Valuing Influenza Vaccine: Medical, Economic, and Social Benefits

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(See the article by Nichol et al. on pages 292–8)

Every year, an influenza epidemic occurs that results in substantial global mortality and morbidity, as well as significant economic costs. The Centers for Disease Control and Prevention estimates that a mean of 200,000 excess hospitalizations occur and 36,000 Americans die every year because of influenza and its complications; therefore, influenza kills more Americans than does any other vaccine-preventable disease [1]. A mean of 1 in 8300 Americans will die of influenza and its complications by the end of the upcoming influenza season. This annual mortality continues despite the availability of influenza vaccines in the United States since the 1940s. Nearly 70 years later, the public and some health care workers still have questions regarding influenza vaccine safety, efficacy, effectiveness, and cost-effectiveness of vaccination of adults, even though multiple studies and a review of the influenza vaccine data for healthy adults have convincingly revealed that vaccination is effective in preventing influenza virus infection [2].

WHAT WERE THE RESULTS OF THE STUDY?

In this issue of Clinical Infectious Diseases, Nichol et al. [3] present the results of a prospective cohort study that examined the effectiveness of influenza vaccine among healthy working adults aged 50–64 years for several important measures. The study assessed the burden of influenza-like illness (ILI) among 497 University of Minnesota employees during the 2006–2007 influenza season. Study data (occurrence of ILI, symptoms, impact on work, and health care use) were self-reported and collected by internet survey every month throughout the influenza season.

Significant morbidity associated with ILI was evident among study participants. Overall, 17.5% of participants reported an ILI episode; the mean duration of illness was 8 days, the mean number of days of missed work was 1.5, and the mean number of days when the participants worked while ill was 4. Thirty percent of the participants were ill enough to seek medical care, and 23% were prescribed antibiotics. Importantly, ILI accounted for 45% of all days of illness, almost 40% of work days lost because of illness, and almost 50% of all days when participants worked while ill. Among those who had received influenza vaccine, vaccination resulted in a reduction in the rate of ILI of 45% and a reduction of >60% in the numbers of days while ill in bed, days of impaired working while ill, and days of illness; this was a huge benefit when the public health impact is considered. These improvements occurred despite findings that vaccinated persons were more likely to have functional impairments and chronic medical conditions and to take prescription drugs, which should have caused a bias against finding these results.

WHAT WAS THE IMPORTANCE OF THIS STUDY?

The study by Nichol et al. [3] provides additional data on the effectiveness of influenza vaccine in preventing ILI in healthy working adults and on a variety of related significant outcomes during a season when circulating wild strains and vaccine strains were well-matched and ILI was widespread. Although the study did not examine outcomes of culture-proven influenza (other studies have done so), it did examine “in the field” outcomes (i.e., the proportion of influenza-like respiratory illness in community-dwelling working adults that can be prevented by influenza vaccination). Of importance and relevant to recent concerns of bias and confounding [4], the study design allowed for an assessment of vaccine effectiveness during periods when influenza virus was not circulating in the communities in

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which study participants lived, which allowed detection of bias and/or confounding caused by other factors (if present); however, no bias or confounding was detected.

An important topic that is rarely addressed in these types of studies and that is worth highlighting is presenteeism (i.e., being present at work or school but with impaired functioning and reduced productivity) [5]. In the study by Nichol et al. [3], participants reported a median level of work effectiveness during days when they were ill of only 70%-75%. The impact of significantly reduced work effectiveness in the workplace and school are obvious. What may be less obvious are the consequences of presenteeism, such as safety concerns (e.g., the potential impact of reduced functioning and judgment among pilots, physicians, nurses, and law enforcement), reduced production and economic productivity, decreased learning (e.g., at school and in continuing education), and increased risk of accidents (e.g., for drivers, machine operators, and public workers).

The use of an internet-based survey to rapidly evaluate influenza vaccine effectiveness was also a novel method. Currently, influenza vaccine effectiveness studies are often reported years after the season in which the study occurred; thus, the studies have only retrospective informational value. Internet-based surveys such as the one used by Nichol et al. [3] are inexpensive, rapid, and potentially provide unique and significant advantages, such as real-time monitoring of vaccine effectiveness (allowing for short-term changes in public health policy), new information regarding changes in vaccine effectiveness during the course of an outbreak, real-time monitoring of vaccine-related adverse events, and estimates of local or regional burden of illness. Similarly, such technology could prove to be invaluable as a real-time information source to public health officials and private practitioners during the chaos of an influenza pandemic.

HOW SHOULD THESE DATA INFLUENCE MEDICAL CARE AND POLICY?

Many studies have demonstrated the safety, efficacy, and cost-effectiveness of influenza vaccine among the elderly population and healthy working adults [6–14]. Studies such as the one by Nichol et al. [3] reinforce an important public health message with regard to influenza vaccination: influenza vaccines are effective in mitigating outcomes of interest, including medically relevant issues and complications, economic and other losses relevant to loss of work or school time, and presenteeism. The study by Nichol et al. [3] provides confirmation of results from other studies. These findings must be shared among health care workers, patients, health care media, and health care professional societies, to influence public health policy in a manner that benefits the public health. According to current knowledge about influenza vaccine, every adult should be offered influenza vaccine annually and should be educated by their physician about influenza and the influenza vaccine. Employers should also understand the importance of these findings in terms of protecting workers’ health and productivity by preventing presenteeism and presenteeism [15].

In particular, when applying these findings to a health care setting, where transmission of virus from infected health care workers to patients occurs, strong consideration should be given to requiring influenza vaccination for health care workers as a condition of employment and renewal of credentials, to prevent presenteeism, presenteeism, and transmission to patients and other staff—outcomes that result in suboptimal patient safety and low-quality patient care [16, 17]. A recent article on the ethics of requiring influenza vaccination for health care workers determined that, from a biomedical ethics point of view, health care institutions have an obligation to insure high rates of influenza vaccination among their staff and should use mandates to do so [18].

Renewed efforts at vaccinating healthy working adults against influenza should be made; for persons aged ≥50 years, such efforts are consistent with current Advisory Committee on Immunization Practices standards [1]. Given that recommendations exist to vaccinate all persons aged 6 months to 18 years and ≥50 years, a simplified and impactful public health recommendation should be that all Americans ≥6 months of age receive influenza vaccine. Although the Advisory Committee on Immunization Practices has signaled its intent to make this public health recommendation, the timeframe for implementation is 2–4 years away.

In addition, studies similar to the one by Nichol et al. [3] should be performed for other subpopulations, such as schoolchildren and groups that receive annual influenza vaccination over many years. Consideration of such annual studies should be performed to improve the database on influenza vaccine effectiveness in subpopulations and across influenza seasons and to allow for the acquisition of real-time public health data. Continued efforts to develop more-effective vaccines (especially for the elderly population), such as universal influenza vaccines that might prevent the burden of yearly vaccination campaigns, and to develop comprehensive funding programs for adult vaccination should not be only aspirational goals, but should be explicitly grounded in public health policy and funding. This latter point is critical; although the United States has a comprehensive childhood vaccination program, it does not have a comprehensive adult vaccination program or adequate funding mechanisms for such a program. In view of the tremendous economic and health impact of influenza and the benefits of preventing it with vaccine, a comprehensive adult vaccination program should be instituted, and adequate funding should be provided for such a program. Data demonstrating vaccine safety, effectiveness, and efficacy need to be shared with policy makers who are unaware of the true
magnitude of the annual morbidity and mortality and the negative annual economic impact associated with influenza. Individual health care workers, health care systems, and employers should have renewed and vigorous advocacy for the implementation of a vaccination program against annual widespread epidemic illness, unnecessary health care costs and deaths, increased work and school absenteeism and presenteeism, and huge direct and indirect economic costs. Health care workers, professional societies, and policy makers should demand that comprehensive public health programs and funding for adult vaccination programs, particularly for influenza vaccine, be accomplished. At a minimum, a comprehensive vaccination program should be implemented before the next influenza pandemic.

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