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TECHNICAL REPORT

A Blueprint for Improving the Promotion and Delivery of Adult Vaccination in the United States

Katherine M. Harris, Lori Uscher-Pines,

Soeren Mattke, Arthur L. Kellermann

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RAND HEALTH

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1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
4570 Fifth Avenue, Suite 600, Pittsburgh, PA 15213-2665
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Preface

Vaccine-preventable disease (VPD) continues to take a heavy toll on adults despite the widespread availability of effective vaccines. Numerous stakeholder organizations have issued reports describing barriers to adult vaccination and recommending improvement. So far, these calls to action have succeeded in stimulating improvements in financial access but have not resulted in changes to make the delivery system more supportive of adult vaccination. A renewed focus on prevention as part of the Affordable Care Act, however, creates a unique window of opportunity to improve the delivery of vaccinations to adults. To help leverage these changes, we conducted a project to identify *specifically* where efforts to improve the delivery of adult vaccination have stalled and to recommend, with input from stakeholders, targeted strategies to address these bottlenecks that are supported by available evidence and build on existing infrastructure. This report describes the results of our investigation. It offers a series of recommendations aimed at integrating the delivery of advice about vaccination into routine office-based care and the development of tools and incentives to encourage providers who do not offer vaccination to refer adult patients to community vaccinators.

This report will provide public health professionals and other organizations involved in the manufacture, purchase, and administration of vaccines with insights useful for strengthening the promotion and delivery of adult vaccination in the United States. This work was supported by an unrestricted grant from GlaxoSmithKline and was conducted by RAND Health in the Program on Public Health Systems and Preparedness. This report has undergone rigorous peer review to ensure that it meets RAND's high standards for research quality and objectivity. The principal investigator for this project was Katherine Harris. All participants were given an opportunity to review and comment on a draft of this report. While this report reflects the insights and opinions of participants in our stakeholder workshop, it does not necessarily reflect their endorsements. A profile of RAND Health, abstracts of its publications, and ordering information can be found at www.rand.org/health.

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Vaccine-preventable disease (VPD) continues to take a heavy toll on adults despite the widespread availability of effective vaccines. The health and productivity costs of influenza alone have been estimated to be as high as $87 billion per year.[3] However, in contrast with childhood vaccination rates, adult vaccination rates remain low. For example, data from 2009 show that only 10 percent of recommended adults had received a shingles vaccination. Even in the case of influenza vaccination, which is widely promoted, attracts substantial media interest, and is often provided at worksites, coverage rates among high-risk adults do not exceed 70 percent.

Numerous stakeholder organizations have issued reports describing barriers to adult vaccination and recommending changes to address them. Barriers include lack of public knowledge of the risks of VPDs,[7] skepticism about vaccine safety and effectiveness,[7, 16, 17] lack of administrative systems for identifying appropriate patients in medical records and generating reminders for them to be vaccinated,[13] perceived inadequacy of reimbursement for vaccination,[11] and lack of vaccination-related performance measures and incentives.[15]

Recent changes in the policy and practice environment surrounding adult vaccination create a unique window of opportunity to take concrete action to improve the delivery of vaccinations to adults. Recent health care reform legislation promotes preventive care generally and improves financial access to adult vaccination specifically. Moreover, growing availability of vaccinations outside of office-based settings, including workplaces, pharmacies, and retail medical clinics, makes obtaining vaccinations easier.

To help leverage these changes, we conducted a project aimed at (1) identifying *specifically* where efforts to improve the delivery of adult vaccination have stalled and (2) recommending—with the input of key stakeholders—targeted strategies to address these bottlenecks that are supported by available evidence and build on existing infrastructure. To achieve this objective, we conducted a comprehensive review of the published literature on adult vaccination, a stakeholder workshop in January 2011, follow-up interviews with meeting participants and additional experts, and a short telephone survey of adults 18 and older (n = 1,278) to learn about the relationship between influenza vaccination and beliefs about the safety of influenza vaccine.

Findings

The policy and practice environment surrounding adult vaccination is changing rapidly. Recent health care reform legislation includes a number of specific provisions aimed at improving financial access to and delivery of vaccinations to adults and others.[63, 117, 118] Health care

reform provisions aimed at improving the provision of preventive care could also have a dramatic effect on the delivery of adult vaccinations. New efforts to release timely, national coverage data could provide benchmarks for measuring progress toward federal objectives. In addition, increasing the use of electronic health records (EHRs) has the potential to increase the efficiency of vaccination support services.

Office-based settings remain a logical focus of efforts to increase adult vaccination. Although vaccination is becoming available in a variety of settings and the use of complementary sites has grown quickly in the past several years, office-based providers remain the primary source of vaccination. Recent national survey data show that over twice as many influenza vaccinations were administered in physician offices and medical clinics than were administered in any other setting. Additionally, adult vaccinations other than influenza are not yet widely available outside of office-based settings. Despite the existence of a growing number of pharmacists who are permitted to vaccinate, we found the information technology infrastructure required to transfer relevant clinical data and vaccination status information across care settings to be in its infancy.

Physicians are also a highly influential source of advice about vaccinations, and achieving substantial increases in adult vaccination will require persuading large numbers of individuals disinclined to be vaccinated.[133] National survey data suggest that by March 2009, 44 percent of the 160 million U.S. adults who were specifically recommended for influenza vaccination were not vaccinated and did not intend to be.[78] In this group, almost half (20 percent of all recommended adults) indicated being willing to be vaccinated with a strong recommendation from a health care provider. In contrast, little is currently known about the ability of complementary vaccinators to persuade hesitant individuals to be vaccinated.

Office-based health care providers are not meeting their potential in administering and promoting adult vaccination. A substantial proportion of physicians who treat adults appear not to vaccinate at all. Self-reported data from physician surveys conducted between 2007 and 2010 suggested that only 27 percent stock all recommended adult vaccinations other than influenza.[87–91] Adult vaccination is also infrequently discussed at health care encounters. Despite data suggesting that the public places a high degree of trust in health care providers to deliver information about vaccination, we found that relatively few adults—even those specifically recommended for vaccination—receive advice about vaccinations from their health care providers. Moreover, we identified few ongoing efforts to evaluate and improve provider communication regarding the safety and benefits of vaccination with adult patients.

Adult practices lack a strong business case to offer vaccination. Office-based administration of vaccines entails substantial fixed costs to providers, as they need to install and operate appropriate storage and cooling facilities, as well as to maintain the administrative infrastructure for ordering vaccine and managing inventory. This investment can only be recouped if demand is sufficiently strong and predictable, as it is in pediatric practices, in which vaccination is a routine part of regular preventive visits, supported by school requirements. In adult practices, however, providers need to identify vaccination gaps, educate patients about vaccination needs, and deliver the vaccination. As payment rates are low and indirect incentives, such as performance measures, are lacking, providers commonly devote their limited time to other health concerns. At the same time, there are no incentives for providers who do not vaccinate to refer patients to community vaccinators.

Recommendations

Efforts to promote vaccination can contribute to, as well as gain from, efforts to strengthen primary care. To realize this opportunity, vaccination stakeholders need to engage in a collaborative fashion to promote adult vaccination and the integration of advice about vaccination—regardless of where it is administered—into routine office-based practice. Our investigation informed by stakeholder input suggested five sets of specific actions that vaccination stakeholders and substantive experts should undertake to facilitate practice change around adult vaccination.

Recommendation 1. Strengthen evidence surrounding practice gaps and strategies for promoting vaccination. In particular, we identified as research priorities (1) the collection and dissemination of national data describing patterns of office-based vaccination of adults to pinpoint gaps in practice and target improvement efforts and (2) the assessment of the costs and benefits of promoting vaccination of adults in office-based settings and complementary settings, such as schools, health departments, and retail stores.

Recommendation 2. Improve guidance to providers about vaccinating adults. To improve provider understanding of how to effetively promote and administer vaccines, we recommend the development of structured vaccination counseling protocols, provision of clear guidance for vaccination of adults with missing or incomplete vaccination histories, and the development of protocols for periodically evaluating adults' vaccination status based on age.

Recommendation 3. Assist providers in making informed decisions about whether to administer vaccinations on site. Vaccination is a complex and costly activity drawing on a variety of practice resources. Thus, we recommend the development of a decision tool to help office-based providers make informed choices about the viability of vaccinating on site.

Recommendation 4. Formalize procedures for referring patients to complementary vaccinators. Referrals should include information regarding the recommended vaccination, locations and hours for community vaccinators offering the recommended vaccination, contact information for the referring provider, provider preferences regarding return of documentation to the referring provider, and handling of patient self-referrals for universally recommended vaccinations—specifically flu.

Recommendation 5. Document vaccination support efforts to facilitate performance-based payment. Without a mechanism for crediting office-based providers for vaccinations administered outside of office-based settings, nonvaccinating providers have little incentive to promote vaccination. There are several avenues through which documentation of vaccination support could be developed:

- Apply for procedure codes specific to vaccination counseling.
- Develop a checklist to assess the effectiveness of office-based providers in ensuring that their adult patients are vaccinated as recommended.
- Add questions about the frequency and quality of vaccination-related advice and referrals to national surveys to gauge the effectiveness of providers in promoting vaccination to patients.

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CHAPTER ONE

Introduction

Vaccine-preventable disease (VPD) continues to take a heavy toll on adults despite the widespread availability of effective vaccines. Vaccines are designed to harness the body's natural ability to fight disease by giving the patient's immune system an "advance look" at a dangerous pathogen so it can swiftly attack and kill it if it tries to cause disease. The Centers for Disease Control and Prevention's (CDC's) Advisory Committee on Immunization Practices (ACIP) recommends 11 different vaccinations for adults to prevent a host of diseases.[1] Three are recommended for all adults and eight are recommended based on age or other risk factors. While they directly reduce death and disease, the vaccinations recommended by ACIP also improve quality of life and reduce medical care costs and productivity losses associated with treating and caring for infected individuals. Vaccination is considered one of the 20th century's greatest public health achievements for its role in the eradication of smallpox and the control of polio, measles, rubella, and other infectious diseases in the United States.[2] The health and financial costs of VPD in adults are extremely high. The health and productivity costs of influenza alone have been estimated to be as high as $87 billion per year.[3] In an average year, 95 percent of the approximately 20,000 to 50,000 Americans who die as a result of VPD are adults, depending on the severity of annual influenza outbreaks.[4]

In contrast with childhood vaccination rates, adult vaccination rates remain low. Childhood vaccination rates in the United States typically exceed 90 percent.[5] Despite clear evidence of the health and economic benefits, adults continue to be vaccinated at stubbornly low and variable rates (see Table 2.2 in Chapter Two). For example, data from 2009 show that only 10 percent of recommended adults had received a shingles vaccination and only 17 percent of young women in the United States had received three recommended doses of human papilloma (HPV) vaccination. Even in the case of influenza vaccination, which is widely promoted, attracts substantial media interest, and is often provided at worksites, coverage rates among adults with chronic conditions that put them at risk of influenza and influenza-related complications do not exceed 70 percent. Not even a widely publicized pandemic could increase rates tangibly, as illustrated by the fact that only 17 percent of adults older than 19 years of age sought vaccination against H1N1 during the 2009 outbreak.[6] Moreover, data from national surveys further show that racial and ethnic minorities are substantially less likely than whites to receive vaccinations recommended for adults.[6–8]

Numerous stakeholder organizations have issued multiple reports describing barriers to adult vaccination and recommending improvement. With the success of the childhood vaccination program in the United States in mind, numerous stakeholder groups have issued reports in recent years calling for action to improve adult vaccination. These reports inventory barriers to expanded adult vaccination and recommend a variety of actions to be

taken by government agencies, health insurers, community vaccinators, and others to raise adult vaccination rates.[4, 7, 9–15] Barriers noted in these reports include

- a lack of public knowledge regarding the risks of VPDs[7]
- skepticism regarding vaccine safety and effectiveness[7, 16, 17]
- inability to pay for vaccination[18]
- the lack of administrative systems for identifying appropriate patients in medical records and generating reminders for them to be vaccinated[13]
- the perceived inadequacy of reimbursement for vaccination and the low vaccine administration fees paid by health insurers[11]
- the lack of vaccination-related performance measures and incentives.[15]

In February 2011, the National Vaccine Advisory Committee's Adult Immunization Group released a draft report titled *Adult Immunization: Complex Challenges and Recommendations for Improvement*.[7] This report provided the most comprehensive overview of the barriers to adult vaccination to date and recommended actions for improvement, including the explicit identification of government agencies and stakeholders most reasonably responsible for implementation.

So far, these calls to action have stimulated improvements in financial access; improvements in the delivery of vaccinations to adults have been harder to achieve. By raising awareness of the benefits of adult vaccinations, low coverage rates, and the barriers to expanded uptake, these reports have stimulated federal policymakers to improve financial access to vaccinations through provisions in recent health reform legislation. These provisions (described in the following section) require health insurance coverage of vaccinations recommended for adults by ACIP and pave the way for providers to purchase adult vaccines at discounted prices negotiated by the federal government. At the same time, stakeholder efforts to promote the improved delivery of adult vaccinations have not met with similar success. Identifying strategies to address this gap in vaccination practice is an important motivation for this report.

The changing health care policy and practice environment creates a unique window of opportunity to improve the delivery of vaccinations to adults. Two fundamental changes in the U.S. health care system are creating a more conducive climate for delivery of preventive care in general and adult vaccination in particular. The first is the emergence of patient-centric care delivery models that hold providers accountable for patient outcomes across the care continuum, such as patient-centered medical homes (PCMHs)* and accountable care organiza-

* The Patient-Centered Primary Care Collaborative defines a PCMH as an approach to delivering primary care in which practicing clinicians will

> [t]ake personal responsibility and accountability for the ongoing care of patients; be accessible to their patients on short notice for expanded hours and open scheduling; be able to conduct consultations through email and telephone; utilize the latest health information technology and evidence-based medical approaches, as well as maintain updated electronic personal health records; conduct regular check-ups with patients to identify looming health crises, and initiate treatment/prevention measures before costly, last-minute emergency procedures are required; advise patients on preventative care based on environmental and genetic risk factors they face; help patients make healthy lifestyle decisions; and coordinate care, when needed, making sure procedures are relevant, necessary and performed efficiently.[119]

tions (ACOs).[†] In particular, the PCMH movement has evolved rapidly and has received the endorsements of numerous professional organizations and patient advocacy organizations. There are more than 40 PCMH demonstrations and pilot projects operating throughout the United States sponsored by private health plans and state and federal governments.[19, 20] The second development is language in health care reform legislation that promotes preventive care generally and improves financial access to adult vaccination specifically. Recently enacted health care reform legislation is likely to accelerate the diffusion of the PCMH model through expanded Medicaid payments and funding for the development and testing of innovative delivery models.[21] Complementing these changes is recent growth in the wide availability of influenza vaccinations outside of office-based settings, including workplaces, pharmacies, and retail medical clinics.

To help leverage these changes, we conducted a project aimed at (1) identifying *specifically* where efforts to improve the delivery of adult vaccination have stalled and (2) recommending—with the input of key stakeholders—targeted strategies to address these bottlenecks that are supported by available evidence and build on existing infrastructure. To achieve these objectives, we undertook four specific activities:

1. an in-depth review of the published literature on adult vaccination, including peer-reviewed articles, stakeholder-issued reports, conference proceedings, vaccination recommendations, and other unpublished "gray" literature.[‡]
2. a stakeholder workshop in January 2011 focused on reviewing the current state of adult vaccination, as reflected in our literature review, and gathering expertise and insights regarding the underlying causes of low adult vaccination rates and ideas for improvement. To ensure a diverse array of expertise and opinion, we invited individuals representing a wide range of public, private, and nonprofit organizations and associations with interests in the appropriate and efficient delivery of adult vaccinations. The 31 individuals who attended the meeting represented the CDC, the U.S. Department of Health and Human Services' (HHS's) National Vaccine Program Office (NVPO), the National Institutes of Health (NIH), the vaccine manufacturing industry, private health insurance plans, public health advocacy organizations, professional associations representing physicians and pharmacists, and firms involved in the development of technologies to facilitate and streamline billing and reimbursement for office-based vaccine administration. Participants also included researchers and others with substantive expertise in vaccine financing and access, health communication, performance measurement, and health behavior counseling. We took detailed notes during the meeting and used them to identify themes and issues to address in our report and to identify areas where additional review of the literature or follow-up was required.
3. follow-up interviews with meeting participants and 11 additional experts identified through the recommendation of participants. The purpose of these interviews was to

[†] The Centers for Medicare and Medicaid Services defines an ACO as "groups of doctors, hospitals, and other health care providers, who come together voluntarily to give coordinated high quality care to the Medicare patients they serve. Coordinated care helps ensure that patients, especially the chronically ill, get the right care at the right time, with the goal of avoiding unnecessary duplication of services and preventing medical errors."[130]

[‡] The databases we searched included PubMed, Google, and Google Scholar. We also obtained reports and unpublished materials from websites maintained by the DHHS National Vaccine Program Office, CDC, the National Influenza Vaccination Summit, and the Immunization Action Coalition.

clarify points and seek further information about topics discussed during the meeting and to solicit feedback on recommendations formed on the basis of the meeting and the materials reviewed.

4. a short, exploratory survey (n = 1,278) of U.S. adults fielded in partnership with senior leadership of a health communication firm who participated in the January 2011 workshop. The purpose of the survey was to inform concerns expressed by several workshop participants about the ability of health care providers to address adequately patient concerns about vaccination safety.

Reflecting available research, the vast majority of the empirical evidence presented in this report is based on studies of the demand for and delivery of influenza vaccination. While influenza vaccinations differ in important ways from other vaccinations, the circumstances surrounding their use can be considered a reasonable "upper-bound" measure of the effectiveness of the current system in delivering vaccinations to adults. Specifically, influenza vaccinations are routinely administered in a wider variety of settings than other vaccinations, are recommended for more frequent use, and are less costly than other (particularly newer) vaccinations. Thus, the barriers that prevent the use of influenza vaccinations are in many cases compounded for other types of vaccinations, which are less accessible and less familiar to the public.

CHAPTER TWO

Findings

Low Adult Vaccination Rates Lead to Costly and Avoidable Illnesses

Vaccine-preventable disease takes a heavy toll, despite the widespread availability of effective vaccines. The health and productivity costs of influenza alone are estimated to be as high as $87 billion per year.[3] In an average year, 95 percent of the approximately 20,000 to 50,000 Americans who die as a result of VPD are adults, a figure that depends, in part, on the severity of annual influenza outbreaks.[4, 22] While there are no comprehensive studies of the value of adult vaccination programs, several of the vaccines recommended for adults have been shown to be cost-effective,[23–36] and even cost-saving.[25, 37–40] The burdens of selected VPDs and the benefits of vaccination are described in Table 2.1. Selected adult vaccination rates by recommended subgroup are shown in Table 2.2.

Recent infectious outbreaks point to potentially catastrophic consequences of low vaccination rates. In cases in which diseases can spread from one individual to another, high vaccination rates not only protect those who are vaccinated but also their family members and neighbors. Vaccinating large numbers of people prevents the rapid spread of disease, as pathogens cannot find susceptible hosts. In effect, vaccinated individuals form a human firewall that blocks or delays the spread of disease. Public health officials refer to this phenomenon as "herd immunity." If overall vaccination rates fall too much, the risk of epidemics or even pandemics increase dramatically because diseases can more easily jump from one susceptible person to another. Recent outbreaks of pertussis and measles are a case in point. According to the California Department of Public Health, such outbreaks can be attributed in part to the fact that immunity from vaccines decreases over time, and booster vaccination rates remain low among adolescents and adults.[62]

The Policy and Practice Environment Surrounding Adult Vaccination Is Changing Rapidly

Health care reform legislation contains five provisions relevant to adult vaccination. Recent health care reform legislation includes a number of specific provisions aimed at improving financial access to and delivery of vaccinations to adults and others.[63, 117, 118] These provisions include the following:

- reauthorization of Section 317 of the Public Health Service Act, which funds states to provide vaccines to children and adults who do not qualify for free vaccination (e.g., under the Vaccines for Children program) and to develop infrastructure for vaccination

Table 2.1
Burdens of Selected Vaccine-Preventable Diseases and Benefits of Vaccination

Influenza	Of the VPDs striking adults, influenza takes the heaviest toll. Influenza is a highly contagious respiratory disease that can lead to mild to serious illness. When influenza strikes adults, it can severely complicate the management of chronic illnesses, such as heart disease and congestive heart failure.[41] Bacterial pneumonia is a frequent complication of influenza.[41] Depending on the severity of annual outbreaks, influenza is associated with up to 49,000 deaths each year, over 200 million days of restricted activity, up to 22 million health care visits, and up to 200,000 hospitalizations.[9, 22] Together influenza and pneumonia constitute the seventh leading cause of death in adults over 65, causing roughly the same number of deaths as diabetes in this population.[42] Influenza vaccination is now recommended for all persons at least 6 months of age.[43] Influenza vaccinations are considered cost-effective and, in some studies, cost-saving for older and high-risk adults.[25, 37–40] There is less consensus surrounding the benefits of vaccinating healthy, middle-age adults for influenza.[23–26, 120]
Invasive pneumococcal disease	Pneumococcal disease is an infection caused by a type of bacteria called Streptococcus pneumoniae. Although the rate of pneumococcal disease among adults has declined in recent years because of widespread use of the pneumococcal conjugate vaccine in children,[7] invasive pneumococcal disease continues to cause more than 6,000 deaths and 175,000 hospitalizations in the United States each year. Pneumococcal vaccination is recommended for high-risk adults between the ages of 18 and 64 and all adults age 65 and older.[44] The growth of antibiotic resistance has also increased the importance of pneumococcal vaccination.[121] Pneumococcal vaccination is considered cost-effective and even cost-saving among adults age 35 and older.[122, 123]
Shingles	Shingles, also known as herpes zoster, is a painful and debilitating nerve condition that is often accompanied by a skin rash with blistering.[45] Shingles is caused by the varicella zoster virus—i.e., chicken pox—which is an infection that typically occurs in childhood. The virus remains latent in the body and can reactivate to cause the symptoms of shingles, particularly in older adults or people whose immune systems are compromised. Each year shingles affects approximately 1 million Americans. One in three Americans will contract shingles in their lifetime.[46] If detected early, shingles can be treated with antiviral medications. However, up to 20 percent of patients can experience severe bouts of shingles, including the development of disabling, long-term chronic pain.[47] Zoster vaccination is recommended for adults age 60 and older.[45, 46] Several studies suggest that zoster vaccination is cost-effective for recommended adults age 60 and older, though results are sensitive to the cost of the vaccine, age at vaccination, and the effectiveness of the vaccine.[27–30]
Human papillomavirus (HPV)	HPV is one of the most common sexually transmitted infections. HPV is linked to the development of genital warts and several types of cancer in women and men. In fact, HPV causes virtually all cases of invasive cervical cancer. Each year, 12,000 women are diagnosed,[48] and 4,000 women die from cervical cancer in the United States.[49] Young women are disproportionately affected by HPV and HPV-related cancers. Approximately 45 percent of women age 20–24 are infected with HPV, and approximately 65 percent of cervical cancer deaths occur in women under the age of 64.[50, 51] Precancerous cervical lesions are curable if detected early and appropriately treated. However, cervical cancer is rarely symptomatic until it is advanced. HPV vaccination is currently recommended for girls 9–18 years of age and women 19–26 years of age, though evidence of cost-effectiveness is strongest for women age 18 and under.[52] The ACIP recently recommended HPV vaccination for males 13–21 years of age.[124]

Table 2.1—continued

Hepatitis A and B	Hepatitis A and B belong to a family of viral infections affecting the liver, which can be transmitted through such routes as contaminated food or water or sexual contact. Those at particular risk of contracting hepatitis include travelers to foreign countries, health care workers, men who have sex with men, and injection drug users. Hepatitis A is usually self-limiting, causing stomach pain, nausea, and vomiting, which can last up to several months, but some infections can lead to acute liver failure. Hepatitis B infections tend to be more serious and can lead to chronic hepatitis, resulting in about 3,000 deaths per year.[7] About 5 percent of acute cases and 15 percent of chronic cases result in liver disease and death.[53] In 2007, there were a total of 25,000 new acute and asymptomatic hepatitis A and 43,000 hepatitis B infections.[54] Hepatitis A and B vaccines are recommended for adults with chronic illnesses and those who are at heightened risk, based on such factors as occupation, travel, and drug use. Both vaccines are considered highly cost-effective when administered in targeted populations.[31–36]
Pertussis	Pertussis, commonly referred to as whooping cough, is a contagious bacterial disease that causes uncontrollable, violent coughing. Thousands of adults contract pertussis each year and can be asymptomatic at the beginning of the illness while infectious. Also, many are not identified as having pertussis when symptomatic. Thus, infected individuals can unknowingly transmit the infections to infants age 2 months and younger, who are too young to be vaccinated and are at the greatest risk for serious complications and death.[125] In fact, although the source of infection is not always known, when a source is identified, a parent or caregiver is typically the first to bring pertussis into a household with multiple pertussis cases.[55–57] In 2010, California experienced its largest pertussis outbreak in 65 years, resulting in ten infant deaths.

- authorization of state vaccination programs to use state funds to purchase vaccines for adults using the federal purchase price negotiated by the CDC
- authorization of a CDC-funded demonstration program through which states can receive federal grants to improve the provision of recommended vaccinations in children, adolescents, and adults through the use of evidence-based interventions
- requirement that the General Accountability Office study and report to Congress about Medicare beneficiary access to recommended vaccines under the Medicare Part D benefit
- initiatives to improve communication regarding implementation of ACIP recommendations in clinics and communities.

Health care reform provisions aimed at improving the delivery of preventive care could have a dramatic effect on the delivery of adult vaccinations. Relevant provisions include the expansion of Medicaid eligibility to 133 percent of the federal poverty level; the expansion of Medicaid eligibility to childless adults; the creation of the Essential Benefits Package, which must be used by health plans participating in state health insurance exchanges and by states for the newly eligible Medicaid recipients; the creation of the Medicare Personalized Prevention Plan Service, which pays providers to create an annual prevention plan specific to their patients that includes all of the important ACIP-recommended vaccines (which could be a great example of reimbursing doctors for counseling services); and the requirement to develop national quality measures for health plans and for Medicaid.[64]

In addition, HHS formulates evidence-based objectives for improving the health and health-related quality of life of Americans in the Healthy People targets. These targets are critical to setting priorities, establishing benchmarks, and monitoring the effectiveness of federal health programs. In the past, vaccination-related Healthy People objectives focused primarily on childhood vaccination and included mostly targets for subgroups of high-risk adults.

Table 2.2
Selected Adult Vaccination Rates by Recommended Subgroup

Vaccine	Recommendation	Recommended Subgroup	Percentage Vaccinated in 2009
Seasonal influenza	Previously recommend for all adults except healthy nonpregnant adults age 19–49 without contact with high-risk individuals. Currently recommended annually for all adults	High-risk adults age 18 and older	55.2[a]
		Age 19 and older with	
		Asthma	44.8[a]
		Chronic lung disease	70.9[a]
		Diabetes	66.0[a]
		Heart disease	69.5[a]
		Age 50–64	40.1
		Age >65	65.6
		Health care personnel	52.9
2009 H1N1 influenza	Initial target groups of adults included pregnant women, health care and emergency medical services personnel, young adults up to age 24, high-risk adults age 25–64, and adults in contact with infants <6 months. Later recommended for all adults	Health care personnel^	37.1[b]
		Pregnant women	46.3[c]
		Adults age 25–64 with high-risk conditions	11.6[d]
Pneumococcal disease	One dose for adults age 65+ unless also indicated at a younger age based on presence of risk factors	>65 years	60.6*
		19–64 years, high risk	17.5*
Human papillomavirus	Three doses as catch-up for adult women up to age 26	Women up to 26 years	17.1*
Shingles	One dose for adults age 60+	>60 years	10.0*
Tetanus, diphtheria, and acellular pertussis	Td every 10 years and substitute one-time dose of Tdap for Td booster as soon as feasible for >19 years	19–49 years	63.1** (Td)
	Tdap recommended for 19–64 years, pregnant women, >65 with close contact with infant		
Hepatitis A	Two doses during adulthood if risk factors are present	19–49 years	9.8+
Hepatitis B	Three doses during adulthood if risk factors are present	19–49 years, high risk	41.8++

SOURCES: ACIP Adult Vaccination Schedule[58]; for percentages, unless otherwise noted, National Health Interview Survey, 2009[5]; [a] Maurer, Harris, and Lurie, 2009[59]; [b] CDC, 2010[60]; [c] CDC, 2010[61]; [d] CDC, 2010.[6]

* At least one dose ever.

** One dose in the previous ten years.

+ At least two doses ever.

++ At least three doses ever.

^ Data are interim (i.e., reflect uptake as of midseason January 2010).

NOTES: Td = tetanus and diphtheria, Tdap = tetanus, diphtheria, and pertussis.

In contrast, Healthy People 2020 contains an expanded number of adult-specific objectives, including an entirely new objective on zoster vaccination (see Table 2.3).[65]

In February 2011, HHS released the *2010 National Vaccine Plan* outlining specific goals, objectives, and strategies for improving the nation's health through vaccination.[66] The goals in the plan are intended to be met through the coordinated actions of a wide range of public and private sector stakeholders and in conjunction with other federal health initiatives, including

Table 2.3
Healthy People Objectives Specific to Adult Vaccination, Targets and 2008 Baseline

Objective	2010 Target Percentage	2020 Target Percentage	2008 Baseline Percentage
IID-12: Increase the percentage of children and adults who are vaccinated annually against seasonal influenza			
Noninstitutionalized adults age 18–64 years*	—	80	25
Noninstitutionalized high-risk adults age 18–64 years	60	90	39
Noninstitutionalized adults age 65 years and older	90	90	67
Institutionalized adults age 18 years and older in long-term or nursing homes	90	90	62
Health care personnel*	—	90	45
Pregnant women*	—	80	28
IID-13: Increase the percentage of adults who are vaccinated against pneumococcal disease			
Noninstitutionalized adults age 65 years and older	90	90	60
Noninstitutionalized high-risk adults age 18–64 years	60	60	17
Institutionalized adults age 18 years and older in long-term or nursing homes	90	90	66
IID-14: Increase the percentage of adults >60 who are vaccinated against zoster (shingles)*	—	30	7
IID-15: Increase hepatitis B vaccine coverage among high-risk populations			
Health care personnel	98	90	64

SOURCE: Healthy People 2020.[65]

* Indicates a new objective not included in previous Healthy People initiatives.

NOTES: Each objective contains a data source and a national baseline value. The baselines use data derived from currently established and, where possible, nationally representative data systems. Baseline data provide the point from which a 2020 target is set. For the set of vaccination objectives, 2008 was selected as the baseline year from which to measure progress.

Healthy People 2020 and the implementation of key Affordable Care Act (ACA) provisions. Three of the ten objectives were identified in the report as being of the highest priority for implementation to address barriers to adult vaccination:

1. Increase awareness of vaccines, VPDs, and the benefits and risks of vaccination among the public, providers, and other stakeholders.
2. Eliminate financial barriers for providers and consumers to facilitate access to routinely recommended vaccines.
3. Increase and improve the use of interoperable health information technology and electronic health records.

New efforts to release timely, national coverage data provide benchmarks for measuring progress toward federal objectives. In an effort to make data on influenza vaccination more timely and actionable, the CDC launched a pilot project in November 2010 to

collect, analyze, and rapidly release geographically specific data on influenza vaccination in midwinter and early spring for the general population and aggregate national data on influenza vaccination of health care personnel and pregnant women.[67] In addition, in spring 2011, the CDC reported influenza vaccination uptake among adults from the 2010–2011 influenza season based on the Behavioral Risk Factor Surveillance Survey (BRFSS).[68] In the past, annual influenza uptake data from the BRFSS were not released until the fall of each year after the next vaccination season had already begun.[69, 70]

Vaccinations are increasingly available in a variety of locations. Workshop participants observed that if the public health community is successful at increasing demand for adult vaccinations, additional capacity to administer vaccinations would be required to meet the increased demand. Entities other than medical offices and clinics, often referred to as "complementary vaccinators," are increasingly able to meet such increases in demand. These include workplaces, schools, retail medical clinics, grocery stores, and pharmacies. The increased capacity provided by complementary vaccination settings stems from the enactment of state laws allowing pharmacists to vaccinate,* government efforts to develop and encourage complementary settings during the H1N1 pandemic,[126–128] active promotion of vaccination by retail settings, and the emergence and proliferation of retail clinics.[72–74] The proportion of adults vaccinated in retail stores has more than doubled in the past five years (from 7 percent in 2007 to 18 percent in 2011), reflecting this increased capacity.[75] Consensus among medical and public health stakeholders regarding the importance of complementary providers is reflected in the Infectious Diseases Society of America's 2009 recommendation that "providers should support use of community-based settings to immunize target populations that have difficulty accessing usual immunization providers."[131] Similarly, NVAC's Adult Immunization Working Group included a recommendation to encourage complementary providers to provide vaccination support services, including education, in its 2011 report.

Increasing the use of electronic health records (EHRs) has the potential to increase the efficiency of electronic vaccination support. Recognizing the health and economic potential of EHR, Congress enacted the Health Information Technology for Economic and Clinical Health Act in 2009. Under the act, health care providers who treat Medicare and Medicaid patients, implement certified EHR systems, and can demonstrate "meaningful use" of their EHR systems can qualify for incentive payments.[76, 77] Starting in 2015, providers who treat Medicare patients and do not adopt EHR technology will have their Medicare payments reduced.

Once populated with vaccination records and appropriate clinical data, active use of EHRs to support vaccination can help providers to qualify for incentive payments and avoid payment reductions. Meaningful uses of EHRs related to vaccination include the ability to electronically identify patients specifically recommended for vaccination; to issue electronically generated reminders to the identified subgroup; to track adherence; to provide patients with access to their vaccination records; and to exchange vaccination status information with other providers, community vaccinators, and immunization registries operated by state health departments.

Although EHRs will be critical to coordinating adult vaccination activities across diverse provider groups and patients,[15] workshop participants commented that it is not a panacea in

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* Pharmacists can now administer influenza vaccine in all 50 states.[71]

the absence of other policy changes. For example, EHRs will offer a range of clinical support tools alerting providers to a myriad of recommended preventive services. Unless vaccination is prioritized with respect to workflow, implementation of EHRs will not result in dramatic changes. Others noted that because requirements for meaningful use are focused on providers rather than other entities, such as health departments, there is no mechanism to ensure that EHRs will be able to exchange vaccination data with immunization information systems (IIS) and community-based vaccinators.

Office-Based Settings Are a Logical Focus of Efforts to Increase Adult Vaccination

Office-based providers remain the primary source of vaccination. While influenza vaccinations are administered in complementary settings,[75] other adult vaccinations are not widely available outside of office-based settings. Even so, the majority of influenza vaccinations continue to be administered in medical settings, such as physicians' offices. Office-based settings also play a particularly important role in vaccinating racial and ethnic minorities and older adults. National survey data show that over twice as many influenza vaccinations were administered in physician offices and medical clinics than were administered in any other setting (see Table 2.4). Adults age 65 and older were more than 10 percentage points more likely to be vaccinated in medical settings compared with their counterparts age 18–64. Likewise, blacks and Hispanics were more than 20 percentage points more likely to be vaccinated in medical settings than were whites.

Achieving substantial increases in adult vaccination will require persuading large numbers of individuals disinclined to be vaccinated. National survey data suggest that by March 2009, 49 percent of the 160 million U.S. adults who were specifically recommended for vaccination were vaccinated for influenza, 7 percent had intended to be vaccinated during flu season and did not follow through on their intentions, and 44 percent were not vaccinated and did not intend to be (see Figure 2.1).[78] Among the 44 percent not intending to be vaccinated,

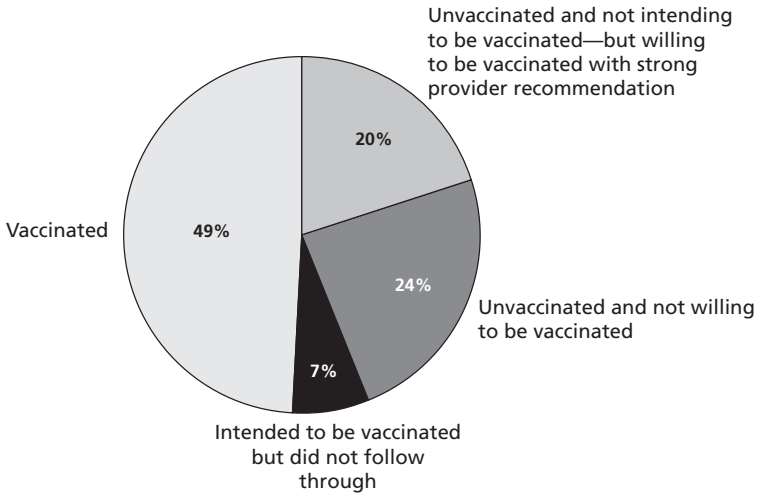
Table 2.4
Location of Seasonal Influenza Vaccination (2009–2010) by Age and Race

		Age Category		Race/Ethnicity		
Location	All Adults	Age 18–64	Age 65+	White	Black	Hispanic
Physician office or medical clinic	47.4	44.5	55.6	35.6	57.7	54.3
Retail setting	17.0	13.9	24.5	12.4	2.9	7.8
Workplace	19.5	26.0	2.5	18.8	11.5	6.2
Health department	6.4	6.3	6.5	22.1	7.7	19.8
Other	9.7	9.3	11.5	11.1	20.2	11.9

SOURCES: Authors' calculations based on Uscher-Pines, Maurer, and Harris, 2011,[73] and unpublished data from RAND's 2009–2010 adult influenza vaccination survey.

NOTE: The "Other" location includes hospitals, community centers, and a nonspecified "other" category. Columns do not sum to 100 percent because of rounding.

Figure 2.1
Vaccination Status of U.S. Adults Recommended for Influenza Vaccination by ACIP, March 2009



SOURCE: Harris, Maurer, and Lurie, 2009.[78]
RAND *TR1169-2.1*

almost half (20 percent of all recommended adults) indicated being willing to be vaccinated with a strong recommendation from a health care provider. The recent pandemic illustrated the challenge of persuading those disinclined to be vaccinated to change their behavior. National data from the 2009–2010 influenza season showed that adults who were routinely vaccinated for seasonal influenza were almost four times as likely to be vaccinated for H1N1 and twice as likely to agree that H1N1 vaccination was safe and worthwhile.[79] These data imply that in the absence of persuasive communication, making vaccination more convenient by offering it in more settings will have only a limited impact on the total number of vaccinated individuals.

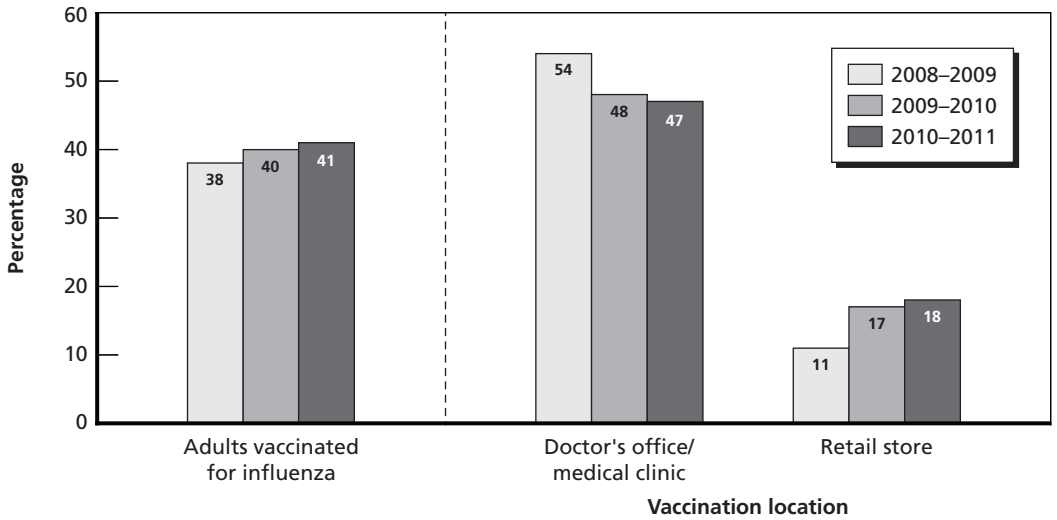
Health care providers are a highly influential source of advice about vaccinations. Health care providers exert a strong and well-documented influence over patient decisions to use preventive care.[80, 81] The same appears to be true for adult vaccinations.[13, 82] The data in Figure 2.1 suggest that strong recommendations from providers could potentially persuade a substantial share of those disinclined to be vaccinated to consider doing so. National survey data also show that more adults rated their health care provider as the most influential source of information used in making decisions regarding seasonal influenza vaccination than any other information source.[133] Likewise, data from a 2007 national survey of young women age 19–26 showed that the strongest predictor of HPV vaccination was physician discussion and recommendation, increasing the odds of initiating the vaccination schedule by four or more times.[84] Furthermore, women who received a strong recommendation were four times more likely to be vaccinated than women who received a weak recommendation.[84]

Yet, provider recommendations do not have to be issued face to face to have an impact. Well-controlled studies show that a simple reminder from a provider issued outside of clinical encounters can strongly influence the vaccination decisions of adult patients.[82] In a 1986 randomized trial, for example, the researchers found that 37 percent of patients in the intervention arm who received telephone reminders were vaccinated, but fewer than 10 percent of the controls (who did not receive reminders) received influenza vaccination.[85]

It is not clear whether complementary vaccinators are as persuasive. While complementary vaccination settings clearly offer consumers convenience, it is unclear whether alternative vaccinators can drive substantial increases in overall coverage levels. Several workshop participants indicated that the public considered vaccination to be a medical procedure and expressed skepticism as to whether the public would consider advice about vaccinations from health care professionals other than physicians and others who provide hands-on care (i.e., nurse practitioners) to be credible. To our knowledge, there are no published studies of the effectiveness of advice from pharmacists and other complementary vaccinators in persuading those who are disinclined to be vaccinated. The fact that steep increases in the number of influenza vaccinations administered to adults between the 2008–2009 and 2009–2010 seasons in complementary settings were not accompanied by similar increases in overall uptake across the population suggests that complementary vaccinators have succeeded in shifting the location of uptake, and perhaps uptake within population subgroups, but not in the overall level (see Figure 2.2).

Office-based settings have the unique potential to offer comprehensive vaccination support in the near term. In contrast with complementary settings, provider offices house medical records needed to identify patients recommended for vaccination based on demographic and clinical characteristics, behavioral risk factors, and vaccination histories. Once individuals recommended for vaccination are identified, office-based providers are well positioned to leverage preexisting relationships with patients to communicate effectively with patients about vaccination using mail, telephone, or email and/or by engaging in face-to-face discussions. Once patients agree to be vaccinated, office-based providers can administer vaccinations on site or refer them to community vaccinators. Once patients have been vaccinated, or their medical offices have been notified of their vaccination, medical offices provide a physical location for storing vaccination records for future retrieval and for reporting records to IIS

Figure 2.2
Influenza Vaccination Rates and Location of Vaccination by Influenza Season



SOURCES: 2008–2009 and 2009–2010 data come from Harris, Maurer, and Uscher-Pines, 2010;[86] CDC, 2011.[67] 2010–2011 data come from CDC, 2011.[75]

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or immunization registries managed by state public health stakeholders. With the exception of vaccines covered under Part D of the Medicare program, office-based providers are generally able to bill health insurers directly for the cost of vaccine and administrative fees, saving patients the inconvenience of submitting paper claims. Office-based settings are unique in their ability to provide a full range of adult vaccination support activities and are likely to remain so in the absence of the widespread implementation of interoperable electronic health records and IIS with the capability to receive and transmit adult coverage data.

Office-Based Health Care Providers Are Not Meeting Their Potential in Promoting Adult Vaccination

Despite the persuasiveness of physician advice, a substantial proportion of physicians who treat adults appear not to stock and administer adult vaccines. Self-reported data from physician surveys conducted between 2007 and 2010 suggest that 75 to 90 percent or more of primary care providers stock and/or administer influenza vaccination; 40 to 90 percent stock Tdap, hepatitis A, hepatitis B, HPV, and zoster vaccines; and 27 percent stock all recommended adult vaccinations other than influenza (see Table 2.5).[87–91]

Adult vaccination is infrequently discussed at health care encounters. Because the average adult visits doctors' offices between three and four times per year,[92] adults have multiple opportunities to receive recommended vaccinations and to talk about them with their providers. This is especially true for adults with chronic conditions who frequently interact with their providers during the year. Moreover, reminders to be vaccinated can be sent to patients via mail or email, for example, and do not require face time with providers. Yet, national survey data suggest that during the 2009–2010 influenza season, only 31 percent of adults with a clinical indication for vaccination recalled receiving a recommendation from a health care provider to be vaccinated, and less than 10 percent recalled a provider-issued reminder.[83] This is consistent with a study of pediatric practices conducted by Prislin et al.[132] They found that all pediatri-

Table 2.5
Percentage of Physicians Administering Adult Vaccinations by Vaccine Type, Physician Specialty, and Data Collection Method

	Survey Self-Reports								
Physician Specialty	Flu	Pneumo-coccal	Tdap	Td	Hep A	Hep B	HPV	Zoster	All Adult Vaccinations—Not Flu
Family practice	90+	92†	88†	92†	65†	82†	73†	44†–49%±	27†
Internal medicine	90+	93†	86†	93†	57†	67†	47†	44†–49%±	27†
Other primary care	90+	—	—	—	—	—	—	44†–49%±	27†
Pulmonology	90*	—	—	—	—	—	—	—	—
Endocrinology	81*	—	—	—	—	—	—	—	—

SOURCES: † Freed et al., 2011[87]; * Davis et al., 2008[88]; + Kempe et al., 2007[91]; ± Hurley et al., 2010.[89]

cians reported vaccinating at every opportunity, while a medical record review revealed that the same pediatricians missed 40 percent of opportunities to vaccinate during preventive care visits, 72 percent during follow-up visits, and 88 percent during acute care visits.

National survey data also suggest that during the 2009 H1N1 (swine flu) pandemic, receipt of provider-issued recommendations to be vaccinated for H1N1 influenza was more strongly associated with having an indication for seasonal influenza vaccination than with having an indication for H1N1 vaccination.[83] Specifically, 18 percent of adults indicated for seasonal influenza vaccination but not for H1N1 vaccination received a recommendation from a provider to be vaccinated for H1N1 compared with 9 percent of those specifically indicated for H1N1 vaccination but not for seasonal vaccination. This pattern suggests that providers may be ill equipped to initiate targeted communication with patients about vaccination during outbreaks.

Health care providers may not be well prepared to communicate with adult patients about vaccination and address their concerns about safety. Despite data suggesting that the public places a high degree of trust in health care providers to deliver information about vaccination, *we found few efforts to evaluate and improve provider communication regarding the safety and benefits of vaccination with adult patients*. In the case of influenza vaccinations, lack of awareness on the part of physicians may help to explain why providers are not issuing reminders and recommendations to recommended patients. A national survey of primary care physicians conducted in 2010 found that more than a quarter did not know that ACIP now recommends influenza vaccination for healthy young adults between the ages of 19 and 49.[93] The survey also found that correct knowledge of the ACIP recommendations was highly predictive of intent to recommend vaccination to patients.

Moreover, workshop participants suggested that physicians are particularly ill prepared to discuss the safety of vaccinations with patients, despite their perceptions that the public harbors strong concerns about the issue. Several participants reported reluctance on the part of group practice managers and health plans to stray beyond safety messaging formulated by CDC. While recognizing the challenges inherent in communicating effectively with patients on such a complex topic, our workshop participants voiced the opinion that CDC messaging on vaccine safety could "go further" in explaining safety in a clearer and more compelling manner to better support physicians in discussions with vaccine-hesitant patients.

Data from an exploratory survey suggested that CDC safety messaging is well received by consumers, but flu risk is not well understood. Based on concerns expressed during the workshop, one organization volunteered to field a survey to compare consumer reactions to two alternative vaccine safety messages suggested by participants with reactions to those issued by CDC.[†] Survey results provide evidence that CDC-endorsed messages were

[†] The survey was developed by Eliza Corporation—a private health communication firm headquartered in Beverly, Mass.—with input from RAND team members. Adults between the ages of 18 and 64 from across the United States (n = 1,278) completed the phone-based, speech-enabled survey, which ran from July 6 to July 19, 2011. The survey was fielded to a list of health care consumers purchased from a marketing research firm. The sample of consumers was designed to approximate the U.S. population in terms of age and gender, based on U.S. Census Bureau statistics. Respondents did not receive incentives for participation. 10.8 percent of individuals reached by telephone completed the survey. The survey asked respondents whether the safety of flu shots was a concern, whether they intended to get a flu shot this fall, about the factors influencing intent to be vaccinated, and beliefs about whether flu shots cause the flu. The survey presented six factual statements (listed in Table 2.6) about the safety of flu shots and asked respondents whether the statements made them feel more comfortable.

as favorably received or more so than one comparing the risks of influenza to those of breast cancer, a disease that the public considers to be both common and serious (see results in Table 2.6). At the same time, respondents found a short statement comparing the risks of flu shots to the risks of the flu itself to be as comforting as CDC messages.

Consistent with the prior literature, survey findings demonstrated high levels of public concern about safety, with 49 percent of respondents concerned about the safety of flu shots, 20 percent neutral, and 31 percent not concerned. However, roughly equal proportions (56 and 55 percent, respectively) of those in the concerned and not concerned subgroups intended to be vaccinated for flu this season (see Figure 2.3).

By contrast, 75 percent of those expressing a high degree of worry about getting the flu intended to be vaccinated, but only 32 percent of those expressing a low degree of worry share the same intention (see Figure 2.4). Likewise, 75 percent of those who did *not* believe that flu vaccine causes flu intended to be vaccinated, but only 39 percent of those who believed otherwise intended to be vaccinated. Taken together, these results suggest that while CDC messaging may provide a useful starting point for patient-provider communication on the issue of vaccination safety, helping patients to understand better influenza risks and causes may be a higher priority.

Economic Barriers Prevent Office-Based Adult Vaccination from Reaching Pediatric Levels

A viable business model for office-based vaccination requires high and predictable demand. Office-based administration of vaccines entails substantial fixed costs to providers, as they need to install and operate appropriate storage and cooling facilities, as well as to maintain the administrative infrastructure for ordering vaccine and managing inventory.[94, 95] Office-based vaccination also requires providers to make up-front investments in a product

Table 2.6
Percentage of Survey Respondents Indicating That Statements About the Safety of Influenza Vaccination Made Them More Comfortable

Statement About the Safety of Influenza Vaccination	CDC Endorsed?	Percentage Answering Yes
Flu vaccines are safe. The Centers for Disease Control and Prevention and the Federal Drug Administration hold vaccines to the highest safety standards and the vaccine is closely monitored.	Yes	75.4%
It is safer to get the flu vaccines than to get the flu.	No	73.6%
The flu vaccine protects you against infection and illness and it cannot give you the flu.	Yes	69.8%
Over the years, hundreds of millions of Americans have safely received seasonal flu vaccines.	Yes	69.4%
The most common side effects from the flu vaccines are mild.	Yes	68.3%
When an outbreak is severe, the same number of people die from the flu that die from breast cancer in a given year.	No	60.8%

NOTE: Respondents were read the following statement: "We're going to say a couple of facts about the flu shot and we'd like you to answer yes if it makes you feel more comfortable or no if it doesn't."

Figure 2.3
Intentions to Be Vaccinated for Flu by Concerns About Flu Vaccine Safety, 2010

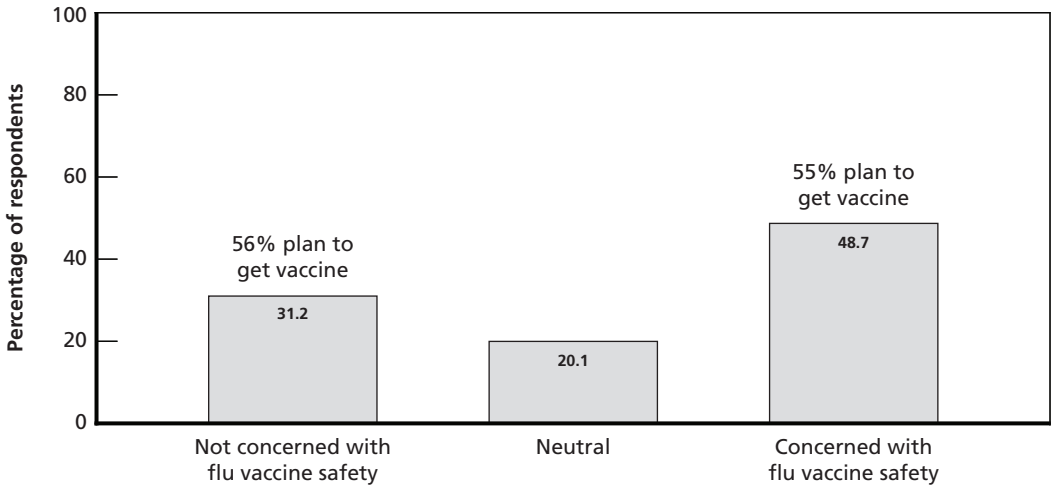

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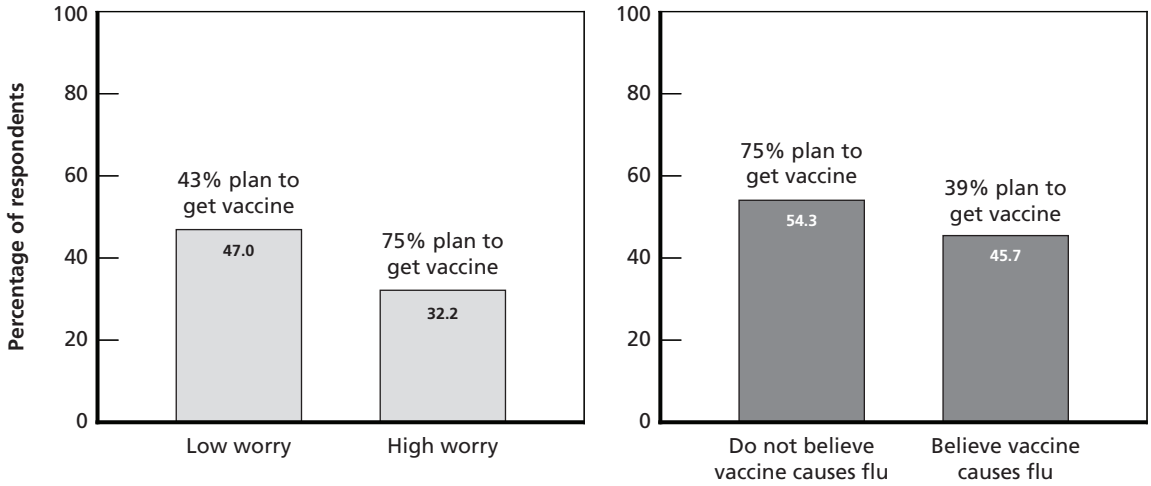
Figure 2.4
Percentage of Respondents Intending to Be Vaccinated for Influenza by Worry About Getting Influenza and Beliefs About Whether Influenza Vaccination Causes Influenza



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with a limited shelf life. Since providers will only be paid if they administer vaccines, economic theory suggests that providers will only offer vaccinations on site if they are confident both that sufficient demand exists and that demand is predictable enough to plan inventory.

Both conditions are met in pediatric practices. Vaccinations are an integral part of well-child visits, as parents are aware of requirements and schools and camps require up-to-date vaccinations. Thus, parents expect pediatricians to offer vaccination, and offices will maintain this service even if it is a loss leader.[96, 97] In addition, the pediatric vaccination schedule is age-based so that practices can forecast demand easily and plan inventory accordingly.

In contrast, relatively few patients in an adult practice are recommended for vaccination at any given time. Compared to the pediatric schedule, ACIP recommends fewer vaccinations

for adults, several of which are to be administered just once (e.g., zoster) or at widely spaced time intervals (e.g., a Td booster every ten years following a one-time dose of Tdap). Other vaccine indications depend on patients' clinical characteristics, such as boosters for hepatitis B. Thus, adult practices face less demand overall and less predictability in demand.

Resolving uncertain vaccination histories creates additional workload. Adults often have missing or incomplete vaccination records, in contrast with children, whose records are housed in pediatricians' offices and IIS. Workshop participants commented that providers may be reluctant to vaccinate patients without complete knowledge of their vaccination history. Providers may be concerned about the safety of revaccination—whether extra, unnecessary vaccinations pose any actual risk or not—and whether duplicate vaccines will be covered by health insurance plans. In the absence of functioning and populated immunization registries, assembling accurate vaccination histories for adults can be extremely labor intensive.

Lastly, vaccinations with substantial patient cost-sharing pose particular problems for providers because of the possibility that lack of insurance coverage for the vaccine or unexpectedly high copayments could lead to patient refusal to be vaccinated and/or patient dissatisfaction. However, this type of financial barrier to vaccination should become less of a deterrent with the implementation of ACA requirements that health plans cover evidence-based preventive services without cost-sharing.

Paradoxically, the availability of selected vaccinations in complementary settings may further discourage office-based providers from administering vaccinations because it increases the unpredictability of demand.[98] In our workshop discussion, we learned that providers are particularly concerned about influenza vaccination because it is widely offered in a range of settings, and patients may not routinely notify their primary care providers of their intentions to be vaccinated off-site. Increased use of EHRs to quickly retrieve and access vaccination histories and indications and immunization registries equipped to process adult vaccinations may help office-based providers to better predict demand.

Vaccine administration fees may not cover the true cost of delivery. Empirical data on the financial viability of office-based vaccination of adults is extremely limited and does not account for the cost of physician-delivered counseling. Data from a 2002 survey of physician office managers from 20 clinics suggest that Medicare payment rates for influenza vaccination were $3.00 to $26.00 (in 2003 dollars) lower than the costs of administering, with smaller practices experiencing the largest losses.[99] At the same time, the study found that very large, corporate practices were able to generate a $2.00 (2003) profit from vaccination through greater administrative efficiencies and the ability to negotiate lower prices on vaccines.

Not all providers have the management resources to operate a financially viable vaccination practice. Workshop participants suggested that vaccination can be profitable for office-based providers—if carefully managed. They noted that profitability requires data-driven assessments of the volume and clinical characteristics of case loads and prudent negotiations with suppliers about purchase prices for vaccines. In addition, anecdotal information and economic intuition suggests that the fixed costs of vaccination combined with low and uncertain patient demand lead to a perception that vaccination in adult office-based settings, especially in smaller practices, is not financially viable. Absent concrete data to the contrary and user-friendly tools to investigate the business case, many providers will decide against vaccination and forgo potential opportunities to increase quality of care and practice revenue.

Provider willingness to promote vaccination is also a matter of opportunity cost. In fee-for-service systems, the financial viability of primary care practices depends on providers'

ability to see a large number of patients for brief periods of time.[100] Working under tight time constraints, physicians naturally focus on patients with the most immediate health concerns. As such, there is little time for providing preventive care, including discussions about vaccination, outside of prescheduled well-care visits. Even during preventive care visits, vaccinations are among dozens of clinical preventive health care services recommended for adults by the U.S. Preventive Services Task Force (USPSTF). A typical patient presenting for preventive care is due for more than 20 preventive care services.[101] If physicians actually provided all of the recommended preventive services, it would require 7.4 working hours per day by some estimates, leaving little to no time for acute care or the management of chronic illness.[102]

Indirect financial incentives to promote and administer vaccinations to adults are limited. Clinical performance measures play an increasing role in priority setting and practice patterns of physicians, especially if measure results are linked to payment, which is referred to as "pay for performance." A prominent example is the provision in the ACA that provides bonus payments of 5 percent (starting in 2013) to privately operated Medicare Advantage Plans based on "star" quality ratings.[103] These measures are generally constructed by dividing the number of patients who are eligible and have received a recommended service or treatment in the measurement year by the total number of patients eligible for the service during the same time frame. Despite the strength of the evidence underlying ACIP recommendations and evidence supporting the use of provider-issued vaccination reminders and recommendations, performance measures relevant to adult vaccination in current use remain limited. Health plan representatives who participated in our workshop attested to the crucial role that performance measures, and the financial incentives based on them, play in determining the focus of the quality improvement efforts they undertake in managing their Medicare Advantage Plans. But existing measures capture the administration of influenza vaccinations to adults 50–64 and influenza and pneumococcal vaccinations to adults 65 and older[‡] and do not reflect administration of other vaccines and vaccine support activities, such as counseling and referrals to community vaccinators.[107]

Incentives to close the vaccination gap by referring patients to community vaccinators are limited. On the surface, community vaccinators appear to be well positioned to receive referrals from a potentially large number of providers who treat adults but do not vaccinate on site. Public health policymakers have promoted the growth of vaccination in complementary settings as a means of reducing cost, extending the capacity of overburdened primary care practices, and improving access through increased convenience.[107] In some cases, health plans include community vaccinators in their provider networks. However, non-vaccinating providers currently have little incentive to make such referrals. Because the effort involved in assessing vaccination status, counseling patients regarding the need for vaccination, and documenting the vaccination is not directly reimbursed, providers bear the full costs of generating appropriate referrals. Moreover, there was a strong consensus among workshop participants representing the views of physicians, consumers, and health plans that patients regard vaccination as a core function of a medical office; thus, patients may perceive providers who refer patients to outside vaccinators as neglectful—particularly when patients are not aware of the cost of vac-

[‡] Influenza vaccination: percentage of Medicare members 65 years of age and older who received an influenza vaccination between September 1 of the measurement year and the date on which the Medicare CAHPS survey was completed.[104] Pneumonia vaccination status: percentage of Medicare members 65 years of age and older who have ever received a pneumococcal vaccination.[105]

cine and the effort involved in administering vaccinations appropriately. One health plan manager attending the workshop recounted active pressure from members of the plan's provider network motivated by financial concerns to refrain from sponsoring a voucher program that encouraged patients to obtain influenza vaccinations at a national drug store chain.

Nonetheless, workshop participants expected that the widespread implementation of EHRs would make vaccination referrals more efficient and effective and possibly support standardized vaccination referral practices. One way to encourage referrals is to standardize vaccination referral practices, thereby increasing patient confidence in the process and ensuring that documentation of vaccination status is transferred back to the provider.

Encouraging Practice Change Around Adult Vaccination

Improving the delivery of vaccinations to adults will require coordinated, consensus-driven action on the part of a diverse array of competing stakeholders. Success requires treating process change as a mission-driven activity guided by strategically defined, achievable goals. The components of sustainable practice change include (1) the motivation of key stakeholders to achieve change, (2) resources to achieve change, (3) motivation stemming from imperatives imposed from outside the practice (e.g., changes in government-sponsored vaccination policies and programs), and (4) opportunities for change.[108] Numerous calls for action on adult vaccination issued by stakeholder organizations, vaccination-specific provisions in health care reform legislation, and other relevant federal initiatives are clear reflections of the motivation of stakeholders to achieve change and the willingness on their part to create opportunities for change to take place. *The current challenge is channeling this motivation into focused efforts to simulate improved delivery at the provider level*.

In response to this type of challenge, it is common for stakeholders to form coalitions composed of policymakers, practitioners, and those with relevant substantive and technical expertise in the areas of communication, measurement, and evaluation and charge them with the explicit mission of developing, testing, and implementing practice-improving interventions and process improvement systems. Individuals who have led coalition-based efforts to integrate screening and brief behavioral counseling into primary care practice discussed their experiences during the January 2011 workshop. They attributed their success to the recruitment of highly motivated coalition members who had vested interests in success, a deep understanding of the day-to-day "grind" of routine clinical practice, and a disciplined focus on solving providers' problems.

CHAPTER THREE

Recommendations

A unique window of opportunity has opened to tackle the challenge of adult vaccination. To realize this opportunity, vaccination stakeholders need to engage in a collaborative effort aimed at promoting adult vaccination and at integrating it into routine office-based practice. Without such an effort, there is the distinct possibility that adult vaccination will, again, get crowded out by other priorities that are supported by other vocal interests. Our investigation informed by stakeholder input suggested five sets of specific actions that vaccination stakeholders and substantive experts should undertake to facilitate practice change around adult vaccination.

Recommendation 1: Strengthen evidence surrounding practice gaps and strategies for promoting vaccination. Evidence facilitates practice change by helping stakeholders to understand where and how to target their efforts and by giving practitioners a reason to change and the confidence that doing so is beneficial. We recommend strengthening evidence in two key areas.

- *Collect national data describing patterns of office-based vaccination of adults.* Our investigation suggested that many providers who treat adults do not stock vaccines at all and many who do may not stock all recommended adult vaccines or stock them only in small quantities. However, national data on such practices are lacking. In several instances, the stakeholders we interviewed suggested that the fact that a substantial fraction of providers who treat adults do not vaccinate them is "common knowledge." Without hard data, however, it remains unclear whether low coverage rates reflect competing demands on the time of otherwise inclined and equipped providers or the failure of practices to invest time and financial resources in the required support infrastructure. National data describing adult vaccination practices by provider characteristics, case mix, geography, and payer mix can inform the development and targeting of interventions intended to increase provider engagement and provide a baseline from which to measure improvements.
- *Measure the economic value of various approaches for promoting vaccination of adults.* We found strong consensus that the increased involvement of office-based providers in promoting to adults—through the identification and targeting of patients specifically recommended for vaccination, issuing reminders and recommendations to be vaccinated, and counseling patients who are hesitant to be vaccinated—is critical for increasing adult vaccination rates. Although the costs of doing so may be relatively high compared with other approaches (e.g., increased public health messaging, promotion of patient self-referral to community vaccinators, direct-to-consumer advertising by retail vaccinators), our investigation also suggests that doing so could be cost-effective from a societal perspective if it leads to improved management of chronic illness and enhances the ability of

public health officials to prevent and manage disease outbreaks and pandemics. However, the costs and benefits of promoting vaccinations in office-based settings compared with doing so using other strategies have not been quantified. Yet, such evidence will be crucial to stimulate private payers and public health agencies to shoulder the cost of enhancing the capabilities of office-based providers to support vaccination.

Recommendation 2: Improve guidance to providers about vaccinating adults. Consistent with other reports studying this topic, we found that physicians may lack a clear understanding of how to promote and administer vaccinations appropriately and efficiently. We recommend improved guidance in three areas.

- *Develop structured vaccination counseling protocols.* Evidence suggests that face-to-face communication with providers can motivate patients to take active steps to protect their health. However, providers are concerned about using their limited time unproductively in conversations with patients who might harbor skepticism about the safety and benefits of vaccination. Tools and guidance for adult providers to discuss vaccination, which do exist for pediatricians planning discussions with parents about childhood vaccinations,[109] are lacking. To fill this gap, we recommend development of structured counseling guidance based on the United States Preventive Task Force's behavioral counseling framework (and referrals to complementary vaccinators, where appropriate).[110] * A substantial amount of source material already exists and has been vetted by experts and government agencies, such as the ACIP adult vaccine recommendation grid, Vaccine Information Statements, and, as the Eliza follow-up survey suggests, CDC safety messaging. Other components would have to be developed, such as brief protocols (under one minute) that take into account the realty of competing demands for adult providers.
- *Provide clear guidance for vaccination of adults with missing or incomplete vaccination histories.* Guidance to providers from CDC encourages the immediate vaccination of unvaccinated individuals. In contrast with pediatric patients, however, the vaccination status of many adult patients is often missing or incomplete. Duplicate vaccination wastes resources and may raise concerns among patients and physicians concerned about vaccination safety. Uncertainty surrounding the handling of individuals with unknown vaccination status in calculating the performance of health plans and practices in improving vaccination rates may also pose a practical barrier to the wider implementation of vaccination performance measures. Yet, clinicians must search for specific guidance regarding the vaccination of patients with unknown history. While some CDC-sponsored materials encourage vaccination if vaccination status is unknown,[43, 111, 112] other materials, including ACIP's adult schedule published in the MMWR,[1] are largely silent on the issue.†
- *Periodically evaluate adults' vaccination status based on age.* Because age is a clearly identifiable characteristic, clinical policies calling for the assessment of adults' vaccination

* The National Institute on Alcohol Abuse and Alcoholism's *Helping Patients Who Drink Too Much: A Clinician's Guide* is an example of a structured counseling protocol based on this framework. See the guide and training materials online.[129]

† The exception is ACIP's Tdap recommendation, which clearly states that health care providers should administer a one-time dose of Tdap to adults <65 who have not received Tdap previously or for whom vaccine status is unknown.

status based on attained age at fixed time intervals (e.g., every 10 to 15 years starting at age 25) would help to generate explicit guidance for adult providers. Age-based assessments would also make it possible to generate clear and verifiable denominators for performance measures on vaccination assessment and counseling and help to focus patient communication while simultaneously offering opportunities to maintain comprehensive vaccination histories.

Recommendation 3: Assist providers to make informed decisions about whether to administer vaccinations on site. Vaccination is a complex and costly activity drawing on a variety of practice resources, including administrative infrastructure, staff time, storage space, medical supplies, and liability insurance, the cost of which is generally spread over multiple patients and functions. The American Medical Association and the Immunization Action Coalition have assembled materials designed to assist physicians in initiating and maintaining an office-based vaccination practice on topics including logistics, storage, regulatory compliance, claims submission, and immunization registries.[95, 113] However, we were unable to locate resources specifically designed to assist providers in assessing whether vaccinating adults is *economically* viable for their specific practice. While providers know the price of the vaccine they order, indirect costs associated with vaccination are more difficult to measure. Thus, the economic viability of vaccinating adults in office-based settings may not be immediately apparent. The widely held perception that provider offices cannot generate positive margins vaccinating adults may dissuade them from doing so, even if an actual business case does exist. Thus, we recommend the development of a decision tool to help office-based providers make informed choices about the viability of vaccinating on site. The tool could help providers understand how operating margins are influenced by vaccines, prices, health insurance payments, case mix, patient volume, and other practice characteristics. Resources developed by the American Academy of Pediatrics to assist pediatricians in understanding the financial impact of their vaccination practices could provide a useful starting point.[94, 114]

Recommendation 4: Formalize procedures for referring patients to complementary vaccinators. Our investigation revealed that vaccination stakeholders have devoted little attention to the issue of vaccination referral, although research suggests that active encouragement and guidance from trusted health care providers to be vaccinated in complementary settings could be highly persuasive. Formalizing and standardizing vaccination referral practices could serve as an important mechanism for engaging nonvaccinating practices in supporting adult vaccination and facilitating access to vaccinations in short supply or administered through mass vaccination sites during disease outbreaks. A structured referral process could also help patients to feel more comfortable with the practice of referring to community vaccinators, which, as our investigation suggests, can make a provider appear to be uncaring and ill prepared. Using referral processes for other screening and treatment procedures as a model, referrals should include

- information regarding the recommended vaccination
- locations and hours for community vaccinators offering the recommended vaccination
- contact information for the referring provider
- provider preferences regarding return of documentation to the referring provider (e.g., postage-paid return cards, confirmation of registry reporting, fax)

- handling of patient self-referrals for universally recommended vaccinations—specifically flu.

Specific procedures could be developed through collaborations among local primary care coalitions, health departments, pharmacy organizations, and other local organizations offering vaccinations using templates and guidelines developed by national-level organizations and CDC. Widespread implementation of interoperable EHR technology could help to facilitate the issuing and tracking of referrals.

Recommendation 5: Document vaccination support efforts to facilitate performance-based payment. Existing performance measures focus solely on vaccination administration (rather than vaccination support activities, such as counseling) as measured through patient surveys and health insurance claims. Without a mechanism for crediting providers for vaccinations administered outside of office-based settings, nonvaccinating providers have little incentive to promote vaccination. Rewarding nonvaccinating providers for promoting vaccination through reimbursements and/or performance bonuses could provide such an incentive. However, documentation of vaccination support is a necessary precondition for rewarding vaccination support activities. There are several avenues through which documentation of vaccination support could be developed.

- *Apply for procedure codes specific to vaccination counseling.* Procedure coding systems maintained by the American Medical Association (AMA) and the Centers for Medicare and Medicaid Services (CMS) are used for reimbursing providers, measuring provider performance, and conducting research and demonstrations on emerging technologies. Both coding systems can be modified and augmented based on preestablished review criteria that include demonstration that the practice is in widespread use, the effectiveness of the practice, and the relevance to performance measurement.[115, 116] Our review suggests that key requirements of the code modification application process can be satisfied (e.g., evidence of the effectiveness of vaccination reminders and recommendations), but others would need to be developed (e.g., incidence of provider-issued reminders and recommendations).
- *Develop a checklist to assess the effectiveness of office-based providers in ensuring that their adult patients are vaccinated as recommended.* Such a checklist should assess whether practices have the systems, processes, and community partnerships in place to identify patients recommended for vaccination; communicate effectively and efficiently about the benefits of vaccination; vaccinate on site or provide tailored referrals to community vaccinators; and receive and maintain transferable documentation of vaccinations. Such a checklist could be incorporated in office accreditation or credentialing programs.
- *Use national surveys to gauge the effectiveness of providers in promoting vaccination to patients.* For example, supplemental questions could be added to the Consumer Assessment of Healthcare Providers and Systems (CAHPS) Clinician and Group survey measuring receipt of vaccination reminders and recommendations, face-to-face discussions about vaccination with providers, and referrals to community vaccinators, if appropriate. Questions about the public's interactions with providers on vaccination-related topics could also be added on a routine or periodic basis to CDC's National Immunization Surveys, National Health Interview Survey, and Behavioral Risk Factor Surveillance Survey.

The results of these efforts could be used as part of a stand-alone system recognizing and rewarding vaccinating practices. Additionally, they could be integrated into patient-centered medical home certification programs so that good vaccination support practices contribute to a practice's ability to earn performance-related bonus payments offered by health plans, employers, and Medicare and Medicaid.

CHAPTER FOUR

Conclusions and Policy Implications

Innovative approaches to improve the delivery of adult vaccination rates are sorely needed. We found strong stakeholder consensus surrounding the need for office-based health care providers to be at the center of any efforts. Advice about vaccination from office-based providers is highly credible because they are able to offer it in the context of an ongoing and trusted relationship. Office-based providers are currently unique in possessing the physical and administrative infrastructure needed to make advice about vaccination immediately actionable. However, for a myriad of reasons, office-based practitioners are not currently living up to their potential in this area. National data suggest that communication between adult patients specifically recommended for vaccination and practitioners does not occur regularly—even in the face of a pandemic outbreak. The failure of practitioners to promote and administer vaccinations and refer adult patients to community vaccinators when the capacity to vaccinate does not exist on site serves as a vivid illustration of the deficiencies of the health care system in protecting the health of patients and the communities in which they live.

We note that a focus on office-based settings is not inconsistent with other stakeholder groups who have called for increasing the role of complementary vaccinators. Stakeholders who attended the January 2011 workshop stressed the need to encourage over the long term approaches and partnerships among providers and community vaccinators, rather than focus in a siloed fashion on individual settings.

A key question facing stakeholders is how to translate ambitious, visible federal initiatives promoting adult vaccination specifically and primary and preventive care generally into action. Our findings suggest that substantial increases in vaccination rates will require improving the ability of adult vaccination to compete for provider attention in a delivery system in which time is severely constrained, the quality and cost-effectiveness of care are increasingly monitored, and strong performers are rewarded financially.

The degree to which specific provisions in the ACA aimed at increasing health insurance coverage for adult vaccinations and allowing providers to purchase vaccine at reduced cost will serve to strengthen provider engagement is highly uncertain. Effective vaccination of adults requires that providers engage in a host of support activities, which are currently not directly reimbursed, monitored, or rewarded as part of performance improvement efforts. These activities include assembling vaccination histories, issuing vaccination reminders, recommending vaccination during face-to-face encounters, and providing in-depth counseling to patients who are hesitant to be vaccinated. Practices may lack the capacity to vaccinate effectively or may believe that their effort is better spent on other endeavors. New data suggest that a substantial share of primary care practices do not stock the full range of adult vaccines, indicating that such situations are not uncommon. In this context, it is questionable whether improved finan-

cial access to adult vaccinations and reductions in the prices that providers pay for vaccine that may accompany the implementation of ACA provisions will be sufficiently large to induce nonvaccinating providers to vaccinate and vaccinating providers to vaccinate more diligently. If not, additional expenditures may only serve to make vaccination more rewarding for those providers already vaccinating adults.

Efforts to make the promotion and administration of adult vaccines more efficient and effective require the same infrastructure that is needed to improve the delivery of other beneficial preventive care services and the management of chronic disease. Thus, efforts to expand adult vaccination may benefit as much, or more, from the success of federal and private sector initiatives aimed at transforming the delivery and financing of primary care as from the implementation of vaccination-specific provisions of health care reform legislation. Efforts to restructure the primary care system of the type envisioned by health care reform and other federal and state PCMH initiatives entail the use of performance measurement and financial incentives to enable and encourage providers to work more effectively and efficiently. But success requires the ability to capture savings resulting from the improved management of chronic disease and leverage them to invest in practice-improving technologies. Whether the transformation envisioned by primary care advocates is possible in practice is highly uncertain and depends on the ability of primary care advocates to demonstrate economic value on an ongoing basis in the face of other budgetary priorities. Seen in this context, efforts to promote vaccination can contribute to, as well as gain from, efforts to strengthen primary care.

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