

Long-Term Payoff: An Economic Perspective on Immunization

FOR DECADES, IMMUNIZATIONS HAVE improved public health and saved lives across both child and adult populations.¹ Vaccines help children develop immunity to serious or life-threatening diseases before exposure,² and they protect adults from certain diseases during travel or other life pursuits. Vaccines also assist in supplementing the immune system for those who are immunocompromised.³ Aging adults, who experience increased susceptibility to infection, benefit from the protection that vaccinations can offer.⁴ In economic terms, vaccinations can decrease national costs, ranging from those associated with hospitalizations to those attached to work attendance and productivity.⁵ The Centers for Disease Control and Prevention (CDC) estimates that vaccines for children born between 1994 and 2018 have prevented approximately 419 million illnesses and generated a net savings of \$406 billion in direct costs and nearly \$1.9 trillion in social costs.⁶

Although evidence supports the value of immunization from both a population health and cost perspective, rates of vaccine administration are below target goals (Table).⁷⁻¹¹ For example, vaccines for human papillomavirus (HPV), which are recommended for children and young adults aged 9 to 26 years as a series of 2 shots administered within 6 to 12 months, are below the CDC's

target of 80% coverage.¹² In 2017, 49% of adolescents complete the HPV series. Approximately 66% of those aged 13 through 17 years had received the first dose of the series.⁹ The vaccination rate for HPV is slowly improving: The mean percentage of adolescents who began the vaccine series grew by approximately 5 percentage points annually from 2013 through 2017.⁹ There remains room for improvement, however, both in meeting the 80% coverage target and in addressing the rate discrepancy between urban and rural areas; in 2017, the percentage of adolescents in rural areas who received the first HPV vaccine dose was 11 percentage points lower than those in urban areas.⁹

When immunization rates fall below their targets, the healthcare system pays for this scenario. According to one study, incidences of 10 vaccine-preventable diseases cost the United States approximately \$9 billion (with a plausibility range of \$4.7 billion to \$15.2 billion) in 2015. Adults who were not vaccinated accounted for approximately \$7.1 billion of this cost.¹³

Financial Barriers To Immunization

Providers frequently identify financial barriers as factors that contribute to a diminished vaccination rate.¹⁴ In a survey conducted in 2013 of 839 general internists and family physicians, approximately 33% of the physicians reported that they “frequently” or “sometimes” did not recommend vaccines when they perceived that a patient lacked insurance coverage for a vaccine or could receive a vaccine more affordably at a different location. Approximately 25% of the surveyed physicians would not recommend vaccinations if they believed that the patients could not afford the vaccine. They believed that the newer, costlier vaccines—such as the HPV vaccine—were deferred or refused more frequently by patients because of expense.¹⁵ It is worth noting, however, that although the HPV vaccine is the most expensive routinely recommended vaccine for adolescents, results from a study published in 2019 suggest that health insurance reimbursement for HPV sufficiently covers the costs of vaccine purchase and administration for adolescents.¹⁶

Refusal of vaccines may indicate that the patients are either uninsured or that their insurance coverage for vaccines is incomplete or involves prohibitively high beneficiary cost sharing.¹⁵ The Patient Protection and Affordable Care Act, enacted in 2010, requires nongrandfathered private health insurance policies to fully reimburse,

TABLE. Common Immunizations: Goals for 2020 and Rates in 2017⁷⁻¹¹

Vaccine	2020 Target Rate ⁷	2017 Rate
HPV	80% adolescents 13-15 years	49% adolescents 13-17 years ⁹
Influenza	80%-90% adults 18-65 years	45.4% adults >19 years ⁸
Pneumococcal	90% adults ≥65 years	24.5% adults 19-64 years 69% adults ≥65 years ⁸
Herpes zoster	30% adults ≥60 years	34.9% adults ≥65 years ⁸
MMR	90% infants 19-35 months	91.5% infants 19-35 months ¹⁰
Tetanus toxoid-containing vaccine	N/A	63.4% adults ≥19 years (reported vaccination within last 10 years) ⁸
Varicella	90% infants 19-35 months	~76%-98% infants 19 to 35 months ¹¹

HPV indicates human papillomavirus; MMR, measles, mumps, rubella; NA, not applicable.

without a co-pay or coinsurance, all recommended childhood and adult vaccines: hepatitis A; hepatitis B; herpes zoster (shingles); HPV; influenza (flu); measles, mumps, and rubella; meningococcal; pneumococcal; tetanus, diphtheria, and pertussis; and varicella.¹⁷ However, patients covered by some grandfathered private health insurance plans, some state Medicaid programs, or Medicare Part D may still be experiencing incomplete coverage and/or prohibitive beneficiary cost sharing.¹⁵ Medicare Part B covers flu, pneumococcal, and hepatitis B vaccines, and Medicare Part D covers other vaccines through formularies.¹⁷ State Medicaid programs reimburse providers for vaccine and administration fees,¹⁸ but for only some adult vaccinations. In a survey published in 2018 of internal medicine and family medicine practices, 55% of respondents reported losing money in administering vaccines to Medicaid patients.¹⁹

Because private health plans negotiate the price of vaccines with manufacturers and distributors, vaccine prices can vary significantly for providers, who are responsible for seeking reimbursement for vaccines after administration. New vaccines tend to be more expensive, and providers who offer adult vaccines have smaller economies of scale than those who offer childhood vaccines.¹⁸ Providers budget not only for the costs of purchasing and administering the vaccine, but the costs of supplies, staff time, storage and handling, and insurance for inventory. Results from a 2017 survey, conducted in 19 medical practices across 9 states, indicated that the amount of time dedicated to vaccination varied across disciplines; family medicine and internal medicine practices dedicated an average of 5 minutes per vaccination, and obstetrics–gynecology (OB-GYN) practices dedicated an average of 29 minutes per vaccination. Consequently, the median associated costs were \$7 per vaccination for family medicine, \$8 for internal medicine, and \$43 for OB-GYN. Within OB-GYN practices, 68% of the patients who received counseling for vaccinations ultimately declined vaccination, which factored into the practices' overall costs per administered vaccine.²⁰

Incentives, Funding, And A Supplemental Model For Higher Vaccination Rates

Although providers may report hesitancy in recommending vaccines, provider reimbursement rates in the United States are increasingly tied to outcomes and to meeting certain quality measures, as the landscape has shifted from fee-for-service toward value-based reimbursement. Value-based reimbursement incentivizes providers to increase vaccination rates among their patients and sustain quality care. The government also offers funding for targeted patient populations who may not be able to afford routinely recommended vaccinations.^{21–23}

Pay-for-performance programs

The federal government has established the following financial incentives for providers to achieve quality related to immunizations:

- Medicare Advantage programs are given bonus payments if they achieve 4 or 5 stars in a 5-star rating system.²⁴ Adult flu vaccination is included as a star rating measure.²⁵
- The Medicare Shared Savings Program assesses accountable care organizations (ACOs) against annual performance benchmarks. An ACO is a group of physicians, hospitals, and other healthcare providers that coordinate and give high-quality care to Medicare beneficiaries. An ACO that doesn't meet the quality standards in a specific year does not share in the potential savings that it earned. Since its inception, the program has grown to 518 ACOs and 10.9 million beneficiaries. In 2018, ACO performance measures included 2 related to vaccination: flu immunization and pneumonia vaccination status in older adults.^{26,27}
- The Merit-based Payment Incentive System (MIPS), which is 1 of 2 arms of the CMS Quality Payment Program, offers participating clinicians a positive, neutral, or negative payment based on performance over the course of a year. More than 1 million clinicians participated in the MIPS in 2017.²⁸ Currently, the program includes measures on flu and shingles vaccinations.²⁹

As noted above, CMS programs currently focus on flu, pneumonia, and shingles vaccination in their incentives for immunization. There is opportunity to expand incentives to include other routinely recommended vaccines, such as the HPV vaccine.

In the private sector, the National Committee for Quality Assurance (a nonprofit organization founded in 1990) established the Healthcare Effectiveness Data and Information Set (HEDIS) as a healthcare performance improvement tool that tracks 90 measures across 6 domains of care.³⁰ This tool is used by health plans and providers as a benchmark for reporting quality metrics and offering greater transparency to consumers.²¹ HEDIS vaccination-related measures include childhood immunization services, immunizations for adolescents, flu vaccines for adults aged 18 to 64 years, flu vaccinations for adults 65 years and older, pneumococcal vaccination status for older adults, adult immunization status, and prenatal immunization status.³¹

In healthcare, HEDIS scores are considered highly credible as a measure of quality. More than 90% of health plans use HEDIS to measure quality performance³² and more

than 190 million patients are enrolled in these plans.²¹ With value-based reimbursement structures, providers hold greater accountability for meeting HEDIS measures.

Government funding

Several federal government programs offer funding to help increase vaccination rates. For example, the CDC's Vaccines for Children program gives recommended vaccines to participating providers, who are then able to administer them to eligible children at no cost. As a second example, the CDC's Section 317 Immunization Program purchases vaccines to administer at no cost to priority populations, such as underinsured children and adults who do not have insurance. The program also funds state, local, and national immunization programs and responds to outbreaks of diseases that could be preventable through vaccination.²²

Supplemental model for vaccine administration

Vaccinations offered by pharmacists are relatively new; 20 years ago, most states did not allow pharmacists to administer vaccines.³³ As regulations changed and more states allowed pharmacists to provide immunizations, vaccination rates across the United States increased. A study showed that in 2013, with more pharmacists giving vaccinations, the number of adults who were vaccinated for seasonal flu increased significantly.³⁴

As of 2017, all states allow pharmacists to administer vaccines, but many states have regulations that restrict pharmacist vaccination services. For instance, some states do not allow pharmacists to vaccinate patients without a prescription from a physician, and other states require pharmacists to follow a vaccination protocol agreed upon by a physician or a state public health department. Since 2012, only 7 states have enacted legislation to allow pharmacists to provide all vaccines. The number and level of the restrictions in certain states may significantly increase costs for pharmacies and compromise the vaccine-related convenience and efficiency they can offer patients.³³

The National Adult Immunization Plan recognizes the important role that pharmacists can play in improving access to vaccines for adults. As of the baseline year (2013) for the plan, 85% of states and territories permitted pharmacists to provide all routinely recommended vaccines for adults without a prescription. The plan created a milestone to reach 100% by 2020.²³

National Immunization Goals

National health-related goals have been created to serve as roadmaps for value-based programs and other initiatives in improving population health. More than 30 years ago, HHS established Healthy People, a collection of science-based national objectives revisited every 10 years for improving

the health of the US population. These objectives are carried out across states and territories in the United States by Healthy People coordinators, who work to ensure their area is aligned with Healthy People objectives. The progress of measurable benchmarks and goals is monitored across multiple health sectors, including immunization. Healthy People 2020 established specific targets to increase immunization rates (Table) and, as a result, reduce preventable disease, by 2020.⁷

In support of the vaccination aims of Healthy People 2020, the National Vaccine plan was released in 2010 as a broad road map for preventing disease with vaccination through the year 2020. The roadmap is supported by 5 goals: improving vaccines, enhancing safety, increasing vaccine shared decision making, increasing vaccine access, and utilizing immunization to reduce death and disease.³⁵ After its release, recognizing that vaccination rates among adults were not on track to meet the Healthy People 2020 goals, the National Vaccine Advisory Committee created the National Adult Immunization Plan to supplement the National Vaccine Plan. The plan's goals are to improve the infrastructure for adult immunizations, increase vaccine access for adults, heighten community demand, and support innovation in developing vaccines and related technologies for adults.²³

Racial and ethnic minority groups in the United States are more likely to be uninsured than the rest of the population and less likely to have adequate access to a primary care physician. As a part of broader efforts to mitigate minority inequalities in healthcare, the HHS established the HHS Action Plan to Reduce Racial and Ethnic Health Disparities, which partners with private and government groups to improve flu vaccine access and education for minority populations.³⁶

Within these frameworks, government funds, provider incentives, and alternative models for vaccine administration have been developed to encourage provider and consumer engagement and reach the Healthy People 2020 immunization goals.

Conclusions

The costs of vaccination for providers and patients have been cited as one of the many concerns contributing to suboptimal immunization rates. However, in recognizing that the long-term savings associated with vaccination can far outweigh the initial investment, various sectors in the healthcare system have dedicated time, resources, and money to improve vaccination affordability and provider reimbursement for vaccinations. Although progress has been made, gaps still exist between current vaccination rates and the target rates established by Healthy People 2020. Additional efforts are needed to continue to increase the accessibility and affordability of immunizations. ♦

REFERENCES

1. Recommended vaccines by age. CDC website. [cdc.gov/vaccines/vpd/vaccines-age.html](https://www.cdc.gov/vaccines/vpd/vaccines-age.html). Updated November 22, 2016. Accessed October 31, 2019.
2. Vaccines for your children: why vaccinate. CDC website. [cdc.gov/vaccines/parents/why-vaccinate/index.html](https://www.cdc.gov/vaccines/parents/why-vaccinate/index.html). Updated August 1, 2019.
3. Why vaccines are important for you. CDC website. [cdc.gov/vaccines/adults/reasons-to-vaccinate.html](https://www.cdc.gov/vaccines/adults/reasons-to-vaccinate.html). Updated May 2, 2016. Accessed November 5, 2019.
4. Weinberger B. Vaccines for the elderly: current use and future challenges. *Immun Ageing*. 2018;15:3. doi: 10.1186/s12979-017-0107-2.
5. Promoting vaccination in the workplace. CDC website. [cdc.gov/flu/business/promoting-vaccines-workplace.htm](https://www.cdc.gov/flu/business/promoting-vaccines-workplace.htm). Updated April 8, 2019. Accessed November 1, 2019.
6. How your child care program can support immunization. CDC website. [cdc.gov/vaccines/partners/childhood/downloads/Immunization-slides-for-childcare-providers.pptx](https://www.cdc.gov/vaccines/partners/childhood/downloads/Immunization-slides-for-childcare-providers.pptx). Updated March 2019. Accessed November 15, 2019.
7. Immunization and infectious diseases. Healthy People 2020 website. [healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases/objectives](https://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases/objectives). Accessed November 11, 2019.
8. Vaccination coverage among adults in the United States, National Health Interview Survey, 2017. CDC website. [cdc.gov/vaccines/imz-managers/coverage/adult-vaxview/pubs-resources/NHIS-2017.html](https://www.cdc.gov/vaccines/imz-managers/coverage/adult-vaxview/pubs-resources/NHIS-2017.html). Updated February 8, 2018. Accessed November 5, 2019.
9. Human papillomavirus (HPV): understanding HPV coverage. CDC website. [cdc.gov/hpv/hcp/vacc-coverage/index.html](https://www.cdc.gov/hpv/hcp/vacc-coverage/index.html). Updated August 23, 2018. Accessed November 5, 2019.
10. Immunization. CDC website. [cdc.gov/nchs/fastats/immunize.html](https://www.cdc.gov/nchs/fastats/immunize.html). Updated March 17, 2017. Accessed November 5, 2019.
11. 1996 through 2017 childhood varicella vaccination coverage trend report. CDC website. <http://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/data-reports/varicella/trend/index.html>. Updated October 11, 2018. Accessed November 5, 2019.
12. Attia AC, Wolf J, Núñez AE. On surmounting the barriers to HPV vaccination: we can do better. *Ann Med*. 2018;50(3):209-225. doi: 10.1080/07853890.2018.1426875.
13. 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.
14. Tsai Y, Zhou F, Lindley MC. Insurance reimbursements for routinely recommended adult vaccines in the private sector. *Am J Prev Med*. 2019;57(2):180-190. doi: 10.1016/j.amepre.2019.03.011.
15. Hurley LP, Lindley MC, Allison MA, et al. Financial issues and adult immunization: Medicare coverage and the Affordable Care Act. *Vaccine*. 2017;35(4):647-654. doi: 10.1016/j.vaccine.2016.12.007.
16. Tsai Y, Megan C, Lindley MC, Zhou F, Stokley S. Insurance reimbursements for human papillomavirus vaccination in the private sector, 2007-2014. *Prev Med Rep*. 2019;15:100917. doi: 10.1016/j.pmedr.2019.100917.
17. Resources for adult vaccination insurance and payment. CDC website. [cdc.gov/vaccines/hcp/adults/for-practice/insurance-payment.html](https://www.cdc.gov/vaccines/hcp/adults/for-practice/insurance-payment.html). Updated May 2, 2016. Accessed November 8, 2019.
18. Shen AK. Provider payment for adult Immunization. CDC website. https://www2.cdc.gov/vaccines/ed/pickup/ciinc/2017/CIINC_4_19_2017.pdf. Presented April 19, 2017. Accessed November 14, 2019.
19. Lindley MC, Hurley LP, Beaty BL, et al. Vaccine financing and billing in practices serving adult patients: a follow-up survey. *Vaccine*. 2018;36(8):1093-1100. doi: 10.1016/j.vaccine.2018.01.015.
20. Shen A, Khavjou O, King G, et al. Provider time and costs to vaccinate adult patients: impact of time counseling without vaccination. *Vaccine*. 2019;37(6):792-797. doi: 10.1016/j.vaccine.2018.12.045.
21. HEDIS and performance measurement. National Committee for Quality Assurance website. [ncqa.org/hedis](https://www.ncqa.org/hedis). Accessed November 6, 2019.
22. Questions answered on vaccines purchased with 317 funds. CDC website. [cdc.gov/vaccines/imz-managers/guides-pubs/qa-317-funds.html](https://www.cdc.gov/vaccines/imz-managers/guides-pubs/qa-317-funds.html). Updated February 17, 2016. Accessed November 14, 2019.
23. The National Vaccine Program Office: National Adult Immunization Plan. HHS website. [hhs.gov/sites/default/files/nvpo/national-adult-immunization-plan/naip.pdf](https://www.hhs.gov/sites/default/files/nvpo/national-adult-immunization-plan/naip.pdf). Accessed November 14, 2018.
24. Jacobson G, Damico A, Neuman T. A dozen facts about Medicare Advantage. Kaiser Family Foundation website. [kff.org/medicare/issue-brief/a-dozen-facts-about-medicare-advantage/](https://www.kff.org/medicare/issue-brief/a-dozen-facts-about-medicare-advantage/). Published November 13, 2018. Accessed October 31, 2019.
25. Medicare 2020 Part C & D Star Ratings technical notes. CMS website. [cms.gov/Medicare/Prescription-Drug-Coverage/PrescriptionDrugCovGenIn/Downloads/Star-Ratings-Technical-Notes-Oct-10-2019.pdf](https://www.cms.gov/Medicare/Prescription-Drug-Coverage/PrescriptionDrugCovGenIn/Downloads/Star-Ratings-Technical-Notes-Oct-10-2019.pdf). Updated October 1, 2019. Accessed November 15, 2019.
26. Accountable care organization (ACO) 2018 quality measures: narrative specifications document. CMS website. [cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharesavingsprogram/Downloads/2018-reporting-year-narrative-specifications.pdf](https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharesavingsprogram/Downloads/2018-reporting-year-narrative-specifications.pdf). Published January 20, 2018. Accessed November 12, 2019.
27. Shared Savings Program: about the program. CMS website. [cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharesavingsprogram/about.html](https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharesavingsprogram/about.html). Updated June 3, 2019. Accessed November 14, 2019.
28. 2017 Quality Payment Program reporting experience. CMS website. <https://www.pcpc.org/sites/default/files/resources/2017%20QPP%20Experience%20Report.pdf>. Accessed November 14, 2019.
29. Explore measures and activities. CMS Quality Payment Program website. <https://qpp.cms.gov/mips/explore-measures/quality-measures>. Accessed November 15, 2019.
30. About NCQA. National Committee on Quality Assurance website. [ncqa.org/about-ncqa/](https://www.ncqa.org/about-ncqa/). Accessed November 15, 2019.
31. Roth L, Sobel K. HEDIS® adult and prenatal immunization measures. National Committee on Quality Assurance website. [ncqa.org/wp-content/uploads/2019/02/NCQA-AIS-PRS-Webinar-Slides-Feb-2019.pdf](https://www.ncqa.org/wp-content/uploads/2019/02/NCQA-AIS-PRS-Webinar-Slides-Feb-2019.pdf). Published February 27, 2019. Accessed October 31, 2019.
32. Major health plan quality measurement sets. Agency for Healthcare Research and Quality website. [ahrq.gov/talkingquality/measures/setting/health-plan/measurement-sets.html](https://www.aHRQ.gov/talkingquality/measures/setting/health-plan/measurement-sets.html). Updated March 2016. Accessed November 14, 2019.
33. Winegarden W. Promoting access and lowering costs in health care: the case of empowering pharmacists to increase adult vaccination rates. Pacific Research Institute website. [pacificresearch.org/wp-content/uploads/2018/04/AdultVaccination_F_web.pdf](https://www.pacificresearch.org/wp-content/uploads/2018/04/AdultVaccination_F_web.pdf). Published April 2018. Accessed November 25, 2019.
34. Drozd EM, Miller L, Johnsrud M. Impact of pharmacist immunization authority on seasonal influenza immunization rates across states. *Clin Ther*. 2017;39(8):1563-1580.e17. doi: 10.1016/j.clinthera.2017.07.004.
35. U.S. National Vaccine Plan. HHS website. [hhs.gov/vaccines/national-vaccine-plan/index.html](https://www.hhs.gov/vaccines/national-vaccine-plan/index.html). Updated October 3, 2019. Accessed November 12, 2019.
36. A nation free of disparities in health and health care. HHS website. [minorityhealth.hhs.gov/assets/pdf/hhs/HHS_Plan_complete.pdf](https://www.minorityhealth.hhs.gov/assets/pdf/hhs/HHS_Plan_complete.pdf). Accessed November 14, 2019.