

Adult vaccination: Now is the time to realize an unfulfilled potential

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Keywords: adult immunization, immunization financing, immunization policy, immunization infrastructure, prevention, public health

Each year, vaccine-preventable diseases kill thousands of adults, both in the United States and across the planet, causing a significant human toll and severe economic burden on the world's healthcare systems. In the United States, while immunization is recognized as one of the most effective primary prevention services that improves health and well-being, adult immunization rates remain low and large gaps exist between national adult immunization goals and actual adult immunization rates. Closing these gaps requires a commitment by national leaders to a multifaceted national strategy to: (1) establish the value of adult vaccines in the eyes of the public, payers, policy makers, and health care professionals; (2) improve access to recommended adult vaccinations by improving the adult vaccine infrastructure in the United States and developing public-private partnerships to facilitate effective immunization behaviors; and (3) ensure fair and appropriate payment for adult immunization. Many of the situations that result in low adult immunizations rates in the United States also exist in many other countries around the world. Successful strategies to improve adult immunization coverage rates will result in reductions in morbidity, mortality, and healthcare costs. All medical and public health stakeholders must now collaborate to realize the significant health benefits that come with a strong adult immunization program.

Introduction

Vaccines are arguably one of the most important life-saving public health interventions of all time.^{1,2} In the United States, the United States Advisory Committee on Immunization Practices (ACIP) provides recommendations for vaccine use to the Centers for Disease Control and Prevention (CDC).³ These recommendations can be category A recommendations, where the

vaccine is recommended for routine universal use in a targeted population, or they can be category B recommendations, where the vaccine is recommended for use in individual patients based on the medical judgment of the medical provider. As a result of a strong pediatric immunization program in the United States, supported by the prevailing social norm to protect children against vaccine-preventable diseases, a robust medical home, and school entry requirements for vaccination, the national immunization coverage rates for most ACIP-recommended vaccines for children entering kindergarten hover at or above 90 percent.^{4,5} Vaccines have been so effective at preventing, and even eradicating, diseases like smallpox, polio, and measles that the public, and indeed many physicians, take them for granted. Unfortunately, the picture is not as positive when it comes to vaccination of our adult population.

Adult Immunization Coverage Rates Are Below Par

Currently, the ACIP recommends immunizing adults against 15 infectious diseases, depending on age and varying risk criteria: influenza, diphtheria, tetanus, pertussis, varicella, human papillomavirus (HPV), zoster, mumps, measles, rubella, pneumococcal disease, meningococcal disease, hepatitis A, hepatitis B, and *Haemophilus influenzae* B (Table 1).⁶ However, adult cases of these diseases remain serious public health concerns because the coverage rates for these vaccines in adults are substantially less than the rates of use among children. There are significant gaps between national adult immunization goals and actual vaccination rates. For example, while Healthy People 2020 states as its influenza vaccination coverage goal the immunization of 90 percent of those over 65 y of age, in 2012, the United States vaccinated only about 68 percent of this population.⁷ It is important to understand that Healthy People 2020 goals are intended to be realistic goals that can be achieved, but when data is lacking at the time the goals were developed, they can then become aspirational. And coverage data for 6 other vaccines commonly recommended for adults—pneumococcal, tetanus and Tdap, Hepatitis A, Hepatitis B, herpes zoster (shingles), and HPV—indicate little overall improvement in adult vaccination coverage in the United States between 2011 and 2012.⁸

Specifically, in 2012, Tdap vaccination among adults aged 19–64 y was only 15.6 percent, herpes zoster vaccination among

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Submitted: 07/15/2014; Revised: 10/13/2014; Accepted: 10/26/2014

<http://dx.doi.org/10.4161/21645515.2014.982998>

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Table 1. Current vaccines recommended for adults (by age) in the United States by the Advisory Committee on Immunization Practices (ACIP)

Vaccine	Age Group	19–21 years	22–26 years	27–49 years	50–59 years	60–64 years	≥ 65 years
Influenza		←1 dose annually→					
Tetanus, diphtheria, pertussis (Td/Tdap)		Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs					
Varicella		←2 doses→					
Human papillomavirus (HPV) Female		←3 doses→					
Human papillomavirus (HPV) Male		←3 doses→					
Zoster		←1 dose→					
Measles, mumps, rubella (MMR)		←1 or 2 doses→					
Pneumococcal 13-valent conjugate (PCV13)		←1 dose→					
Pneumococcal polysaccharide (PPSV23)		←1 or 2 doses→ ←1 dose→					
Meningococcal		←1 or more doses→					
Hepatitis A		←2 doses→					
Hepatitis B		←3 doses→					
<i>Haemophilus influenzae</i> type b (Hib)		←1 or 3 doses→					

adults aged 60 y or older was 20.1 percent, and HPV vaccination among women aged 19–26 y for 1 or more doses was 34.5 percent. For the population of adults aged 65 y and older, pneumococcal vaccine coverage was 59.9 percent, also below the Healthy People 2020 goal of 90 percent. Finally, with respect to hepatitis B vaccination in healthcare workers, the immunization rate ranged from approximately 62% to 69% percent in healthcare workers aged 18 through 64 y of age, far short of the Healthy People 2020 goal of 90 percent.^{9,10} Consequently, unlike the life-saving success seen in pediatric immunizations, about 40,000 to 80,000 adults die annually from vaccine-preventable diseases like influenza, pneumococcal disease, and hepatitis B. Hundreds of thousands more are hospitalized, creating a significant cost burden for the health care system. It is estimated that in 2010, 4 major vaccine preventable diseases—influenza, pneumococcal disease, zoster, and pertussis—resulted in United States health-care costs of about \$15 billion.¹¹ Another study estimates that influenza hospitalizations alone cost the US health care system about \$8.3 billion annually.¹²

Poor Adult Coverage Rates Have Negative Impact

Beyond the impact to the health of the public and the costs to the health care system, our country's failure to immunize adults has additional ramifications. For example, in the absence of demand from both providers and the public, especially when a vaccine may not achieve a universal recommendation for use from the Advisory Committee on Immunization Practices (ACIP), there is little incentive for manufacturers to enter the existing vaccine market, continue research and development of vaccines, or bring new vaccines through very complex and expensive Phase III clinical trials to seek approval from the Food and Drug Administration (FDA). Influenza remains a classic example of this problem. One of the reasons for the influenza vaccine supply issues in the mid-2000s was the limited number of influenza vaccine manufacturers in the market. As demand for influenza immunization improved, as Medicare payment for the administration of vaccinations under Medicare Part B increased, and ultimately with the adoption of a universal influenza immunization

recommendation, all of which occurred through education, advocacy, and outreach efforts from multiple groups including the National Adult and Influenza Immunization Summit,¹³ the number of manufacturers for influenza vaccine increased. Vaccine supply is now stable, and indeed, robust.

There are a number of remarkable new adolescent and adult vaccines currently in development, including West Nile virus, Lyme disease, and hepatitis C vaccines. However, unless the United States develops an infrastructure to cultivate and support adult vaccination, many of these may not proceed into very expensive Phase III clinical trials. Indeed, R & D of adult vaccines is not an insignificant cost to vaccine manufacturers and concern of the lack of a return on investment as a result of underutilization of appropriate adult vaccines will weigh heavily in the decision-making processes of pharmaceutical companies as they decide whether to invest in adult vaccines or in the latest cardiovascular drug.

A failure to immunize adults leaves many people with chronic disease conditions, such as heart disease or diabetes, vulnerable. For this population, infection with a vaccine-preventable disease increases the risk of severe complications. Indeed, the high-risk adult population remains the most poorly immunized in the United States.⁸ The pneumococcal immunization rate in high-risk adults aged 19 through 64 y of age was just 20 percent in 2012, and the hepatitis B vaccination rate in adults with diabetes was only 28.6 percent. These vulnerable adults are at risk of severe complications should they become infected. When they do become ill, they require care that is complex and costly.

The absence of a national commitment to improve adult vaccination exacerbates existing barriers to immunization for those in the lower socio-economic strata and for racial and ethnic minorities. Unlike the pediatric population where, as a result of the Vaccines for Children program, there are virtually no disparities in immunization coverage, there are significant disparities in the adult population. Between 2011 and 2012, racial/ethnic disparities persisted and even widened for the majority of vaccines recommended for adults.⁸ Non-Hispanic blacks, Hispanics, and non-Hispanic Asians had lower vaccination rates than non-Hispanic whites for most routinely recommended adult vaccines. For example, with respect to

pneumococcal vaccination of the population over 65 y of age, non-Hispanic whites were immunized at about 67.5 percent while non-Hispanic blacks were immunized at 52.3 percent and non-Hispanic Asians were vaccinated at 48.2 percent.

Finally, a strong adult immunization infrastructure will prepare the country for events such as major disease outbreaks or a potential influenza pandemic. Such events could necessitate delivery of more than 300 million doses of vaccine or medications. Any infrastructure developed for adult immunizations will serve a dual purpose: increasing immunization and improving public health preparedness. Our failure to vaccinate our adult population in non-emergency times predicts our failure to do so in times of crisis.

Barriers to Adult Immunizations

There are many barriers to improving use of recommended adult vaccines. Our low vaccination rates reflect limited public and provider knowledge about adult immunization, patterns of health care use by adults, economic constraints, absence of infrastructure, and complex public health recommendations. **Table 2** lists many of the reasons that have been previously reported for poor adult immunization rates. However, in order to successfully improve the country's adult immunization rates, there must be a dramatic change in the way adult immunizations are perceived.

It is important to realize that this is a challenge tantamount to the behavioral change required to reduce the inappropriate use of antibiotics. To achieve this worthy success requires a culture shift in both providers and the patients they serve, dictating several years of continued effort and commitment by adult immunization stakeholders. Despite the identification of so many barriers to successful adult immunization, our lack of immunization progress over the past decade reflects a piecemeal approach to adult immunization. Interventions have been sporadic, dictated by inconsistent funding, and have targeted individual barriers instead of addressing all barriers comprehensively.

By stepping away from the multitude of individual barriers and looking at the adult immunization challenge as a whole, we identify 3 major barriers that need to be addressed simultaneously in order to achieve a paradigm change in adult immunization. These are:

Undervaluation of adult immunization

Adult immunization is severely undervalued by the public and by providers.¹⁴⁻¹⁶ Outreach efforts to both the public and health care providers regarding the importance of adult immunization are not consistent and persistent. This results in a lack of adequate education about the benefits of immunization and the safety of vaccines approved in the United States. Additionally, significant misinformation, much perpetuated by the anti-vaccine movement, exist surrounding vaccines and vaccination.^{17,18}

Currently, both providers and the public have little appreciation of the value of vaccinating adults. As a whole, we have not made a strong effort to educate our public and our providers about the value of adult immunizations, including the economic

impact to the individual (for example, in terms of time and wages lost) and the costs to society (for example, in terms of costs to the medical system). Additionally, as important stakeholders in adult immunization, employers need to be better engaged and made aware of the economic benefits they achieve when their employees are protected from vaccine-preventable diseases. Employer benefits include the impact of reduced employee sick days as a consequence of vaccine-preventable disease. Because the public does not demand vaccination and because providers are not recommending adult vaccines, there is little incentive for national and state policymakers to support programs to improve adult immunization coverage.

The importance of provider vaccine recommendations cannot be overstated. Compelling data exist to indicate that the number one reason why patients receive vaccines is because their provider recommends and offers to administer the vaccine.¹⁹⁻²³ When providers do not set good examples for their patients by getting themselves vaccinated, it is also difficult for them to give a strong recommendation to their patients.

Finally, when adult vaccines are not considered important, racial and ethnic disparities are exacerbated. Indeed, data suggests that racial and ethnic minorities do not receive as many recommendations for vaccination compared to the non-Hispanic white population.^{21,24} In pediatrics, near universal agreement about the importance of protecting children from vaccine preventable disease has led to immunization laws and policies that create an obligatory environment for receiving vaccinations supported by near universal private and public funding. This, coupled with a strong vaccination program has removed disparities in immunization coverage. In contrast, adult coverage rates in the racial and ethnic minority populations are consistently lower than in the non-Hispanic white population.²⁵

Inadequate infrastructure to support adult vaccination

The infrastructure to ensure the adult vaccine pipeline, from research and development to delivery of the vaccine into the arms of patients, is woefully inadequate.^{14,16,26} Thus, the infrastructure to develop and produce adult vaccines, and to deliver these vaccines into the hands of providers is inconsistent, resulting in spot shortages of vaccines and confusion about the vaccine supply in providers. When coupled with the fact that in general, the mechanisms to ensure delivery of adult vaccines are poorly understood by providers, the result is a lack of provider confidence in the enterprise. We need infrastructure encompassing issues ranging from stimulating research and development to liability and compensation for adult vaccines and the establishment of vaccine supply surveillance systems.

In pediatrics, as a result of the Vaccines for Children Program, there is an inherent understanding between the private sector and public health that there is a need to collaborate in order to ensure that public dollars are not wasted and that vaccines are effectively given to uninsured children. As a result, even vaccines given in the private sector that are paid for by private payers, also benefited from the scrutiny. Unfortunately, there is very limited public-private collaboration of this nature to support adults receiving vaccines. Public health must be encouraged to

Table 2. Current vaccines recommended for adults (by risk condition) in the United States by the Advisory Committee on Immunization Practices (ACIP)

Vaccine	Indication	Pregnancy	Immuno-compro-mising conditions (excluding human immuno-deficiency virus [HIV])	Men who have sex with men (MSM)	Kidney failure, end-stage renal disease, receipt of hemo-dialysis	Heart disease, chronic lung disease, chronic alcohol-ism	Asplenia (including elective splenectomy and persistent complement deficiencies)	Chronic liver disease	Dia-betes	Health-care personnel
Influenza	1 dose IIV annually			1 dose IIV or LAIV annually	1 dose IIV annually					1 dose IIV or LAIV annually
Td/Tdap	1 dose Tdap each pregnancy Contraindicated			1-time dose of Tdap for Td booster; then boost with Td every 10 yrs						
Varicella										
HPV Female						2 doses				
HPV Male						3 doses through age 26 yrs 3 doses through age 21 yrs				
Zoster						1 dose				
MMR						1 or 2 doses				
PCV13						1 dose		1 dose		
PPSV23						1 dose 1 or 2 doses		1 dose		1 or 2 doses
Meningococcal						1 or 2 doses		1 or more doses		1 or 2 doses
Hepatitis A						1 or more doses		1 or more doses		2 doses
Hepatitis B						2 doses		2 doses 3 doses		3 doses
Hib						3 doses 1 or 3 doses		1 or 3 doses		1 or 3 doses
			post-HSCT recipients only							

Table 3. Barriers identified to adult immunizations in the United States

Reasons cited in the literature for poor adult immunization rates

Lack of an insurance-covered, routine healthcare wellness visit schedule for adults
Under appreciation of the importance and impact of adult vaccine-preventable diseases
Lack of public knowledge and awareness of the need for and value of adult immunization
Lack of support by sub-specialty professional medical associations and their members for adult immunizations
Uncertainty or lack of knowledge about the safety and efficacy of adult vaccines
Poor public-private commitment to a sustained adult vaccine delivery infrastructure
Liability and compensation concerns
Limited access to preventive services
Lack of awareness among healthcare professionals about immunization disparities
Confusion related to differing vaccination schedules for various subpopulations rather than universal recommendations for all adults
"Missed opportunities" for vaccination during in-patient encounters and at regularly scheduled clinic visits
Cultural and language differences between patients and their physicians
Failure to engage physicians on the issue (in contrast with the childhood immunization program where pediatricians have embraced the public health benefit of immunization)
Insufficient quality indicators related to adult immunization
Poor role-modeling of interest in adult immunization by physicians and other healthcare professionals – no ownership/medical home
Lack of payment for the cost and administration of adult vaccinations

collaborate with private sector providers and other stakeholders to work on supporting their transitions from non-immunizers to immunizers through educational, quality improvement, and information technology initiatives, and to facilitate, monitor, and improve the administration of adult vaccines to the patient. A strong public-private partnership would address issues ranging from the use of information technology to develop adult immunization registries (that are compatible with electronic health records) to the development and dissemination of best practices for providers to improve their vaccination of adults in their facilities.

Adult vaccine recommendations are often confusing to both patients and providers. This makes it hard for patients to recognize the vaccines that they need, and for providers to conveniently assess the appropriate vaccines for their adult patients. Coupled with the perceived uncertainties concerning vaccine supply and the lack of a liability and compensation process for some adult vaccines, many providers may choose to simply not become immunizers. However, best practices have been identified, including those reviewed and summarized by the United States Community Services Task Force.^{27,28} These include strategies to enhance access to vaccines, such as reducing patients' out-of-pocket costs for getting vaccinated; strategies to increase community demand for vaccines, such as patient reminder/recall systems or incentives; and strategies directed at the provider or the healthcare system, such as the use of standing orders, provider reminder systems, and provider assessment and feedback. It is clear that organizational change to create a supportive

environment for adult immunizations, such as implementing standing orders, initiating vaccination-only clinics, and using patient reminder-recall, individually or in combination, is most effective at increasing coverage rates. Unfortunately in the absence of leadership from, and collaboration with, public health to improve the use of these best practices in the predominantly private sector adult immunization enterprise, adoption/implementation remains slow.

In the United States, adult vaccines are driven by free market forces. There is no federal program for the adult population comparable to the Vaccines for Children program where vaccine for uninsured children is procured by the federal government. While there are a few programs such as the Department of Defense, the Veterans Administration and the Indian Health Service, there is no large public sector payer for adult vaccinations, other than Medicaid and Medicare for those over 65 y of age. For adults under 65 y of age, coverage is almost exclusively through private payers. Even with Medicare, substantial barriers inhibit access to vaccines. A recent GAO report recognized that Medicare Part D plans present significant barriers to vaccination for patients over 65 y of age.²⁹ Providers are also wrestling with decisions about how to manage an increasingly larger and more expensive adult vaccine inventory. Thus, as more and more adult vaccines come to the market and many of these bear a significant cost, the decision to immunize patients in the practice comes with the cost of having to stock and store these vaccines. In small practices, storage and handling of vaccines can also create logistic barriers where physicians have not only to maintain the cold chain for the vaccines but also have to pay rent for the space where vaccines are stocked. In the absence of best practices to assist with decision-making, many providers may choose to selectively stock only the vaccines that they can afford and feel certain their patients will accept. This results in decreased patient access and feeds the perception that adult vaccination lacks value. Adult vaccination success depends on good policy decisions that balance the free market need for return on investment with the public health benefit of robust vaccination of our adult population. As an example, policy decisions resulting in adult vaccines being covered as a benefit under Medicare Part D has yielded barriers to adults over 65 y of age receive vaccines such as zoster.²⁹

Inadequate payment for adult vaccines and vaccination

There are few systems in the public or private sector to ensure adequate payment for vaccines and for proper remuneration for providers to offer counsel and to administer adult vaccines.¹⁶ While the Affordable Care Act (ACA) has improved access to adult vaccines for patients to age 65 y by removing co-payments for ACIP-recommended vaccines, it does not address whether payment to providers for administering the vaccines is adequate. If providers cannot earn money giving adult immunizations, they have no incentive to immunize, and may even stop immunizing.

With the ACA essentially mandating vaccine payment for all ACIP-recommended vaccines, the importance of securing an ACIP recommendation for an adult vaccine becomes more critical for manufacturers. However, the ACIP recommendation process provides little incentive for research and development

(R&D) of new adult vaccines. A vaccine without a universal ACIP recommendation will not be covered by the ACA and likely will not be covered by payers. This creates a strong disincentive for providers and patients to offer or seek out the vaccine. It is imperative, as we monitor the impact of the ACA on immunizations that we also monitor for unintended consequences on vaccine R&D – the uncertainty of whether a newly developed vaccine will receive the all-important, routine ACIP recommendation will make vaccine manufacturers wary of developing new vaccines.

Advancing solutions for one of these 3 barriers, without addressing the other 2 simultaneously, will ultimately fail. In order for the paradigm shift to occur and behavior to change, all 3 barriers must be advanced together. For example, if we successfully improve valuation for adult vaccination, but do not improve vaccine access, we cannot succeed. On the other hand, if we develop a significant national infrastructure to deliver adult vaccines, but providers perceive that they are inadequately compensated for giving vaccines, we cannot succeed.

Shifting the Paradigm—A National Adult Immunization Plan

It is clear that a new paradigm is necessary to improve adult immunizations in the United States. Uncoordinated solutions may provide piecemeal improvements, but they cannot drive sustained improvement. A national strategy is necessary, comprising interventions to advance the following actions:

- Drive demand by improving valuation via education and outreach.
- Improve access to all adult vaccines by:
 - Ensuring supply and delivery through improved infrastructure;
 - Tracking and monitoring demand for, and supply of, vaccine;
 - Creating collaborative provider relationships and public-private partnerships to facilitate/promote adult immunization.
- Ensure adequate payment, because adult immunization cannot be a money-losing proposition for providers.

The good news is that in the United States, adult immunizations are beginning to receive greater attention from the public health community and from immunization stakeholders. As a result, there are efforts underway to advance a national plan that will drive interventions in these 3 directions. A number of programs are leading the way, including the following:

National strategic plan for adult immunization

The National Vaccine Advisory Committee (NVAC) is a federal advisory committee on national immunization policy to the Assistant Secretary for Health at the Department of Health and Human Services (DHHS). In 2011, the NVAC released a white paper on adult immunizations and provided

3 recommendations for improvement of adult immunization rates in the US. These three recommendations stated that (1) the DHHS should develop and adequately support a coordinated and comprehensive National Adult Immunization Program, (2) the DHHS should lead the development of a comprehensive National Strategic Plan for Adult Immunization that incorporates input from a broad range of stakeholders, and (3) appropriate resources (financial and infrastructure) should be allocated by the leadership of the National Adult Immunization Program to carry out the strategic action plan.¹⁶ As a result of this report and its recommendations, the National Vaccine Program Office of DHHS has started the work to develop the National Strategic Plan for Adult Immunization.

The national adult and influenza immunization summit

The National Adult and Influenza Immunization Summit (NAIIS) is a partnership of more than more than 140 public and private organizations dedicated to achieving Healthy People 2020 goals for adult and influenza immunization.¹³ The NAIIS has taken on a leadership role to advance action to address and resolve adult and influenza immunization issues. The NAIIS has a diverse representation, which includes a wide range of professionals from the healthcare industry, public health and private medical sectors, vaccine manufacturers and distributors, consumers, and others interested in stopping the transmission of vaccine-preventable diseases. This action-oriented partnership carries out much of its work through 5 working groups: (1) Provider Outreach, (2) Patient Awareness, (3) Quality Measurement, (4) Access and Collaboration, and (5) Decision Makers. Through the efforts of these working groups, progress has already been made to consolidate and disseminate best practices in adult immunizations, improve messaging to the patient, identify gaps in quality measurement for adult immunizations, improve adult immunization standards of care to reflect a broader provider base, and document the status of individual states on adult immunization policy. The complete work of the NAIIS can be reviewed at its website: www.izsummitpartners.org.

The standards for adult immunization practice (standards)

In 2013, under the leadership of the NVAC and the NAIIS, the existing Standards for Adult Immunization Practice were updated and adopted by the NVAC as new recommendations.²⁷ The updated Standards reflect the changing environment of adult immunization, including the impact of the ACA and the increasing diversity of the adult public and provider population. The Standards emphasize a necessary paradigm shift, urging that ALL providers of care to adults embrace 4 fundamental responsibilities to meet the Standards for Adult Immunization Practice and ensure that adult patients are fully immunized and have maximum protection from serious diseases:

- ASSESS immunization status of all patients in every clinical encounter,
- RECOMMEND strongly the vaccines that patients need,

- ADMINISTER needed vaccines or REFER to a provider who can immunize, and
- DOCUMENT vaccines administered or received by patients.

The American college of obstetricians and gynecologists (ACOG)

The American College of Obstetricians and Gynecologists (ACOG) has become a national leader in promoting adult immunization in the high-risk pregnant population. As part of this effort, ACOG has launched a comprehensive website to promote efforts to vaccinate the pregnant patient: <http://www.immunizationforwomen.org/>. Under the leadership of ACOG and its partners, influenza immunization coverage in pregnant women has increased over 3 y from below 30 percent to 50.5 percent in 2012.

The American College of Physicians (ACP)

The American College of Physicians (ACP) has launched an initiative to improve adult immunization by tying it to quality improvement through its Quality Connect programs (<http://immunization.acponline.org/>). These programs allow physicians and their health care teams to implement quality improvement with help from ACP QI experts. To improve their adult immunization rates, physicians will be taught how to use online QI tools and registries and how to upload data from paper charts or EHRs. Maintenance of certification Practice Assessment points, Continuing Medical Education credits, and submission to the Physician Quality Reporting System are among the benefits of the programs.

Adult Immunizations in other countries

Many of the situations that result in low adult immunizations rates in the United States also exist in many other countries around the world. Globally, due to a strong commitment to pediatric immunization programs, such as through initiatives such as the Expanded Program on Immunization (EPI) and the Global Alliance for Vaccines and Immunization (GAVI), vaccination saves an estimated 2–3 million lives each year. In contrast, there is almost non-existent commitment to immunizing adults.

There has been some studies performed looking at the differences between countries other than the United States.^{30,31} Vaccination policies for adults vary significantly across the different countries of the Europe.³¹ While some countries recommend only 4 different adult vaccines, others may recommend as many as 16. On average, European countries have recommendations for 11 adult vaccines. Most commonly recommended adult vaccines are seasonal influenza, and tetanus and diphtheria containing vaccines, reflecting public health priorities in most European countries at preventing these diseases. Shingles vaccination is the least recommended.

Only tetanus and diphtheria containing vaccines are routinely recommended for all adults in most countries.³⁰ All other vaccines have recommendations based on age and on risk factors. Some countries have recommendations for influenza based on age, some will have risk-based recommendations, and these recommendations will differ greatly. Adding to the complexity of

making comparisons across countries is the fact that the age definition of adults vary across European countries with different ages defining the onset of adulthood, and different implementation priorities for a recommendation for vaccination. Finally, while some countries will provide significant monetary resources for implementing a vaccination recommendation, others do not, and without the fiscal commitment to match the policy, immunizations rarely occur. In particular, routine surveillance for adult vaccine preventable diseases and routine adult vaccination coverage assessment are essential in order to continually improve adult vaccination commitment and rates, but support across countries for these important infrastructure needs is extremely variable.

Accordingly, the picture across the world for recommendations for the other adult vaccines is variable and complex, but ultimately, the issues that stand out in global adult immunizations are not that different from those being dealt with in the United States. Some predictors exist as to whether a country will have adult immunization strategies in place.³⁰ Thus, countries with large populations were more likely to have a coverage estimate for adult vaccines and this is important to continuous process improvement. A higher GDP per capita and health expenditure per capita were associated with an increased probability of recommendation for adult vaccines in the country, and increasing out-of-pocket health expenditure was related to a decreased likelihood of the country having a recommendation for a vaccine as well as having a vaccination coverage estimate available. Finally, a recommendation for adult vaccination was positively associated with having a comprehensive adult immunization schedule in the country.

Conclusions and Potential New Challenges

Adult immunization, like pediatric immunization, has the potential to reduce morbidity, mortality, and cost to the United States economy. However, unlike pediatric immunization, there has not been a sustained effort to ensure the delivery of adult vaccines from manufacturer, through the private sector distribution system, and into the arms of patients. As a result, adult immunization coverage rates are very low and the morbidity, mortality, and societal costs of adult vaccine-preventable diseases are much higher than they are in our pediatric population.

In order to improve adult immunization coverage in the United States, we need to establish a national adult immunization strategic plan that will advance action to address 3 fundamental barriers simultaneously: (1) undervaluation of adult immunizations, (2) lack of access to adult vaccines, and (3) lack of adequate payment for adult vaccinations. Only a national strategic plan can develop interventions that change fundamental behaviors in both provider and the public regarding the vaccinations of adults.

Recently, there have been increased efforts by multiple groups to drive these behavior changes. And there is optimism that leadership from the National Vaccine Program Office, the Centers for Disease Control and Prevention, and the National Adult and Influenza Immunization Summit, coupled with the development

of the National Strategic Plan for Adult Immunization, will realize the potential for improving adult immunizations rates.

Challenges remain, even as the country makes progress in adult immunizations. The ACA, when fully implemented, will guarantee improved cost-free access to all ACIP-recommended vaccines for many more adults. However, with the challenges posed by differential state-by-state adoption of expanded Medicaid, we will need continued education of providers and patients regarding their eligibility for adult immunization benefits. Continued education is also needed for those over 65 y of age who are insured through Medicare, and the providers who serve them, as vaccines covered under Medicare Part D plans are reimbursed very differently from influenza, pneumococcal, and hepatitis B vaccines covered under Medicare Part B.

As ACA makes payment concerns for the patient less of a barrier, we must also ensure adequate access points for eligible adults to receive vaccinations. The new Standards for Adult Immunization Practice suggest that all providers of adult care need to recommend, and provide adult vaccines. The ACA made its coverage mandates specific to providers who are considered “in-network” by insurance plans. Most public health departments, pharmacies, and other complementary providers (such as community immunizers), are considered out-of-network. Because ACA provisions do not apply to these providers, the provisions significantly reduce the number of cost-free locations where patients can be vaccinated, and increase the confusion about why vaccines do not appear to be 100 percent free. Additional provider and patient outreach addressing these nuances in payment for adult vaccines will be necessary. In particular, data indicates that provision of adult vaccinations in pharmacies and other mass immunization settings improves access to vaccinations and increases rates and indeed, may actually be more cost-effective than when given in a physician office setting.^{32,33} Thus, the consideration by commercial health plans to implement a pharmacy-based adult vaccination benefit would be one step to improve access for adult vaccines.³⁴

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Finally, despite the improvements in access to healthcare afforded by the ACA, many adults will remain uninsured. There remains a critical need for public health safety nets to provide vaccination opportunities. Additionally, our delivery system must also be prepared for the disproportionate influx of adults of lower socio-economic status who are seeking cost-free access to adult vaccines. The already fragile public health system may not be ready to handle this increase in patients.

It is in the interest of any society seeking to reduce mortality, morbidity, and societal costs to implement a strong adult immunization infrastructure as part of a national adult immunization plan. Work is now underway, through the leadership of the National Vaccine Program Office, to develop the National Strategic Plan for Adult Immunization, with a planned release of the plan in 2015. At the global level, opportunities also exist for improving adult immunizations. The entire global population, like the United States, is aging. Indeed, the United Nations estimates that by 2025, 15% of the world's population will be over the age of 60 y. Multiple global organizations have called for increased focus on adult immunizations, particularly in the vulnerable aging population. Indeed, the International Federation on Aging (IFA) has recommended that greater attention be given to adult immunizations. Many adults with chronic illness are recommended for vaccination and the world is now paying more attention to the burden of chronic illness, creating synergistic opportunities to advance adult vaccination as part of the course of management of chronic disease. The persistent unrealized potential of adult immunizations in the United States and around the world is unacceptable. All medical and public health stakeholders must now collaborate to realize the significant health benefits that come with a strong adult immunization program.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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