Editorial
Approaches for Improving Influenza Prevention and Control

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KEY WORDS: influenza, pandemic, public health, vaccine

Despite efforts to increase the number of doses of influenza vaccine produced and distributed in the United States, there have been disruptions in the production and distribution of the trivalent influenza vaccine during five of the last six years. These delays and shortages have highlighted some of the limitations of our vaccine supply system and have contributed toward concerns that the nation is inadequately prepared to respond to an influenza pandemic. However, these challenges have also provided an opportunity to focus attention on the importance of influenza, as well as the need for improving influenza vaccine production processes, expanding disease surveillance efforts, strengthening public health–private provider relationships to facilitate vaccine distribution and redistribution, and other strategies for improving vaccination coverage levels. These actions are not only important during interpandemic years but also essential for pandemic planning and preparedness.

Influenza is a serious disease. In the United States, interpandemic or seasonal influenza and its complications are associated with an average of 36,000 deaths each year and more than 200,000 hospitalizations. More than 90 percent of these deaths and approximately half of the hospitalizations occur among persons 65 years of age or older. The annual economic toll of influenza has been estimated at between $2 and $3 billion per year in direct medical costs. The severity and impact of the next pandemic, whether from the highly pathogenic avian influenza A (H5N1) virus or another influenza virus, cannot be predicted. However, modeling studies suggest that, in the absence of any control measures, a “medium-level virulence” pandemic in the United States could result in 89,000 to 207,000 deaths, between 314,000 and 734,000 hospitalizations, 18 to 42 million outpatient visits, and another 20 to 47 million people becoming ill if 15 percent to 35 percent of the US population develops influenza in a pandemic. The associated economic impact in our country alone could range between $71.3 and $166.5 billion. Although it is important to consider the national effects of a pandemic, Aaby et al demonstrated the benefits of applying computer models to assess the potential impact of a pandemic at the local level; for example, to identify local clinics’ capacity to triage prospective recipients of vaccine and to administer vaccine. The information can be used to project the number of clinic sites, their hours, and number of people that can be served.

There are currently two types of influenza vaccine: an inactivated trivalent influenza vaccine administered as an injection and a live attenuated influenza vaccine administered as an intranasal spray. Routine vaccination against influenza is recommended each year for people at high risk of severe complications from influenza (such as people 65 years and older, people with chronic health conditions, women who will be pregnant during the influenza season, and children 6–23 months of age), for people who are 50–64 years of age, and...
for people who can transmit influenza to others who are at high risk for complications (including healthcare workers and caregivers and household contacts of infants younger than 6 months of age).9

Although the benefits of annual vaccination are clearly evident, influenza vaccine remains underutilized. Vaccination is targeted for more than 185 million persons in the United States, but no more than approximately 83 million doses of vaccine have ever been distributed for annual prevention campaigns. The limited supply of vaccines is partially in response to the inadequate demand for vaccine, as evidenced by low-vaccination coverage levels. Vaccination coverage in 2004 for influenza in high-risk adults 18–49 years of age and 50–64 years of age was approximately only 26 percent and 46 percent, respectively; and in adults aged 65 years and older, coverage was approximately 65 percent, according to the National Health Interview Survey (NHIS) (Centers for Disease Control and Prevention [CDC], National Center for Health Statistics [NCHS] and National Immunization Program [NIP], unpublished data, 2006). Significant racial/ethnic disparities—which are not well understood—persist, despite controlling for socioeconomic status, education, and access to healthcare. In 2004, influenza vaccination rates were estimated to be 67 percent, 45 percent, and 55 percent, for non-Hispanic Whites, non-Hispanic African Americans, and Hispanics aged 65 years or older, respectively (NHIS, CDC, NCHS and NIP, unpublished data, 2006). The Racial and Ethnic Disparities in Immunization Initiative (READII) described by Morita represents an effort to better understand disparities in Immunization Initiative (READII) described by Morita represents an effort to better understand disparities in immunization. Preliminary findings from a combination of READII projects have highlighted some challenges that may not be unique to overcoming disparities. A key component of the Chicago READII project they describe was the development of a community action plan to increase coverage levels by educating the community, increasing the use of provider-based strategies, and enhancing access to influenza vaccine. Preliminary findings from a combination of READII projects have highlighted some challenges that may not be unique to overcoming disparities. For example, healthcare providers to adults may not offer vaccines because of (a) time constraints, (b) the costs of purchasing vaccines upfront, (c) inadequate vaccine administration fees, (d) limited staff and other resources, (e) an absence of supportive policies or procedures, and (f) varying perceptions of the provider’s role. Misinformation and/or negative attitudes among provider office, administrative, and nursing staff may also have an adverse effect on whether adults are vaccinated.

Efforts are needed to motivate providers and the public to promote and accept influenza vaccination. Data collected in 2004 indicate that only 42 percent of healthcare workers were vaccinated against influenza (CDC, NHIS from NCHS and NIP, unpublished data, 2006). If providers are not willing to be vaccinated, then their willingness to effectively promote vaccination to their patients is compromised, and they may infect their patients with influenza. Different communication messages may be needed depending upon the target audience. For example, older adults may be motivated by messages that emphasize being vaccinated to protect those they care about, such as grandchildren and other family members.8

The effectiveness of influenza vaccine varies by age group and health status, and how well the vaccine is matched to circulating strains. In general, influenza vaccine is effective in preventing illness among 70 percent to 90 percent of healthy adults younger than 65 years of age and less so among noninstitutionalized elderly adults.9–11 The vaccine is 30 percent to 70 percent effective in preventing hospitalizations for pneumonia and influenza.12,13

New influenza vaccines are produced each year because the influenza viruses included in the vaccines change each year, depending upon the types of strains circulating. The 6- to 8-month production process requires that the selection of the vaccine strains occur well in advance of the actual influenza season. Consequently, in a given season, the match between the vaccine virus strains and those strains in circulation may not be perfect.14

The ability to monitor the burden of disease and assess the impact of vaccination relies upon a strong surveillance system. In the United States, influenza surveillance is a collaborative process between state and local health departments and laboratories, sentinel physicians, hospital-based emerging infections programs, and state vital statistics offices.15 Efforts are underway to enhance hospital-based surveillance for influenza in children by expanding surveillance sites. As Nagykaldi et al have noted, there are opportunities for improving influenza surveillance by incorporating additional sentinel providers, such as practice-based research networks.16 These networks can provide timely information regarding the number of patients treated with influenza-like illness, including the numbers that are hospitalized. Nevertheless, assessing influenza-related morbidity and mortality can be difficult because of the inability to distinguish between influenza and other influenza-like illnesses without laboratory confirmation. Therefore, state and federal public health officials are discussing making all laboratory-confirmed influenza hospitalizations notifiable. In the meantime, in 2004, the Council for State and Territorial Epidemiologists recommended that pediatric deaths associated with laboratory-confirmed influenza be a nationally notifiable condition.17
Unlike the situation for other routinely recommended pediatric vaccines, the public sector role in the purchase and distribution of influenza vaccine is much more limited. For example, while CDC funds are used by state and local public health agencies to secure approximately 50 percent of routinely recommended vaccines for children, only about 10 percent of influenza vaccines are purchased through CDC contracts (CDC, NIP, unpublished data, 2005). As a consequence, state and local public health agencies have a limited capacity, particularly during shortage situations, to provide vaccine to private providers when those providers are unable or unwilling to procure doses directly from manufacturers and distributors.

Tate describes the experience of the state and local health departments in Maryland during 2001–2004 and their shared efforts to assure the provision of influenza vaccination services during challenging times. Her article and that of Roddy et al provide specific recommendations to address potential vaccine supply and delivery issues on the basis of prior experiences in Minnesota. For example, in Maryland, a report is produced each year that documents the experience of local health departments and provides lessons learned, such as the benefits of ordering vaccine from multiple sources, developing partnerships, and the collection of vaccine ordering and administration trends. Minnesota used its Web-based vaccine order information in 2004 to facilitate the redistribution of vaccine among providers. Bennett et al provide detailed information about their challenges and lessons learned from redistributing 60,000 doses of influenza vaccine through a public health–private provider collaboration. Although the authors also highlight the importance of conducting assessments and having effective partnerships and communication systems, they also recognize the importance of responding to the concerns of community partners.

The legal context in which state and local health officials operate guides their actions as well as their actions. Hodge and O’Connell describe a number of strategies that were implemented during the 2004–2005 vaccination season. For example, 27 states took legal action, primarily to ensure that vaccine was available to reach high-risk populations, vaccine allocation, and vaccine pricing. However, as Iton has noted, many legal uncertainties remain that should be addressed prior to a pandemic, particularly with respect to the ability of local public health agencies to assess the local supply and demand for vaccine, and ensure that vaccine is used for priority populations in accordance with established guidelines. Pandemic preparedness depends not only upon having adequate healthcare capacity, vaccine supply, and a legal framework for responding to public health emergencies but also upon having well-developed communication messages for the public and for healthcare providers. Janssen et al discuss a process used with healthcare providers and members of the general public to test preliminary pandemic-related communication materials regarding a variety of factors, including comprehensibility, believability/credibility, level of interest in the subject, perceived importance of the information, likelihood of action after being exposed to the information, and unanticipated consequences of learning the information. The development of messages must reflect the intended target audiences. However, we cannot overlook the critical need for ensuring that messages and services incorporate social justice principles. As Kayman and Ablorh-Odjidja explain, to be successful pandemic preparedness efforts must focus on assuring access, respecting individual rights, providing opportunities for public input, and training staff to be more culturally competent, as well as other key elements like ensuring sufficient resources exist and that they are appropriately distributed.

While we have a tendency to focus upon partnerships between state and local public health agencies and healthcare providers, as Skelton demonstrates, there is a critical need for engaging the private sector in planning, preparedness, and response efforts. The US Department of Health and Human Services has produced a series of checklists to facilitate these efforts in a variety of sectors, including businesses.

Several changes to the existing immunization system are needed if we are going to improve influenza vaccination coverage levels and prepare for a pandemic when initial vaccine supplies are likely to be limited. There must be greater awareness of the importance of vaccination as a key element in achieving/sustaining good health. To enhance the demand for vaccination, we must maintain and strengthen the public and private partnerships that have been formed during the recent vaccine shortage seasons. The partnerships can help to educate the public, healthcare providers, and healthcare institutions about the risks and benefits of vaccination, resources that are available to provide them, and strategies for healthcare providers to help them in delivering influenza vaccine, particularly when supply is limited. In addition, this partnership can assist with implementing and/or expanding policies and procedures that encourage vaccination, such as standing orders, performance-based measures and incentives, state/local laws or regulations, and late-season (ie, December or later) vaccination.

Assuring improved influenza vaccination coverage levels, especially among adults, should increase demand for vaccines and stabilize the vaccine market. As the articles in this supplement demonstrate,
disruptions in vaccine supply impose a great burden on public health agencies, providers, and the public. To assure a safe and adequate supply of influenza vaccine during routine and emergency situations, greater efforts are needed to stabilize vaccine production, including streamlining the regulatory processes; addressing liability issues; utilizing vaccine stockpiles; and increasing financial incentives for research, development, production, and administration. Swain and Ransom discuss enhanced or universal influenza vaccine recommendations as a vehicle for stabilizing vaccine production and supply. These issues are under active discussion by influenza researchers and the Advisory Committee on Immunization Practices.

To leverage existing public health and primary care resources, state and local public health agencies need sufficient resources to provide essential influenza-related activities such as outreach to various sectors (eg, education, business, and health), disease surveillance, outbreak control, education, service delivery in both traditional and nontraditional sites, applied research to increase coverage, and quality assurance. These efforts will have a direct effect on the public’s health by reducing the burden of influenza, and will also provide opportunities for addressing other threats to health. All of these issues, including improving vaccination coverage, improving access to vaccines for all adults, simplifying vaccine purchase and reimbursement procedures, better understanding and measuring influenza’s impact, and implementing a comprehensive research policy have also been discussed in detail, and endorsed, by the National Vaccine Advisory Committee.

To evaluate the effects of these efforts to protect our nation against influenza, a series of assessments are needed, including effective systems to track vaccine distribution, inventory, and doses-administered data; timely estimates of vaccination coverage levels for all age groups; improved surveillance of influenza hospitalizations and deaths, vaccine safety, and vaccine effectiveness; refined cost-effective and cost-benefit analyses; and surveys of providers and the public regarding changes in their knowledge, attitudes, practices, and/or beliefs related to influenza.

An influenza pandemic has greater potential than any other naturally occurring infectious disease event to cause a large and rapid increase in deaths and serious illnesses. Preparedness is the key to substantially reducing the health, social, and economic impacts of an influenza pandemic and other public health emergencies. Somewhat different than preparedness for smallpox and other bioterrorism events, being prepared for the next influenza pandemic fundamentally depends upon enhancing the national, state, and local capacity to handle the complexity of issues associated with a routine public health challenge: annual influenza epidemics.

REFERENCES


