vaccine can become available as early as July 1, some providers may not have received vaccine until later in the 2011–12 season and therefore would not have begun recommending or offering the vaccine. Additionally, there are many factors associated with vaccination, and not all of these factors could be controlled for in this analysis [1, 24, 25].

In conclusion, recommendations and offers of influenza vaccinations are important tools in the efforts to improve adult influenza vaccination coverage. Receipt of these were reported by less than half of patients during the 2011–12 influenza season. Assessment of each

patients' influenza vaccination status should occur during every HCP visit during the influenza season and evidence based provider and system strategies that help providers recommend and offer vaccination should be implemented whenever possible [21, 22]. Strong influenza vaccination recommendations should be given to those individuals not yet vaccinated against influenza and influenza vaccination should be offered if vaccine is available. If vaccination is not available, patients should be referred to a HCP who does offer influenza vaccination.

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Table 1

Characteristics of adult participants who visited a health care provider (HCP) at least once since July 1, 2011[f], United States, March 2012 National Flu Survey, 2011–12 influenza season.

	All adult participants		Visited HCP[f]	
Characteristics	**n[g]**	**Weighted[h] % (95%CI[i])**	**n**	**Weighted % (95%CI)**
Total	15,630	–	12,044	72.8 (71.4–74.1)
Sex				
a. Female	7,979	50.6 (49.1–52.1)	6,375	78.0 (76.2–79.7)[b]
b. Male	7,651	49.4 (47.9–50.9)	5,669	67.4 (65.3–69.5)[a]
Age				
a. 18–49 years	5,952	58.4 (57.1–59.8)	4,015	65.9 (63.7–68.0)[b,c]
b. 50–64 years	4,734	24.5 (23.3–25.6)	3,739	79.5 (77.4–81.4)[a,c]
c. 65+ years	4,944	17.1 (16.3–18.0)	4,290	86.9 (85.2–88.3)[a,b]
Education				
a. <12 years	1,236	10.2 (9.2–11.2)	899	69.2 (64.5–73.6)[d]
b. 12 years	2,741	22.4 (21.1–23.8)	2,051	70.5 (67.1–73.7)[d]
c. Some college	3,697	29.3 (27.8–30.8)	2,896	72.3 (69.2–75.2)
d. College graduate	6,299	38.2 (36.7–39.7)	5,033	75.9 (73.9–77.9)[a,b]
Race/ethnicity				
a. Hispanic	1,647	13.9 (12.8–15.2)	1,123	62.7 (57.9–67.2)[b,c,e]
b. Black, non-Hispanic	1,770	12.0 (10.9–13.1)	1,393	72.8 (67.9–77.2)[a,d]
c. White, non-Hispanic	11,081	67.5 (66.0–69.0)	8,745	75.5 (73.9–77.0)[a,d]
d. Asian, non-Hispanic	678	4.3 (3.7–4.9)	433	62.6 (56.4–68.4)[b,c,e]
e. Other or Multi-racial, non-Hispanic	454	2.3 (1.9–2.8)	350	73.5 (64.3–81.0)[a,d]
Reminder[j]				
a. Yes	2,920	17.2 (16.1–18.4)	2,333	76.3 (72.7–79.4)[b]
b. No	12,195	82.8 (81.6–83.9)	9308	71.9 (70.3–73.4)[a]
Usual HCP[k]				
a. Yes	14,152	88.1 (87.0–89.1)	11,480	77.3 (75.9–78.7)[b]
b. No	1,451	11.9 (10.9–13.0)	555	39.0 (34.2–43.9)[a]
Number of HCP Visits[l]				
a. 0	3,529	27.9 (26.5–29.3)	–	–
b. 1	2,830	19.7 (18.5–21.0)	–	–
c. 2–3	4,881	29.9 (28.6–31.3)	–	–
d. 4–9	2,963	17.0 (15.9–18.1)	–	–
e. ≥10	950	5.6 (4.9–6.3)	–	–
Health Insurance[m]				
a. Yes	12,448	82.5 (81.1–83.9)	10,110	78.2 (76.8–79.6)[b]

Characteristics	All adult participants		Visited HCP[f]	
	n[g]	Weighted[h] % (95%CI[i])	n	Weighted % (95%CI)
b. No	1,575	17.5 (16.1–18.9)	797	48.2 (43.6–52.8)[a]
High-Risk Condition[n]				
a. Yes	4,967	29.2 (27.9–30.6)	4,443	86.9 (84.7–88.9)[b]
b. No	9,380	70.8 (69.4–72.1)	6,679	67.0 (65.1–68.8)[a]

[a,b,c,d,e] The presence or absence of superscripted letters denotes whether that estimate was significantly different at $P<0.05$ from another row, and denotes which row it differed from (a, b, c, d, e), based on pair-wise comparison *t*-test. For example, the percentage of females who reported HCP visits (78.0%) was significantly different from the percentage of males who reported HCP visits (67.4%).

[f] "Since July 1st, 2011 have you visited a doctor or other health professional your own health at a doctor's office, hospital, clinic, or some other place?"

[g] Unweighted sample size: characteristic specific sample sizes may be lower due to missing values.

[h] Weighting based on two sample frames (landline and cell phone) subdivided into two strata: an oversampling area and a non-oversampling area, to achieve higher proportional representation among three minority race/ethnicity groups – Hispanic, non-Hispanic Black, and non- Hispanic Asian. Oversampling among landline telephones was done at the county level. Oversampling for cell phone was done at the state level.

[i] 95% confidence intervals; all percentages and CIs are based on weighted analysis of data using SUDAAN.

[j] "Since July 1, 2011, did your doctor or other health professional remind you some way by mail, email, phone call, or text message to get a flu vaccination? Posted signs, newsletters, pamphlets, or television and radio ads were not considered a reminder."

[k] "Is there a place you usually go when you need routine or preventive medical care, such as a physical exam or check-up?"

[l] "How many times since July 1st have you visited a doctor or other health professional about your own health at a doctor's office, hospital, clinic, or some other place?"

[m] "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?"

[n] High-risk condition included individuals who currently had asthma, diabetes, heart disease a lung condition other than asthma, a kidney condition, obesity, sickle cell anemia or other anemia, a neurological or neuromuscular condition, a liver condition, or a weakened immune system caused by chronic illness or by medications taken for chronic illness.

Table 2

Characteristics of National Flu Survey adult participants who visited a health care provider (HCP)[f] and received recommendations[g] or offers[h] for influenza vaccination since July 1, 2011, United States, March 2012 National Flu Survey, 2011–12 influenza season.

	Recommended[g] and Offered[h]		Recommended but Not Offered		No Recommendation	
Characteristics	**n[i]**	**Weighted[j] % (95%CI)[k]**	**n**	**Weighted % (95%CI)**	**n**	**Weighted % (95%CI)**
Total	4,177	33.3 (31.7–35.0)	1,264	10.2 (9.1–11.3)	6,214	56.5 (54.8–58.3)
Sex						
a. Female	2,279	35.2 (32.9–37.6)[b]	682	10.8 (9.4–12.5)	3,173	53.9 (51.5–56.4)[b]
b. Male	1,898	31.1 (28.9–33.3)[a]	582	9.4 (8.0–11.0)	3,041	59.5 (57.1–61.9)[a]
Age						
a. 18–49 years	1,096	27.8 (25.4–30.4)[b,c]	341	9.5 (7.8–11.4)[c]	2,475	62.7 (60.0–65.4)[b,c]
b. 50–64 years	1,310	37.4 (34.5–40.3)[a,c]	362	9.2 (7.8–10.8)[c]	1,962	53.5 (50.5–56.4)[a,c]
c. 65+ years	1,771	42.7 (40.1–45.3)[a,b]	561	13.4 (11.8–15.2)[a,b]	1,777	43.9 (41.2–46.6)[a,b]
Education						
a. <12 years	394	41.3 (35.1–47.7)[c,d]	84	10.5 (6.3–17.0)	401	48.3 (41.7–54.9)[c,d]
b. 12 years	790	35.7 (31.9–39.6)[d]	215	10.1 (8.0–12.7)	993	54.2 (50.2–58.3)[d]
c. Some college	1,041	33.2 (29.9–36.6)[a,d]	277	8.8 (7.1–10.9)[d]	1,515	58.0 (54.5–61.4)[a]
d. College graduate	1,572	28.9 (26.6–31.2)[a,b,c]	584	11.5 (9.8–13.4)[c]	2,752	59.7 (57.1–62.2)[a,b]
Race/Ethnicity						
a. Hispanic	422	34.4 (29.0–40.2)	107	14.4 (9.8–20.5)	562	51.3 (45.3–57.2)[c,d]
b. Black, non-Hispanic	614	42.3 (36.8–47.9)[c,d]	107	6.4 (4.4–9.3)[c]	651	51.3 (45.7–56.9)[c,d]
c. White, non-Hispanic	2,863	31.6 (29.8–33.4)[b]	971	10.1 (9.1–11.3)[b]	4,597	58.3 (56.3–60.2)[a,b]
d. Asian, non-Hispanic	150	27.0 (20.8–34.3)[b,e]	39	10.8 (6.5–17.4)	228	62.2 (53.6–70.1)[a]
e. Other or Multi-racial, non-Hispanic	128	42.0 (29.7–55.3)[d]	40	8.5 (4.9–14.6)	176	49.5 (37.5–61.5)
Reminder[l]						
a. Yes	1,177	52.3 (48.3–56.3)[b]	312	12.0 (9.7–14.8)	786	35.7 (32.0–39.6)[b]
b. No	2,892	29.1 (27.3–30.9)[a]	925	9.8 (8.6–11.1)	5,286	61.2 (59.2–63.1)[a]

	Recommended[g] and Offered[h]		Recommended but Not Offered		No Recommendation	
Characteristics	**n[i]**	**Weighted[j] % (95%CI)[k]**	**n**	**Weighted % (95%CI)**	**n**	**Weighted % (95%CI)**
Usual HCP[m]						
a. Yes	4,086	34.6 (33.0–36.4)[b]	1,226	10.2 (9.2–11.3)	5,795	55.1 (53.4–56.9)[b]
b. No	90	14.2 (10.1–19.5)[a]	36	9.5 (4.7–18.2)	414	76.3 (68.3–82.9)[a]
Number of HCP Visits[n]						
a. 1	702	22.9 (20.3–25.8)[b,c,d]	270	9.2 (7.3–11.5)	1,779	67.9 (64.6–71.0)[b,c,d]
b. 2–3	1,674	33.4 (30.9–36.0)[a,c,d]	492	10.2(8.6–12.0)	2,563	56.4 (53.7–59.1)[a,c,d]
c. 4–9	1,274	41.0 (37.5–44.6)[a,b]	333	9.9 (7.9–12.4)	1,314	49.1 (45.5–52.6)[a,b]
d. ≥10	400	43.9 (37.7–50.3)[a,b]	119	12.4 (8.5–17.7)	415	43.8 (37.5–50.3)[a,b]
Health Insurance[o]						
a. Yes	3,581	33.8 (32.1–35.6)[b]	1,098	10.7 (9.5–12.0)	5,178	55.5 (53.7–57.4)[b]
b. No	226	28.0 (22.1–34.9)[a]	67	7.2 (4.6–11.2)	492	64.8 (57.8–71.1)[a]
High-Risk Condition[p]						
a. Yes	1,924	43.4 (40.7–46.1)[b]	542	12.3 (10.6–14.3)[b]	1,864	44.4 (41.6–47.1)[b]
b. No	1,954	27.8 (25.7–30.0)[a]	634	8.9 (7.6–10.5)[a]	3,935	63.3 (60.9–65.6)[a]

[a,b,c,d,e] The presence or absence of superscripted letters denotes whether that estimate was significantly different at $P<0.05$ from another row, and denotes which row it differed from (a, b, c, d, e), based on pair-wise comparison *t*-test. For example, the percentage of females who reported receiving a recommendation and an offer (35.2%) was significantly different from the percentage of males who reported receiving a recommendation and an offer (31.1%).

[f] "Since July 1st, 2011 have you visited a doctor or other health professional your own health at a doctor's office, hospital, clinic, or some other place?"

[g] "At one or more visits of these visits, did your doctor or other health care professional recommend that you should get a flu vaccination, should not get a flu vaccination, or did not give a recommendation either way?" For the purposes of analysis, this variable was dichotomized into "recommendation" or "no recommendation" (which included those that were recommended to not get a flu vaccination and those not receiving a recommendation)

[h] "During your visits to the doctor or other health professional, did your doctor or other health professional offer the flu vaccination to you?"

[i] Unweighted sample size: characteristic specific sample sizes may be lower due to missing values.

[j] Weighting based on two sample frames (landline and cell phone) subdivided into two strata: an oversampling area and a non-oversampling area, to achieve higher proportional representation among three minority race/ethnicity groups – Hispanic, non-Hispanic Black, and non- Hispanic Asian. Oversampling among landline telephones was done at the county level. Oversampling for cell phone was done at the state level.

[k] 95% confidence intervals; all percentages and CIs are based on weighted analysis of data using SUDAAN.

[l] "Since July 1, 2011, did your doctor or other health professional remind you some way by mail, email, phone call, or text message to get a flu vaccination? Posted signs, newsletters, pamphlets, or television and radio ads were not considered a reminder."

[m] "Is there a place you usually go to when you need routine or preventive medical care, such as a physical examination or check-up?"

[n] "How many times since July 1st have you visited a doctor or other health professional about your own health at a doctor's office, hospital, clinic, or some other place?"

[o] "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?"

[p] High-risk condition included individuals who currently had asthma, diabetes, heart disease a lung condition other than asthma, a kidney condition, obesity, sickle cell anemia or other anemia, a neurological or neuromuscular condition, a liver condition, or a weakened immune system caused by chronic illness or by medications taken for chronic illness.

Table 3

Association between demographic characteristics and recommendations[a] for influenza vaccination for adult participants who visited a health care provider (HCP) since July 1, 2011, United States, March 2012 National Flu Survey, 2011–12 influenza season.

Characteristics		Unadjusted		Adjusted[e]	
		Recommendation Prevalence[b] (95%CI[c])	Recommendation Prevalence Ratio[d] (95%CI)	Recommendation Prevalence	Recommendation Prevalence Ratio (95%CI)
Sex					
	Female	46.5 (44.0–48.9)	**1.14 (1.06–1.24)**[f]	44.2 (41.7–46.7)	1.06 (0.98–1.14)
	Male	40.7 (38.3–43.1)	ref [g]	41.9 (39.5–44.3)	ref
Age					
	18–49 years	37.6 (35.0–40.4)	ref	37.6 (34.9–40.4)	ref
	50–64 years	46.6 (43.7–49.6)	**1.24 (1.13–1.36)**	45.8 (42.7–48.8)	**1.22 (1.10–1.34)**
	65+ years	56.6 (53.9–59.2)	**1.50 (1.38–1.64)**	53.3 (50.2–56.3)	**1.42 (1.29–1.55)**
Education					
	<12 years	52.2 (45.5–58.7)	ref	50.3 (43.7–56.8)	ref
	12 years	45.9 (41.9–49.9)	0.88 (0.75–1.03)	45.5 (41.7–49.4)	0.91 (0.78–1.06)
	Some college	42.2 (38.7–45.7)	**0.81 (0.70–0.94)**	41.6 (38.4–44.9)	**0.83 (0.71–0.96)**
	College graduate	40.4 (37.9–43.0)	**0.78 (0.67–0.89)**	41.2 (38.6–43.9)	**0.82 (0.71–0.95)**
Race/Ethnicity					
	Hispanic	48.8 (42.8–54.8)	**1.16 (1.02–1.32)**	50.4 (44.1–56.6)	**1.21 (1.06–1.39)**
	Black, non-Hispanic	48.7 (43.1–54.4)	**1.16 (1.02–1.31)**	43.2 (38.4–48.2)	1.04 (0.92–1.18)
	White, non-Hispanic	42.2 (40.2–44.1)	ref	41.5 (39.4–43.7)	ref
	Asian, non-Hispanic	38.1 (30.2–46.7)	0.90 (0.72–1.13)	45.6 (37.1–54.4)	1.10 (0.90–1.34)
	Other or Multi-racial, non-Hispanic	50.5 (38.5–62.5)	1.20 (0.94–1.53)	45.9 (36.3–55.8)	1.10 (0.89–1.38)
Reminder[h]					
	Yes	64.4 (60.5–68.1)	**1.65 (1.52–1.78)**	62.0 (58.0–65.8)	**1.60 (1.47–1.73)**
	No	39.1 (37.2–41.0)	ref	38.8 (36.9–40.8)	ref
Usual HCP[i]					
	Yes	45.2 (43.4–47.0)	**1.90 (1.40–2.59)**	43.9 (42.0–45.8)	**1.45 (1.10–1.93)**
	No	23.8 (17.2–31.8)	ref	30.2 (22.4–39.2)	ref

Characteristics		Unadjusted		Adjusted[e]	
		Recommendation Prevalence[b] (95%CI[c])	Recommendation Prevalence Ratio[d] (95%CI)	Recommendation Prevalence	Recommendation Prevalence Ratio (95%CI)
Number of HCP Visits[j]					
	1	32.3 (29.2–35.6)	ref	35.1 931.8–38.5)	ref
	2–3	44.0 (41.3–46.7)	**1.36 (1.21–1.53)**	44.2 (41.5–47.0)	**1.26 (1.13–1.41)**
	4–9	51.3 (47.7–54.9)	**1.59 (1.41–1.79)**	47.0 (43.4–50.6)	**1.34 (1.18–1.52)**
	≥10	56.3 (49.8–62.6)	**1.74 (1.50–2.03)**	51.6 (45.0–58.1)	**1.47 (1.25–1.73)**
Health Insurance[k]					
	Yes	44.7 (42.8–46.5)	**1.26 (1.04–1.54)**	43.7 (41.8–45.7)	1.15 (0.97–1.36)
	No	35.3 (28.9–42.2)	ref	38.1 (32.2–44.3)	ref
High-Risk Condition[l]					
	Yes	55.8 (53.0–58.5)	**1.51 (1.40–1.64)**	50.9 (47.7–54.0)	**1.31 (1.20–1.43)**
	No	36.9 (34.6–39.3)	ref	38.8 (36.5–41.1)	ref

[a] "At one or more visits of these visits, did your doctor or other health care professional recommend that you should get a flu vaccination, should not get a flu vaccination, or did not give a recommendation either way?" For the purposes of analysis, this variable was dichotomized into "recommendation" or "no recommendation" (which included those that were recommended to not get a flu vaccination and those not receiving a recommendation)

[b] The predicted marginal model was used to estimate recommendation prevalence.

[c] 95% confidence intervals; all percentages and CIs are based on weighted analysis of data using SUDAAN.

[d] Prevalence ratio interpreted as the odds of report of recommendation given the characteristic for the exposure variable compared to the exposure variable reference group.

[e] Adjusted for sex, age, education, race/ethnicity, reminder, usual HCP, number of HCP visits, health insurance, and high-risk condition (n=10,088).

[f] Bolded prevalence ratios and 95%CI indicate statistical significance, $P < 0.05$.

[g] Reference group

[h] "Since July 1, 2011, did your doctor or other health professional remind you some way by mail, email, phone call, or text message to get a flu vaccination? Posted signs, newsletters, pamphlets, or television and radio ads were not considered a reminder."

[I] "Is there a place you usually go to when you need routine or preventive medical care, such as a physical examination or check-up?"

[j] "How many times since July 1st have you visited a doctor or other health professional about your own health at a doctor's office, hospital, clinic, or some other place?"

[k] "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?"

[1] High-risk condition included individuals who currently had asthma, diabetes, heart disease a lung condition other than asthma, a kidney condition, obesity, sickle cell anemia or other anemia, a neurological or neuromuscular condition, a liver condition, or a weakened immune system caused by chronic illness or by medications taken for chronic illness.

Table 4

Association between demographic characteristics and offers[a] for influenza vaccination for adult participants who visited a health care provider (HCP) and received a recommendation since July 1, 2011, United States, March 2012 National Flu Survey, 2011–12 influenza season.

Characteristics		Unadjusted		Adjusted[e]	
		Offer Prevalence[b] (95%CI[c])	Offer Prevalence Ratio[d] (95%CI)	Offer Prevalence	Offer Prevalence Ratio (95%CI)
Sex					
	Female	76.5 (73.3–79.4)	1.00 (0.94–1.06)	75.9 (72.5–79.0)	0.99 (0.93–1.06)
	Male	76.8 (73.2–80.0)	ref [f]	76.5 (72.7–79.9)	ref
Age					
	18–49 years	74.6 (70.1–78.6)	ref	73.2 (68.4–77.5)	ref
	50–64 years	80.3 (77.0–83.2)	1.08 (1.01–1.15)	80.3 (76.7–83.4)	**1.10 (1.02–1.18)**[g]
	65+ years	76.1 (73.1–78.8)	1.02 (0.95–1.09)	76.3 (72.8–79.4)	1.04 (0.97–1.13)
Education					
	<12 years	79.8 (69.0–87.5)	ref	81.1 (71.8–87.8)	ref
	12 years	77.9 (72.8–82.3)	0.98 (0.81–1.11)	78.7 (73.4–83.2)	0.97 (0.87–1.09)
	Some college	79.0 (74.6–82.8)	0.99 (0.87–1.13)	78.0 (73.4–82.0)	0.96 (0.86–1.08)
	College graduate	71.6 (67.5–75.3)	0.90 (0.79–1.02)	71.8 (67.7–75.6)	0.89 (0.79–0.99)
Race/Ethnicity					
	Hispanic	70.5 (60.2–79.1)	0.93 (0.81–1.07)	68.8 (58.9–77.2)	0.90 (0.79–1.04)
	Black, non-Hispanic	86.8 (81.2–90.9)	**1.15 (1.08–1.22)**	83.7 (77.1–88.6)	**1.10 (1.02–1.19)**
	White, non-Hispanic	75.8 (73.2–78.1)	ref	76.1 (73.2–78.8)	ref
	Asian, non-Hispanic	71.5 (58.7–81.6)	0.95 (0.80–1.11)	76.4 (63.9–85.5)	1.00 (0.87–1.16)
	Other or Multi-racial, non-Hispanic	83.1 (70.5–91.0)	1.10 (0.97–1.24)	79.0 (65.3–88.3)	1.04 (0.90–1.21)
Reminder[h]					
	Yes	81.4 (77.2–84.9)	**1.09 (1.02–1.16)**	81.2 (77.0–84.9)	**1.09 (1.03–1.16)**
	No	74.8 (71.9–77.6)	ref	74.3 (71.1–77.3)	ref
Usual HCP[i]					
	Yes	77.2 (74.9–79.4)	**1.29 (0.93–1.78)**	76.9 (74.3–79.2)	**1.35 (0.98–1.85)**
	No	59.9 (40.0–76.9)	ref	57.2 (38.9–73.7)	ref
Number of HCP Visits[j]					

Characteristics		Unadjusted		Adjusted[e]	
		Offer Prevalence[b] (95%CI[c])	Offer Prevalence Ratio[d] (95%CI)	Offer Prevalence	Offer Prevalence Ratio (95%CI)
	1	71.4 (65.6–76.5)	ref	70.9 (64.9–76.2)	ref
	2–3	76.6 (72.8–80.0)	1.07 (0.98–1.17)	76.6 (72.7–80.0)	1.08 (0.99–1.18)
	4–9	80.5 (76.0–84.3)	1.13 (1.03–1.24)	79.3 (74.9–83.1)	1.12 (1.02–1.23)
	≥10	78.0 (69.6–84.7)	1.09 (0.97–1.24)	76.5 (68.0–83.3)	1.08 (0.95–1.23)
Health Insurance[k]					
	Yes	76.0 (73.4–78.4)	0.96 (0.85–1.07)	75.7 (72.8–78.4)	0.94 (0.84–1.04)
	No	79.5 (69.4–86.9)	ref	80.9 (72.1–87.4)	ref
High-Risk Condition[l]			.		
	Yes	77.9 (74.7–80.9)	1.03 (0.97–1.10)	76.3 (72.6–79.6)	1.00 (0.94–1.07)
	No	75.7 (72.0–79.0)	ref	76.1 (72.5–79.3)	ref

[a] "During your visits to the doctor or other health professional, did your doctor or other health professional offer the flu vaccination to you?"

[b] The predicted marginal model was used to estimate offer prevalence.

[c] 95% confidence intervals; all percentages and CIs are based on weighted analysis of data using SUDAAN.

[d] Prevalence ratio interpreted as the odds of report of offer given the characteristic for the exposure variable compared to the exposure variable reference group.

[e] Adjusted for sex, age, education, race/ethnicity, reminder, usual HCP, number of HCP visits, health insurance, and high-risk condition (n=4,654).

[f] Reference group

[g] Bolded prevalence ratios and 95%CI indicate statistical significance, $P < 0.05$.

[h] "Since July 1, 2011, did your doctor or other health professional remind you some way by mail, email, phone call, or text message to get a flu vaccination? Posted signs, newsletters, pamphlets, or television and radio ads were not considered a reminder."

[i] "Is there a place you usually go to when you need routine or preventive medical care, such as a physical examination or check-up?"

[j] "How many times since July 1st have you visited a doctor or other health professional about your own health at a doctor's office, hospital, clinic, or some other place?"

[k] "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?"

[l] High-risk condition included individuals who currently had asthma, diabetes, heart disease a lung condition other than asthma, a kidney condition, obesity, sickle cell anemia or other anemia, a neurological or neuromuscular condition, a liver condition, or a weakened immune system caused by chronic illness or by medications taken for chronic illness.

Table 5

Association between recommendation[a] and offer[b] with influenza vaccination for adult participants who visited a health care provider (HCP) since July 1, 2011, United States, March 2012 National Flu Survey, 2011–12 influenza season.

Exposure variable	Unadjusted		Adjusted[f]	
	Influenza Vaccination Coverage[c] (95%CI[d])	Vaccination Prevalence Ratio[e] (95%CI)	Influenza Vaccination Coverage % (95%CI)	Vaccination Prevalence Ratio (95%CI)
Intervention for influenza vaccination				
Recommendation[a] and Offered[b]	71.4 (68.6–74.0)	**1.96 (1.84–2.11)**[g]	68.3 (65.2–71.3)	**1.76 (1.64–1.90)**
Recommendation and No Offer	69.9 (64.2–75.0)	**1.92 (1.74–2.12)**	66.5 (60.7–71.9)	**1.72 (1.55–1.90)**
No Recommendation	36.4 (34.2–38.7)	ref[h]	38.8 (36.5–41.1)	ref

[a] "At one or more visits of these visits, did your doctor or other health care professional recommend that you should get a flu vaccination, should not get a flu vaccination, or did not give a recommendation either way?" For the purposes of analysis, this variable was dichotomized into "recommendation" or "no recommendation" (which included those that were recommended to not get a flu vaccination and those not receiving a recommendation)

[b] "During your visits to the doctor or other health professional, did your doctor or other health professional offer the flu vaccination to you?"

[c] The predicted marginal model was used to estimate vaccination coverage.

[d] 95% confidence intervals; all percentages and CIs are based on weighted analysis of data using SUDAAN.

[e] Prevalence ratio interpreted as the odds of report of influenza vaccination given the characteristic for the exposure variable compared to the exposure variable reference group.

[f] Adjusted for sex, age, education, race/ethnicity, reminder, usual HCP, number of HCP visits, health insurance, and high-risk condition (n=10,032).

[g] Bolded prevalence ratios and 95%CI indicate statistical significance, $P < 0.05$.

[h] Reference group