



Hepatitis B – an occupational hazard

How much do we know? A short review

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INTRODUCTION

The authors embarked on this literature review to give the practising professional nurse greater clarity on a very serious occupational hazard. The authors have run a Hepatitis B vaccination programme for over 800 nurses in the Gauteng region for approximately five years and were amazed at just how little nurses knew about this occupational hazard. This is an invitation to update your knowledge on Hepatitis B.

WHAT IS VIRAL HEPATITIS?

According to Marieb¹, viral hepatitis is described as being an inflammation of the liver, mostly due to one of the viruses in a catalogue that ranges from the Hepatitis A virus (HVA) through to F(HVF). Of these, two (HVA & HVE) are transmitted enterically and the infections they cause are largely self-limiting. Those transmitted via blood (mainly HVB, HVC, and HVD) are linked to chronic hepatitis and cirrhosis of the liver. HVD is a mutated virus that needs HVB to be infectious. Thus far, little is known about HVF.

Marieb¹ further clarifies that Hepatitis B (HVB) can be transmitted via blood transfusions, contaminated needles, or sexual contact and carries with it an elevated risk of liver cancer. HBA is a more benign form, frequently observed in day care centres and transmitted via sewage-contaminated food, raw shellfish, water and faecal-oral-route, which explains why hand cleanliness is important for food handlers. The life-threatening Hepatitis C virus is transmitted in a similar way, causing water epidemics, largely in developing countries.

WHO NEEDS PROTECTION AND WHAT IS THE LATEST IN PROTECTION?

The CDC² revealed the following results:

“National studies have shown that about 12,5 million Americans have been infected with Hepatitis B virus at some point in their lifetime ... About 5000 persons will die each year from Hepatitis B-related liver disease resulting in over \$700 million medical and work losses.”

Most will probably agree with the Immunization Action Coalition from the USA³ that Hepatitis B vaccination should be for all children 0–18 years (here in SA it has only in recent years been introduced for the 0–2 year compulsory immunization programme); screening for pregnant women; high risk sport where participants may be exposed to bodily fluids; sexually high-risk groups; all health care workers (that includes the OHN

who may be administering injections or be called to the scene of an accident); those working with medical waste e.g. cleaners and couriers. Hepatitis B vaccination should perhaps also be used for screening food handlers, and given to prison inmates, illicit drug users, those with haemophilia, dialysis patients, as well as household members of carriers, as per Lewis & Collier⁴.

Always follow universal precautions as listed in Lewis & Collier⁴. They add that protection is enhanced by ensuring there is good environmental sanitation and screening of previously mentioned high risk groups. In America, any Hepatitis B carrier is notifiable whilst in South Africa only the acutely ill are notifiable. This should be considered for change. One of the most important measures of protection is vaccination against HVB. In Lewis & Collier⁴, previously there was:

- Antiviral chemotherapy (interferon) which attempted to eliminate the chronic HVB state.
- Passive immunisation for post exposure prophylaxis ISG/HBIG (immunoglobulin).
- Hepatavax-B (formalin treated Hepatitis B vaccine made from purified HbsAg-containing particles of plasma from chronic HbsAg carriers).
- Recombivax-B (genetically engineered from a recombinant strain of yeast).
- Engerix-B = genetically engineered and presently being used in SA.

It includes a course of three vaccines which can be administered either one month after the other, offering a quick but short lived protective level or over six months offering up to a five year span of protection. It has shown no side effects except for a slight redness or temporary stiff deltoid muscle on occasion. The first two measures listed are often used still in prophylaxis with regards to protecting household members or resistance to the vaccines.

There are also Herbal African Products on the market such as Kekana; Stop Drop and G-caps as advertised on Herbal Africa web⁵. One must remember these HAVE NOT been scientifically tested and are often for hepatitis caused by alcohol abuse/drug induction and not for viral hepatitis. They may be effective in treating the symptoms of an active infection but not as a prophylaxis in preventing it.

COMMON MISCONCEPTIONS ABOUT VACCINATION AND HOW TO RESPOND TO THEM

The following queries about vaccinating workers

and/or their family often arise:

1. Diseases had already begun to disappear before vaccines were introduced, because of better hygiene and sanitation.
2. The majority of people who get a disease have been vaccinated.
3. There are 'hot lots' of vaccine that have been associated with more adverse events and deaths than others.
4. What would happen if we stopped vaccinations?

Due to space limitation, it is highly recommend that you seek the scientifically researched answers from the CDC in order to make an informed decision when administering a vaccine by visiting:

<http://www.cdc.gov/nip/publications/6mishome.htm>

<http://www.cdc.gov/nip/publications/fs/gen/WhatIfStop.htm>

SCREENING, TESTING AND UNDERSTANDING THE RESULTS

In order to understand the testing/screening, one must know the dynamics of the effects of the virus. HVB is a DNA virus with three distinct antigenic particles (Lewis & Collier⁴):

(a) Hepatitis B surface antigen (HBsAg) – a group of proteins that form the outer coating of the virus. It is also produced in large amounts by host liver cells in response to the virus to make Hepatitis B surface antibodies (anti-HBs). Both are easily detected in the serum of the host.

(b) Hepatitis B core antigen (HBcAg) – antigenic material in the core of the virus. It is probably infectious but cannot be detected in the blood. However, the antibody (ant-HBc) can.

(c) Hepatitis B e-antigen (HBeAg) – is found in circulating blood and only present with HBsAg-positive persons. It seems to be associated with the development of chronic liver disease after acute HVB infection; it is, however, also associated with chronic liver disease of those who are HBsAg carriers. The presence of HBeAg correlates with the time of highest infectivity.

There is an antibody formed to each of the above antigens. Another recent form of testing is Hepatitis B PCR which detects the actual virus in quantity by polymerase chain reaction i.e. DNA testing, but is a lot more costly.

Worman H.J., MD⁷, further explains in his article on Hepatitis B that in an acute infection, HBsAg is detectable for several weeks coinciding with clinical symptoms (jaundice, pale stool, nausea, upper right epigastric pain, etc). HBeAg is also detectable at this time, characterized by a high rate of viral replication. At the same time anti-HBc (both IgM and IgG) is present. As the acute infection resolves, IgG antibodies persist against the core antigen whilst the IgM antibodies and HBsAg become undetectable. Subjects who develop an immune response against the HBV develop anti-HBs which are also the antibodies produced by vaccination. Those who have had an actual acute infection that resolves continue to have IgG antibodies against the core antigen for life. Some remain immune with anti-HBs but some lose these antibodies over time and may be susceptible to future infection. This raises the question of what one actually requests when doing blood testing or screening.

Pre-screening for vaccination programme:

As the occupational health practitioner managing such a programme, you only really need to know the level of Hepatitis B surface antibodies (anti-HBs). For some laboratories in SA the following guideline is used:

The minimum value of 250 mIU/mL as being anti-HB protective enough for at least another year; 150-250 mIU/mL requires one booster and below 150 mIU/mL a full course. If the value is above 1000 mIU/mL this could indicate a good immunity level from a recent vaccination schedule or that the person has had an infection of HVB. Whichever the cause, the person will not require vaccination for at least the next 5 years.

One would only then advise the client to do a full Hepatitis B Profile if the subject at time of screening was presenting with symptoms. By only screening for surface antibodies (anti-HBs), a more cost effective Hepatitis B health programme can be created⁸. The transmission by non-symptomatic carriers is greatly reduced by maintaining daily universal methods of protection and prevention e.g. effective hand washing and glove usage.

The acutely HVB infected: a full Hepatitis B profile is recommended which includes HBsAg, anti-HBs, anti-HBc, HBeAg, anti-HBe in order that the medical practitioner can make a conclusive diagnosis for treatment. In addition, instead of doing an invasive liver biopsy, one can now also request the Hepatitis B PCR blood test which will reflect the actual viral load of HVB.

The chronically HVB infected:

Here one can periodically monitor the HBsAg and anti-HBc but of more importance is converting the HBeAg positive to a negative with medical treatment. The practitioner may opt to monitor periodically the fluctuation in viral load by requesting Hepatitis B PCR.

CONCLUSION

And we thought we knew it all ... how effective your Hepatitis B vaccination programmes have been will provide another interesting article, as would the reason why some people may not develop antibodies. We thus close with another challenge for the readers to submit their research regarding this aspect.

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