Editorial

Universal Neonatal Hepatitis B Immunization—Are We Jumping on the Bandwagon Too Early?

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Immunization recommendations have proliferated over the past few years, and family physicians now have a host of vaccines to prevent disease throughout the life cycle. The pediatric age group has been a special beneficiary of this explosion of biomedical technology. For example, by late 1991 our pediatric patients received 13 to 15 immunizations for polio, diphtheria, pertussis, tetanus, *Hemophilus influenzae*, measles, mumps, and rubella.

Are all these immunizations justified? The answer is a resounding *Yes!* These were common, devastating diseases, and immunizations have, in large part, brought them under control. Secular trends are an unlikely explanation. For example, in both England and Japan, a decline in the pertussis vaccine resulted in a prompt increase in this disease.[1]

We now have an immunization for the hepatitis B virus (HBV). The Centers for Disease Control (CDC) adopted a policy advocating the *routine use* of this immunization *at childbirth*. The American Academy of Pediatrics (AAP) followed. Recently the American Academy of Family Physicians (AAFP) concurred that all future newborns should receive three immunizations against this disease. Now that three wise and powerful organizations agree, should clinicians follow this recommendation? Simply put, is the routine immunization of *all* newborns for HBV justified?

In favor of universal immunization, Shapiro and Margolis of the National Center for Infectious Diseases, Centers for Disease Control, wrote:

> . . . childhood HBV infections are widespread in certain ethnically defined populations in low endemic areas, further emphasizing the potential benefits of hepatitis B vaccination of infants. Consequently, immunization advisory groups in the United States have recently endorsed a strategy to eliminate HBV transmission among adults and children through universal infant immunization.[2]

This logic seems frail. They state that because *certain* populations are at high risk, the CDC endorses a strategy to eliminate HBV transmission among *adults* by immunizing *all infants*. They propose to vaccinate newborns to prevent a primarily adult illness. This premise requires closer scrutiny.

There are many organizations that create practice guidelines, and often these guidelines conflict.[3–6] It is therefore up to each individual physician to determine what is best for his or her patients. There are criteria or tests that any preventive measure must meet in order to be justified.[7] It is important that the measure *satisfy all criteria before it receives our support*. Instead of taking the CDC, AAP, and AAFP evaluation of the topic, each physician should apply these five criteria to routine neonatal HBV immunization before deciding how to manage the newborn.

1. Does the condition have a significant impact on health? HBV has a significant potential to cause major health problems. The disease is highly contagious,[8] and after contracting it, an adult has a 5% to 10% chance of developing chronic hepatitis. In children under the age of 5 years this rate increases to 25% to 50%.[9,10] Finally, chronic carriers of HBV carry a 100-fold increased risk of developing hepatocellular carcinoma.[11]

The lifetime risk of hepatitis B, however, is at most 5%,[8,12] and 60% to 70% of the disease occurs in high-risk populations.[9] In addition, the disease is uncommon in children, with only 2400 of the 300,000 annual cases of hepatitis B occurring before age 10 years.[13] Most of these children are high-risk infants who would be immunized under a selective rather than universal immunization program. The disease is serious, but because of its low incidence in the young, we must have more infor-

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mation before determining whether it has a "significant impact on health" in this age group.

2. Are there any hazards associated with the immunization? There is no evidence of the lifelong safety of the hepatitis B immunization, though there are no known significant adverse effects in adults or children after 10 years. In children, however, there may be serious short-term effects, but this is purely conjecture at this point. Young children receiving the Hib vaccine may develop lower antibody titers to the other childhood immunizations, thus potentially rendering all childhood immunizations less effective.[14] Presumably, adding yet another immunization to the already crowded immunization schedule in the first 6 months of life may overwhelm the child's ability to mount an appropriate immune response. Although adverse effects of larger-scale administration of hepatitis B vaccine along with the polio, diphtheria, tetanus, pertussis, and *H influenzae* vaccines are unknown, there is evidence of a decrease in the immune response to HBV when the vaccine is given too early.[12,15]

Thus, newborn immunization may not be as effective as later immunization, and it carries the potential of a decreased immune response to the primary pathogens of childhood. These two concerns, coupled with the exceedingly low incidence of hepatitis B in children, raises the question whether the immunization offers more harm than benefits. Even the CDC emphasizes the need for continued monitoring of the immunization's safety.[12] In our opinion the immunization fails to pass this second test.

3. Will immunization make it possible to change the prognosis of the disease? The immunization is at least 90% effective in the short term.[12] However, titers fall in up to 60% of people after 9 years, though immunologic memory persists.[12] There is no evidence of the immunization's effectiveness after 10 years.[16] For this reason the need for a booster is likely, as with all other immunizations given in the first 18 months of life. So, while the immunization is effective, the program of universal newborn immunization *does not* pass the third test. There is insufficient data that such a childhood immunization program will offer immunity as an adult, when it is most needed.

4. Is the immunization acceptable to the patient and the physician? Not all parents agree that immunizations are justified.[17] Nevertheless, both patients and physicians generally regard immunizations as acceptable, and the hepatitis B vaccine has fewer side effects than most. On the other hand, a significant number of physicians anticipate negative parental reactions and nurse resistance to giving three injections (DPT, Hib, and HBV) at a single well-child visit. It is not clear whether the immunization passes the fourth test.[18]

5. Is the immunization cost-effective? In this context, *cost-effectice* means that the benefits of the immunization justify the costs. Assume the three-dose schedule costs $50, has no side effects, and is 90% successful at preventing the disease. Given a 5% lifetime risk of the disease, the immunization program costs only $1100 per case of hepatitis B prevented. This cost seems reasonable.

Does this mean that routine immunization of newborns for hepatitis B is cost-effective? Hardly. The most cost-effective method is to immunize "endemic" populations, and hepatitis B is primarily a disease of adolescence and adulthood; it is essentially unknown in children before age 10 years. Given that 4 million infants are born in this country each year, a universal immunization program costing only $50 per infant will cost $200 million each year. Since the majority of the program's effect will not be seen for 15 to 20 years, the nation will spend $3 to $4 billion before a significant effect on hepatitis B is seen. If the emphasis were placed instead on high-risk newborns or mandatory immunizations of teenagers, the costs would be much less and the effects more immediate.

The important question, however, is not hepatitis B but the carrier state. Using the data given above, between 6173 and 12,346 immunization series (ie, up to 37,000 vaccinations) are needed to prevent one case of HBV carrier state. For those who believe that hepatocellular carcinoma is a valid rationale for the newborn immunization program, similar calculations demonstrate that approximately 2 million immunization series (6 million vaccinations for $100 million) are necessary to prevent one case of hepatocellular carcinoma. In short, universal newborn immunization is not cost-effective.

What about the CDC's argument that teenagers are too hard to immunize? Would you really implement a childhood immunization program that may not work when needed just because the program is convenient? Are there better mechanisms of assuring the compliance of teenagers? Two examples are proof of immunization before entering high school (similar to the requirement that children be immunized before starting kindergarten) and proof of immunization before getting a driver's license. Immunization programs based in the school would be less expensive than office-based programs and would also improve compliance in teenagers. Such a program could be tied to tetanus and rubella boosters, thus increasing the compliance and decreasing the costs associated with these immunizations as well.

First and foremost, our efforts should be concentrated on preventing the spread of hepatitis B. Universal newborn hepatitis B immunization may eventually prove to be justified, but in 1993 it is a premature policy. The program fails at least four of the five criteria, and we should abandon the practice outside of carefully designed

clinical trials. Instead, we should focus our resources on the immunization of teenagers and high-risk children.

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