

Optimizing Vaccine Availability and Utilization

Position Statement of the American College of Preventive Medicine

Seira Kurian, MD, MS, Debra S. Blog, MD, MPH, Kevin M. Sherin, MD, MPH, CPE

Introduction

Immunizations represent a major success in public health and their economic and health benefits have been well documented.^{1,2} Therefore, it is unfortunate that major shortcomings in the current system threaten a reliable supply of immunizations for the American population. The recent shortage of influenza vaccine was yet another reminder of the continuing need to revamp the nation's vaccine supply. Leading organizations such as the National Vaccine Advisory Committee (NVAC),³ the United States General Accounting Office (GAO),⁴ and the Institute of Medicine (IOM; www.nap.edu/books/0309089794/html)⁵ have dedicated considerable resources to studying this issue. Target areas that have surfaced as important points of intervention have focused on the production, supply, and financing of vaccines. These issues will also resonate in terms of future vaccine development against bioterrorism agents. A cohesive approach to the efficient manufacture and use of these vaccines is of growing concern. Under-utilization of existing vaccines is a related concern, especially in terms of manufacturing efficiency, and in terms of optimizing the utilization of vaccines by at-risk groups during periods of shortages. All of these issues are important components of the vaccine discussion and deserve further attention.

Over the past few years, shortages of vaccines against diphtheria, tetanus, pertussis (DTaP, Td); measles, mumps, rubella (MMR); varicella; influenza; and pneumococcus (pneumococcal 7-valent conjugate vaccine) have occurred.³ In response, standard immunization schedules had to be altered by the Advisory Committee on Immunization Practices (ACIP) in order to ensure that vulnerable populations were given priority.⁶ The factors that perpetuated these shortages included matters of production, distribution, and policy. For example the DTaP and Td shortages arose because of a series of events that led to one manufacturer's decision to cease production.⁷ Plant modifications undertaken by the manufacturers of MMR and varicella vaccines con-

tributed to significant production interruptions.⁸ Other contributing factors to vaccine shortages included delays brought on by production-line shut-downs that were necessary to bring manufacturing plants into compliance with the current good manufacturing practices (cGMP), a set of Food and Drug Administration (FDA) guidelines.³ Policy changes regarding the use of thimerosal also led to significant alterations in vaccine production and led to greater costs for some manufacturers.⁴

Another factor contributing to shortages has been disproportionate demand. Unanticipated need following the introduction of the pneumococcal vaccine led to an under-supply of the Prevnar® vaccine.⁹ The decrease in the recommended age from 65 to 50 for influenza vaccination,¹⁰ and the more recent concerns regarding a more virulent influenza season has also led to limited availability of the influenza vaccine as product demand far exceeded supply. Other unique problems are associated with the production of influenza vaccine that persistently places it in danger of shortage. Almost annually the composition of this vaccine requires alteration in order to incorporate new strains. A less-than-optimal yield during production with the new vaccine can quickly lead to delays and shortages.

The application of new FDA regulations also has the potential to interfere with supply. Starting in 1999, the FDA applied a more rigorous approach to evaluating manufacturer compliance with cGMP. Manufacturers have expressed concern regarding a lack of clear communication from the FDA regarding the specifics of this new approach, which makes adherence more difficult. Other communication issues have arisen due to the lack of advance notification given to the government by manufacturers regarding impending shortages. This greatly diminishes the possibility of any preparation that can be done to bridge a possible shortage period. One interim management tool that has been offered has been the use of national stockpiles. The goal of these stockpiles is to maintain enough vaccine supply to meet public needs for a 6-month period. Currently only MMR and inactivated polio vaccine (IPV) stockpiles have even partially approached that goal. Furthermore, policy and manufacturing changes due to reformulation, combination, or targeting of new age groups may cause currently stockpiled vaccines to become obsolete. Lack of consistent com-

From the State University of New York (Kurian); New York State Department of Health (Blog), Albany, New York; and Family Practice Center (Sherin), Hometown, Illinois.

Address correspondence and reprint requests to: American College of Preventive Medicine, Attn: Jennifer K. Bretsch, MS, 1307 New York Avenue, NW, Suite 200, Washington DC, 20005. E-mail: jkb@acpm.org.

munication between key stakeholders, such as the FDA, manufacturers, and individual states has also hampered the development of an efficient stockpiling system.⁴

The high costs associated with vaccine research and development, and the relatively low revenues attained have given little incentive for manufacturers to enter production.⁴ This poses significant problems as the need for new vaccines is likely to appear in light of the changing epidemiology of certain diseases, and due to the heightened concerns regarding bioterrorism. The continued uncertainty regarding which agents may be used and the timing of potential attacks are just a few of the other unique challenges in terms of developing vaccines against bioterrorism agents. In spite of these issues, vaccines have been developed against some, but not all, agents of bioterrorism.¹¹⁻¹⁷ Other barriers that have prevented companies from entering into vaccine development include the uncertainty regarding the demands of the market and the costs and time associated with clinical trials. Foreign clinical trials are accepted under limited conditions for use in U.S. licensure, but because there is no standardization of regulatory requirements between countries, this is often a difficult road to navigate. There is a push toward standardization or "harmonization" of these regulations in regards to other pharmaceutical products, but vaccines are not currently among them.⁴

The under-utilization of vaccines also has the potential for producing a virtual shortage since community-wide disease prevention cannot occur if available vaccines are not optimally used. Optimizing utilization is of utmost importance especially during periods of shortage; further research in this area is paramount when addressing vaccine shortage. Organizations such as the National Coalition for Adult Immunization¹⁸ and the IOM¹⁹ have looked at the issue of barriers to immunization and under-utilization of vaccines. Both have found that community-wide education and intervention are important in improving vaccine utilization.

Background

In 2001, the U.S. Department of Health and Human Services (DHHS) requested that the NVAC identify possible causes of the supply shortages and develop options for preventing future problems. The GAO also conducted a similar investigation aimed at determining what factors had contributed to the recent shortages and what strategies federal agencies were considering to help deal with disruptions in the vaccine supply. The agencies used the involvement of experts and stakeholders, visits to vaccine manufacturers, reviews of regulations, analyses of vaccine supply problems, advisory panel meetings examining vaccine shortages, and interviews with agency officials and other vaccine experts in developing their recommendations. Concurrently, the IOM undertook an evaluation of the financ-

ing infrastructure for immunizations. Their report found that the system for purchasing and administering vaccines played an integral role in the strength and growth of vaccine supplies. Their recommendations provide innovative solutions that can improve many aspects of vaccine development including production, supply, and utilization.

Statement

The American College of Preventive Medicine recognizes the many dangers of vaccine shortages and based on the recommendations put forth by the NVAC, GAO, and the IOM, the College supports:

1. The implementation of a new insurance mandate combined with a government subsidy and voucher plan for those vaccines recommended by the ACIP as outlined by the IOM report. Components of this plan would include:
 - a. Federal legislation mandating vaccination coverage by all public and private health plans.
 - b. A new federal subsidy to reimburse health plans and providers for mandated vaccine costs and administration fees.
 - c. A federally funded voucher system for vaccines and administration fees for uninsured populations. The mandate, subsidy, and voucher system would apply to vaccines with high societal benefit in terms of their ability to prevent highly contagious illnesses.
2. The establishment of funding for a national stockpile to ensure that all vaccines recommended for routine administration by the ACIP are present in necessary quantities to meet demands for at least 6 months in the event of a shortage.
3. The maintenance and extension of liability programs such as the Vaccine Injury Compensation Program to include newly developed vaccines in addition to coverage of all components of existing vaccines, such as preservatives and additives.
4. Advance notification by vaccine manufacturers to the DHHS and the ACIP regarding the desire to withdraw from production or the possibility of shortages due to manufacturing delays.
5. Streamlining the production and regulatory processes of the FDA with a thorough review of the current regulatory standards.
6. Further research regarding improving the utilization of vaccines.
7. Ongoing evaluations of existing programs aimed at improving utilization, with federal funding for a nationally based expansion of those projects found to significantly improve utilization rates.
8. Improved communication between national intelligence and public health to better understand the need and societal benefit of specific vaccines against bioterrorism agents.

9. Consensus on an economic model that will effectively determine the societal benefit of future vaccines including those directed against bioterrorism agents in order to determine the need for such vaccines in addition to aiding in setting an effective federal subsidy price.

Rationale

Vaccine shortages have led to an increased risk for preventable disease. Identifying and remediating the causes of these shortages are necessary in securing the nation's health. Maximizing vaccine utilization is also paramount in disease prevention. Success has been noted by projects aimed at improving utilization rates through the use of community-based campaigns^{20,21} and may provide a model for expanded implementation. Meanwhile, the potential for a bioterrorism event continues to pose a significant threat. These events are wrought with significant uncertainty; discussions regarding further development and production of bioterrorism vaccines will benefit greatly from a thorough economic evaluation.²²

The NVAC, GAO, and the IOM through exhaustive research have identified strategies for preventing future vaccine shortages and further strengthening the immunization system. These innovative recommendations provide an important approach to dealing with vaccine shortages and are therefore supported by the American College of Preventive Medicine.

The views expressed in this position statement are those of the American College of Preventive Medicine. Seira Kurian, MD, MS, Debra S. Blog, MD, MPH, and Kevin Sherin, MD, MPH, CPE, wrote this statement on behalf of the College. ACPM's Prevention Practice Committee provided guidance on the development of the statement. It was adopted by ACPM's Board of Regents on November 14, 2003. These views do not reflect the position of the *American Journal of Preventive Medicine*.

References

1. Centers for Disease Control and Prevention. Achievements in public health, 1900–1999. Impact of vaccines universally recommended for children—United States, 1990–1998. *MMWR Morb Mortal Wkly Rep* 1999;48:243–8.
2. Centers for Disease Control and Prevention National Immunization Program. What would happen if we stopped vaccinations? Available at: www.cdc.gov/nip/publication/fs/gen/WhatIfStop.htm. Accessed July 27, 2003.
3. Santoli JM, Peter G, Arvin AM, et al. Strengthening the supply of routinely recommended vaccines in the United States: recommendations from the National Vaccine Advisory Committee. *JAMA* 2003;290:3122–8.
4. General Accounting Office Report #GAO-02-987. Childhood vaccines: ensuring an adequate supply poses continuing challenges, 2002. Available at: www.gao.gov/new.items/d02987.pdf. Accessed July 27, 2003.
5. Institute of Medicine. Financing vaccines in the 21st century: assuring access and availability. 2003 Available at: www.nap.edu/books/0309089794/html. Accessed November 11, 2003.
6. Atkinson WL, Pickering LK, Schwartz B, et al. General recommendations on immunization. Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Family Physicians (AAFP). *MMWR Morb Mortal Wkly Rep* 2002;51:1–36.
7. Centers for Disease Control and Prevention. Shortage of tetanus and diphtheria toxoids. *MMWR Morb Mortal Wkly Rep* 2000;49:1029–30.
8. Centers for Disease Control and Prevention. Notice to readers: shortage of varicella and measles, mumps and rubella vaccines and interim recommendations from the Advisory Committee on Immunization Practices. *MMWR Morb Mortal Wkly Rep* 2002;51:190–7.
9. Centers for Disease Control and Prevention. Notice to readers: updated recommendations on the use of pneumococcal conjugate vaccine in a setting of vaccine shortage. A report of the Advisory Committee on Immunization Practices. *MMWR Morb Mortal Wkly Rep* 2001;50:1140–2.
10. Zimmerman RK. Lowering the age for routine influenza vaccination to 50 years: AAFP leads the nation in influenza vaccine policy. *Am Fam Physician* 1999;60:2061–6.
11. Inglesby TV, Henderson DA, Bartlett JG, et al. Anthrax as a biological weapon: medical and public health management. Working Group on Civilian Biodefense. *JAMA* 1999;281:1735–45.
12. Henderson PA, Inglesby TV, Bartlett JG, et al. Smallpox as a biological weapon. Medical and public health management. *JAMA* 1999;281:2127–37.
13. Wharton M, Strikas RA, Harpaz R, et al. Recommendations for using smallpox vaccine in a pre-event vaccination program: supplemental recommendations of the ACIP and HICPAC. *MMWR Recommendations Reports* 2003;52:1–16.
14. Aron SS, Schechter R, Inglesby TV, et al. Botulinum Toxin as a biological weapon. Medical and public health management. *JAMA* 2001;285:1059–70.
15. Dennis DT, Inglesby TV, Henderson DA, et al. Tularemia as a biological weapon. Medical and public health management. *JAMA* 2001;285:2763–73.
16. Boro L, Inglesby T, Peters CJ, et al. Viral hemorrhagic fevers as a biological weapon. Medical and public health management. *JAMA* 2001;285:2391–2405.
17. Inglesby TV, Dennis DT, Henderson DA, et al. Plague as a biological weapon. Medical and public health management. *JAMA* 2000;283:2281–90.
18. National Coalition for Adult Immunization. A call to action: improving influenza and pneumococcal immunization rates among high-risk adults. 1998 Available at: www.nfid.org/ncai/publications/roundtable. Accessed November 11, 2003.
19. Institute of Medicine. Overcoming barriers to immunization: a workshop summary. 1994 Available at: www.nap.edu/books/N1000400/html/index.html. Accessed November 11, 2003.
20. Shenson D, Quinley J, Dimartino D. Pneumococcal immunizations at flu clinics: the impact of community-wide outreach. *J Community Health* 2001;26:191–201.
21. Burger TL, Fry DA. Community flu campaigns: reaching the under immunized. Presentation at 37th National Immunization Conference, Chicago IL, March 17, 2003. Available at: www.cdc.confex.com/cdc/nic2003/techprogram/session_351.htm. Accessed November 11, 2003.
22. Kaufman AF, Meltzer MI, Schmid GP. The economic impact of a bioterrorist attack: are prevention programs justifiable. *Emerg Infect Dis* 1997;3:83–94.