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RESEARCH ARTICLE

Pneumococcal Vaccine Coverage in Adults Aged 19–64 Years, Newly Diagnosed With Chronic Conditions in the U.S.

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Introduction: This study examined pneumococcal vaccine coverage in adults aged 19–64 years newly diagnosed with diabetes, chronic heart, lung, or liver disease. These conditions are indicated for pneumococcal vaccination by the Advisory Committee on Immunization Practices.

Methods: A retrospective cohort analysis was conducted in 2016 using the Truven Health MarketScan® database. The study population was adults aged 19–64 years with at least one new chronic condition during 2009–2013 and continuous health plan enrolment for 2 years before and 1 year after the initial diagnosis. Vaccine coverage by length of follow-up since diagnosis (ranging from 1 to 5 years) was summarized. Multivariate analyses were performed to understand factors associated with vaccination.

Results: A total of 552,942 adults aged 19–64 years with chronic conditions were identified. There were 8% of adults newly diagnosed with one of four chronic conditions that received a pneumococcal vaccination after 1 year of follow-up; the proportion increased to 20.1% among those with 5 years of follow-up data. Adults aged 50–64 years were more likely to be vaccinated than those aged 19–49 years. Adults with diabetes were more likely to be vaccinated than adults with chronic heart, lung, or liver disease. Adults enrolled in HMO plans were more likely to be vaccinated than adults in other plan types. A higher number of healthcare encounters increased the likelihood of vaccination. Adults who received influenza vaccination were also more likely to receive a pneumococcal vaccination.

Conclusions: Vaccine coverage remains well below Healthy People 2020 targets. A substantial number of adults with chronic conditions remain unvaccinated and at risk for pneumococcal disease.

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INTRODUCTION

Pneumococcal disease, caused by *Streptococcus pneumoniae,* remains an important cause of morbidity and mortality in non-elderly adults in the U.S. In 2015, a total of 29,500 invasive pneumococcal disease (IPD) cases and 3,350 IPD-related deaths were estimated to have occurred in the U.S. Adults aged 18–64 years accounted for 52% of cases and 40% of deaths.[1]

Young and middle-aged adults with underlying medical conditions, such as chronic heart disease, chronic lung disease, chronic liver disease, and diabetes, are at increased risk for pneumococcal disease.[2] The rate of IPD in adults aged 18–64 years with chronic conditions in the U.S. was estimated to be 3.4 times the rate in healthy adults. Rates vary by underlying medical condition; IPD rates in adults diagnosed with diabetes and chronic heart disease were 3.5 and 4.3 times the rate in healthy adults, whereas rates in adults with chronic liver and lung disease were 9.1 and 10.0 times the rate in healthy adults.[3]

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The economic burden associated with pneumococcal disease in this age group is considerable. In 2004, there were 119,000 hospitalizations and 1,841,000 outpatient visits in the U.S. that were attributed to *S. pneumoniae*–related infections in adults aged 18–64 years amounting to approximately 4 billion in direct medical costs and productivity losses because of premature death or disability.[4] Because of higher disease rates, average annual costs during 2007–2010 (per 100,000 person-years) for IPD in adults with underlying chronic medical conditions were estimated to be three times higher than IPD costs in healthy adults.[3]

Two vaccines are approved for the prevention of pneumococcal disease in adults—pneumococcal conjugate vaccine (PCV-13 Prevnar 13®) and pneumococcal polysaccharide vaccine (PPSV-23 Pneumovax®23). Since 1997, the Advisory Committee on Immunization Practices (ACIP) has recommended a single dose of PPSV-23 (Merck, pneumococcal polyvalent vaccine) for adults aged 19–64 years with underlying medical conditions including chronic heart disease, chronic lung disease, chronic liver disease, and diabetes.[5] The decennial U.S. health promotion and disease prevention strategic plan (Healthy People 2020) aimed to achieve at least 60% immunization coverage in high risk adults aged 19–64 years by 2020.[6] However, according to National Health Interview Survey estimates, only 20.3% of high risk adults aged 19–64 years reported ever receiving a pneumococcal vaccination in 2015, indicating a substantial unmet need.[7]

Previous studies have shown that pneumococcal vaccine coverage varies by underlying medical condition. Based on National Health Interview Survey data, Lu and Nuorti[8] demonstrated that pneumococcal vaccine coverage among adults 18–64 years varied from to 2.7% in respondents with chronic liver disease to 13.1% and 14.6% of adults with diabetes and lung disease, respectively. Kyaw et al.[9] identified IPD cases in adults 18 years and older with a pneumococcal vaccine indication through the Centers for Disease Control and Prevention's Active Bacterial Core surveillance network. They found that 52% of adults with a vaccine indication were unvaccinated, and almost all unvaccinated adults had an opportunity for vaccination in the 2 years prior to their pneumococcal infection. Younger adults (aged 18–64 years) were less likely to be vaccinated than older adults. Among younger adults, having asplenia, HIV, leukemia, alcohol abuse, and congestive heart disease significantly increased the likelihood of pneumococcal vaccination.[9]

Using a large administrative claims database, the objective of this study is to specifically examine the 1997 ACIP recommendation for a single dose of PPSV-23 in adults 19–64 years with underlying chronic conditions. This paper aims to evaluate vaccine coverage in a cohort of adults aged 19–64 years who were newly diagnosed with chronic medical conditions indicated for pneumococcal vaccination by the ACIP. Assessing time from diagnosis to vaccination in a population newly diagnosed with a chronic condition can provide insight into factors that can improve vaccine uptake.

METHODS

This was a retrospective cohort study conducted in 2016 using the Truven Health MarketScan® Commercial Claims and Encounters database. The database provides patient demographics, health plan information, medical diagnosis codes, procedure codes, prescriptions, and cost data. It represents ≅100 employer-sponsored private health plans covering ≅45 million members. Each member in the database has a unique identifier that can be used to track patients across sites of service and providers over time. IRB approval was not obtained because this study was an analysis of de-identified secondary data.

Study Population

The study population included adults aged 19–64 years diagnosed with a chronic medical condition of interest during January 1, 2009, to December 31, 2013. Chronic medical conditions of interest included chronic heart diseases (including chronic rheumatic heart disease, hypertensive heart and renal disease, ischemic heart disease, chronic pulmonary heart disease, cardiomyopathy, heart failure, and other forms of heart disease); chronic lung diseases (including chronic obstructive pulmonary disease and allied conditions, asthma, pneumoconiosis, other diseases of respiratory system); diabetes (including diabetes mellitus and secondary diabetes mellitus); and chronic liver diseases (including chronic liver disease and cirrhosis, liver abscess and sequelae of chronic liver disease, and other disorders of liver).

Adults were included in this study if they had evidence of at least one of the chronic medical conditions of interest in their claims history during January 1, 2009, to December 31, 2013; were aged 19–64 years on the initial date of diagnosis; and had continuous health plan enrolment (enrollment gap ≤45 days was allowed) for >2 years before and 1 year after the initial diagnosis date. Adults were excluded if they

1. had evidence of any of the chronic medical conditions of interest in their claims history during the 2 years prior to the initial diagnosis date;
2. had multiple chronic medical conditions of interest on the initial diagnosis date;
3. had received a pneumococcal vaccination during the 2 years prior to the initial diagnosis date; and
4. had the following immunocompromising conditions during the 2 years prior to the initial diagnosis date through the end of follow-up (i.e., from 2009 to the end of continuous health plan enrollment or December 31, 2014, whichever came first): HIV, chronic renal disease, cancer, or organ transplantation.

It was assumed that adults included in this study represented incident cases of disease, diagnosed between 2009 and 2013,