

Vaccination Practices for Adults with Diabetes

Reviewed by the Professional Practice Committee

People with diabetes may have abnormalities in immune function, increasing their vulnerability to infectious diseases. An infection can complicate diabetes self-management, increasing the risk of hospitalization and mortality. The ADA 2019 Standards of Medical Care in Diabetes and the Centers for Disease Control and Prevention (CDC) provide vaccination recommendations for adults with diabetes, specifically influenza, pneumococcal, and hepatitis B vaccinations. Additional infectious diseases that are preventable with appropriate immunization include tetanus, diphtheria, pertussis, varicella zoster virus, measles, mumps, rubella, and human papillomavirus. Vaccines for these infectious diseases may be recommended for all adults or for certain adults depending on their age or specific health, occupational or lifestyle factors. The purpose of this practice paper is to outline the vaccination recommendations for adults with diabetes and provide rationale to support the diabetes care & education specialist in providing preventative education to people with diabetes.

Background/Rationale and Evidence

Influenza, pneumococcal diseases, and hepatitis B are common preventable infectious diseases with high morbidity and mortality in people with chronic diseases, such as diabetes or renal failure, and in the elderly.¹ Observational studies of individuals with a wide variety of chronic illnesses have shown that these conditions are associated with a higher hospitalization rate and complications compared to persons without chronic health conditions.^{2,3} Communities with pockets of unvaccinated and under-vaccinated populations are at increased risk for outbreaks of vaccine-preventable diseases.^{4,5}

Influenza

Annual administration of the influenza vaccine has been shown to decrease diabetes-related hospital admissions for influenza during “flu epidemics” by as much as 79% based on reports of case-controlled studies.^{1,6} The number of influenza-associated deaths varies from year to year because of the unpredictability in length and severity of each influenza season. The CDC

estimates 959,000 flu-associated hospitalizations and 79,400 flu-associated deaths occurred in the United States during the 2017-2018 season.⁷ While anyone can have influenza-related complications and hospitalizations, serious illness and death, the CDC reports that older adults and specific populations, including those with diabetes, are especially vulnerable. According to the Advisory Committee on Immunization Practices (ACIP), the American College of Physicians (ACP), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP), yearly vaccination of individuals at high risk before the onset of influenza season is the most effective measure for reducing the impact of influenza.⁸

Pneumococcal Disease

Pneumococcal disease, caused by *Streptococcus pneumoniae*, includes infection of the lungs, blood, or meninges of the brain and spinal cord. Diabetes increases the risk for acquiring pneumonia and invasive pneumococcal disease, as well as increases the risk for morbidity and mortality from pneumococcal infection.¹ The

pneumococcal vaccines, 13-valent pneumococcal conjugate vaccine (PCV13) and 23-valent pneumococcal polysaccharide vaccine (PPSV23), help to protect against pneumococcal disease, including bacteremic disease.

Individuals with diabetes are six times more likely to be hospitalized and three times more likely to die from complications of influenza or pneumonia than those in the general population.⁹ During the 2017-2018 flu season an estimated 61.8% of individuals 65 years of age or older received the influenza vaccine. Additionally, in 2017 only 69% of individuals aged 65 and older had ever received a pneumococcal vaccination.¹⁰ Both influenza and pneumococcal vaccination numbers fall short of *Healthy People: 2020* vaccination goal of 70% of all people age 18 and older against influenza and 90% of people age 65 and older against pneumococcal disease.⁴

Hepatitis B

Hepatitis B is caused by infection with the hepatitis B virus (HBV). Higher concentrations of HBV are found in blood, while lower concentrations are found in other bodily fluids. HBV infection can be self-limited or chronic, with the risk for chronic infection inversely related to age at acquisition. Chronic HBV infection carries a risk of premature death from cirrhosis or hepatocellular carcinoma.¹¹ Adults with diabetes are twice as likely to acquire an acute HBV infection and have a 60% higher prevalence of HBV infection compared to adults without diabetes.^{12,13} The ACIP Hepatitis Working Group has provided the answers to focused questions related to diabetes and hepatitis. Insufficient persistence to infection control measures with assisted blood glucose monitoring increases the risk of acquiring HBV among adults with diabetes, and vaccination is likely to substantially reduce the risk of hepatitis B among adults with diabetes.¹²

Role of Diabetes Care & Education Specialists

Based on the ADCES's National Practice Survey in 2017, only 31% of diabetes care & education specialists offer information or discuss immunizations with people with diabetes.

Infections and illnesses may make blood glucose management more difficult and elevated glucose can weaken the immune system. Routine vaccines are an important aspect of care. Effective management of diabetes involves all diabetes-care stakeholders—individuals, educators, physicians and insurers. Diabetes educators need to make a concerted effort to discuss and help people with diabetes obtain regular preventative vaccinations to maximize their protection of common, preventable infectious diseases. By following CDC recommendations from *Healthy People 2020*, diabetes educators can work towards a coordinated strategy with the community and other healthcare providers for provision of culturally appropriate preventive health care education to individuals with diabetes.¹⁷

Recommendations

The American Diabetes Association (ADA) and the CDC recommend the following vaccinations for adults with diabetes.

- PPSV23 is recommended for adults with diabetes aged 19 through 64 years. At age 65 years or older, adults with diabetes should receive 1 dose of PCV13, if not previously received, followed by another dose of PPSV23 at least 1 year after PCV13 and at least 5 years after the last PPSV23.¹⁵

Certain populations require additional pneumococcal vaccinations. Adults aged 19 years or older with immunodeficiency disorders (including HIV), anatomical or functional asplenia, chronic renal failure, nephrotic syndrome, cerebrospinal fluid leak, and cochlear implants should receive 1 dose of PCV13 followed by a dose of PPSV23 at least 8 weeks later. Adults with immunodeficiency disorders (including HIV), anatomical or functional asplenia, chronic renal failure, or nephrotic syndrome should receive a second dose of PPSV23 at least 5 years after the first dose of PPSV23.¹⁵ Whenever both PCV13 and PPSV23 are indicated, PCV13 should always be given prior to PPSV23. Adults

who receive a dose of PCV13 before the age of 65 are not indicated to receive additional doses when they turn 65 years of age or older.

All adults aged 65 years or older should receive a dose of PCV13, if not previously administered, followed by a dose of PPSV23 at least 1 year after PCV13. If PPSV23 was previously administered but not PCV13, administer PCV13 at least 1 year after PPSV23.¹⁵

- Hepatitis B vaccination is recommended for all unvaccinated adolescents, all unvaccinated adults at risk for HBV infection, and all unvaccinated adults seeking protection from HBV infection. Hepatitis B vaccination is recommended for adults with diabetes under the age of 60. For adults with diabetes over the age of 60, vaccination should be based on the patient's likelihood of acquiring HBV infection. ACIP recommends Heplisav-B® (HepB-CpG) as an option for adults age 18 or greater for vaccination against HBV. ACIP does not make a preferential recommendation for HepB-CpG over the other available hepatitis B vaccines; however, HepB-CpG is given as a two-dose series separated by 1 month (compared to the standard 3-dose vaccine at months 0, 1 & 6), which may result in improved series completion.^{15,19}
- All adults should receive a Td booster every 10 years. Adults who have not yet received Tdap or for whom vaccine status is unknown should receive a single lifetime dose of Tdap as soon as possible. Tdap can be given regardless of the interval since the last Td booster was given. Women should also receive a dose of Tdap with every pregnancy, preferably between gestational weeks 27-36.¹⁵
- Shingrix® (RZV), the recombinant adjuvanted herpes zoster vaccine, is administered intramuscularly in two doses given 2-6 months apart. It is recommended for immunocompetent adults age 50 and greater. RZV is the preferred shingles vaccine; however,

Zostavax® (ZVL), the live herpes zoster vaccine given subcutaneously as a one-time dose, may be given to immunocompetent adults 60 years and older for those who prefer ZVL, are allergic to RZV, or if RZV is unavailable and the patient requests immediate vaccination.¹⁵ It is also recommended that patients previously vaccinated with ZVL be revaccinated with RZV due to its higher efficacy and longer duration of protection.¹⁵

- At least 1 dose of MMR vaccine is recommended in adults born during or after 1957 who have no evidence of immunity (documented receipt of vaccine, laboratory evidence of immunity, or laboratory confirmation of disease).¹⁵ MMR vaccine is also recommended for special populations who have not received the vaccine during childhood including those with; diabetes, HIV (with CD4 count 200 or greater), kidney disease, splenectomy or spleen dysfunction, heart disease, chronic lung disease, chronic alcoholism, and chronic liver disease.
- Gardasil 9 ®, HPV vaccine series, is recommended at age 11 to 12 but can be started as early as age 9. Although the FDA has granted extended approval of vaccination through age 45, ACIP and CDC recommend vaccination through age 26 for all females and age 21 for all males if not vaccinated previously. In addition, males may also be vaccinated through age 26 if they are immunocompromised, have sex with other men, or at the clinician's discretion.¹⁵
- Additional vaccines protecting against hepatitis A, varicella, and meningitis may be recommended for adults with diabetes depending on vaccine history, certain comorbidities, and risk of exposure.

Conclusion

Persons with diabetes often have co-morbid factors which increase morbidity and mortality from infection. In addition, glucose management is more difficult when illness is present. Vaccines



are among the most cost-effective clinical preventive services and are a core component of any preventive services package. Adults with

diabetes should routinely receive vaccines as recommended by the ADA 2019 Standards of Medical Care in Diabetes and the CDC.



Resources:

2019 ADA Standards of Medical Care in Diabetes

http://care.diabetesjournals.org/content/42/Supplement_1/S34

CDC Diabetes Type 1 and Type 2 and Adult Vaccination

<http://www.cdc.gov/vaccines/adults/rec-vac/health-conditions/diabetes.html>

2018 Recommended Immunizations for Adults: By Age

<http://www.cdc.gov/vaccines/schedules/downloads/adult/adult-schedule-easy-read.pdf>

Vaccine Recommendations of the ACIP

<http://www.cdc.gov/vaccines/hcp/acip-recs/index.html>

References

1. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Medical Care in Diabetes—2018. *Diabetes Care*. 2018;41(Supplement 1):S28-S37.
2. Van Kerkhove MD, Vandemaële KA, Shinde V, et al. Risk factors for severe outcomes following 2009 influenza A (H1N1) infection: a global pooled analysis. *PLoS medicine*. Jul 2011;8(7):e1001053.
3. Rao Kondapally Seshasai S, Kaptoge S, Thompson A, et al. Diabetes mellitus, fasting glucose, and risk of cause-specific death. *N Engl J Med*. 2011;364(9):829-841.
4. U.S. Department of Health and Human Services. Healthy People 2020 - Improving the Health of Americans <http://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases>. Accessed July 6, 2018.
5. Athamneh LN, Sangsriy SS. Influenza vaccination in patients with diabetes: disparities in prevalence between African Americans and Whites. *Pharm Pract (Granada)*. 2014;12(2):410.
6. Goeijenbier M, van Sloten TT, Slobbe L, et al. Benefits of flu vaccination for persons with diabetes mellitus: a review. *Vaccine* 2017;35:5095-5101
7. CDC. Estimating influenza illnesses, medical visits, hospitalizations, and deaths in the United States – 2017-2018 influenza season. <https://www.cdc.gov/flu/about/burden/estimates.htm>. Accessed December 10, 2018
8. Grohskopf LA, Sokolow LZ, Broder KR, et al. Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices - United States, 2017-18 Influenza Season. *MMWR Recomm Rep*. 2017;66(2):1-20.
9. CDC. Flu and Pneumonia Vaccinations Decrease Relative Morbidity Risk for People with Diabetes. <http://www.cdc.gov/diabetes/projects/pdfs/hpNewsletter.pdf>. Accessed August 13, 2015.
10. CDC. Early Release of Selected Estimates Based on Data From the 2017 National Health Interview Survey; <https://www.cdc.gov/nchs/nhis/releases/released201806.htm>. Accessed July 10, 2018.



11. Busch K, Thimme R. Natural history of chronic hepatitis B virus infection. *Med Microbiol Immunol*. Feb 2015;204(1):5-10.
12. Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. *MMWR Recomm Rep* 2018;67(No. RR-1):1–31 DOI: <http://dx.doi.org/10.15585/mmwr.rr6701a1>
13. Reilly ML, Schillie SF, Smith E, et al. Increased risk of acute hepatitis B among adults with diagnosed diabetes mellitus. *J Diabetes Sci Technol*. Jul 2012;6(4):858-866.
14. Liang JL, Tiwari T, Moro P, et al. Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep* 2018;67(No. RR-2):1–44. DOI: <http://dx.doi.org/10.15585/mmwr.rr6702a1>
15. CDC. Vaccine-Specific Recommendations. 2018; <http://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/index.html>. Accessed July 10, 2018.
16. Williams, W., Lu, P., Halloran, A., et al. US Department of Health and Human Sciences/CDC. Surveillance of vaccination coverage among adult populations – United States 2015. *MMWR*, May 5, 2017; 66(11); 7
17. U.S. Department of Health and Human Services. Healthy People 2020 - Improving the Health of Americans <http://www.healthypeople.gov/2020/default.aspx>. Accessed July 10, 2018.
18. CDC. Adult Immunization Schedules 2018; <http://www.cdc.gov/vaccines/schedules/hcp/adult.html>. Accessed July 10, 2018.
19. CDC. Recommendations of the Advisory Committee on Immunization Practices for use of Hepatitis B Vaccine with a novel adjuvant. *MMWR*, April 20, 2018; 67(15); 455-458. <http://www.cdc.gov/mmwr/volumes/67/wr/mm6715/5.htm>. Accessed December 11, 2018.

Acknowledgements

Hannah Day MSN, APRN, BC-ADM, CDE

Linda Kerr, DNP, RN, FNP-BC, CDE

Katherine S. O’Neal, Pharm.D., MBA, BCACP, CDE, BC-ADM, AE-C, CLS

Caroline Champion, PharmD, BCACP

Carol Rasmussen, MSN, CDE, APRN, FAADE