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# Hepatitis B immunisation: A survey of surgeons and theatre nurses

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**Abstract: Acute viral hepatitis remains a serious condition. Its long-term sequelae include cirrhosis and hepatocellular carcinoma. Health workers constitute a high-risk group for contracting hepatitis B. A group of clinicians associated with invasive procedures and nurses working in operating theatres were invited to answer a confidential questionnaire concerning hepatitis B immunisation and the use of protective measures. A self-administered confidential questionnaire was sent to 152 clinicians and 97 theatre nurses, of whom 82 and 74 respectively responded, giving an overall response rate of 63 %. Whilst ninety-one per cent of respondents considered their speciality as being of high risk for hepatitis B only sixty-three per cent of them were fully immunised and of these only fifty one per cent had had their immunity tested . Out of those who checked their antibody status nineteen per cent did so following a needlestick injury. Sixty per cent of our respondents had had a needlestick injury over the past year. Even so barrier precaution techniques were used infrequently with only seventeen per cent always or at least frequently using double gloving and ten per cent wearing a visor during operations. Some respondents also commented on the poor availability of resources such as impermeable gowns or blunt needles which are established precautions against contamination from hepatitis B.**

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## Introduction

Hepatitis B virus has been known to be a hazard to health care staff operating on or handling the body fluids of infected patients since the early 1970s. In recent years the risk of acquiring Human Immunodeficiency Virus (HIV) as well as Hepatitis C has been recognised. These three viruses are transmitted by inoculation of infected blood or its contact with broken skin or mucous membranes. Although in recent years HIV infection has been given more importance, it is important to keep in mind that there is a 20% seroconversion rate for Hepatitis B if non immune whilst that for HIV is 0.5%.

It is estimated that there are 200-300 million carriers of hepatitis B virus (HBV) worldwide. In the Western world chronic hepatitis B is mainly a disease of high-risk individuals, such as homosexual men and intravenous drug abusers. The risk of chronic viral carriage is 5% after infection and their risk of dying from end-stage liver disease or hepatocellular carcinoma is estimated to be 15-40%.

Between 1980-1984 the average annual reported rate of acute hepatitis B in surgeons in England was 25/100000[1]. Current UK prevalence is unknown but in the USA it is 1-2 % with an incidence of Hepatitis B infection in surgeons 10 times the general population[2]. Breuer and Jeffries[3] in their review of 1992 had felt the situation not to be any different in England. Infection with hepatitis B virus, apart from having an impact on a person's health can also result in a person losing his or her job. It is known that patients are at risk of acquiring viral infections from affected surgeons and in the UK carriers of the hepatitis B virus who are known to be antigen e positive must inform their employer and are not permitted to carry out invasive procedures[4].

A survey was conducted at St. Luke's Hospital (SLH) to assess the current state of hepatitis B immunisation and the attitudes to barrier and other protective measures taken by surgeons and theatre nurses.

## Method

A confidential questionnaire about hepatitis B immunisation and safety measures used to avoid contamination was circulated to 152 doctors working in surgery and 97 nurses working in operating theatres in SLH. The former group included all doctors working in general surgery, urology, vascular, cardiothoracic and neurosurgery (62), orthopaedics (20), anaesthesia (41), obstetrics and gynaecology (22) as well as ophthalmology (7). Their opinion as to the perceived level of risk for occupational acquisition was sought. They were asked about their immunisation status, if they had checked their antibody titre and if immunised for more than 5 years if they had received a booster dose. In addition they were asked about the precautions they made use of,

also if they had any needlestick injuries in the previous year and if so what was their line of action.) A summary of the questionnaire is shown below.

## Results

Replies were received from 82 doctors (54%) and 74 nurses (76%) giving an overall response rate of 63%. The doctors' response rate was in the region of 53% in all categories from house officers to consultants. The age of respondents was less than 40 years in 73% and 88% were aged 50 years or less.

| | 0 (unspecified age ) | 20-30 yrs | 30-40 yrs | 40-50 yrs | 50+ yrs | TOTAL |
|---|---|---|---|---|---|---|
| No. Of respondents | 6 (3%) | 52 (33%) | 62 (40%) | 23 (15%) | 13 (8%) | 156 (100%) |
| % immunised | 66 | 71 | 61 | 56 | 54 | 63.4 |
| Needlestick injuries | | | | | | |
| 0 | 6 | 19 | 25 | 10 | 4 | 64 (41%) |
| 1-5 | 0 | 30 | 28 | 5 | 5 | 68 (43%) |
| 6-10 | 0 | 1 | 0 | 2 | 1 | 4 (2%) |
| 10+ | 0 | 2 | 7 | 6 | 1 | 16 (10%) |

Table 1 - Frequency data from hepatitis B questionnaire

The majority of respondents (91%) considered their speciality as high risk for acquisition of hepatitis B. However, only 63% were fully immunised with the younger respondents more likely to be immunised than the older ones (Table 1).

Only half of the respondents that were fully immunised (52%) had checked their antibody titre and 19% of them had checked their antibody titre after sustaining a needlestick injury . A good 77% did so on their own initiative. Half the respondents (55%) had completed their course more than 5 years before receiving the questionnaire and only 53% of these had taken a booster dose (Table 2).

Only 41% of respondents were told of the need to check their antibody titre or take a booster dose.

The great majority of respondents (97%), admitted to a needlestick injury in the previous year. In 10% of these the number of needlestick injuries was so high that respondents were not able to give a specific number (Table 1).

As expected most of these injuries (49%) occurred by skin puncture whilst other less common but specified

| | |
|---|---|
| Number of respondents | 156 |
| Fully Immunised <5 years before | 45 |
| Fully Immunised >5 years before | 55 |
| Checked antibody titre | 52 |
| Took booster dose and were immunised >5 years before | 29 (53%) |

Table 2 - Pattern of vaccination

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QUESTIONNAIRE

**a. Tick safety precautions you make use of:**

| | Never | Rarely | Frequently | Always | High risk patients |
|---|---|---|---|---|---|
| 1.Double gloving | | | | | |
| 2. Wear visor during operations | | | | | |
| 3. Wear glasses during operations | | | | | |
| 4. Use blunt needles for suturing | | | | | |
| 5. Use of impermeable gowns | | | | | |
| 6. Screen patients for hep B infection | | | | | |

**b. Passive measures**

7. How many doses of hepatitis B vaccine have you had?
8. When have you been vaccinated? More or less than five years ago?
9. Have you checked your antibody titre?

**c. Needlestick injuries**

10. Have you had a needlestick injury over the past year?
11. If yes how many times?
12. Are you aware of the Infection Control needle stick injury policy?

| Precaution taken | always /frequently | high risk patients only |
|---|---|---|
| | | |
| | Number | Number |
| double gloving | 28 | 57 |
| using visor | 15 | 41 |
| wearing glasses | 66 | 4 |
| using impermeable gowns | 13 | 42 |
| screening patients | 16 | 37 |

Table 3 - Precautions taken (total respondents 156)

circumstances were via cuts (4%) and blood splashes (5%). When the potentially contaminating injuries occurred, 48 (32%) respondents were wearing gloves and 10 (6%) were wearing eye protection. Also only 27 respondents reported to infection control or checked the patient's or their own blood for Hepatitis B whilst 38%, that is 58 respondents, admitted to not doing anything about it and another 63 (41%) left the question completely unanswered.

This leads us to the precautions that doctors in surgery and theatre nurses are currently using in order to protect themselves from any contamination (Table 3).

The survey showed that 18% of respondents always or frequently used double gloving during surgery whilst 10% wore visor, screened patients and used impermeable gowns always or frequently. More respondents used precautions when the patient was considered high risk but they were still a minority, with 36% using double gloving, 26% wearing impermeable gowns and visors and 24% actually screening the patient.

Venesection was performed by 99 respondents, 55% of which use gloves always or frequently and an additional 16% do so if the patient was high risk. Sharps containers were carried always or frequently by 65%. Most (53 %) recap the needle always or frequently and 18% do it if the patient is low risk.

When asked about needlestick injury policy and the needlestick injury management service only 39% of responders were aware that a policy existed and only 42% knew about the service provided in the management of such mishaps.

## Discussion

The 63% overall response rate to this questionnaire was similar to rates of other postal surveys[5] sent to healthcare workers but the 54% response from doctors was quite disappointing. Those who returned the questionnaire were more likely to be concerned about the risk of contracting the infection and this may have produced an element of bias in the results.

The picture presented is mixed. Although most of the respondents considered themselves at high risk of acquiring the infection and a good rate of 63% were fully immunised, a comparatively small number had bothered to check their antibody response or to take a booster dose if immunised more than 5 years before. However, considering that younger respondents were more likely to be immunised than older ones it seems that the attitude to vaccination is changing.

On the other hand there is still a high rate of handling needles, poor use of protective eye wear, double gloving and impermeable gowns and a high rate of needlestick injuries (97%). Thus it seems that vaccination is still the most active measure that doctors in surgery and theatre nurses are taking to protect themselves.

It is possible to prevent most cases of HBV infection by vaccination. Launched in 1987 the vaccine is nowadays used routinely for high-risk individuals like healthcare workers. In countries with high seroprevalence rates and adequate finances it has also been introduced routinely for all babies. It has only a few minor side-effects[6]. A response is mounted by 80-90% of individuals and antibody titres should be checked 2-4 months after completion of immunisation[7]. In the survey 52% had done so and 75% of these on their own initiative. An antibody titre over 100 milliunits/l is a good response, 50-100 milliunits/l a partial response, 10-50 milliunits/l a poor response and < 10 milliunits no response. Partial and poor responders can be given further doses of the vaccine to boost their antibody response. The duration of antibody persistence is not known and responders should take a booster dose at least 5 years after the first dose[8]. In the survey 53% of those fully immunised >5 years before had taken a booster dose.

Two responders of the survey have admitted to being non-responders to HBV vaccine. Non-responders should be screened for markers of HBV infection. Genuine non-responders are negative for anti-HBc and anti-HBs and for these follow-up of inoculation injuries and reimmunisation should be considered. Those individuals who are antigen HBe positive clearly pose a difficult management problem.

Safe working practice is an important element in protection from contamination from HBV and still needs considerable initiative. Glove perforations, which have been shown to occur in 20% of surgical procedures [9,10] and blood splashes are routes through which HBV as well as HIV are transmitted. The use of visors or goggles, impermeable gowns and double gloving are simple and easily adopted practices that reduce the exposure to body fluids [8,11]. Double gloving reduces the exposure of the operators skin to blood and body fluids by 60%[10]. Operators have argued that wearing two pairs of gloves decreases dexterity but various studies have dismissed this [9,12]. The facemask also protects surgeons from blood splashes[10]. Such measures should be adopted universally but the survey has showed that even in high risk patients these were poorly used.

We hope that with our questionnaire we helped to increase awareness for:

- Need for vaccination in high risk groups
- The importance of confirming seroconversion post immunization
- Active measures of risk reduction in surgical practice

Healthcare workers should make better use barrier methods and of the vaccination service provided. Improved surgical technique such as care when handling sharp instruments, use of diathermy in dissection, stapling devices and laparoscopic technique decrease risks. A further reduction in risk requires an increased effort from medical authorities to provide more information and advisory documents on the subject and also to be more active in offering immunisation and routine checking of antibody status. Besides this our respondents felt that the department should make an effort to see to the availability of better theatre clothing and blunt ended surgical needles. The latter are now manufactured in various sizes and suture materials, they have been shown to be particularly useful in hazardous situations of abdominal closure and to reduce incidence of glove perforation in the surgical team[13].

In the United Kingdom a recently enacted Control of Substances Hazardous to Health Regulations oblige employers to provide adequate protection for employees against harmful substances including micro organisms and the British Medical Association's legal department believes that an employer could be considered negligent for failing to vaccinate or provide proper protective clothing[8].

The authors are pleased to report that following the presentation of this paper at the Fourth Maltese Medical Conference, the Medical School insisted on all medical students being immunized. Malta is deemed to be a country with an intermediate risk for Hepatitis B and a recent national immunization programme was targeted at 7-8 year old children.

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