2736. Insurance Disparity in United States Cancer Survivors' Influenza Vaccination Rates: A Trend Study from NHIS 2005–2017

Xin Zheng, DO, MS[1]; Changchuan Jiang, MD, MPH[2]; [1]Loma Linda University Medical Center, Loma Linda, California; [2]Icahn School of Medicine at Mount Sinai, Mount Sinai St lukes and Mount Sinai West Hospital, New York, New York

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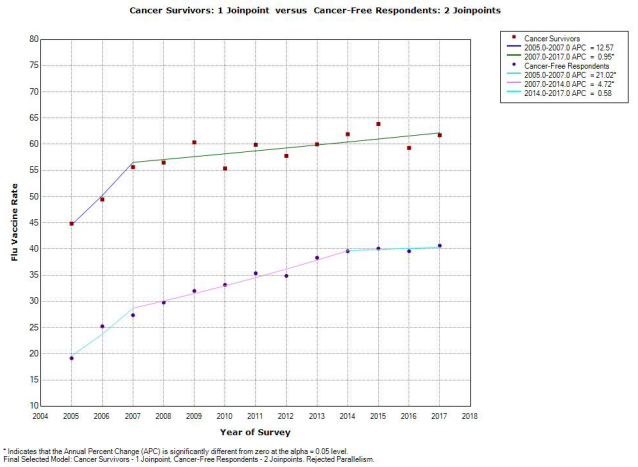
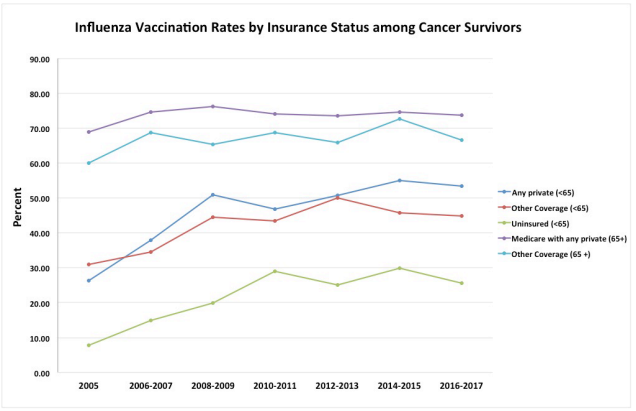
Background: Patients with underlying cancer often have suppressed immunity from disease process and cancer therapy, making this population particularly vulnerable to influenza. Few studies have investigated the overall flu vaccination rates; however, little is known regarding the trend of vaccination rates in US cancer survivors and how it varied by individuals' insurance coverage.

Methods: We conducted a retrospective cross-sectional study to evaluate the temporal trend of flu vaccination rates using the National Health Interview Survey from 2005 through 2017. Adult cancer survivors (n = 24,381) were included in the analysis. The outcomes were self-reported flu vaccination during the past 12 months with either inactivated or live attenuated nasal vaccine. Insurance coverage was categorized into private (age ≤65), other coverage (age ≤65), uninsured (age ≤65), Medicare and private (age > 65), and other coverage (age > 65). We combined every 2 years data to improve statistical power in the subgroup analysis. Weighted analyses were performed with SAS 9.4 to account for the complex design and NCI-Joinpoint 4.7 was used for joinpoint regression in the trend analysis.

Results: The overall cancer survivors' flu vaccination rates improved from 45% in 2005 to 63% in 2017, whereas the cancer-free group improved from 18% in 2005 to 41% in 2017. With cancer survivors, influenza vaccination rates varied remarkably by insurance status (P < 0.001). Elderly survivors (age 65+) with any type of insurance consistently had higher flu vaccination rates than survivors younger than 65 (averaging 70% vs. 40%). For cancer patients age 65 or younger, whether insured or not, the overall flu vaccination rates had improved since 2005. However, for the subgroup who had coverage but not with private insurance, the vaccination rates had been declining since 2012 (50% in 2012/2013 to 45% in 2016/2017).

Conclusion: Despite the overall increase of flu vaccination rates in both cancer survivors and cancer-free participants since 2005, the growth rate has plateaued since 2015. This is likely related to shifts in healthcare law on the national level. Such impact is particularly significant in cancer patients who are younger and do not have private insurance coverage. Such vulnerable and underserved population will need more resources to help improve their influenza vaccination rate.





Disclosures. **All authors:** No reported disclosures.

2737. Comparison of Antibody Responses to Vaccination with a Pure Hemagglutinin Influenza Vaccine (rHA) and Licensed Subvirion Influenza Vaccine Made in Eggs or Cell Culture in Adults 60 Years and Older

Moumita Sarker, MD[1]; Angela Branche, MD[2]; Michael Peasley, BS Biomedical Science[3]; David Topham, PhD[2]; [1]University of Rochester Medical Center, Rochester, New York; [2]University of Rochester, Rochester, New York; [3]Univeristy of Rochester, Rochester, New York

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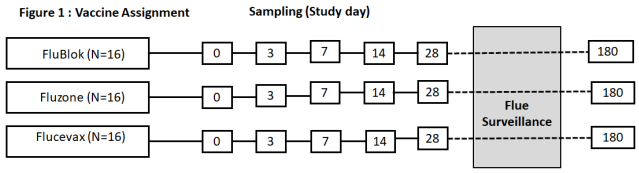
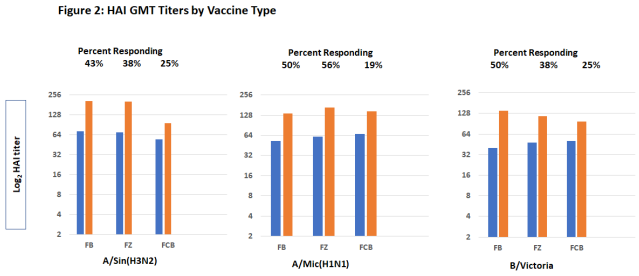
Background: Influenza is associated with increased mortality and morbidity for older adults. High-dose egg grown trivalent inactivated influenza vaccine (Fluzone HD) is safe and provides superior immune responses in older adults compared with standard dose (SD). Recently, two new vaccines have been licensed in the United States: cell cultured inactivated vaccine FluCelVax and baculovirus-expressed pure hemagglutinin (HA) vaccine FluBlok. Data from one study demonstrated higher efficacy with FluBlok than SD Fluzone in older adults. There is no data however comparing HD Fluzone to FluBlok and FluCelVax has not been studied at all. The purpose of this study was to assess hemagglutinin inhibition (HAI) antibody responses to vaccination with three vaccines in adults ≥ 60 years.

Methods: Adults ≥ 60 years were randomly assigned to receive one of the three vaccines: Fluzone HD, FluBlok and FluCelVax (Figure 1). Active influenza-like illness (ILI) surveillance was conducted with bi-weekly telephone calls. Serum samples were collected prior to vaccination and at day 7, 14, 28 and 180 and antibody responses assessed by HAI titer to A/Singapore/INFIMH-16–0019(H3N2), A/Michigan/45/2015(H1N1) and B/Colorado/6/2017 (Victoria) viruses as well as a circulating H3N2 strain. The primary endpoint was a 4-fold rise in antibody titer at day 28.

Results: 48 subjects were vaccinated in October 2018. Mean age was 69 and 65% were female. Two subjects reported ILI symptoms and one was positive for infection (H1N1). A majority of subjects demonstrated pre-existing antibody to all three viruses (Figure 2, Blue). Geometric mean titers (GMT) for antibody responses to the influenza A viruses were similar for FluBlok (FB) and HD Fluzone (FZ) but lower for FluCelVax(FCB) subjects (Figure 2, Orange). A higher percent of FlubBlok subjects demonstrated 4-fold rise in antibody responses to the Victoria influenza B virus (FB GMT 140 vs. FZ GMT 116, P = 0.26).

Conclusion: In this small study, antibody responses were similar or higher in older adults after vaccination with FluBlok compared with Fluzone HD with lower responses demonstrated with FluCelvax. Emerging concerns about HA egg adaptation during vaccine development compels further study to determine the appropriate vaccination strategy for this vulnerable population.





Disclosures. **All authors:** No reported disclosures.

2738. Influenza Vaccination During Pregnancy Among Mothers of Infants with Acute Respiratory Illness, United States, 2016–2018

Constance E. Ogokeh, MPH[1]; Manish Patel, MD[2]; Joana Y. Lively, MPH[1]; Mary. A. Staat, MD, MPH[3]; Geoffrey A. Weinberg, MD[4]; Julie A. Boom, MD[5]; Janet A. Englund, MD[6]; John V. Williams, MD[7]; Natasha B. Halasa, MD, MPH[8]; Rangaraj Selvarangan, BVSc, PhD[9]; Christopher J. Harrison, MD[10]; Eileen J. Klein, MD, MPH[11]; Elizabeth P. Schlaudecker, MD, MPH[12]; Marian G. Michaels, MD, MPH[13]; Leila C. Sahni, PhD, MPH[14]; Peter G. Szilagyi, MD, MPH[15]; Laura S. Stewart, PhD[8]; Brian Rha, MD, MSPH[1]; Lauren Beacham, MA[1]; Barbara Bardenheier, PhD, MPH, MA[1]; Daniel C. Payne, PhD, MSPH[16]; Alicia M. Fry, MD, MPH[1]; Angela P. Campbell, MD, MPH[1]; [1]Centers for Disease Control and Prevention, Atlanta, Georgia; [2]US Centers for Disease Control and Prevention, Atlanta, Georgia; [3]Cincinnati Children's Hospital Medical Center, University of CIncinnati College of Medicine, Cincinnati, Ohio; [4]University of Rochester School of Medicine & Dentistry, Rochester, New York; [5]Baylor College of Medicine, Texas Children's Hospital, Houston, Texas; [6]Seattle Children's Hospital/ University of Washington, Seattle, Washington; [7]University of Pittsburgh, Pittsburgh,

Pennsylvania; [8]Vanderbilt University Medical Center, Nashville, Tennessee; [9]Children's Mercy, Kansas City, Missouri, [10]Children's Mercy Hospital - Kansas City, Kansas City, Missouri, [11]Seattle Children's Hospital, Seattle, Washington, [12]Cincinnati Children's Hospital Medical Center, University of Cincinnati College of Medicine, Cincinnati, Ohio, [13]Children's Hospital of Pittsburgh of UPMC, Pittsburgh, Pennsylvania, [14]Texas Children's Hospital, Houston, Texas, [15]University of California, Los Angeles, Los Angeles, California, [16]Centers for Disease Control and Prevention, Atlanta, Georgia, Atlanta, Georgia

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Background: Influenza vaccination has been shown to reduce influenza risk in pregnant women and their infants who are not yet age-eligible for vaccine. Ascertainment of vaccination history is important for vaccine safety and effectiveness evaluations. Our goals were to (a) determine coverage, location, and timing of maternal influenza vaccination and (b) compare a subset of self-reported influenza vaccinations with documented vaccine records.

Methods: We enrolled children < 18 years. with acute respiratory illness in 7 pediatric hospitals and emergency departments in the New Vaccine Surveillance Network from December 1, 2016 to October 31, 2018. We interviewed all mothers of enrolled infants < 1 year, and obtained mother's influenza vaccine information while pregnant. As an option, sites obtained maternal influenza vaccine records from reported sources (e.g., registries, provider records, pharmacies).

Results: Among 5,458 mothers, 2,944 (54%) self-reported receiving influenza vaccine during pregnancy (57% in 2016–2017; 51% in 2017–2018), varying from 49% to 74% by site. Among self-reported vaccinees, 17%, 36%, and 47% received vaccine during their first, second, and third trimester, respectively. Most women (76%) were vaccinated at their OB/GYN or midwife office, 7% at their primary care provider, 7% at their workplace, and 5% at a retail pharmacy. Among 1,338 infants < 6 months. during early influenza season (i.e., born from June to August) and thus ineligible for vaccination, only 46% of mothers reported receiving vaccine during pregnancy (42% reported not receiving it, 12% were unsure). Of 2,242 women for whom vaccine verification was attempted, 1,491 (67%) self-reported receiving influenza vaccine during pregnancy; of those, documentation of vaccine receipt was found for 901 (60%).

Conclusion: Influenza vaccination coverage among pregnant women was suboptimal, potentially increasing the risk of influenza in unvaccinated pregnant women. Infants born to unvaccinated women, particularly those born from June to August, may also be at higher risk since they are not age-eligible to receive vaccine before influenza season. The optimal approach to ascertainment of maternal vaccination history with accuracy and completeness merits further investigation.

Disclosures. **All authors:** No reported disclosures.

2739. Comparison of Hemagglutination Antibody Inhibition (HAI) Titers Following Influenza Vaccination by Birth Cohort and Repeated Influenza Vaccination History

Amy C. Sherman, MD[1]; Lilin Lai, MD[1]; Mary B. Bower, BA, BSN[2]; Muktha S. Natrajan, PhD, MPH[3]; Christopher M. Huerta, BS[1]; Yongxian Xu, MD[4]; Mark Mulligan, MD, FIDSA[5]; Nadine Rouphael, MD[6]; Nadine Rouphael, MD[6]; [1]Emory University, Decatur, Georgia; [2]Hope Clinic, Decatur, Georgia; [3]Emory University Vaccine Center, Atlanta, Georgia; [4]Hope Clinic VTEU Lab, Decatur, Georgia; [5]New York University, New York, New York; [6]Emory University School of Medicine, Atlanta, Georgia

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Background: The host immune response to influenza vaccination can be affected by prior imprinting to a specific influenza strain based on birth cohort and prior influenza vaccination history. Understanding the underlying immune mechanisms is essential to development of an improved seasonal vaccine and an effective universal influenza vaccine.

Methods: This is a prospective pilot study, with a total of 20 subjects in either the H3N2 cohort (N = 10, born 1968–1977) or the H1N1 cohort (N = 10, born 1948–1957). Each cohort was further stratified by subjects who have received the influenza vaccine < 2 or ≥ 3 of the past 5 years. The FDA-approved quadrivalent 2018–19 influenza vaccine (containing A(H1N1), an A/Michigan/45/2015-like virus; A(H3N2), an A/Singapore/INFIMH-16–0019/2016-like virus; B/Colorado/06/2017-like virus; and B/Phuket/3073/2013-like virus) was administered on Day 1. Demographic information included age, gender, ethnicity, and BMI. HAI titers for each component of the vaccine were obtained at baseline, 29 days post-vaccination, and 180 days post-vaccination. HAI fold-change and HAI geometric mean titers (GMT) were analyzed.

Results: There was no significant difference between H1N1 or H3N2 HAI fold-change in the H3N2 birth cohort (P = 0.7496) or in the H1N1 birth cohort (P = 0.8237), Figure A. Comparing HAI fold-change for the repeatedly vs. minimally vaccinated groups, there was a significant higher fold change in the minimally vaccinated group (H1N1 HAI (P = 0.002) and H3N2 HAI (P < 0.0001), Figure B). GMT was higher at baseline for the repeatedly vaccinated group (H1N1, 70; H3N2, 98; vs. H1N1, 30; H3N2, 21 for the minimally vaccinated group); however, the GMT for the minimally vaccinated group was higher at day 29 (H1N1, 172; H3N2, 184; vs. H1N1, 422; H3N2, 299 for the minimally vaccinated group; Figure C). HAI titers and analysis at day 180 post vaccination are in progress.

Conclusion: There was no evidence of an imprinting effect by birth cohort for HAI titer magnitudes, even when stratified by vaccination history. There was a significantly higher HAI fold change for individuals who had received minimal influenza vaccinations in the past 5 years at 29 days post-vaccination. Individuals who had repeated vaccinations in the last 5 years had higher HAI GMT at baseline.

Disclosures: Nadine Rouphael, MD, Merck: I conduct as Emory PI the PNEUMO MERCK study at Emory, Research Grant; Pfizer: I conduct as co-PI the RSV PFIZER study at Emory, Research Grant; Sanofi-Pasteur: I conducted as Emory PI the CDIFFENSE trial at Emory, Research Grant.

2740. Using Machine Learning Methods to Identify Factors Associated with Pregnant Women Receiving the Influenza Vaccine during 2017–2018

Barbara Bardenheier, PhD, MPH, MA[1]; Vishal Nayak, Master of Science[2]; Fangjun Zhou, PhD[3]; Carla Black, PhD[1]; Sarah Ball, ScD, MPH4; James A. Singleton, PhD[1] [1]Centers for Disease Control and Prevention, Atlanta, Georgia; [2]General Dynamics Information Technology, Atlanta, Georgia; [3]CDC, Atlanta, Georgia; [4]Abt Associates, Newton, Massachusetts

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Background. Pregnant women are recommended for influenza vaccination because they are at higher risk of severe illness, and to protect their babies before they are old enough to receive the vaccine. Traditional statistical methods have been used to identify factors associated with vaccination, but programmatic efforts to increase vaccination coverage may be enhanced by machine learning methods that optimize prediction.

Methods. Using data from an Internet panel survey of pregnant women (n = 1,771), we used a random forest classification model to identify the strongest predictors of receiving influenza vaccination using the Gini Mean Decrease Score. The higher the Score, the more important an attribute is in predicting the outcome. Forty-three attributes inputted into the model included demographic, economic, healthcare provider related, health related, and knowledge, attitudes and practices related to influenza and influenza vaccine. The majority (70%) of our data were used to train the model and the rest were used to validate how well it performed by using model performance measures (e.g., accuracy, sensitivity, specificity).

Results. ***Our model had an accuracy of 84% (95% CI:*** 82%, 86%), sensitivity of 89% and specificity of 79%. The most important attribute was the belief that pregnant women should get the flu shot (Gini Score: 457), the second was due date (September–October 2017 and September–October 2018 had low probability of vaccination, Gini Score: 275), and the third was being offered the vaccine by a healthcare provider (Gini Score: 196).

Conclusion. Analyzing data using machine learning techniques may bring new insights for vaccination campaigns. Our results suggest that a provider recommendation is important, but perhaps even without a recommendation, women who form their own beliefs about need for vaccination may also be more likely to get vaccinated. Also, pregnant women and women of childbearing age should be targeted for vaccination during each fall, and for those with due date early in the flu season, providers should stress the importance of maternal vaccination for protection of the infant since the baby will be <6 months old during peak influenza season, when they are most vulnerable but would benefit from maternal antibodies.

FIGURE A

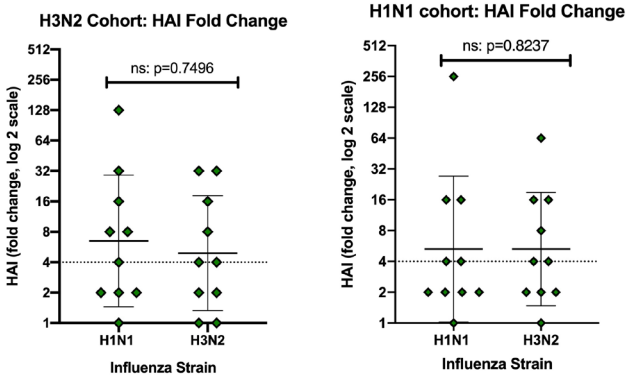

FIGURE B