



Published in final edited form as:

J Infect Dis. 2014 August 15; 210(4): 535–544. doi:10.1093/infdis/jiu224.

Influenza-like illness, the time to seek healthcare, and influenza antiviral receipt during the 2010–11 influenza season — United States

Matthew Biggerstaff, MPH¹, Michael A. Jung, MD, MPH¹, Carrie Reed, DSc, MPH¹, Alicia M. Fry, MD, MPH¹, Lina Balluz, ScD, MPH², and Lyn Finelli, DrPH, MS¹

¹Epidemiology and Prevention Branch, Influenza Division, National Center for Immunization and Respiratory Disease, Centers for Disease Control and Prevention, Atlanta, GA. USA

²Division of Behavioral Surveillance, Public Health Surveillance and Informatics Program Office, Centers for Disease Control and Prevention, Atlanta, GA. USA

Abstract

Background—Few data exist describing health care seeking behaviors among persons with influenza-like illness (ILI) or adherence to influenza antiviral treatment recommendations.

Methods—We analyzed adult responses to the Behavioral Risk Factor Surveillance System in 31 states and the District of Columbia (D.C.) and pediatric responses in 25 states and D.C. for January – April 2011 by demographics and underlying health conditions.

Results—Among 75,088 adult and 15,649 child respondents, 8.9% and 33.9%, respectively, reported ILI. ILI was more frequent among adults with asthma (16%), chronic obstruction pulmonary disease (COPD; 26%), diabetes (12%), heart disease (19%), kidney disease (16%), or obesity (11%).

Forty-five percent of adults and 57% of children sought health care for ILI. Thirty-five percent of adults sought care 2 days after ILI onset. Seeking care 2 days was more frequent among adults with COPD (48%) or heart disease (55%).

Among adults with a self-reported physician diagnosis of influenza, 34% received treatment with antiviral medications. The only underlying health condition with a higher rate of treatment was diabetes (46%).

Conclusion—Adults with underlying health conditions were more likely to report ILI, but the majority did not seek care promptly, missing opportunities for early influenza antiviral treatment.

Corresponding author: Matthew Biggerstaff, MPH; Centers for Disease Control and Prevention, 1600 Clifton Road NE MS A-32; Atlanta, GA 30333; Phone: 404-639-2198; FAX: 404-639-3866, MBiggerstaff@cdc.gov.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Conflict of interest: There are no conflicts of interest or financial disclosures with the publication of this manuscript.

Presentations: Preliminary findings reported in this manuscript were presented during the 2013 IDWeek held October 2–6, 2013, in San Francisco, California.

Funding statement: None

Keywords

Influenza; influenza antiviral treatment; healthcare-seeking behavior; time to seek healthcare

Introduction

The Advisory Committee on Immunization Practices (ACIP) recommends early, empiric treatment of influenza with antiviral medications for persons at high risk for influenza complications, including adults aged ≥ 65 years, and persons with chronic pulmonary or cardiovascular conditions, and diabetes [1]. In the United States, there are few data describing clinician adherence to ACIP recommendations or the tendency for persons with influenza-like illness (ILI) to seek healthcare promptly after illness onset [1–3]. The few studies that have described adherence to ACIP treatment recommendations in an outpatient setting suggest that adherence could be improved [4, 5].

To assess whether ACIP treatment guidelines were followed during the 2009 influenza pandemic, the Centers for Disease Control and Prevention (CDC) utilized a community-based telephone survey among the U.S. population [6, 7]. Results indicated that during the 2009 pandemic, most persons at high risk for influenza complications more frequently reported ILI and healthcare seeking but did not report increased receipt of influenza antiviral medication. The results also indicated that certain socioeconomic and healthcare access factors (e.g. unemployment, lack of insurance, financial barriers to healthcare) may have reduced access to appropriate medical treatment [6, 7].

The 2009 pandemic was associated with frequent communications reminding those with high-risk factors to seek healthcare promptly and for healthcare providers to treat them with influenza antivirals. Additionally, ACIP treatment guidelines were updated prior to the start of the 2010–11 influenza season and included the addition of morbid obesity as a risk factor for severe influenza illness for the first time [1]. Therefore, CDC repeated the telephone survey during the 2010–2011 influenza season to determine if the previous findings would be consistent during a seasonal influenza epidemic and to assess the time to seek healthcare, which was not collected in the previous survey [3]. In this report, we present the results from this survey conducted from January 2011 to April 2011 among adult respondents in 31 states and the District of Columbia (DC) and pediatric respondents in 25 states and DC.

Methods

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based, random-digit-dialed telephone survey that is the main data source for information on the prevalence of health-risk behaviors and chronic health conditions among the non-institutionalized U.S. population aged ≥ 18 years [8]; survey methodology is described elsewhere [9]. The BRFSS has been approved as exempt research by the CDC's institutional review board.

From January 1, 2011 to April 30, 2011, adult respondents in 31 states¹ and DC were interviewed using a BRFSS ILI module that contained questions to determine recent ILI and healthcare-seeking behavior. Among adults who sought care, additional questions were

asked to determine the time to seek care, whether an influenza diagnosis was received, whether influenza testing was performed, and whether influenza antiviral treatments were prescribed. We determined the presence of ILI by asking 2 questions: “Last month, were you ill with a fever?” and “Did you also have a cough and/or sore throat?” Answering “yes” to both questions was classified as ILI. We determined whether medical care was sought by asking, “Did you visit a doctor, nurse, or other health professional for this illness?” and when medical care was sought by asking, “When did you visit the doctor, nurse, or other health professional for this illness?” and giving a choice of 3 responses: (1) “Within 2 days of getting ill,” (2) “Within 3 to 7 days of getting ill,” or (3) “More than 7 days of getting ill.” Seeking care within 2 days of getting ill was chosen as the endpoint for prompt care seeking because that is when influenza antivirals have shown the most benefit and because this time point serves as the cut-off for approved administration of influenza antivirals in the product license [1, 10]. We determined whether a clinical diagnosis of influenza was given by asking, “What did the doctor, nurse, or other health professional tell you?” and giving a choice of 2 responses: (1) “You had influenza or the flu” or (2) “You had some other illness, but not the flu.” We determined whether an influenza test was given by asking, “Did you have a flu test that was positive for this illness?” and giving a choice of 3 responses: (1) “Had flu test and it was positive,” (2) “Had flu test and it was negative,” or (3) “Did not have flu test.” Finally, we determined whether antiviral medications were given by asking, “Did you receive Tamiflu® or oseltamivir or an inhaled medicine called Relenza® or zanamivir to treat this illness?”

We determined the presence of ILI and healthcare seeking among children in 25 states² and DC by asking adult respondents about their child’s illness. The time to seek care, the clinical diagnosis, and receipt of an influenza test or influenza antiviral medication treatment were not ascertained for children.

Adult respondents were evaluated by demographic characteristics, pre-existing health conditions, pregnancy, behavioral factors, and healthcare access. Demographic characteristics evaluated were age, sex, race or ethnicity, educational attainment, and employment status. Pre-existing health-conditions evaluated were asthma, chronic obstructive pulmonary disorder (COPD), diabetes, heart disease (ever having been diagnosed with myocardial infarction; angina; or chronic-heart disease), kidney disease, arthritis, depression, disability, and WHO BMI classification as calculated from self-reported weight and height. The only behavioral factor evaluated was smoking. Health-care access questions evaluated were insurance status among those 18–64 years old, having a personal doctor(s), and healthcare affordability. The characteristics of children with ILI and healthcare seeking were evaluated by age, sex, and race or ethnicity.

¹States or territories using the BRFSS ILI module were Alabama, Alaska, Arizona, California, Colorado, Connecticut, Delaware, Georgia, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, North Carolina, Oklahoma, Oregon, Rhode Island, South Dakota, Utah, Virginia, and Wisconsin.

²States using the BRFSS ILI module for children were Alabama, Arizona, California, Connecticut, Delaware, Georgia, Illinois, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, North Carolina, Oklahoma, Oregon, Rhode Island, South Dakota, Utah, Virginia

We used SAS-callable SUDAAN® v.10 statistical software (Research Triangle Institute, NC) to calculate population-weighted estimates and corresponding standard errors, 95% confidence intervals (CIs), and *p* values, taking into account the design of the BRFSS sampling plan. We used linear contrasts to evaluate differences in responses by age group, sex, race-ethnic categories, pre-existing health conditions, behavioral factors, and health-care access questions. Statistical significance was set at alpha (α) 0.05. Because the age and sex distributions among groups differed, prevalence estimates were age-adjusted using the standard year 2000 projected U.S. population¹⁰.

Response rates were calculated using Council of American Survey and Research Organizations guidelines [9]. Median survey response rates were calculated as the percentage of people who completed interviews among all eligible people, including those who were not contacted, while median cooperation rates were calculated as the percentage of people who completed interviews among all eligible people who were contacted.

Results

Report of ILI among adults and children

From January 2011 to April 2011, a total of 75,088 adults and 15,649 children were interviewed using the BRFSS ILI module. The median state survey response rate was 53% (range=37%–66%), and the median cooperation rate was 77% (range=55%–89%).

During this period, 8.9% of adults (median age = 41 years) reported ILI in the calendar month preceding interview (Table 1). ILI was more frequently reported among adults who were American Indian/Alaska Native (20%), unemployed (11%), or unable to work (15%), or who reported current (16%) or former (14%) asthma, COPD (26%), diabetes (12%), heart disease (19%), kidney disease (16%), depression (16%), disability (14%), obesity (11%), or financial barriers to care (15%) (Tables 1 and 2).

During this same period, 33.9% of children were reported to have ILI (median age = 7 years); children who were in the age groups 0–4 years old (38%) or 5–11 years old (37%) were reported to have ILI more frequently, while children who were identified as black, NH were reported to have ILI less frequently (27%) (Table 3).

Report of health care seeking among adults and children

Among those participants who reported ILI, 45% of adults reported seeking health care (Table 1). Healthcare seeking was significantly more frequent among adults who were 65 years old (60%); who reported COPD (62%); heart disease (59%); kidney disease (69%); disability (50%); being obese (52%); or having current (57%) or past (58%) asthma (Tables 1 and 2). Conversely, reports of healthcare seeking were significantly less frequent among adults who identified as AI/AN (34%), were unemployed (35%), or who reported having no insurance (27%) or no personal doctor (38%) (Tables 1 and 2).

Among children with ILI, 57% were reported to have sought health care, and children in the age groups 0–4 years old (68%) and 5–11 years old (56%) and those who were black, NH

(67%); or Hispanic (64%) were reported to have sought care significantly more frequently (Table 3).

Time to seek health care among adults

Of adult health care seekers, 35% sought care for ILI within 2 days and 47% within 3–7 days of illness onset (Table 4). Among the medical conditions evaluated, only adults with COPD (48%) or heart disease (55%) were significantly more likely to seek care within 2 days (Table 5). Adults who were unemployed (25%), unable to work (27%), or who reported diabetes (23%), kidney disease (22%), or no insurance (23%) were significantly less likely to seek care within 2 days (Tables 4 and 5).

Report of influenza diagnosis and influenza testing among adults

Among adults who reported ILI and sought health care, 26% reported a clinical diagnosis of influenza, and 27% reported receiving an influenza test. Reports of receiving a clinical diagnosis of influenza (19%) or an influenza diagnostic test (11%) were less frequent among adults who sought health care 7 days from illness onset (Supplemental Tables 1&2).

Antiviral medication receipt among adults diagnosed with influenza

Among adults who reported ILI, sought health care, and were diagnosed with influenza, 34% reported receiving an influenza antiviral medication (Table 1). Influenza antiviral medication receipt did not significantly differ by most of the characteristics evaluated with sufficient numbers for reliable estimates, including most high-risk conditions in adults (Tables 1 and 2). Receipt of influenza antiviral medication was significantly higher among persons with diabetes (46%) but was significantly lower among adults who were disabled (18%) (Tables 1 and 2). Patients who sought care within 2 days (55%) were significantly more likely to have reported receiving influenza antiviral medication than those who sought care later (35%) (Table 5).

Discussion

To our knowledge, this study represents the largest telephone survey conducted in the United States that describes health care seeking and outpatient use of antiviral medications among adults with high-risk conditions during a regular influenza season. We found that most adults with underlying medical conditions had higher proportions of self-reported ILI but were not more likely to seek care within two days, except those with COPD and heart disease, or to be treated with influenza antiviral medications. However, we found that prompt health care seeking was associated with increased receipt of antiviral medications. Our findings highlight the need to educate patients at high risk for influenza complications to seek care early, to educate physicians about the benefits of influenza antiviral treatment among high risk patients, and to better understand the social, medical and economic barriers that may prevent use of influenza antiviral treatment that is consistent with ACIP recommendations during a seasonal influenza epidemic.

During the 2010–11 influenza season, AI/AN adults and those reporting asthma, heart disease, and disability were more likely to report ILI, a finding consistent with risk factors

for ILI identified during the 2009 pandemic [6, 7]. Additionally, adults reporting COPD, kidney disease, arthritis, and depression, conditions that were not ascertained during the previous BRFSS pandemic survey, were also more likely to report ILI. The consistency of these results may indicate that certain ACIP high-risk conditions, which are already known to confer an increased risk for influenza complications, may also increase the risk for the acquisition of influenza or other respiratory virus infections [11–16]. Alternately, persons with high-risk conditions in this study may have just been more likely to recall symptoms consistent with influenza illness. No study has systematically assessed the risk for acquiring influenza by the presence or absence of ACIP high-risk conditions, and further research is needed before any assessment of differential risk can be made.

Only a third of respondents sought care within 2 days of illness onset, when influenza antiviral medications are most effective, and prompt health care seeking was associated with increased receipt of antiviral medications in this survey. However, more than 80% of patients sought care within 7 days when antivirals may have some benefit [1, 17, 18]. Those without insurance and those who are unemployed or unable to work were significantly more likely to either delay care or not seek care, which may place them at higher risk for severe outcomes from influenza. Efforts to identify and reduce the barriers associated with missed or delayed healthcare seeking among the unemployed and those unable to work or without health insurance are needed to ensure that access to effective antiviral treatment is available to this population.

Thirty-four percent of respondents who received an influenza diagnosis reported receiving an influenza antiviral medication. This represents a large increase from the 14%–19% that reported receiving an influenza antiviral medication during the 2006–07 influenza season and is similar to the 36% reported during the 2009 pandemic [6, 19]. The reason for this increase is unclear but may be the result of expansion of ACIP recommendations for influenza antiviral treatment from 2008 [20] to the 2009 pandemic [21] or an increasing number of publications and communications describing the benefits of early empiric treatment with influenza antiviral medications, especially during and after the 2009 pandemic. However, challenges in increasing the uptake of influenza antiviral medications remain. This study found that groups at increased risk for severe illness (most persons reporting any chronic condition and those ≥ 65 years) have similar or lower rates of antiviral medication receipt when compared to younger persons or persons with no ACIP high-risk conditions. These results are similar to those seen during the 2009 pandemic and the 2006–07 influenza season and suggest that more work is needed to improve treatment rates among those most vulnerable to influenza complications. This should include efforts to better understand the effect of reduced healthcare access and affordability on receipt of appropriate and timely influenza antiviral treatment as well as the impact that a lack of physician education may have.

Our results also reinforce the finding that telephone surveys, which traditionally have not been used to monitor morbidity from influenza, may provide an efficient survey method for monitoring the burden of disease from influenza and adherence to treatment guidelines. As such, they may also help better define the assumptions of mathematical models describing the transmission and spread of influenza. Because data describing differences in healthcare

seeking, time to seek healthcare, and antiviral treatment by demographic groups have been largely unavailable, mathematical models frequently utilized assumptions that may not have been validated with epidemiological or laboratory data from seasonal or pandemic influenza [22]. The results of this study, including the important behavioral information, may help provide some of this missing information.

The methodology in this report is subject to several limitations. First, the positive predictive value of the ILI definition used in this study likely varied over time as the prevalence of influenza illness fluctuated throughout the influenza season [6, 7]. This may have caused respondents to self-report ILI that was not influenza, particularly during periods of low influenza activity. Second, data in this study are self-reported and subject to recall and social desirability bias. Therefore, the report of a clinical diagnosis of influenza or receiving an influenza diagnostic test or antiviral medication has not been verified and may represent the receipt of diagnoses other than influenza or non-influenza clinical tests or treatments (e.g., antibiotics). However, we would expect any potential misclassification to be similar for high-risk and non-high risk respondents. Third, because the percentage of respondents reporting a positive influenza test can be influenced by the duration from illness onset to health care encounter and the sensitivity of the type of influenza diagnostic test used, the proportion of respondents reporting a positive influenza test should not be interpreted as the percentage of confirmed influenza [23–25]. Fourth, we only assessed risk factors available in the BRFSS during the 2010–11 influenza season. Therefore, because some known risk factors for influenza complications were not included (e.g., persons with hepatic, neurologic/neuromuscular, or hematologic disorders or persons with immunosuppression), some persons with high-risk conditions could be misclassified as having no high-risk medical conditions. Fifth, BRFSS data are collected only from households with a landline telephone, and our study is subject to selection bias resulting from exclusion of households with only cellular phones [26]. Finally, the BRFSS is a household survey that does not collect information from persons in institutions, nursing homes, long-term-care facilities, and correctional institutions. Therefore, the results presented in this analysis do not generalize to these populations.

During the influenza season following the 2009 pandemic, most adults with underlying medical conditions had higher proportions of self-reported ILI but were not more likely to seek healthcare promptly than individuals without these conditions. A third of persons who received a diagnosis of influenza during a medical visit reported receiving treatment with antiviral medication, and the rates of antiviral treatment were not significantly different among those with and without any high risk condition. Further efforts are needed to educate persons at high risk to seek healthcare early and to identify reasons why persons at high risk are not receiving influenza antivirals.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We are particularly grateful for the assistance in the preparation and editing of the manuscript given by Dr. Thomas W. Carton.

References

1. Fiore AE, Fry A, Shay D, et al. Antiviral agents for the treatment and chemoprophylaxis of influenza --- recommendations of the Advisory Committee on Immunization Practices (ACIP). *Morbidity and Mortality Weekly Report*. 2011; 60:1–24.
2. Brammer L, Blanton L, Epperson S, et al. Surveillance for influenza during the 2009 influenza A (H1N1) pandemic--United States, April 2009–March 2010. *Clin Infect Dis*. 2011; 52 (Suppl 1):S27–35. [PubMed: 21342896]
3. Centers for Disease Control and Prevention. Update: influenza activity--United States, 2010–11 season, and composition of the 2011–12 influenza vaccine. *MMWR Morb Mortal Wkly Rep*. 2011; 60:705–12. [PubMed: 21637185]
4. Hsieh YH, Kelen GD, Dugas AF, Chen KF, Rothman RE. Emergency Physicians' Adherence to Center for Disease Control and Prevention Guidance During the 2009 Influenza A H1N1 Pandemic. *The western journal of emergency medicine*. 2013; 14:191–9. [PubMed: 23599869]
5. Vijayan V, Jing J, Zangwill KM. Evaluation of diagnostic and therapeutic approaches for suspected influenza A(H1N1)pdm09 infection, 2009–2010. *Emerg Infect Dis*. 2012; 18:1414–21. [PubMed: 22931909]
6. Biggerstaff M, Jhung M, Kamimoto L, Balluz L, Finelli L. Self-reported influenza-like illness and receipt of influenza antiviral drugs during the 2009 pandemic, United States, 2009–2010. *Am J Public Health*. 2012; 102:e21–6. [PubMed: 22897525]
7. Biggerstaff M, Jhung MA, Reed C, et al. Impact of medical and behavioural factors on influenza-like illness, healthcare-seeking, and antiviral treatment during the 2009 H1N1 pandemic: USA, 2009–2010. *Epidemiol Infect*. 2013:1–12.
8. Chowdhury PP, Balluz L, Murphy W, et al. Surveillance of certain health behaviors among states and selected local areas--United States, 2005. *MMWR Surveill Summ*. 2007; 56:1–160. [PubMed: 17495793]
9. Centers for Disease Control and Prevention. [Accessed 2 October 2012] Behavioral Risk Factor Surveillance System Operational and User's Guide. 2012. Available at: <ftp://ftp.cdc.gov/pub/Data/Brfss/userguide.pdf>
10. Food and Drug Administration. [Accessed 21 January 2014] Tamiflu (oseltamivir phosphate) capsules label. Available at: http://www.accessdata.fda.gov/drugsatfda_docs/label/2011/021087s057lbl.pdf
11. Miller EK, Griffin MR, Edwards KM, et al. Influenza burden for children with asthma. *Pediatrics*. 2008; 121:1–8. [PubMed: 18166550]
12. Hirota Y, Takeshita S, Ide S, et al. Various factors associated with the manifestation of influenza-like illness. *International Journal of Epidemiology*. 1992; 21:574–82. [PubMed: 1634321]
13. Gordon A, Ortega O, Kuan G, et al. Prevalence and seasonality of influenza-like illness in children, Nicaragua, 2005–2007. *Emerg Infect Dis*. 2009; 15:408–14. [PubMed: 19239753]
14. Kropp RY, Bogaert LE, Barber R, et al. Pandemic (H1N1) 2009 outbreak at Canadian Forces cadet camp. *Emerg Infect Dis*. 2010; 16:1986–9. [PubMed: 21122239]
15. Smolderen KG, Vingerhoets AJ, Croon MA, Denollet J. Personality, psychological stress, and self-reported influenza symptomatology. *BMC Public Health*. 2007; 7:339. [PubMed: 18036207]
16. Currier M, Coffman T, Boyd P, Fremd B, Israel E. Influenza vaccine efficacy in a Maryland nursing home. *Md Med J*. 1988; 37:781–3. [PubMed: 3185148]
17. Hanshaoworakul W, Simmerman JM, Narueponjirakul U, et al. Severe human influenza infections in Thailand: oseltamivir treatment and risk factors for fatal outcome. *PLoS One*. 2009; 4:e6051. [PubMed: 19557130]
18. McGeer A, Green KA, Plevneshi A, et al. Antiviral therapy and outcomes of influenza requiring hospitalization in Ontario, Canada. *Clin Infect Dis*. 2007; 45:1568–75. [PubMed: 18190317]

19. Kamimoto L, Euler GL, Lu PJ, et al. Seasonal influenza morbidity estimates obtained from telephone surveys, 2007. *Am J Public Health*. 2013; 103:755–63. [PubMed: 23237164]
20. Fiore AE, Shay DK, Broder K, et al. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2008. *Morbidity and Mortality Weekly Report*. 2008; 57:1–60. [PubMed: 18185492]
21. Centers for Disease Control and Prevention. [Accessed 2 October 2012] Updated interim recommendations for the use of antiviral medications in the treatment and prevention of influenza for the 2009--2010 season. 2012. Available at: <http://www.cdc.gov/h1n1flu/recommendations.htm>
22. Carrasco LR, Jit M, Chen MI, Lee VJ, Milne GJ, Cook AR. Trends in parameterization, economics and host behaviour in influenza pandemic modelling: a review and reporting protocol. *Emerging themes in epidemiology*. 2013; 10:3. [PubMed: 23651557]
23. Carrat F, Vergu E, Ferguson NM, et al. Time lines of infection and disease in human influenza: a review of volunteer challenge studies. *Am J Epidemiol*. 2008; 167:775–85. [PubMed: 18230677]
24. Shu B, Wu KH, Emery S, et al. Design and performance of the CDC real-time reverse transcriptase PCR swine flu panel for detection of 2009 A (H1N1) pandemic influenza virus. *J Clin Microbiol*. 2011; 49:2614–9. [PubMed: 21593260]
25. Centers for Disease Control and Prevention. Evaluation of 11 commercially available rapid influenza diagnostic tests--United States, 2011–2012. *MMWR Morb Mortal Wkly Rep*. 2012; 61:873–6. [PubMed: 23114254]
26. Centers for Disease Control and Prevention. Methodologic changes in the Behavioral Risk Factor Surveillance System in 2011 and potential effects on prevalence estimates. *MMWR Morb Mortal Wkly Rep*. 2012; 61:410–3. [PubMed: 22672976]

Table 1

Reported influenza-like illness (ILI) in the calendar month preceding interview, healthcare seeking for ILI, and influenza antiviral treatment among those who sought health care and were diagnosed with influenza, among adults (≥ 18 years old), by selected demographics, January 1, 2011–April 30, 2011.

	Reported ILI			Sought healthcare for ILI			Antiviral treatment among those who sought health care and were clinically diagnosed with influenza		
	n	% Yes	95% CI	n	% Yes	95% CI	n	% Yes	95% CI
Characteristics									
All respondents	75088	8.9	8.2–9.6	5763	45.2	41.3–49.2	512	34.1	22.8–47.6
Age group, in years^a									
18–49	23208	10.6*	9.5–11.8	2390	42.7*	37.4–48.1	208	37.2	22.0–55.5
50–64	25547	7.8*	7.1–8.5	2117	47.2*	42.7–51.9	181	28.9	18.2–42.6
65+ [#]	25730	4.5	4.0–5.1	1224	60.0	53.6–66.1	123	19.2	11.5–30.4
Sex^a									
Male	1842	8.1*	7.0–9.4	1840	34.7*	28.8–41.1	150	37.8	20.3–59.2
Female [#]	3926	9.6	8.9–10.4	3923	53.8	49.7–57.8	362	31.6	18.3–48.7
Race or ethnic group									
White, non-Hispanic [#]	60784	8.8	8.2–9.4	4522	47.0	44.0–50.1	354	22.9	16.1–31.4
Black, non-Hispanic	6154	7.8	5.5–11.0	408	52.5	42.1–62.6	57	52.3*	38.8–65.5
Hispanic	3346	9.4	7.4–11.8	340	43.6	32.7–55.0	54	45.3	25.3–66.9
American Indian/Alaska Native	1167	19.5*	12.3–29.5	146	33.5*	23.7–45.0	16	38.7 [†]	18.3–64.2
Other race, NH	2425	10.7	7.3–15.5	263	50.0	36.9–63.2	26	10.7* [†]	4.6–22.9
Level of education									
Less than high school	6307	11.0*	8.9–13.7	580	48.3	40.1–56.6	64	39.1	28.7–50.7
High school graduate	22335	9.7	8.2–11.4	1644	50.3	44.1–56.4	173	26.7	14.6–43.6
Some college/college graduate [#]	45694	8.2	7.5–8.9	3499	43.8	40.1–47.6	273	40.1	28.8–52.5
Employment status									
Employed [#]	36323	8.2	7.4–9.0	2783	44.1	39.4–48.9	237	33.6	21.7–48.1
Unemployed	4158	11.1*	9.0–13.6	411	34.7*	27.3–42.9	34	27.1 [†]	12.8–48.6
Unable to work	5147	15.2*	13.1–17.7	907	57.3*	48.7–65.5	90	15.5*	8.7–26.2
Homemaker	5164	5.7	3.6–8.8	364	37.2	21.8–55.6	36	35.7 [†]	17.9–58.5
Student	1057	8.6	5.3–13.6	130	45.1	28.2–63.2	17	46 [†]	36.8–55.5
Retired	22650	5.1	4.5–5.7	112	49.3	42.2–56.4	98	18.8	12.3–27.6

^a Estimate not age and sex adjusted since variable includes an age or sex component

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Reference group for statistical comparison

* $P < 0.05$ compared with reference group

† Estimate might be unreliable because the relative standard error is 30% of estimate or the un-weighted sample size is < 50 . Caution should be used when interpreting this estimate.

Table 2

Reported influenza-like illness (ILI) in the calendar month preceding interview, healthcare seeking for ILI, and influenza antiviral treatment among those who sought health care and were diagnosed with influenza, among adults (≥ 18 years old), by selected medical conditions and other characteristics, January 1, 2011–April 30, 2011.

Characteristics	Reported ILI			Sought healthcare for ILI			Antiviral treatment among those who sought health care and were clinically diagnosed with influenza				
	n	%	95% CI	n	%	95% CI	n	%	95% CI		
ACIP high-risk medical conditions	No ACIP condition#	51246	7.5	6.8–8.4	3171	41.3	37.3–45.5	264	35.3	22.0–51.3	
	Asthma	Current	6493	16*	13.9–18.5	1124	56.6*	48.8–64	112	26.7/	12.2–48.8
		Former	2447	13.5*	9.5–18.8	250	57.6*	46.9–67.6	16	8.6*/	6.4–11.5
		Never#	65102	8.0	7.2–8.8	4294	43.4	39.8–47.1	381	39.4	27.3–52.9
	COPD	Yes	5752	25.9*	21.6–30.7	1096	61.8*	52.7–70.1	106	18.7	10.5–31.3
		No#	68393	8.2	7.5–9.0	4593	43.2	39.7–46.7	400	34.6	23.5–47.7
	Diabetes	Yes	9353	11.7*	9.2–14.7	909	55.2	44.1–65.8	88	46.3*	38.7–54.1
		No#	65032	8.8	8.1–9.6	4805	45.2	41.8–48.6	422	31.1	20.4–44.4
	Heart disease	Yes	6987	19.3*	14.2–25.7	696	58.8*	45.6–70.9	80	29.1/	12.6–53.9
		No#	66866	8.6	7.9–9.4	4965	44.7	41.4–48.2	428	34.3	23.5–47.0
Kidney disease	Yes	2310	15.9*	10.7–22.9	285	68.7*	54.7–79.9	38	12.7*/	6.4–23.4	
	No#	71949	8.9	8.2–9.6	5407	45.6	42.3–48.9	472	34.4	23.4–47.4	
Other medical conditions	1 ACIP condition	23230	14.6*	13.0–16.4	2559	52.5*	37.3–45.5	248	24.8	13.2–41.7	
	Arthritis	Yes	26209	14.2*	12.5–16.1	2515	51.5*	46.0–56.9	244	18.6	11.3–29.1
		No#	47877	7.9	7.1–8.7	3177	42.7	38.7–46.7	264	34.1	21.9–48.7
	Depression	Yes	12804	15.6*	13.1–18.4	1862	46.3	40.4–52.3	168	19.1*	12.3–28.6
		No#	61371	7.7	7.0–8.5	3839	46.4	42.6–50.4	344	36.7	23.8–51.7
	Disability	Yes	23027	14.3*	12.4–16.4	2624	50.1*	44.2–56.0	235	17.7*	10.1–29.1
		No#	51158	7.4	6.7–8.2	3080	42.7	38.6–46.8	275	39.9	26.4–55.2
	Pregnancy ^d	Yes	374	7.3/	3.9–13.4	33	52.3/	24.4–78.8	2	N/A	N/A
		No#									

	Characteristics	Reported ILI			Sought healthcare for ILI			Antiviral treatment among those who sought health care and were clinically diagnosed with influenza		
		n	%	95% CI	n	%	95% CI	n	%	95% CI
Weight status	No#	10187	11.4	10.0–12.9	1162	54.1	47.6–60.5	111	N/A	N/A
	Underweight	1099	12	7.3–18.9	105	43.3	30.5–57.1	9	15.8 [†]	2.7–55.6
	Normal Weight#	23709	8.9	7.4–10.7	1541	39	33.7–44.6	133	31.2	18.1–48.2
Health status	Overweight	26173	7.7	6.9–8.7	1856	47.6*	42.2–53.1	165	28.2	17.1–42.9
	Obese	20062	11.1*	9.9–12.5	1975	51.9*	46.4–57.4	184	37.8	25.2–52.3
	Fair or poor health	14216	14.4*	12.6–16.5	1922	56.8*	50–63.4	184	35.8	18.5–57.8
Smoking status	Good, very good, or excellent health#	59978	7.9	7.2–8.7	3788	42.1	38.4–45.8	326	32.4	21.4–45.7
	Current smoker	11258	10.8*	9.6–12.1	1253	45.1	40–50.3	102	22.5 [†]	11.9–38.3
	Former smoker	22840	9.1	8–10.4	1723	46.8	41.2–52.4	135	31.6	20.7–45.0
Healthcare access	Never smoked#	40049	8.4	7.4–9.5	2735	45.6	40.7–50.6	273	36.3	22.0–53.4
	Insurance among 18–64 year olds ^a	42403	9.5	8.6–10.4	3836	47.7	42.9–52.5	337	32.6	20.6–47.4
	Personal doctor	6239	11.3	9.2–13.7	660	27.4*	19.5–37.1	52	48.0 [†]	20.6–47.4
Financial barrier to care	Yes#	65753	9.3	8.4–10.1	5025	48.4	44.9–52.0	476	34.4	24.5–45.9
	No	8548	8.3	6.9–10.1	692	37.9*	29.6–46.8	35	25.0 [†]	11.5–46.0
	Yes	7905	14.9*	13.0–17.1	1237	42.9	36.9–49.0	109	33.9	18.5–53.7
	No#	66425	7.9	7.1–8.7	4479	47.5	43.7–51.4	401	31.9	20.3–46.3

^a Estimate not age and sex adjusted since variable includes an age or sex component

[#] Reference group for statistical comparison

* $P < 0.05$ compared with reference group

[†] Estimate might be unreliable because the relative standard error 30% of estimate or the un-weighted sample size is < 50 . Caution should be used when interpreting this estimate.

N/A= Sample size too small to estimate value.

Percentage of children (<18 years old) reported to have influenza-like illness (ILI) in the calendar month preceding interview and to have sought healthcare for ILI, by selected demographics, January 1, 2011–April 30, 2011.

Table 3

Characteristics	Reported ILI			Sought healthcare for ILI			
	n	% Yes	95% CI	n	% Yes	95% CI	
All respondents	15649	33.9	32.4–35.5	5113	56.6	53.8–59.5	
Age group, in years ^a	0–4	1330	38.1*	910	68.0*	62.8–72.7	
	5–11	1879	37.3*	1067	56.3*	51.7–60.9	
	12–17 [#]	1931	27.1	24.9–29.5	943	45.6	40.9–50.5
Sex ^a	Male	2612	33.4	31.3–35.6	1468	54.1	50.1–58.1
	Female [#]	2502	34.8	32.5–37.1	1434	58.6	54.5–62.6
Race or ethnic group	White, non-Hispanic [#]	10726	36.7	35.0–38.5	3657	51.1	48.0–54.2
	Black, non-Hispanic	1765	27.1*	23.4–31.2	436	67.1*	59.1–74.3
	Hispanic	1647	32.9	28.6–37.4	532	64.1*	55.9–71.5
	American Indian/Alaska Native	383	35.9	26.1–47.0	136	64.3	47.4–78.2
Other race, NH	919	32.9	27.6–38.6	291	51.1	42.1–59.9	

^a Estimate not age and sex adjusted since variable includes an age or sex component

[#] Reference group for statistical comparison

* $P < 0.05$ compared with reference group

Table 4
Time from influenza-like illness onset to healthcare seeking, among adults (≥ 18 years old) who reported ILLI and sought health care, by selected demographics, January 1, 2010–April 30, 2011.

Characteristics	n	2 days		3–7 days		>8 days	
		% Yes	95% CI	% Yes	95% CI	% Yes	95% CI
All respondents	2996	34.6	29.9–39.6	47.4	42.6–52.2	18.0	15.2–21.2
Age group, in years ^a							
18–49	1165	37.7	31.0–44.9	46.6	39.8–53.6	15.7	12.3–19.9
50–64	1054	29.0	24.1–34.5	50.2	44.2–56.2	20.8	16.4–26.0
65+ [#]	761	27.8	22.6–33.6	47.4	40.5–54.4	24.8	17.6–33.8
Sex ^a							
Male	819	34.0	27.0–41.9	48.8	40.6–57.1	17.2	12.9–22.6
Female [#]	2177	34.9	28.9–41.4	46.7	40.8–52.6	18.4	15.0–22.5
Race or ethnic group							
White, non-Hispanic [#]	2340	33.6	29.3–38.2	46.8	42.4–51.2	19.6	16.7–23.0
Black, non-Hispanic	228	30.5	19.4–44.4	48.5	33.4–64.0	21.0	13.5–31.2
Hispanic	183	30.4	20.4–42.6	60.5 [*]	48.1–71.7	9.1 [*]	5.0–15.9
American Indian/Alaska Native	83	43.4	25.6–62.9	49.2	30.9–67.7	7.5 [*]	3.3–16.1
Other race, NH	124	57.2 [*]	40.1–72.8	22.9 [*]	12.5–38.1	19.9	10.6–34.4
Level of education							
Less than high school	332	31.4	21.2–43.9	52.4	38.1–66.4	16.1	7.5–31.5
High school graduate	922	34.3	25.6–44.3	46.0	37.1–55.2	19.6	15.0–25.4
Some college/college graduate [#]	1723	33.8	29.0–38.9	48.6	43.0–54.2	17.7	14.5–21.4
Employment status							
Employed [#]	1344	38.8	32.9–45.0	45.8	39.3–52.3	15.5	12.4–19.1
Unemployed	182	25.1 [*]	16.4–36.3	54.6	42.4–66.2	20.3	12.8–30.7
Unable to work	548	27.4 [*]	19.5–37.0	43.0	34.4–52.1	29.6 [*]	19.2–42.7
Homemaker	188	18.5 [*]	12.3–27.0	71.7 [*]	64.0–78.3	9.8 [*]	6.3–15.1
Student	67	43.1	25.3–62.9	51.1	33.5–68.5	5.7 [*]	1.6–18.7
Retired	647	10.2 [*]	7.8–13.3	78.5 [*]	72.2–83.6	11.3	7.2–17.3

^a Estimate not age and sex adjusted since variable includes an age or sex component

[#] Reference group for statistical comparison

* $P < 0.05$ compared with reference group

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 5

Time from influenza-like illness (ILI) onset to healthcare seeking, among adults (≥ 18 years old) who reported ILI and sought health care, by selected medical conditions and other characteristics, January 1, 2010–April 30, 2011.

Characteristics	n	2 days		3–7 days		>8 days		
		% Yes	95% CI	% Yes	95% CI	% Yes	95% CI	
No ACIP condition#	1431	33.0	27.5–39.0	51.3	45.0–57.6	15.7	12.6–19.4	
Asthma	Current	722	30.1	21.4–40.6	50.7	40.5–60.7	19.2	14.4–25.2
	Former	143	26.7	14.5–44.0	46.3	31.0–62.4	27.0	17.2–39.5
	Never#	2085	35.5	30.4–41.0	47.9	42.3–53.6	16.6	13.6–20.1
COPD	Yes	751	47.7*	40.1–55.4	33.4*	27.3–40.2	18.8	13.7–25.3
	No#	2199	31.8	27.3–36.7	50.8	45.6–56.0	17.4	14.4–20.9
Diabetes	Yes	544	22.8*	16.7–30.4	56.5	44.1–68.1	20.7	12.5–32.1
	No#	2428	34.6	29.8–39.8	47.3	42.1–52.6	18.0	15.1–21.4
Heart disease	Yes	447	54.5*	43.4–65.1	33.6*	24.4–44.2	12.0*	8.0–17.6
	No#	2494	32.4	27.9–37.1	49.1	44.1–54.2	18.5	15.5–21.9
Kidney disease	Yes	186	21.6*	13.3–33.1	31.1*	20.8–43.7	47.3*	32.3–62.8
	No#	2771	34.6	29.9–39.6	48.5	43.5–53.6	16.9	14.3–19.7
1 ACIP condition	1549	35.2	27.8–43.4	42.8	35.7–50.2	22.0	16.8–28.3	
Arthritis	Yes	1472	35.1	27.4–43.6	42.8	35.7–50.2	22.1	15.5–30.6
	No#	1489	36.0	30.3–42.1	47.7	41.6–53.8	16.3	13.2–20.0
Depression	Yes	1046	31.9	25.0–39.8	43.7	36.8–50.9	24.5*	18.2–31.8
	No#	1921	34.8	29.2–40.9	49.4	43.3–55.5	15.8	12.9–19.1
Disability	Yes	1520	33.6	26.1–42.0	45.7	38.5–53.1	20.7	15.4–27.3
	No#	1449	34.5	28.8–40.7	49.2	42.9–55.5	16.3	13.2–20.1
Weight status	Underweight	57	30.1	16.7–48.0	65.1*	50.0–77.6	4.8*	1.6–13.8
	Normal Weight#	739	29.2	21.7–38.0	48.3	40.0–56.6	22.6	17.3–28.8
Overweight	960	34.4	27.5–42.0	48.6	40.8–56.5	17.0	12.6–22.6	

	Characteristics	n	2 days		3-7 days		>8 days		
			% Yes	95% CI	% Yes	95% CI	% Yes	95% CI	
Health status	Obese	1089	35.5	28.7-43.0	49.0	41.4-56.7	15.5*	11.8-20.0	
	Fair or poor health	1162	28.6	22.2-35.9	50.4	41.6-59.1	21.1	15.1-28.6	
	Good, very good, or excellent health [#]	1808	35.6	30.0-41.5	47.3	41.5-53.2	17.1	14.1-20.5	
Smoking status	Current smoker	636	32.5	25.7-40.2	43.6	35.9-51.7	23.8*	16.5-33.1	
	Former smoker	913	34.8	27.1-43.4	45.9	37.2-55.0	19.3	14.5-25.2	
	Never smoked [#]	1419	33.7	27.1-40.9	51.1	43.9-58.3	15.2	12.1-19.0	
Healthcare access	Insurance among 18-64 year olds ^d	Yes [#]	2008	37.3	31.7-43.2	45.3	39.8-50.9	17.4	14.3-21.1
		No	207	22.9*	13.1-36.9	63.1*	47.3-76.5	14.0	8.0-23.2
	Personal doctor	Yes [#]	2757	32.9	28.7-37.3	48.9	44.0-53.7	18.3	15.3-21.6
		No	216	37.9	23.8-54.4	43.9	29.0-60.0	18.2	10.5-29.6
	Financial barrier to care	Yes	579	27.4	19.9-36.3	53.5	43.4-63.3	19.1	13.8-25.9
		No [#]	2394	36.8	31.5-42.5	45.9	40.4-51.5	17.3	14.2-20.8
Influenza diagnosis	Yes	566	40.0	30.7-50.0	47.8	37.7-58.0	12.3*	7.5-19.3	
	No [#]	2279	33.9	29.2-38.9	46.9	41.9-52.0	19.3	16.3-22.7	
Influenza testing	Tested for influenza	Yes	638	42.2	34.4-50.5	50.4	42.1-58.7	7.4*	4.5-11.9
		No [#]	1966	32.8	26.8-39.3	46.5	40.2-53.0	20.7	17.1-24.9
	Tested positive influenza	Yes	248	38.8	29.4-49.1	54.1	43.0-64.9	7.0	3.7-12.9
No [#]		390	43.8	34.7-53.3	48.1	38.6-57.7	8.1	4.3-14.7	
Influenza antivirals	Yes	171	54.5*	42.2-66.3	39.2	27.7-52.0	6.3	2.8-13.6	
	No [#]	337	34.5	21.6-50.1	49.5	34.8-64.3	16.0	8.8-27.5	

^d Estimate not age and sex adjusted since variable includes an age or sex component

[#] Reference group for statistical comparison

* $P < 0.05$ compared with reference group

[†] Estimate might be unreliable because the relative standard error $> 30\%$ of estimate or the un-weighted sample size is < 50 . Caution should be used when interpreting this estimate.