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RESEARCH ARTICLE

# Promoting Adult Immunization Using Population-Based Data for a Composite Measure

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**Introduction:** A composite adult immunization status measure is currently under consideration for adoption into the Healthcare Effectiveness Data and Information Set. This paper complements the Healthcare Effectiveness Data and Information Set health plan–level measure testing efforts by examining use of survey-based self-reported vaccination data to assess composite adult immunization coverage and identify limitations to using survey data to measure progress.

**Methods:** The 2015 National Health Interview Survey data were used in 2017 to calculate estimates for a composite of selected vaccines routinely recommended for adults aged ≥19 years, overall and in three age groups: 19–59, 60–64, and ≥65 years for tetanus and diphtheria toxoids (Td); tetanus toxoid; reduced diphtheria toxoid; and tetanus, diphtheria, acellular pertussis vaccine (Tdap); and herpes zoster, pneumococcal, and influenza vaccines.

**Results:** Composite coverage for adults aged ≥19 years including receipt of Tdap in the past 10 years and influenza vaccination was 11.9%, ranging from 6.3% in adults aged 60–64 years to 13.7% in adults aged 19–59 years. Excluding influenza, composite coverage was 20.7%, ranging from 8.1% (adults aged 60–64 years) to 25.2% (adults aged 19–59 years). In a composite including any Td-containing vaccine in the past 10 years, coverage including influenza vaccination for adults aged ≥19 years was 23.4%, ranging from 12.6% (adults aged 60–64 years) to 25.7% (adults aged 19–59 years). Excluding influenza, composite coverage was 51.4%, ranging from 15.8% (adults aged 60–64 years) to 63.0% (adults aged 19–59 years).

**Conclusions:** Survey-based vaccination data may under- or over-estimate coverage, but most adults require at least one additional vaccination by any metric. A composite measure provides a single focal point to promote adherence to standards of care.

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## INTRODUCTION

Adults in the U.S. experience a considerable burden of vaccine-preventable disease; however, coverage with most Advisory Committee on Immunization Practices (ACIP) recommended vaccines[1,2] remains well below Healthy People 2020 targets.[3,4] An age-stratified composite adult immunization status (AIS) measure is currently under consideration for adoption into public and private healthcare quality measurement programs.[5] Measurement and feedback on vaccination coverage is an evidence-based strategy to increase vaccination uptake; adoption of a composite quality measure may facilitate and promote use of this strategy.[6]

Composite performance measures, which combine multiple measurement elements into a single construct, can be used to assess[7] performance of the healthcare system and health plans in addition to progress made on individual

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measure components. Composite measures of recommended childhood vaccines have long been used to monitor healthcare quality and prevention efforts,[4,8] and a composite measure for adolescent vaccinations was recently introduced.[8] Conversely, no composite measures for adult vaccination exist, though individual measures for influenza and pneumococcal vaccination are available.[9]

In 2016, the National Adult Immunization Plan was introduced to guide and support implementation of adult immunization standards of care across the U.S.; one National Adult Immunization Plan objective is evaluation and enhancement of targeted improvement initiatives.[10] In pursuit of this objective, the Indian Health Service tested the feasibility of, and subsequently implemented, an adult immunization composite measure that assesses receipt of all routine adult vaccinations as an Indian Health Service health system performance measure. Building on the success of this effort, the National Vaccine Program Office funded the National Committee on Quality Assurance to develop and test an AIS composite measure among patients in health plans as a possible Healthcare Effectiveness Data and Information Set (HEDIS®)[11] 2019 measure. Having an AIS composite measure and identifying a national benchmark will be important for assessing progress. This paper complements HEDIS® health plan–level measure testing efforts by examining use of survey-based self-reported vaccination data to assess immunization coverage of routinely recommended adult vaccines and identify limitations to using survey data to measure progress.

## METHODS

Data from the 2015 National Health Interview Survey (NHIS) were analyzed in 2017 to determine baseline estimates for a composite measure of vaccination coverage for select vaccines routinely recommended for all adults aged ≥19 years (tetanus and diphtheria toxoids [Td]; tetanus toxoid; reduced diphtheria toxoid; and tetanus, diphtheria, acellular pertussis vaccine [Tdap]; and influenza vaccines) or indicated based on age (herpes zoster and pneumococcal vaccines) and three age groups (age 19–59, 60–64, and ≥65 years) based on the vaccines recommended for that age group (Table 1). Estimates were calculated as the weighted proportion of respondents who reported receiving tetanus toxoid–containing (Td or Tdap), Tdap, herpes zoster, and pneumococcal vaccines using definitions from a previous report,[3] producing nationally representative vaccination coverage estimates. Influenza vaccination coverage estimates were based on reported receipt of influenza vaccination in the past 12 months. Pneumococcal vaccination was assessed only in those aged ≥65 years; coverage among people aged 19–64 years with medical conditions that increase the risk for pneumococcal disease is not included in this composite measure.

Estimates for the AIS measures were calculated to include Tdap vaccine in the past 10 years (Method 1) or any tetanus-toxoid–containing vaccine in the past 10 years (Method 2), and both with and without influenza vaccination in the past 12 months. Respondents who did not answer *yes* or *no* to questions about vaccination with any vaccine or those who answered *don't know* were excluded from the analysis (Method 1: 38.7%–40.9%, Method 2: 5.6%–9.0%; Table 2). In addition, to estimate Tdap coverage among those who reported tetanus vaccination, those who were not told or did not know vaccine type (Td or Tdap), refused to answer, or for whom data were not obtained were also excluded (54.3% of those reporting tetanus vaccination). Point estimates and 95% CIs were calculated using SAS, version 9.3 and SUDAAN, version 11, to account for the complex sample design.

## RESULTS

Table 3 presents a composite estimate of overall vaccination coverage among adults who have received the selected vaccines that are recommended for their age groups based on receipt of Tdap in the past 10 years (Method 1) or Td or Tdap in the past 10 years (Method

**Table 1.** Definitions of AIS Measure and Methods Used in Analysis, NHIS

| | Vaccines included | | |
|---|---|---|---|
| **Age group, years** | **Method 1** | **Method 2** | **Optional** |
| ≥19 | Proportion of adults who received all vaccines recommended for their age group including Tdap | Proportion of adults who received all vaccines recommended for their age group including any Td-containing vaccine | Influenza (past 12 months) |
| 19–59 | Tdap vaccine in the past 10 years | Td-containing vaccine in the past 10 years | Influenza (past 12 months) |
| 60–64 | Tdap vaccine in the past 10 years AND Herpes zoster | Td-containing vaccine in the past 10 years AND Herpes zoster | Influenza (past 12 months) |
| ≥65 | Tdap vaccine in the past 10 years AND Herpes zoster AND PCV13 OR PPSV23 | Td-containing vaccine in the past 10 years AND herpes zoster AND PCV13 OR PPSV23 | Influenza (past 12 months) |

AIS, adult immunization status; NHIS, National Health Interview Survey; PCV13, 13-valent pneumococcal conjugate vaccine; PPSV23, 23-valent pneumococcal polysaccharide vaccine; Td, tetanus and diphtheria toxoids; Tdap, tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.