Hepatitis B Immunization and Postimmunization Serology

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Before the introduction of a vaccine, hepatitis B virus (HBV) was a major occupational risk to health care workers. Some of the highest infection rates were found in dentists and surgeons.[1] Infected health care workers have a 5-10% risk of developing chronic hepatitis B. A number of clusters of dentist-to-patient HBV transmissions have been reported over the years, although these have decreased since the introduction of universal precautions.[2] Recent guidelines from Health Canada recommend restriction of practice of health care workers who test positive for hepatitis B e antigen.[3]

The development of hepatitis vaccines in the 1980s has substantially decreased dental workers' risk of acquiring HBV. A recent survey[4] of dentists in Canada showed that more than 90% had completed an immunization series and an additional 3% had natural immunity. However, rates of immunization among dental assistants and hygienists was found to be much lower.

Hepatitis B Vaccines

Hepatitis B surface antigen (HBsAg) induces neutralizing antibodies (anti-HBs) that protect against HBV infection. The original hepatitis B vaccine Heptavax was derived from human plasma, and, although unfounded, concerns about possible contamination with other bloodborne pathogens prevented its widespread adoption. Two genetically engineered vaccines, made by inserting the gene for HBsAg into the yeast *Saccharomyces* and harvesting the HBsAg produced are available in Canada. Engerix B and Recombivax are equivalent and can be used interchangeably. The recommended dosing schedule is at zero, one and 6 months; however, accelerated regimens are possible (zero, one and 2 months, with a booster dose of vaccine at 12 months[5]).

The vaccine is administered intramuscularly into the deltoid muscle, as gluteal injection may result in decreased response rates. Response to vaccine following a 3-dose series is typically greater than 95% in young, healthy people, although it decreases with age (< 90% response at age 40 and only 75% response at age 60). Other factors such as smoking, obesity and chronic disease decrease vaccine efficacy and may be used to predict risk of nonresponse.[6] Adverse events are minimal, although mild injection-site reactions may occur in 20% of recipients.

Antibody Levels Required for Protection

Levels of anti-HBs above 10 mIU/mL provide virtually complete protection against HBV.[7] Typically, levels in the 100s or 1000s of mIUs/mL are achieved following a 3-dose series, and some authorities recommend a fourth dose if levels are 10-100 mIU/mL. People who do not respond to the initial series may be given additional doses. About 15-25% of people will respond to one additional dose and 30-50% respond to 3 additional doses.[6] According to some reports, intradermal vaccine, given at full doses, may produce seroconversion in persistent nonresponders.[8] People who do not respond after 2 series should be warned that they may be susceptible to HBV and should receive hepatitis B immune globulin (HBIG) following HBV exposure.

Postimmunization Testing for Immunity

Although health care workers who perform invasive procedures have an obligation to know their serostatus, postvaccination testing for anti-HBs has been controversial. In a survey of Canadian dentists, only 72% reported knowing their serostatus after immunization.[4] It has been argued that the high seroconversion rates seen in most recipients and the decline in occupational HBV exposure make this unnecessary. Others have suggested that postexposure testing and administration of HBIG to nonresponders is more cost-effective than postimmunization testing.[6] This argument is based on the high seroconversion rates seen with the vaccine and the relatively low risk of exposure. However, it presupposes that people exposed to HBV will follow up with a postexposure protocol. Many may not, either because they are unaware that a patient is a carrier of the virus or because they feel they are protected, as they have been immunized. Adequate postexposure management also requires knowledge of immune status to determine whether HBIG should be administered. Vaccine-induced antibodies decline

with time, and up to 60% of those who initially respond to vaccination lose antibodies within 12 years.[9] These people may, therefore, receive HBIG unnecessarily.

Are Booster Doses of Hepatitis B Vaccine Necessary?

When the recombinant vaccines were released, initial recommendations included booster doses of vaccine after 5 years due to declining antibody levels. However, studies have shown that even if anti-HBs levels fall below 10 mIU/mL and infection occurs, it is transient and clinically unapparent and chronic disease does not develop. Thus, the National Advisory Committee on Immunization no longer recommends booster doses in immunocompetent people nor periodic testing to determine antibody levels.[10]

Conclusion

All nonimmune dental health care workers should receive immunization with recombinant hepatitis B vaccine. Postimmunization serology should be performed to ensure seroconversion and guide further immunization and postexposure prophylaxis. Following seroconversion, booster doses of vaccine are not required. ◆

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