

Out of Hospital Care Provider Policy

Title: Hepatitis B Vaccination Program

Effective Date: February 1, 1995

POLICY:

Hepatitis B is an easily transmitted virus that can lead to chronic illness, and in some cases death. It has long been established that prehospital care providers are at risk of contracting the Hepatitis B virus. Currently, a relatively safe and effective vaccination is available to prevent contraction of the Hepatitis B virus. Furthermore, the Occupational Safety and Health Administration and PESH mandates that all employers make Hepatitis B vaccinations available to employees at no charge. The Erie County Division of Emergency Medical Services recommends that all prehospital care providers consider Hepatitis B vaccination and has developed a program to assist agencies in providing the vaccination to prehospital care providers at a reduced cost.

PROCEDURE:

Vaccinations for Hepatitis B shall be administered at 0, 1 and 6 months. All three doses of the vaccine are required in order to provide maximum protection from the Hepatitis B virus. The Erie County Division of Emergency Medical Services will arrange for the vaccination to be administered to prehospital care providers pursuant to the following guidelines:

- 1) Any agency in Erie County that provides prehospital care is eligible for inclusion in the Hepatitis B vaccination program. A chief officer or director shall contact the Department of Emergency Medical Services at 681-6070 to arrange for vaccinations.
- 2) A video tape will be provided for prehospital care providers to view. The agency shall determine the number of persons who are to be vaccinated and submit a list of participants names and social security numbers to the Division of Emergency Medical Services, 3359 Broadway, Cheektowaga, New York 14227. The agency is advised to have all employees declining vaccination sign a declination form.
- 3) The agency shall be responsible for paying for all three doses of the vaccination prior to the administration of the first dose. Current cost per individual is approximately \$110.00 for the three dose series. The vaccine will not be ordered until it is completely paid for. Allow approximately four weeks from the time of payment until the vaccine is received and ready for distribution.
- 4) Upon ordering the vaccine, a site for administration of the vaccine will be determined. If the agency does not have an individual within the agency who is qualified to administer the vaccine, the Division of Emergency Medical Services will attempt to make arrangements to provide a qualified person to administer the vaccine.

- 5) The agency shall be responsible for maintaining records of those individuals within the agency that have received the vaccination and shall insure that the individuals return for each of the two successive doses. Additionally, the Erie County Division of Emergency Medical Services will maintain records of vaccination administration including the care provider's name, date of administration(s) and lot number of the vaccination.
- 6) Any questions regarding the Hepatitis B vaccination program shall be directed to the Division of Emergency Medical Services at 681-6070.

HEPATITIS

by Anthony J. Billittier IV, M.D.

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Despite all the recent publicity (stimulated primarily because of the recently introduced OSHA guidelines), I often wonder how much prehospital care providers really know about hepatitis B. Despite being 100 times more infectious than AIDS, I do not think that health care providers truly appreciate the seriousness of the hepatitis B virus (HBV) infection. Between 10,000 to 15,000 health care workers become infected with HBV annually, and of these about 300 die. However, HBV can (and probably will) become a nearly totally preventable disease through vaccination.

Hepatitis is a general term for inflammation of the liver for which there are many causes. Causes of hepatitis (and other conditions that result in liver damage) include: medications such as Tylenol and birth control pills; recreational drugs such as alcohol; toxins such as carbon tetrachloride; and various infectious agents. The hepatitis B virus is only one of these infectious causes of hepatitis. Infectious mononucleosis ("the kissing disease"), the herpes virus, cytomegalovirus (a potential cause of chronic fatigue syndrome), as well as the hepatitis A virus (HAV), the hepatitis C virus (HCV), the hepatitis D virus (HDV) and the hepatitis E virus (HEV) are other viruses that may cause hepatitis.

The hepatitis A virus is transmitted by ingestion (often in raw shellfish) and subsequently passed in the feces. It is easily destroyed by boiling food for 1 minute. It is rarely passed through blood contamination, and therefore poses no real risk to health care providers.

The hepatitis E virus is found primarily only in India, Asia and Central America; and it is also transmitted through the oral-fecal route. Overall, hepatitis A and E cause less serious forms of hepatitis. The hepatitis may be so mild that the patient does not seek medical care (and may even be unaware of the infection). This is proven by the fact that 40% of people in urban America have antibodies against a previous hepatitis A exposure (and are therefore immune to further hepatitis A infections); yet only 5% of these people remember having had any symptoms. In addition, symptoms from both hepatitis A and E infections tend to be shorter lived and are never chronic.

The hepatitis C virus has only recently been identified. It was previously known as Non-A, Non-B hepatitis. It is transmitted primarily through blood and some blood products. The risk of transmission has been greatly reduced however because of a new screening test for donated blood. Theoretically, this agent can be transmitted through occupational exposure; however, it is not yet considered a great threat to health care workers.

The hepatitis D virus (also known as the delta hepatitis agent or the Dane particle) is actually a defective hepatitis B virus. Since it does not have all the mechanisms to survive (see below), it relies

on the hepatitis B virus for the "spare parts". Therefore, it can only co-infect or superinfect with the HBV.

While the hepatitis B virus poses the greatest risk to health care providers, it is the only type of hepatitis for which there is a vaccine. Over 300,000 new cases of hepatitis B occur in the United States each year; and 1 to 1.25 million Americans are chronic HBV carriers. These carriers are potentially infectious to health care workers. Each year between 3,000 to 4,000 people die from hepatitis and its sequelae.

Each hepatitis B virus is composed of two basic components known as **antigens**. The hepatitis B **core** antigen is the functional portion of the virus. It contains DNA (i.e., the blueprints) for making more viruses and for infecting humans. The core antigen is contained within a coating known as the hepatitis B **surface** antigen. Each of these antigens is recognized by the body as being foreign; and the **body** usually attempts to rid itself of them. It does this by making **antibodies** against each antigen (i.e., hepatitis B core antibody and hepatitis B surface antibody). These antibodies bind to the core and surface antigens respectively; and these antigen-antibody complexes are then destroyed.

It is actually the body's own destructive process that causes the symptoms of hepatitis. Initially the virus particles invade the liver without directly damaging the liver cells. However, the hepatitis B core and surface antigens become attached to the surface of these liver cells. The core and surface antibodies subsequently attack and destroy not only these hepatitis B antigens, but the liver cells as well.

In addition, antibodies attach to hepatitis B core and surface antigens floating freely in the bloodstream. These antigen-antibody complexes may travel to various other tissues such as the kidneys and joints. As the body then destroys these antigen-antibody complexes it also damages its own surrounding tissues. Because of this cascade of immune or inflammatory reactions a "serum sickness" syndrome may result.

Patients exposed to HBV do not develop symptoms until 6 to 8 weeks after the exposure. These symptoms are initially nonspecific and may include: fatigue or malaise, nausea, vomiting, diarrhea, constipation, anorexia (lack of appetite), bloody urine, itching and/or hives, cough and other "cold" symptoms, headache, muscle pain, arthritis, sore throat, chills and a low grade fever.

Eventually the liver becomes inflamed; and the patient may develop right upper quadrant abdominal pain and tenderness. Likewise, the spleen may become involved and cause left upper quadrant pain and tenderness. As the liver becomes damaged it may not function efficiently. Bile may not be adequately secreted into the intestines; and the patient's stool may become white or clay colored. (Bile normally causes the stool to be green to brown in color.) The excess bile will accumulate, and the patient's skin and eyes may then become yellow or jaundiced. Also, the urine will become dark as this excess bile is excreted by the kidneys. While these symptoms can be expected to last 3 to 4 months, they resolve completely in 90% of HBV infected patients. However, approximately 0.1% of patients will die, and the remainder (about 10%) will develop

chronic active hepatitis (i.e., remain actively infected and have symptoms for 6 months or more) and/or become chronic carriers (i.e., harbor the HBV, but not be "infected" by it). These patients have a much higher risk of developing cirrhosis (i.e., scarring of the liver), liver cancer, liver failure and death.

The safety and effectiveness of the hepatitis B vaccination are based on the following two principles. Unless a patient is infected with the intact hepatitis B particle (i.e., both the core antigen and surface antigen), a hepatitis B infection will not result. Also, hepatitis B surface antibody alone is enough to make a patient immune to the disease. Therefore, injecting a person with the hepatitis B surface antigen only will stimulate immunity, but will not cause the person to develop the hepatitis B infection.

The initial type of hepatitis B vaccine was manufactured from the blood of patients chronically infected with hepatitis B. This blood was purified so that only the hepatitis B surface antigen remained, and all other infectious agents (e.g., HIV and the hepatitis B core antigen) were eliminated. This vaccine is no longer manufactured and has been replaced by a vaccine produced through recombinant DNA technology. This process alters the DNA of common bakers' yeast to cause the yeast to produce the hepatitis B surface antigen. This antigen is then purified prior to administration.

Currently, there are two manufactures of this recombinant vaccine. The vaccination is given as, a series of three shots. The second shot is given one month after the first, and the third is given five months after the second. Ideally this vaccination should be given in the deltoid muscle (i.e., the upper arm), and stimulates immunity in over 90% of those vaccinated.

The presence and the amount of the hepatitis B surface antibody a person has can be measured through a simple blood test. If the amount of this antibody (i.e., the titre) is high enough, then the patient is considered immune from developing future hepatitis B infections. Over time the amount of antibody will diminish. However, it is still unclear at what level the immunized health care provider should be given a booster shot to build this level back up. Hopefully, the United States Center for Disease Control will establish a guideline as to when, and if, booster hepatitis B vaccinations should be given.

Should a vaccinated health care provider be determined to not have developed a high enough titre, then one or two additional doses of the vaccination may be given. This will stimulate another 15% to 50% to develop immunity. This antibody level or titre is routinely drawn after a health care provider is exposed to blood or body fluids; but is not routinely drawn simply after the series of three vaccinations.

Over 4 million adults have been vaccinated in the United States with the hepatitis B vaccine; and serious side effects have been extremely rare. The most common mild side effects that have been seen include pain at the injection site and a low grade temperature. Also, an association with (not necessarily a cause of) Guillain-Barre (a disease with muscular weakness and paralysis) has been reported very rarely. No deaths have been reported.

As with any medication, the benefits of the medication must always be weighed against the risks of not receiving it. Because the chances of prehospital care providers contracting the hepatitis B virus are significant, and because the consequences of this infection are quite serious, and because the risks of the hepatitis B vaccination are extremely low, it is highly recommended that all health care providers receive the series of three vaccinations. Because of this, the Occupational Safety and Health Administration has mandated that employers of persons who have a potential exposure to blood or body fluids provide these employees with the opportunity to receive the series of vaccinations free of charge.

I would therefore like to encourage all of those prehospital care providers that have not received the hepatitis B vaccination (or the complete series of the hepatitis B vaccination) to strongly consider doing so. Anyone with further questions is encouraged to contact their personal physicians or their county EMS office. Any prehospital care providers or prehospital care agencies that would like to arrange to receive this vaccination should contact their medical control facility and/or their county EMS office.

Finally, I would like to warn all of those prehospital care providers who have been vaccinated that immunity against hepatitis B (not to mention HIV) is not guaranteed as discussed above. None of us should be lulled into a false sense of security; and each of us **must** continue to practice universal precautions to protect us, our families and our patient.