Proposed Changes to Existing Measure for HEDIS®[1] Measurement Year (MY) 2023:
Adult Immunization Status (AIS-E)

Proposed Measure Retirements for HEDIS MY 2023:
Flu Vaccinations for Adults Ages 18–64 (FVA)
Flu Vaccinations for Adults Ages 65 and Older (FVO)
Pneumococcal Vaccination Status for Older Adults (PNU)

NCQA seeks public comments on proposed changes to the Adult Immunization Status (AIS-E) measure and proposed retirement of three immunization measures reported using the CAHPS®[2] Health Plan Survey method.

Proposed Changes to Adult Immunization Status

The AIS-E measure assesses the percentage of adults who are up to date on recommended routine vaccinations, with separate indicators for influenza; tetanus and diphtheria (Td) or tetanus, diphtheria, and acellular pertussis (Tdap); zoster; and pneumococcal vaccinations. AIS-E is specified for commercial and Medicaid members 18–64 years of age and Medicare members ages 65 and older. The measure is specified for the HEDIS Electronic Clinical Data Systems (ECDS) reporting standard and captures receipt of vaccinations using data from electronic sources including administrative claims, immunization registries and EHRs.

Proposed measure updates were supported by our expert panels and are described below.

Pneumococcal indicator

The Advisory Committee on Immunization Practices released new pneumococcal vaccination guidelines in early 2022 that recommend two new conjugate vaccines: the 20-valent (PCV20) and 15-valent (PCV15).[3] Both include additional serotypes and provide better coverage against pneumococcal disease when compared to the existing 13-valent conjugate (PCV13) and polysaccharide (PPSV23) vaccines.

ACIP also recommends a simplified vaccination schedule for younger adults with underlying conditions vs. older adults, and includes guidance on administering PCV20 or PCV15 to adults who have previously been vaccinated (Table 1).

Table 1. ACIP Pneumococcal Vaccine Recommendations, January 2022

When to Vaccinate	Pneumococcal Vaccination History	Vaccines to Administer
Adults age 19-64 with certain chronic and immunocompromising conditions and adults 65 and older	No or unknown vaccination history	• PCV20, ***or*** • PCV15 followed by PPSV23
	Previously received PPSV23 only	• Follow with PCV20 or PCV15
	Previously received PCV13	• Follow with previously recommended PPSV23

[1] HEDIS® is a registered trademark of the National Committee for Quality Assurance.
[2] CAHPS® is a registered trademark of the Agency for Healthcare Research and Quality (AHRQ).
[3] Kobayashi, M., J.L. Farrar, R. Gierke, et al. 2022. "Use of 15-Valent Pneumococcal Conjugate Vaccine and 20-Valent Pneumococcal Conjugate Vaccine Among U.S. Adults: Updated Recommendations of the Advisory Committee on Immunization Practices—United States, 2022." *MMWR Morb Mortal Wkly Rep* 71:109–17. DOI: http://dx.doi.org/10.15585/mmwr.mm7104a1.

NCQA proposes to update the pneumococcal vaccination indicator to align with these updated recommendations, including the following changes (Table 2):

- Assess vaccination of all adults 65 and older, including those with/without underlying conditions. The measure would not include younger adults because it may not be feasible to identify underlying conditions (e.g., smoking status).
- Revise the numerator time frame to count receipt of vaccines between 18 years and the end of the measurement period because members with certain conditions may be vaccinated at younger ages.
- For the numerator, count receipt of PCV20, PCV15, PCV13 or PPSV23, given that some adults are not recommended to be re-vaccinated with the new vaccines.

Table 2. Proposed Updates to AIS-E Pneumococcal Indicator

Current AIS-E Pneumococcal Indicator	Proposed AIS-E Pneumococcal Indicator
Adults 65+ who had the following between age **60** and the end of measurement period: **PPSV23.** • Includes adults with chronic medical conditions. • Excludes adults with immunocompromising conditions.	Adults 65+ who had any of the following between age **18** and end of measurement period: **PCV20, PCV15, PCV13 or PPSV23.** • Includes adults with chronic medical conditions. • Includes adults with immunocompromising conditions.

Age range

To address concerns that commercial and Medicaid plans report the measure only for younger adults and Medicare plans report only for older adults, we propose to specify that all three product lines report the measure for all adults, in accordance with guidelines. In addition, we propose adding age stratifications to assess measure performance among members younger than 65, 65 and older and all ages combined. Specifically, all product lines would report the following rates:

- *Influenza indicator:* 18–64, 65 and older, total rate.
- *Td/Tdap indicator:* 18–64, 65 and older, total rate.
- *Zoster indicator:* 50–64, 65 and older, total rate.
- *Pneumococcal indicator:* 65 and older.

Proposed Retirement of CAHPS Immunization Measures

NCQA also seeks comments on the proposed retirement of the following measures reported using the CAHPS Health Plan Survey method:

- Flu Vaccinations for Adults Ages 18–64 (FVA).
- Flu Vaccinations for Adults Ages 65 and Older (FVO).
- Pneumococcal Vaccination Status for Older Adults (PNU).

AIS-E will be publicly reported in MY 2022, which presents an opportunity to streamline the adult immunization measures in HEDIS. Stakeholders have suggested retiring the three CAHPS immunization measures, which rely on patient recall of vaccination receipt, and focusing on AIS-E, which provides specific clinical information about vaccination. In addition, expansion of the age range for AIS-E will ensure that vaccination status is captured across all age groups represented in the CAHPS measures.

Supporting documents include the current measure specifications, evidence workup and performance data.

NCQA acknowledges the contributions of the Geriatric, Technical and Adult Immunization Measurement Advisory Panels.

Measure title	Adult Immunization Status*	**Measure ID**	AIS-E
Description	The percentage of members 19 years of age and older who are up to date on recommended routine vaccines for influenza, tetanus and diphtheria (Td) or tetanus, diphtheria and acellular pertussis (Tdap), zoster and pneumococcal.		
Measurement period	January 1–December 31.		
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Clinical recommendation statement	The Advisory Committee on Immunization Practices recommends annual influenza vaccination; and tetanus, diphtheria and acellular pertussis (Tdap) and/or tetanus and diphtheria (Td) vaccine; herpes zoster vaccine; and pneumococcal vaccination for adults at various ages.
Citations	Freedman M.S., P. Hunter, K. Ault, A. Kroger. 2020. "Advisory Committee on Immunization Practices Recommended Immunization Schedule for Adults Aged 19 Years or Older—United States, 2020." *MMWR Morb Mortal Wkly Rep* 69:133–5. DOI: http://dx.doi.org/10.15585/mmwr.mm6905a4.
Characteristics	
Scoring	Proportion.
Type	Process.

Stratification

1. Commercial. ~~19–65 years.~~
2. Medicaid. ~~19–65 years.~~
3. Medicare. ~~66 years and older.~~

Risk adjustment

None.

Improvement notation

A higher rate indicates better performance.

Guidance

Allocation:
The member was enrolled with a medical benefit throughout the participation period.

Requirements:

- All measure rates are specified based on clinical guideline recommendations for the age group included in the rate.
- ~~Commercial and Medicaid plans report measure rates for members 19–65 years at the start of the measurement period and Medicare plans report measure rates for members 66 years and older at the start of the measurement period.~~

Note: *The following table describes which measure rates and age groups should be reported by commercial, Medicaid and Medicare plans.*

~~Measure Rate~~	~~Denominator Age Ranges~~	
	~~Medicare Plans~~	~~Commercial & Medicaid Plans~~
~~Rate 1: Immunization status: Influenza~~	~~Age 66 and older~~	~~Age 19–65~~
~~Rate 2: Immunization status: Td/Tdap~~	~~Age 66 and older~~	~~Age 19–65~~
~~Rate 3: Immunization status: Zoster~~	~~Age 66 and older~~	~~Age 50–65~~
~~Rate 4: Immunization status: Pneumococcal~~	~~Age 66 and older~~	~~N/A~~

Measure Rate	Ages Reported by Commercial, Medicaid & Medicare Plans for Each Indicator
Rate 1: Immunization status: Influenza	• Age 19-64 • Age 65 and older • Total
Rate 2: Immunization status: Td/Tdap	• Age 19-64 • Age 65 and older • Total

	<table><tr><td>Rate 3: Immunization status: Zoster</td><td>• Age 50-64 • Age 65 and older • Total</td></tr><tr><td>Rate 4: Immunization status: Pneumococcal</td><td>• Age 65 and older</td></tr></table> **Reporting:** Product line stratifications are not included in the measure calculation logic and need to be programmed manually.
Definitions	
Participation	The identifiers and descriptors for each organization's coverage used to define members' eligibility for measure reporting. Allocation for reporting is based on eligibility during the participation period.
Participation period	The measurement period.
Initial population	**Initial population 1** Members 19 years and older at the start of the measurement period who also meet the criteria for participation. **Initial population 2** Same as the initial population 1. **Initial population 3** Members 50 years and older at the start of measurement period who also meet the criteria for participation. **Initial population 4** Members 66 years and older at the start of the measurement period who also meet the criteria for participation.
Exclusions	• Members with active chemotherapy any time during the measurement period. • Members with bone marrow transplant any time during the measurement period. ~~• Members with history of immunocompromising conditions, cochlear implants, anatomic or functional asplenia, sickle cell anemia and HB-S disease or cerebrospinal fluid leaks any time during the member's history through the end of the mMeasurement pPeriod.~~ • Members in hospice or using hospice services any time during the measurement period.

Denominator	**Denominator 1** The initial population 1, minus exclusions. **Denominator 2** Same as denominator 1. **Denominator 3** The initial population 3, minus exclusions. **Denominator 4** The initial population 4, minus exclusions.
Numerator	**Numerator 1—Immunization Status: Influenza** • Members who received an influenza vaccine on or between July 1 of the year prior to the measurement period and June 30 of the measurement period, ***or*** • Members with anaphylaxis due to the influenza vaccine any time before or during the measurement period. **Numerator 2—Immunization Status: Td/Tdap** • Members who received at least one Td vaccine or one Tdap vaccine between nine years prior to the start of the measurement period and the end of the measurement period, ***or*** • Members with a history of at least one of the following contraindications any time before or during the measurement period: – Anaphylaxis due to the diphtheria, tetanus or pertussis vaccine. – Encephalitis due to the diphtheria, tetanus or pertussis vaccine. **Numerator 3—Immunization Status: Zoster** • Members who received at least one dose of the herpes zoster live vaccine or two doses of the herpes zoster recombinant vaccine at least 28 days apart, any time on or after the member's 50th birthday and before or during the measurement period, ***or*** • Members with anaphylaxis due to the herpes zoster vaccine any time before or during the measurement period. **Numerator 4—Immunization Status: Pneumococcal** ~~• Members who were administered the 23-valent pneumococcal polysaccharide vaccine on or after the member's 60th birthday and before or during the measurement period,~~ • Members who were administered at least one dose of an adult pneumococcal vaccine on or after the member's 19th birthday and before or during the measurement period, ***or*** • Members with anaphylaxis due to the pneumococcal vaccine any time before or during the measurement period.

Data criteria (element level)

Value sets:

- **AISE_HEDIS_MY2022-1.0.0**
  - Adult Influenza Immunization (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1913)
  - Adult Influenza Vaccine Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1914)
  - Adult Pneumococcal Immunization (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.2405)
  - Adult Pneumococcal Vaccine Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.2406)
  - Anaphylaxis Due to Diphtheria, Tetanus or Pertussis Vaccine (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.2240)
  - Anaphylaxis Due to Herpes Zoster Vaccine (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.2379)
  - ~~Anatomic or Functional Asplenia (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1477)~~
  - Bone Marrow Transplant (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1325)
  - ~~Cerebrospinal Fluid Leak (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1448)~~
  - Chemotherapy Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1500)
  - ~~Cochlear Implant (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1447)~~
  - ~~Cochlear Implant Device (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1521)~~
  - ~~Cochlear Implant Diagnosis (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1520)~~
  - Encephalitis Due to Diphtheria, Tetanus or Pertussis Vaccine (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.2241)
  - Herpes Zoster Live Immunization (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1915)
  - Herpes Zoster Live Vaccine Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1917)
  - Herpes Zoster Recombinant Immunization (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1916)
  - Herpes Zoster Recombinant Vaccine Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1918)
  - ~~Immunocompromising Conditions (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1502)~~
  - Influenza Virus LAIV Immunization (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1974)
  - Influenza Virus LAIV Vaccine Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1973)

  - ~~Pneumococcal Polysaccharide 23 Immunization (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1921)~~
  - ~~Pneumococcal Polysaccharide 23 Vaccine Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1922)~~
  - ~~Sickle Cell Anemia and HB S Disease (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1373)~~
  - Td Immunization (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1923)
  - Td Vaccine Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1924)
  - Tdap Immunization (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1791)
  - Tdap Vaccine Procedure (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1792)
- **NCQA_Hospice-1.0.0**
  - Hospice Encounter (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1761)
  - Hospice Intervention (https://www.ncqa.org/fhir/valueset/2.16.840.1.113883.3.464.1004.1762)

Direct Reference Codes:

- **AISE_HEDIS_MY2022-1.0.0**
  - codesystem "ICD-10": 'http://hl7.org/fhir/sid/icd-10-cm'
- **NCQA_Terminology-1.0.0**
  - codesystem "ConditionClinicalStatusCodes": 'http://terminology.hl7.org/CodeSystem/condition-clinical'
  - codesystem "coverage-type": 'http://terminology.hl7.org/CodeSystem/v3-ActCode'
  - code "active": 'active' from "ConditionClinicalStatusCodes"
  - code "managed care policy": 'MCPOL' from "coverage-type"
  - code "retiree health program": 'RETIRE' from "coverage-type"
  - code "subsidized health program": 'SUBSIDIZ' from "coverage-type"

Adult Immunization Status (AIS-E)
Measure Workup

Topic Overview

Importance

Vaccines are recommended for adults to prevent serious diseases. Routine vaccination against influenza, tetanus, diphtheria and pertussis is recommended for all adults, while vaccines for herpes zoster and pneumococcal disease are recommended for older adults (Freedman et al. 2020).

Health Importance and Prevalence

Influenza vaccine

The influenza vaccine protects against influenza, a serious disease that can lead to hospitalization and death (Centers for Disease Control and Prevention [CDC] 2016a). It is characterized by a variety of symptoms related to the nose, throat and lungs that can range in severity (CDC 2015a). Flu viruses spread mainly by droplets made when people with flu cough, sneeze or talk (CDC 2016a). Flu season in the United States can start as early as October and last as late as May; peak influenza activity occurs most frequently in January and February (CDC 2015a). Although anyone can get the flu, people 65 and older, pregnant women, young children and those with chronic conditions are at higher risk of developing serious complications (CDC 2016a).

The impact of influenza is variable because influenza seasons can vary in severity. The CDC estimates that since 2010, yearly influenza cases have ranged from 9.2–35.6 million; influenza-related hospitalizations, from 140,000–710,000; and influenza-related deaths, from 12,000–56,000 (CDC 2017). Deaths associated with influenza are typically higher in older adults. In an analysis based on the 2010–2011 and 2012–2013 flu seasons, 71%–85% of deaths from influenza were among adults 65 and older (Grohskopf et al. 2016).

Td/Tdap vaccine

There are 11 combination vaccines licensed in the U.S. that protect against tetanus and diphtheria; 8 combinations also protect against pertussis. Tetanus results in painful muscle spasms that can cause fractures, difficulty breathing, arrhythmia and death (CDC 2015b).

Diphtheria can present as a respiratory or cutaneous disease (CDC 2016c). Complications include myocarditis, which can lead to heart failure, and neuritis, which may temporarily paralyze motor nerves. Death occurs in 5%–10% of cases (CDC 2015c).

Pertussis, also known as whooping cough, is a respiratory infection characterized by a prolonged cough; it is highly communicable, transmitted via respiratory droplets from coughing or sneezing. This infection can also lead to secondary pneumonia, the most common cause of pertussis-related deaths (CDC 2015d).

Due to vaccines, tetanus and diphtheria are now uncommon. On average, there were 29 reported cases of tetanus per year from 1996–2009, and nearly all were among people who had never received a tetanus vaccine or were not up to date on their booster shots (CDC 2013). In the past decade, fewer than 5 diphtheria cases were reported to the CDC, although the disease is more prevalent in other countries: In 2014, 7,321 cases of diphtheria were reported to the World Health Organization, and there are likely many more unreported cases (CDC 2016b).

Pertussis is much more prevalent today than tetanus and diphtheria, even though vaccines offer protection against the disease. Before the vaccine was introduced in the 1940s, there were about 200,000 cases of pertussis annually (CDC 2015d). Since widespread use of the vaccine, pertussis cases have decreased by 80% (CDC 2015d). However, pertussis cases have been increasing since the 1980s; currently, there are 10,000–40,000 pertussis cases and up to 20 deaths reported each year (CDC 2015d). Pertussis is usually milder in children, adolescents and adults than in infants and young children who may not be fully immunized. Older adults are often the source of infection for infants and children (CDC 2015d).

Herpes zoster vaccine

The herpes zoster vaccine protects against herpes zoster, commonly known as shingles. Herpes zoster is a painful skin rash caused by reactivation of the varicella zoster virus (CDC 2016c). After a person recovers from primary infection of varicella (chickenpox), the virus stays inactive in the body and can reactivate years later. Most people typically only have one episode of herpes zoster, but second or third episodes are possible. People with compromised immune systems are at higher risk of developing herpes zoster (CDC 2016c).

The most common complication of herpes zoster is post-herpetic neuralgia (PHN) (CDC 2016c), severe, debilitating pain at the site of the rash that has no treatment or cure. Herpes zoster can also lead to serious complications of the eye, pneumonia, hearing problems, blindness, encephalitis or death (CDC 2016c). In the U.S., there are 1 million new cases of herpes zoster each year; 1 of every 3 people will be diagnosed with herpes zoster in their lifetime (CDC 2016c). A person's risk for developing herpes zoster increases sharply after age 50 (CDC 2016c). As people age, they are more likely to develop PHN; it rarely occurs in people under 40, but can be seen in a third of untreated adults 60 and older (CDC 2016c).

Between 1% and 4% of adults with herpes zoster are hospitalized for complications, and an estimated 96 deaths each year are directly caused by the virus (CDC 2016c). The vaccine can reduce the risk of developing herpes zoster and PHN.

Pneumococcal vaccine

Vaccines protect against pneumococcal disease, which is a common cause of illness and death in older adults and in persons with certain underlying conditions. The major clinical syndromes of pneumococcal disease include pneumonia, bacteremia and meningitis, with pneumonia being the most common (CDC 2015e). Pneumonia symptoms generally include fever, chills, pleuritic chest pain, cough with sputum, dyspnea, tachypnea, hypoxia tachycardia, malaise and weakness.

There are an estimated 400,000 cases of pneumonia in the U.S. each year and a 5%–7% mortality rate, although it may be higher among older adults and adults in nursing homes (CDC 2015f; Janssens and Krause 2004).

Bacteremia, a blood infection, is another complication of pneumococcal disease (CDC 2015f). Approximately 30% of patients with pneumonia also have bacteremia, and 12,000 patients have bacteremia without pneumonia each year (CDC 2015f). Bacteremia has a 20% mortality rate among all adults and a 60% mortality rate among older adults.

Pneumococcal disease causes 3,000–6,000 cases of meningitis each year (CDC 2015f). Meningitis symptoms may include headache, lethargy, vomiting, irritability, fever, nuchal rigidity, cranial nerve signs, seizures and coma. Meningitis has a 22% mortality rate among adults (CDC 2015f).

Financial Importance and Cost-Effectiveness

Administration of the influenza, Tdap/Td, herpes zoster and pneumococcal vaccines can decrease overall health care costs by preventing severe disease and hospitalization.

Influenza vaccine

Influenza is an important cause of outpatient medical visits and worker absenteeism among adults. The average annual burden of seasonal influenza among adults 18–49 includes approximately 5 million illnesses, 2.4 million outpatient visits, 32,000 hospitalizations and 680 deaths (Grohskopf et al. 2016). A study in 2016 estimated that the cost-effectiveness ratio of the influenza vaccine was approximately $100,000 per quality-adjusted life year (Xu et al 2016). The study also suggested that influenza immunization leads to the most cost savings during moderate or severe influenza seasons.

Tdap/Td vaccine

Administering the Tdap vaccine to adults helps prevent the spread of pertussis to infants and prevents such hospitalizations; in 2010, the average cost of hospitalizing an infant with pertussis was $16,339, an increase from $12,377 in 2000 (Davis 2014). Because there has been a rise in pertussis over the past several decades in the U.S., studies have evaluated the cost-effectiveness of providing Tdap immunizations to adults. One study found that providing a dose of Tdap to people at age 11 or 12, as currently recommended, and again at age 21, could reduce outpatient visits for pertussis by 4% and hospitalizations for pertussis by 5%; costs per quality-adjusted life years saved would be $204,556 (Kamiya et al. 2016).

Another study found that vaccinating all adults 2–64 at least once with Tdap is cost-effective (<$50,000 per quality-adjusted life years) if pertussis incidence in adults is greater than 120 cases per 100,000 people (Lee et al. 2006). McGarry et al. found that vaccinating all adults ages 65 and older with Tdap is a cost-effective intervention and would prevent 97,000 cases of pertussis annually—from the payer perspective, it would provide a net cost savings of $44.8 million (2014).

Herpes zoster vaccine

In 2004, a systematic literature review estimated that total medical costs in the U.S. from zoster were 1.9 billion (Panatto et al., 2015). A CDC study estimated that vaccination with the recombinant zoster vaccine, compared with no vaccination, cost $31,000 per quality adjusted life year, on average, for immunocompetent adults 50 and older. The number of people needed to be vaccinated with the recombinant zoster vaccine to prevent one case of zoster ranged from 11-17 and to prevent one case of PHN ranged from 70–187 (Dooling et al., 2018). A study of the cost-effectiveness of the live herpes zoster vaccine among people at 50, 60 and 70 years found that vaccination at age 60 would prevent the most cases (26,147 cases per 1 million people), compared with vaccination at 50 or 70 (Hales et al. 2014). It also found that live zoster vaccination at 60 costs $86,000 per quality-adjusted life year, compared with $37,000 at 70 and $287,000 at 50 (Hales et a. 2014).

Pneumococcal vaccine

Pneumococcal infections result in significant health care costs each year. Geriatric patients with pneumonia require hospitalization in nearly 90% of cases, and their average length of stay is twice that of younger adults (Janssens and Krause 2004). Pneumonia in the older adult population is associated with high acute-care costs and an overall impact on total direct medical costs and mortality during and after an acute episode (Thomas et al. 2012). Total medical costs for Medicare beneficiaries during and one year following a hospitalization for pneumonia were found to be $15,682 higher than matched beneficiaries without pneumonia (Thomas et al. 2012). It was estimated that in 2010, the total annual excess cost of hospital-treated

pneumonia in the fee-for-service Medicare population was approximately $7 billion (Thomas et al. 2012).

Pneumococcal vaccines have been shown to be highly effective in preventing invasive pneumococcal disease. When comparing costs, outcomes and quality adjusted life years, immunization with recommended pneumococcal vaccines was found to be more economically efficient than no vaccination, with an incremental cost-effectiveness ratio of $25,841 per quality-adjusted life year gained (Chen et al. 2014).

Supporting Evidence

Influenza vaccine

ACIP recommends routine annual influenza vaccination for all people 6 months of age and older (Grohskopf et al. 2017). For people 19 and older, any age-appropriate inactivated influenza vaccine (IIV) formulation or recombinant influenza vaccine (RIV) formulation are acceptable options. ACIP notes that live attenuated influenza vaccine (LAIV) should not be used during the 2017–2018 season for any population. Vaccination should occur before the onset of influenza activity in the community, ideally by the end of October; however, vaccination efforts should continue throughout flu season into February and March (Grohskopf et al. 2017). People who have a history of severe allergic reaction (e.g., anaphylaxis) to any component of the vaccine should not receive the influenza vaccine (CDC 2020).

Tdap/Td vaccine

ACIP recommends that regardless of the interval since their last tetanus or diphtheria toxoid–containing vaccine, persons aged 19 and older who have never received a dose of Tdap should receive one dose of Tdap. To ensure continued protection against tetanus and diphtheria, booster doses of either Td or Tdap should be administered every 10 years throughout life (Havers et al., 2020). Pregnant women should receive a dose of Tdap during each pregnancy irrespective of the patient's prior history of receiving Tdap. Tdap should be administered at 27–36 weeks' gestation, preferably during the earlier part of this period, although it may be administered at any time during pregnancy. For women not previously vaccinated with Tdap, if Tdap is not administered during pregnancy, it should be administered immediately postpartum (Havers et al., 2020). People who have a history of severe allergic reaction (e.g., anaphylaxis) to any component of the Tdap or Td vaccine should not receive it. Tdap is contraindicated for adults with a history of encephalopathy (e.g., coma or prolonged seizures) not attributable to an identifiable cause within seven days of administration of a vaccine with pertussis components (CDC 2020).

Herpes zoster vaccine

There are currently two types of zoster vaccines recommended for older adults: the zoster vaccine live (ZVL) and a recombinant zoster vaccine (RZV). The ZVL is a 1-dose vaccine licensed for immunocompetent adults 50 and older; ACIP recommends ZVL for immunocompetent adults 60 and older. ZVL vaccine coverage for adults 60 and older has increased each year since ACIP first recommended it in 2008 (Dooling et al. 2018).

In October 2017, the Food and Drug Administration approved the RZV for adults 50 and older. In January 2018, ACIP published a guideline recommending RZV for immunocompetent adults 50 and older, irrespective of prior receipt of varicella vaccine or ZVL (Dooling et al. 2018). RZV is a two-dose series; the second dose should be given 2–6 months after the first dose. If the second dose of RZV is given less than four weeks after the first, the second dose should be repeated; if the second dose is more than six months after the first dose, the vaccine series need not be restarted although individuals may be at higher risk for zoster. ZVL remains a recommended

vaccine for immunocompetent adults 60 and older (Dooling et al. 2018). Patients with a severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component should not receive either zoster vaccine (Dooling et al. 2018).

Pneumococcal vaccine

In 2021, two new pneumococcal vaccines were licensed for use in the U.S.: the 15-valent pneumococcal conjugate vaccine (PCV15) and the 20-valent pneumococcal conjugate vaccine (PCV20). Both include additional serotypes and therefore provide better coverage against pneumococcal disease when compared to use of the 13-valent pneumococcal conjugate vaccine (PCV13) or 23-valent pneumococcal polysaccharide vaccine (PPSV23). In response to this, ACIP convened in October 2021 and approved new recommendations for pneumococcal disease. The recommendation states that a dose of the newer pneumococcal conjugate vaccine (either PCV20 or PCV15) is beneficial for immunocompetent adults age 65 and older and for adults age 19 to 64 who have certain underlying medical conditions or risk factors given that both populations account for over 90 percent of invasive pneumococcal disease cases in the U.S.[1] (Kobayashi et al., 2022). The rationale for this change is the increasing burden of pneumococcal disease in U.S. adults.

Gaps in Care

Healthy People 2020, which provides science-based, 10-year national objectives for improving the health of all Americans, recommends increasing the percentage of adults who are vaccinated against influenza, zoster and pneumococcal disease (U.S. Department of Health and Human Services 2017). Estimates of national vaccination coverage are available through the National Health Interview Survey (NHIS), in which a sample of adults self-report receipt of vaccines. In 2015, 45% of adults 19 and older reported that they received the influenza vaccine during the 2014–2015 flu season, well below the Healthy People 2020 target of 70% (Williams et al. 2017).

64% of adults 65 and older reported having ever received the PPSV23 vaccine and/or the PCV13 vaccine, which is below the Healthy People 2020 target of 90% (Williams et al. 2017). Although there is no corresponding Healthy People 2020 goal for routine Tdap or Td vaccination among adults, only 23% of adults 19 and older responding to the 2015 NHIS reported receiving the Tdap vaccine within the past 10 years, and 62% reported receiving any tetanus toxoid-containing vaccination during the past 10 years (Williams et al. 2017).

In 2015, 31% of adults ages 60 and older reported ever receiving the herpes zoster vaccine (Williams et al. 2017). Although zoster vaccination coverage meets the Healthy People 2020 target of 30% coverage, 70% of adults are not receiving this recommended vaccination due to factors that include vaccine shortages shortly after licensure (Hurley et al. 2010), complications in storing the vaccine and cost to consumers (Hurley et al. 2010).

Barriers to adult vaccination in general include provider and patient lack of knowledge and awareness of the importance of vaccines, missed opportunities for vaccination and operational and systemic barriers (e.g., cost, lack of access to immunization records) (Ventola 2016; Tan 2015). Having health insurance coverage and a usual place for health care is associated with higher vaccination coverage (Williams et al. 2017).

There are evidence-based practices for improving adult vaccination coverage: Health care providers can routinely assess patients' vaccination history and offer needed vaccines to adults, implement reminder-recall systems, use standing-order programs and analyze practice- or provider-specific vaccination rates (Williams et al. 2017). In addition, providing easy access and convenience for adult vaccination within

[1] Includes alcoholism, chronic heart/liver/lung disease, cigarette smoking, diabetes mellitus, chronic renal failure, nephrotic syndrome, immunodeficiency, iatrogenic immunosuppression, generalized malignancy, human immunodeficiency virus, Hodgkin disease, leukemia, lymphoma, multiple myeloma, solid organ transplants, congenital or acquired asplenia, sickle cell disease or other hemoglobinopathies, CSF leak or cochlear implant.

and outside of the health care setting is important for increasing adult vaccine uptake (Ventola 2016). Health care providers can offer walk-in visits or extended hours specifically for vaccination (Ventola 2016). Influenza vaccines are commonly offered at retail pharmacies; offering other types of adult vaccines at retail pharmacies could potentially increase uptake (Ventola 2016). Leveraging health information technology to share immunization data among patients, providers, pharmacies, retail clinics and public health agencies and registries is a key strategy for tracking patients' immunization history and keeping them up to date on vaccines (America's Health Insurance Plans 2015).

Health care disparities

There are racial and ethnic disparities in adult vaccination coverage. The 2015 NHIS survey found that White adults were more likely to have received the influenza vaccine (47%) than Blacks (37%) and Hispanics (33%) (Williams et al. 2017). Tdap and Td booster vaccination coverage was higher for White adults 19 and older than Black, Hispanic and Asian adults (Williams et al. 2017). Similarly, pneumococcal vaccination coverage and zoster vaccination coverage was higher for White older adults than for Black, Hispanic and Asian older adults (Williams et al. 2017). Racial and ethnic disparities in pneumococcal vaccination and herpes zoster vaccination coverage widened from 2014–2015 due to increases in vaccination coverage for older White adults (Williams et al. 2017).

Vaccination coverage also varies by age for influenza and Tdap/Td. In the 2015 NHIS survey, older adults were more likely to report receiving the influenza vaccine; 32% of adults 19–49 reported receiving the flu vaccine, compared with 49% of adults 50–64 and 74% of adults 65 and older (Williams et al. 2017); however, adults 65 and older were less likely to report having received the Td or Tdap vaccine than adults 19–64 (Williams et al. 2017).

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Guidelines & Recommendations

Table 1: Routine Adult Immunizations: Recommendations from the CDC ACIP*

Vaccine Recommendation Date & Title	ACIP Recommendation	Contraindications (CDC 2020)
Influenza (Grohskopf et al. 2017)	ACIP recommends routine annual influenza vaccination for all people ages six months and older. Vaccination should occur before the onset of influenza activity in the community, ideally by the end of October; however, vaccination efforts should continue throughout flu season into February and March.	Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component
Td/Tdap (Havers et al. 2020)	ACIP recommends that regardless of the interval since their last tetanus or diphtheria toxoid–containing vaccine, persons aged 19 and older who have never received a dose of Tdap should receive one dose of Tdap. To ensure continued protection against tetanus and diphtheria, booster doses of either Td or Tdap should be administered every 10 years throughout life. Pregnant women should receive a dose of Tdap during each pregnancy irrespective of the patient's prior history of receiving Tdap. Tdap should be administered at 27–36 weeks' gestation, preferably during the earlier part of this period, although it may be administered at any time during pregnancy.	Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component Tdap: Encephalopathy (e.g., coma, decreased level of consciousness, or prolonged seizures) not attributable to another identifiable cause within seven days of administration of a previous dose of a vaccine with pertussis components
Zoster (Dooling et al. 2018)	ACIP recommends the two-dose recombinant zoster vaccine (RZV) for use in immunocompetent adults aged 50 and older, irrespective of prior receipt of varicella vaccine or zoster vaccine live (ZVL). ZVL remains a recommended vaccine for prevention of herpes zoster in immunocompetent adults aged 60 and older.	RZV and ZVL: Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component

Vaccine Recommendation Date & Title	ACIP Recommendation	Contraindications (CDC 2020)
		ZVL: Known severe immunodeficiency (e.g., from hematologic and solid tumors, receipt of chemotherapy, congenital immunodeficiency, long-term immunosuppressive therapy or patients with HIV infection who are severely immunocompromised) ZVL: pregnancy
Pneumococcal (Kobayashi et al. 2022)	ACIP recommends that adults age 19-64 with certain chronic or immunocompromising conditions[2] and adults 65 and older who have not previously received a pneumococcal conjugate vaccine, or whose previous vaccination history is unknown, should receive a pneumococcal conjugate vaccine (either PCV20 or PCV15). If PCV15 is used, this should be followed by a dose of pneumococcal polysaccharide vaccine (PPSV23) at least 1 year later. A minimum interval of 8 weeks can be considered for adults with underlying conditions. Adults who previously received PPSV23 only should receive either PCV20 or PCV15 at least 1 year later. Adults who previously received PCV13 only should receive PPSV23 at least 1 year later (or at minimum 8 weeks later for individuals who are immunocompromised).	PCV20, PCV15, PCV13: Severe allergic reaction (e.g., anaphylaxis) after a previous dose to any vaccine containing diphtheria toxoid or to any component of these vaccines PPSV23: Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component

**ACIP is chartered as a federal advisory committee to provide expert external advice and guidance to the director of CDC on use of vaccines and related agents for the control of vaccine-preventable diseases in the civilian population of the United States. Recommendations for routine use of vaccines in children and adolescents are harmonized to the greatest extent possible with recommendations made by the American Academy of Pediatrics, the American Academy of Family Physicians (AAFP), and the American College of Obstetricians and Gynecologists. Recommendations for routine use of vaccines in adults are reviewed and approved by the American College of Physicians, AAFP, the American College of Obstetricians and Gynecologists and the American College of Nurse-Midwives. ACIP recommendations adopted by the CDC director become agency guidelines on the date published in the Morbidity and Mortality Weekly Report (MMWR).*

References (Guidelines)

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[2]Includes alcoholism, chronic heart/liver/lung disease, cigarette smoking, diabetes mellitus, chronic renal failure, nephrotic syndrome, immunodeficiency, iatrogenic immunosuppression, generalized malignancy, human immunodeficiency virus, Hodgkin disease, leukemia, lymphoma, multiple myeloma, solid organ transplants, congenital or acquired asplenia, sickle cell disease or other hemoglobinopathies, cerebral spinal fluid leak or cochlear implant.

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HEDIS Health Plan Performance Rates: Adult Immunization Status (AIS-E)

Influenza

Table 1. HEDIS AIS-E Measure Performance—Medicaid Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	272	103 (37.9)	18.3	7.0	10.6	13.6	18.0	22.7	27.3
2019	265	62 (23.4)	15.2	6.7	6.1	10.1	15.4	19.8	22.8
2018	256	21 (8.2)	11.6	6.9	2.8	7.8	11.7	15.3	20.7

*For 2020 the average denominator across plans was 88,360 individuals, with a standard deviation of 135,430.

Table 2. HEDIS AIS-E Measure Performance—Commercial Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	416	258 (62.0)	20.9	7.4	13.3	16.4	19.2	23.9	29.5
2019	417	166 (39.8)	19.6	6.0	12.9	15.8	18.8	22.1	26.1
2018	405	71 (17.5)	18.7	7.4	11.4	14.9	18.1	20.7	26.4

*For 2020 the average denominator across plans was 134,816 individuals, with a standard deviation of 178,120.

Table 3. HEDIS AIS-E Measure Performance—Medicare[1] Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	649	203 (31.3)	32.6	19.1	6.8	19.7	30.3	45.7	62.0
2019	—	—	—	—	—	—	—	—	—
2018	525	44 (8.4)	18.3	17.1	5.1	8.3	12.5	21.8	30.5

*For 2020 the average denominator across plans was 21,227 individuals, with a standard deviation of 84,932.

[1] For measurement year 2019, CMS removed HEDIS reporting requirements for Medicare plans.

TD/TDAP

Table 4. HEDIS AIS-E Measure Performance—Medicaid Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	272	103 (37.9)	33.8	14.9	16.0	22.5	31.8	44.7	53.1
2019	265	62 (23.4)	28.9	14.4	9.1	19.0	26.5	39.1	46.2
2018	256	21 (8.2)	20.9	11.9	4.9	14.1	21.1	25.0	34.4

*For 2020 the average denominator across plans was 88,360 individuals, with a standard deviation of 135,430.

Table 5. HEDIS AIS-E Measure Performance—Commercial Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	416	258 (62.0)	30.2	12.3	17.4	22.3	28.2	35.2	46.9
2019	417	166 (39.8)	29.1	11.0	17.8	21.9	26.6	33.1	42.4
2018	405	71 (17.5)	29.4	14.0	18.6	20.8	25.2	30.9	46.5

*For 2020 the average denominator across plans was 134,816 individuals, with a standard deviation of 178,120.

Table 6. HEDIS AIS-E Measure Performance—Medicare[1] Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	649	203 (31.3)	19.7	16.5	2.9	7.5	15.3	26.8	41.9
2019	—	—	—	—	—	—	—	—	—
2018	525	44 (8.4)	26.5	20.0	9.4	14.7	20.7	28.9	60.2

*For 2020 the average denominator across plans was 21,227 individuals, with a standard deviation of 84,932.

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Table 7. HEDIS AIS-E Measure Performance—Medicaid Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	272	102 (37.5)	3.9	3.6	0.4	0.8	2.5	6.4	8.8
2019	265	60 (22.6)	2.2	2.7	0.0	0.3	0.9	3.9	6.3
2018	256	21 (8.2)	1.6	2.2	0.0	0.4	0.6	1.4	5.3

*For 2020 the average denominator across plans was 21,145 individuals, with a standard deviation of 34,042.

Table 8. HEDIS AIS-E Measure Performance—Commercial Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	416	258 (62.0)	8.4	5.1	3.1	4.9	7.3	10.6	14.8
2019	417	166 (39.8)	6.2	4.0	2.7	3.9	5.2	7.2	10.0
2018	405	71 (17.5)	6.1	4.5	2.7	4.1	5.0	6.5	9.8

*For 2020 the average denominator across plans was 44,197 individuals, with a standard deviation of 57,446.

Table 9. HEDIS AIS-E Measure Performance—Medicare[1] Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	649	203 (31.3)	9.5	14.4	0.0	0.3	2.8	12.2	31.5
2019	—	—	—	—	—	—	—	—	—
2018	525	44 (8.4)	12.9	19.1	0.4	0.9	5.3	14.7	41.2

*For 2020 the average denominator across plans was 21,227 individuals, with a standard deviation of 84,932.

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Table 10. HEDIS AIS-E Measure Performance—Medicare[1] Plans

Measurement Year	Total Number of Plans (N)	Number of Plans Reporting (N (%))	Performance Rates (%)						
			Mean	Standard Deviation	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2020*	649	203 (31.3)	26.2	18.0	4.3	13.1	22.4	36.2	50.9
2019	—	—	—	—	—	—	—	—	—
2018	525	44 (8.4)	20.3	21.2	5.4	7.9	10.8	23.0	60.2

*For 2020 the average denominator across plans was 21,227 individuals, with a standard deviation of 84,932.