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The Burden of Vaccine-Preventable Diseases in Adults

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The Burden of Vaccine-Preventable Diseases in Adults

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Jerika Lam, PharmD, and Jeff Goad, PharmD, MPH

Among the many treatments for diseases, vaccines are the safest and most cost-effective form of preventive medicine in the United States. Despite a rise in vaccination rates among young adults between 1993 and 2013, a persistently low uptake of routinely recommended immunizations remains among adults 50 years or older.¹⁻³ Except for modest increases in tetanus, diphtheria, and pertussis vaccination for adults 19 years or older and herpes zoster (shingles) vaccination among those 60 years or older, adult vaccination coverage did not improve from 2013 to 2014. The CDC reports that a low trend for influenza, human papilloma virus (HPV), pneumococcal, hepatitis B (for health care providers), and herpes zoster vaccinations continues to persist among adults.⁴ These poor vaccination rates could be attributed to gaps in insurance coverage, personal beliefs, and disparities in access to vaccines. As a result, the burden of vaccine-preventable diseases translates into significant social, public health, and economic costs within our society.

At present, 8 vaccines have age-only recommendations by the CDC to protect adults against 11 diseases (Table 1⁵). An additional 5 vaccines can be used to protect adults with specific medical conditions or activities. The CDC delineates 5 age groups for adult vaccination: 19 to 21 years, 22 to 26 years, 27 to 59 years, 60 to 64 years, and ≥ 65 years. Also available from the CDC is an immunization table that lists medical conditions and activities that serve as indications or contraindications to adult vaccines.⁵ Because of more effective childhood immunization programs, diseases such as measles, rubella, diphtheria, tetanus, and pertussis are rare among adults 19 years or older.⁶ However, reports of limited adult cases of measles, mumps, or pertussis have emerged in recent years in areas of low vaccine uptake.⁷

TABLE 1. RECOMMENDED IMMUNIZATION SCHEDULE FOR ADULTS BY AGE GROUP^{5,6}

Vaccine	19-21 years	22-26 years	27-59 years	60-64 years	≥65 years
Influenza	1 dose annually				
Td/Tdap	Substitute Tdap for Td once, then Td booster every 10 years				
MMR	1 or 2 doses depending on indication				
VAR	2 doses				
HZV				1 dose	
HPV—Female	3 doses				
HPV—Male	3 doses	3 doses			
PCV13	1 dose				1 dose
PPSV23	1 or 2 doses depending on indication				1 dose
HepA	2 or 3 doses depending on vaccine				
HepB	3 doses				
MenACWY or MPSV4	1 or more doses depending on indication				
MenB	2 or 3 doses depending on vaccine				
Hib	1 or 3 doses depending on indication				



Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection



Recommended for adults with additional medical conditions or other indications



No recommendation

HepA = hepatitis A; HepB = hepatitis B; Hib = *Haemophilus influenzae* type b conjugate; HPV = human papillomavirus; HZV = herpes zoster vaccine; MenACWY = serogroups A, C, W, and Y meningococcal conjugate; MenB = serogroup B meningococcal; MMR = measles, mumps, and rubella; MPSV4 = serogroups A, C, W, and Y meningococcal polysaccharide; 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; VAR = varicella.

*Please see discussion of important information regarding this schedule in the article later in this report entitled, "A Detailed Guide to Adult Immunizations."

In 2015, there were 14.1 million cases of vaccine-preventable diseases attributable to unvaccinated adults. Of the total economic burden of approximately \$9 billion due to direct costs and productivity losses from vaccine-preventable diseases, lack of vaccination was responsible for \$7.1 billion.⁸ Table 2⁹ displays the burden of some common vaccine-preventable diseases from 2012 to 2016.⁹ It is clear that case rates have declined more than 90% for all major diseases since their peak years. However, there have been some disturbing trends with measles and pertussis in children and mumps in college-aged adults.

TABLE 2. VACCINE-PREVENTABLE DISEASE TRENDS*							
Disease	Max Cases	Year	Cases 2012	Cases 2013	Cases 2014	Cases 2015	Cases 2016
Diphtheria	206,939	1921	1	0	1	0	0
Hib	~20,000	1980s	30	18	27	16	22
Measles	894,134	1941	55	184	628	188	72
Mumps	152,209	1968	229	438	1151	422	5311
Pertussis	265,209	1934	48,277	24,231	28,660	13,004	1634
Rubella	2.5 million	1964-1965	9	9	8	4	2
CRS	~30,000		3	0	1	1	0
Tetanus	601	1948	37	19	21	17	2
Varicella	221,983	1984	13,447	9987	9058	5373	815

CRS = congenital rubella syndrome; Hib = *Haemophilus influenzae* type b.

MEASLES, MUMPS, AND RUBELLA

Measles and mumps are viral infections that are highly contagious via the respiratory route. Although the vaccine for both of these diseases is contained in the measles, mumps, and rubella (MMR) vaccine and childhood immunization rates are high, outbreaks continue. In the United States, measles cases start as imported disease, mostly from travelers to nations with low vaccination rates. Thus, it is essential that individuals in the United States who travel to other countries receive 2 doses of MMR before departing. Mumps has also experienced a resurgence in both travelers to Europe and college campuses in the United States. In many of these settings, 2-dose MMR vaccination is high, but even the small failure rate associated with the vaccine can allow outbreaks to occur.¹⁰

INFLUENZA

According to the CDC, fewer than 50% of adults chose to receive the flu vaccine in the 2015-2016 season. More effort is required to ensure that individuals who see their health care providers during the flu season receive the vaccination. In addition, health care providers are strongly advised to receive annual influenza vaccinations.¹¹ Over several years, pharmacists have continued to lead other medical professions in getting their flu shot.¹² If not vaccinated, they may serve as a source of influenza virus transmission to vulnerable patients.

HERPES ZOSTER

Herpes zoster has been increasing since 1992, and 1 out every 3 individuals in the United States will develop it during their lifetime. However, only 28% get vaccinated.¹³ Reasons for the low herpes zoster vaccination rates include in some cases the high cost of the vaccine, challenges to stocking the vaccine (requires freezer storage), billing issues, and out-of-pocket costs.⁴ Because a great proportion of all herpes zoster vaccine is distributed to pharmacies, and pharmacists in all 50 states can administer the vaccine, it is imperative that pharmacists take a proactive role in zoster vaccination.

OVERCOMING BARRIERS TO VACCINATION

For the unvaccinated adult group 65 years or older, the incidence of influenza and pneumococcal disease accounts for the greatest burden of disease,^{14,15} as both influenza and pneumococcal disease can result in hospitalization and death. However, unvaccinated individuals in younger age groups account for a higher percentage of cases of vaccine-preventable diseases: 85% of adults aged 19 to 49 years, 81% of adults aged 50 to 64 years, and 56% of adults 65 years or older.⁸

Patient barriers to vaccination include lack of awareness of the need for the vaccine, disbelief that receiving the vaccine will be helpful, low education level, busy schedules and competing demands, and lack of recommendations by a health care provider.¹⁶⁻¹⁹ The last barrier centers on provider issues: research shows that some physicians do not believe vaccines are effective; therefore, they do not recommend vaccination to their patients, do not stock the vaccines, and fail to act as proponents for adult vaccination.²⁰⁻²²

Recently, the CDC and the National Vaccine Advisory Committee proposed 4 essential components for improving vaccination rates: (1) assess immunization status, (2) recommend (make strong recommendations for needed vaccines), (3) administer or refer (stock and administer needed vaccines or refer to a provider who can), and (4) document (using immunization information systems or immunization registries).²³ Research has shown that individuals who are steadfast on refusing vaccination are still open to listening and even getting vaccinated when a health care provider makes a strong recommendation.²⁴

Now that pharmacists have expanded authority to vaccinate in every state, they need to become proactive vaccinators by identifying and making strong recommendations for all patients. Doing so will help reduce the burden of influenza, HPV, pneumococcal disease, herpes zoster, and other vaccine-preventable diseases.

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References

1. CDC. Adult vaccination coverage – United States, 2010. *MMWR Morb Mortal Wkly Rep.* 2012;61(4):66-72.
2. Chun GJ, Sautter JM, Patterson BJ, McGhan WF. Diffusion of pharmacy-based influenza vaccination over time in the United States. *Am J Public Health.* 2016;106(6):1099-1100. doi: 10.2105/AJPH.2016.303142.
3. CDC. Flu vaccination coverage: United States, 2013-2014 influenza season. CDC website. cdc.gov/flu/fluview/coverage-1314estimates.htm. Published September 2014. Updated January 28, 2016. Accessed February 24, 2017.

4. Williams WW, Lu PJ, O'Halloran A, et al; CDC. Surveillance of vaccination coverage among adult populations—United States, 2014. *MMWR Surveill Summ*. 2016;65(1):1-36. doi: 10.15585/mmwr.ss6501a1.
5. CDC. Recommended immunization schedule for adults aged 19 years or older, United States, 2017. CDC website. cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf. Published February 2017. Accessed February 24, 2017.
6. McLaughlin JM, McGinnis JJ, Tan L, Mercatante A, Fortuna J. Estimated human and economic burden of four major adult vaccine-preventable diseases in the United States, 2013. *J Prim Prev*. 2015;36(4):259-273. doi: 10.1007/s10935-015-0394-3.
7. Helmecke MR, Elmendorf SL, Kent DL, Pauze DK, Pauze DR. Measles investigation: a moving target. *Am J Infect Control*. 2014;42(8):911-915. doi: 10.1016/j.ajic.2014.04.024.
8. Ozawa S, Portnoy A, Getaneh H, et al. Modeling the economic burden of adult vaccine-preventable diseases in the United States. *Health Aff (Millwood)*. 2016;35(11):2124-2132. doi: 10.1377/hlthaff.2016.0462.
9. CDC. Notifiable diseases and mortality tables. CDC website. cdc.gov/mmwr/mmwr_nd/nd_data_tables.html. Published January 2017. Updated January 30, 2017. Accessed February 24, 2017.
10. CDC. Update: mumps outbreak—New York and New Jersey, June 2009-January 2010. *MMWR Morb Mortal Wkly Rep*. 2010;59(5):125–129.
11. CDC. Flu vaccination coverage, United States, 2015-16 influenza season. CDC website. cdc.gov/flu/fluview/coverage-1516estimates.htm. Published September 2016. Updated September 29, 2016. Accessed February 24, 2017.
12. Black CL, Yue X, Ball SW, et al. Influenza vaccination coverage among health care personnel—United States, 2015-16 influenza season. *MMWR Morb Mortal Wkly Rep*. 2016;65(38):1026-1031. doi: 10.15585/mmwr.mm6538a2.
13. CDC. Shingles surveillance. CDC website. cdc.gov/shingles/surveillance.html. Updated August 19, 2016. Accessed February 24, 2017.
14. Weycker D, Sato R, Strutton D, Edelsberg J, Atwood M, Jackson LA. Public health and economic impact of 13-valent pneumococcal conjugate vaccine in US adults aged ≥ 50 years. *Vaccine*. 2012;30(36):5437-5444. doi: 10.1016/j.vaccine.2012.05.076.
15. Williams WW, Lu PJ, Lindley MC, Kennedy ED, Singleton JA; CDC. Influenza vaccination coverage among adults—National Health Interview Survey, United States, 2008-09 influenza season. *MMWR Suppl*. 2012;61(2):65-72.
16. Lau D, Hu J, Majumdar SR, Storie DA, Rees SE, Johnson JA. Interventions to improve influenza and pneumococcal vaccination rates among community dwelling adults: a systematic review and meta-analysis. *Ann Fam Med*. 2012;10(6):538-546. doi: 10.1370/afm.1405.
17. Zimmerman RK, Santibanez TA, Fine MJ, et al. Barriers and facilitators of pneumococcal vaccination among the elderly. *Vaccine*. 2003;21(13-14):1510-1517.
18. Zimmerman RK, Santibanez TA, Janosky JE, et al. What affects influenza vaccination rates among older patients? An analysis from inner-city, suburban, rural, and veterans affairs practices. *Am J Med*. 2003;114(1):31-38.
19. CDC. Influenza and pneumococcal vaccination levels among persons aged ≥ 65 years—United States, 2001. *MMWR Morb Mortal Wkly Rep*. 2002;51(45):1019-1024.

20. Kimura AC, Nguyen CN, Higa JI, Hurwitz EL, Vugia DJ. The effectiveness of vaccine day and educational interventions on influenza vaccine coverage among health care workers at long-term care facilities. *Am J Public Health*. 2007;97(4):684-690. doi: 10.2105/AJPH.2005.082073.
21. Nichol KL, Zimmerman R. Generalist and subspecialist physicians' knowledge, attitudes, and practices regarding influenza and pneumococcal vaccinations for elderly and other high-risk patients: a nationwide survey. *Arch Intern Med*. 2001;161(22):2702-2708.
22. Silverman M, Terry MA, Zimmerman RK, Nutini JF, Ricci EM. Tailoring interventions: understanding medical practice culture. *J Cross Cult Gerontol*. 2004;19(2):47-76. doi: 10.1023/B:JCCG.0000027845.23006.e8.
23. CDC. Standards for adult immunization practice. CDC website. cdc.gov/vaccines/hcp/adults/for-practice/standards. Updated May 2, 2016. Accessed February 24, 2017.
24. Nichol KL, MacDonald R, Hauge M. Factors associated with influenza and pneumococcal vaccination behavior among high-risk adults. *J Gen Intern Med*. 1996;11(11):673-677.