

## SHORT REPORT

# Hepatitis B transmission through blood and body fluids exposure of school personnel

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<b>Background</b>	Hepatitis B transmission from students to members of staff has been documented in schools, particularly nurseries and day care centres.
<b>Aims</b>	To investigate the frequency of exposure to blood and other body fluids within day schools and to document practices adopted by school personnel to avoid direct contact and decontaminate the environment.
<b>Methods</b>	Questionnaire survey among 21 public day schools in Malta.
<b>Results</b>	Episodes of significant blood exposure were rare, occurring at frequencies of 0.071 [95% confidence interval (CI): 0–0.148] incidents per thousand student days. Contact with larger volumes of other body fluids, namely urine and vomitus, was more likely: 0.12 (95% CI: 0.008–0.383) and 0.088 (95% CI: 0.048–0.128) episodes per 1000 student days, respectively. School personnel generally used correct personal protective equipment, particularly gloves, in cases of contact with blood and body fluids. Environmental disinfection methods varied considerably with only 38% of schools (95% CI: 21–59%) using recommended hypochlorite preparations.
<b>Conclusions</b>	Exposure to quantities of blood sufficient to result in HBV transmission in day schools is rare. Emphasis should be placed on risk assessment at individual school level, concentrating on correct management of body fluid exposures through effective staff education.
<b>Key words</b>	Blood; hepatitis B; schools; teachers.

## Introduction

Hepatitis B virus (HBV) is present in high titres in blood and certain serous fluids of infected individuals or chronic carriers. School teachers are a potential occupational risk group since they may come into contact with students' body fluids during the course of their work. Transmission has been reported in day care centres [1] and in nursery schools [2]. Evidence of spread within day schools appears to be much rarer; there is only one reported incidence of an elementary school teacher who was found to have acquired HBV infection of the same sub-type as one of her class children who was a chronic carrier [3].

## Methods

In order to document the level of exposure to body fluids of staff working within day schools, a questionnaire was formulated and sent to head teachers in charge of public schools on the island country of Malta (population 350 000). A total of 35 questionnaires was forwarded to all public schools identified as having maintained records of blood-related incidents over the previous trimester. Respondents were asked to indicate the number of documented episodes of nose bleeds encountered during that specified time period as well as injuries to children that resulted in either mild bleeding (defined as episodes where bleeding could be easily controlled by simple dressings and from which the environment was not contaminated) or heavy bleeding (haemorrhage that resulted in significant environmental soiling). The questionnaires asked about the number of occasions in which the children had bitten their teacher, vomited or were incontinent of urine. It also sought feedback on the methods adopted for cleaning the environmental

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**Table 1.** Frequency of reported exposure incidents

Incident	Per thousand student days	95% CI	
		Lower	Upper
Mild bleeding	0.265	0.126	0.406
Heavy bleeding	0.071	0.000	0.148
Nose bleeds	0.071	0.038	0.104
Biting teacher	0.000	0.000	0.000
Urine incontinence	0.120	0.008	0.383
Vomiting	0.088	0.048	0.128

spillages of body fluids, if personal protective equipment (particularly gloves) were worn and what type of disinfectants were utilized for environmental decontamination. Initial non-respondents were sent a reminder on two occasions, 2 weeks apart.

**Results**

A total of 21 correctly filled questionnaires (60%) were returned. The most frequently reported sources of bleeding were minor incidents in which the children acquired grazes and cuts that did not contaminate the environment or pose difficulty to control (Table 1). Episodes of heavier blood loss as well as nosebleeds were on the whole quite uncommon, occurring at frequencies of 0.071 incidents [95% confidence interval (CI): 0–0.148] per thousand student days. Exposure to significant volumes of other body fluids, namely urine and vomitus, was more likely to occur: 0.12 (95% CI: 0.008–0.383) and 0.088 (95% CI: 0.048–0.128) episodes per 1000 student days, respectively. Episodes of urine incontinence were found exclusively in primary schools. No episodes of teachers being bitten by pupils were reported, even at primary school level.

When coming into potential contact with blood and other body fluids, school staff generally used correct protective equipment. Gloves were universally worn in practically all cases of contact with blood as well as other body fluids such as urine and vomit. On the other hand, there was significant heterogeneity in the management of environmental spillages. Only eight schools (38%; 95% CI: 21–59%) used a hypochlorite solution to clean hard surfaces and floors after the body fluid had been removed. Seven schools used chloroxylenol solution whereas one school did not use any sort of disinfectant, relying only on detergents. The remaining five schools used a variety of other disinfectants.

**Discussion**

The risk for HBV virus transmission for school personnel (other than those working in nursery schools or schools

containing aggressive pupils) does not appear to be higher than that found within the general population [4]. Documented cases of HBV in the educational setting tend to be sporadic. Often, there is no apparent reason why other school personnel as well as students, who had been equally exposed to the case in question, did not acquire the same infection [3]. This is not surprising as horizontal transmission of HBV involves complex multi-factorial epidemiology. It would appear that transmissibility varies considerably from one setting to another, possibly depending on student mix and number, staff knowledge, school activities, etc. It was also evident from our data that the staff are more likely to be exposed to urine than to largish quantities of blood. The concentration of HBV antigen in urine of infected patients is generally regarded to be low and inconsistent, although it should be still regarded as a potential source of HBV transmission and full protective equipment used whenever exposure occurs [5].

Despite the power limitations of the study originating from the unavoidably low sample size, our findings support the need for education of school personnel as well as occupational risk assessments to be undertaken through surveillance and documentation in order to establish the actual level of exposure present within the particular school. Additionally, it is also vital that effective prevention of cross transmission is practised whenever contact with body fluids occurs. This normally entails the use of adequate protective equipment, mainly gloves, as well as satisfactory decontamination of the environment after spillages. It was apparent from the results of our study that both teachers as well as domestics appreciated the need for basic personal protection in such circumstances, but were not fully cognisant about correct decontamination techniques, particularly evident in the use of chloroxylenol for spillage disinfection. This phenolic disinfectant is known to have limited or at best undocumented decontamination capability against enveloped viruses and is also liable to be inactivated by blood and other proteins within body fluids [6]. Chlorine-releasing agents providing 10 000 mg/l of free chlorine are normally the disinfectant of choice for decontamination of environmental spillages.

Members of staff deemed to be at an increased risk of HBV virus may need to be offered vaccination. Increased risk is normally regarded to exist if there is weekly continuous contact with one or more children having a history of severe mental handicap, institutionalization or poor body-fluid control [7]. Presence of a known HBV carrier within the classroom is also considered to constitute increased risk of transmission [8]. On the other hand, universal HBV vaccination does not appear to be cost-effective or indicated for most school personnel [9]. In the event of a significant exposure incident where blood or body fluids make contact with breaks in the skin

or on the conjunctiva of a staff member, post-exposure prophylaxis using HBV vaccine and/or immunoglobulin is deemed sufficiently effective to reduce risk of infection. [10].

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