

## Seroprevalence of hepatitis B and C in a Merseyside hospital for the mentally handicapped

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### SUMMARY

This study reports the prevalence of antibodies to hepatitis B virus (HBV) and C virus (HCV), and the frequency of potential exposure to these viruses among patients and staff in six long-stay wards of a hospital caring for mentally handicapped adults from the Mersey region. A retrospective survey of risk behaviour among 134 patients and questionnaire survey of 75 nursing staff was performed. Serum samples from both groups were tested for HBV markers and patient sera for antibodies to HCV by enzyme-linked immunosorbent assay (ELISA). None of the 102 patients tested had antibodies against HCV, although 17 had detectable antibody to HBV core (anti-HBc). Seven out of the 17 were positive for HBV surface antigen. None was positive for IgM antibody to HBV core. Only 1 out of 61 staff had anti-HBc and none was positive for surface antigen. Twenty-nine of 75 (39%) staff reported bites sufficient to break the skin and 52 (69%) significant other injuries from patients; 25 (31%) of staff had not received HBV vaccination. None of the patients had received HBV vaccine.

We conclude that HCV does not appear to be a major hazard in this closed community but the prevalence of HBV markers indicating past exposure among patients is high, vaccine uptake is incomplete and incidents which may allow viral transmission are frequent.

### INTRODUCTION

Hepatitis B has long been known to pose a significant risk to patients and staff of institutions caring for the mentally handicapped [1]. High transmission rates within institutions have been documented probably due to close contact, frequent minor injuries or biting, and the greater likelihood of patients with Down's syndrome becoming chronic carriers [2]. A study from the United States demonstrated high transmission rates to staff at day schools (2.6% staff infected per year), showing that community care workers are also at significant risk [3]. The results of seroprevalence surveys in the United Kingdom are variable, probably due to the low prevalence of hepatitis B in many parts of Britain.

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Serological evidence of exposure to hepatitis B was found in 0.5%, 35.7% and 54.1% of patients in north-east England, south Wales, and southern England respectively [2, 4, 5].

The current emphasis on care in the community [6] has important implications for infection control in mentally-handicapped patients. Firstly community care of previously institutionalized patients exposes a new group of carers to the risk of infection with HBV, some of whom may not have been offered vaccination. Secondly, early discharge of less-disturbed patients and the inevitable ward closures that follow leave a cohort of severely disturbed patients, often in more crowded conditions.

Both hepatitis B and C can be transmitted by blood contact but as reliable serological tests for HCV have become available only recently, its prevalence in mentally handicapped patients in the UK is unknown. Five of 90 mentally handicapped patients were reported to be positive for anti-HCV in 1989 [7]; however, the tests available at that time were not as sensitive or specific as those available today. A study of outpatients with developmental disabilities in New York City found that none of 113 patients tested was positive for antibodies to HCV, whereas 24 (21%) were positive for anti-HBc [8]. Another study of 264 in-patients at an institution for the developmentally handicapped in Ontario, Canada found that none was positive for antibodies to HCV while 176 (67%) were positive for anti-HBs [9]. To determine whether HCV is prevalent in patients in the UK and the extent of HBV infection, we undertook a seroprevalence survey on the long stay wards of a hospital for the mentally handicapped in the Mersey region.

## MATERIALS AND METHODS

### *The study population*

Greaves Hall is a 270-bedded hospital caring for moderate and severely mentally handicapped patients from the Mersey region. The hospital also treats psychogeriatric, general adult psychiatric, and short-stay mental handicap admissions but these do not share wards or nursing staff with the patients studied. Patients are accommodated in separate, self-contained wards. Three of the wards studied were male only, one female only and two wards were mixed. Patients from single-sex wards may mix for therapy sessions. In recent years many less severely handicapped patients have been discharged for care in the community; this has led to ward closures and transfer of patients between wards. All long-stay patients with mental handicap aged over 18 years were eligible for entry into the study. Consent was sought from next of kin, independent advocates, or the patients themselves. The study was approved by the hospital and district ethical committees. Case notes of all eligible patients were reviewed and nursing staff questioned regarding risk factors of individual patients for viral transmission such as biting, scratching, falls, etc.

The wards accommodate 134 patients in total, consent for hepatitis B and C testing was not obtained for 30, and 2 were too disturbed to allow venepuncture. Serum samples were taken from 31 female and 71 male patients. Demographic characteristics and risk factors of all 134 eligible patients are given in Table 1.

A standard questionnaire was given to the day-time nursing staff on the long-

Table 1. Demographic characteristics and risk factors in patients

	Total (n = 134)	Positive for anti-HBc (n = 17)	Negative for anti-HBc (n = 85)
Sex			
Male	87 (65%)	17 (100%)	54 (64%)
Female	47 (35%)	0	31 (36%)
Mean age in years (range)	41 (24-74)	42 (26-57)	40 (24-72)
Mean length of stay in years (range)	21 (1-46)	27 (11-36)	21 (1-46)*
Blood transfusions	6 (4%)	2 (12%)	1 (1%)
Biting	25 (19%)	3 (18%)	17 (20%)
Injuring others	25 (19%)	3 (18%)	19 (22%)
Injuring self	48 (36%)	2 (12%)	33 (39%)
Falls	39 (29%)	5 (29%)	23 (27%)
Epilepsy	80 (60%)	11 (65%)	52 (61%)
Sexually active	7 (5%)	0	4 (5%)
Pressure sores/ulcers	18 (13%)	4 (24%)	10 (12%)

\* $P = 0.009$ ; all other values not statistically significant.

Table 2. Demographic characteristics and risk factors in staff

	Total (n = 75)
Sex	
Male	28 (37%)
Female	47 (63%)
Mean age in years (range)	35.7 (18-58)
Mean length of service in years (range)	8.5 (1 month-40 yr)
HBV vaccination (> 3 doses)	39 (52%)
anti-HBs checked	35 (47%)
Needlestick injury	7 (9%)
Blood transfusions	7 (9%)
Bites from patients	29 (39%)
Other injuries from patients	52 (69%)
Eczema	11 (15%)
Duties include phlebotomy	3 (4%)
Duties include giving IM injections	28 (37%)
Routinely wear gloves dealing with body fluids	38 (51%)

stay wards; this included inquiry into HBV vaccination status, duration of service, past history of hepatitis, needle stick and other injuries. All 75 staff approached answered the questionnaire, 61 agreed to provide a serum sample for viral serology. Demographic characteristics and risk factors of staff are given in Table 2.

#### Serological tests

Antibodies to hepatitis C virus were detected by a second-generation ELISA that uses synthetic HCV peptides (UBI HCV EIA). Anti-HBc was assayed by ELISA (Wellcozyme anti-HBc). Any positive samples were screened undiluted for surface antigen (Bioelisa HBsAg) and referred to the regional Public Health Laboratory for HBeAg and anti-HBe (Sorin EBK ELISA) and anti-HBc IgM testing (Sorin P2249 ELISA).

*Statistical analysis*

Chi-square analysis, with Yate's correction where appropriate, or Fisher's exact test, was used for binomial variables. The Student's *t* test was used for continuous variables. Statistical significance was defined as  $P \leq 0.005$ . Data were analysed on Epi info 5, a public domain software package from the Centers for Disease Control, Atlanta, USA.

## RESULTS

*Patients*

None of the 102 patients tested was positive for antibodies to HCV. However, 17 patients were positive for anti-HBc, which indicated past exposure to HBV. These patients were all male, with a mean age of 42 years and had all been in-patients or at least 11 years. Analysis by ward showed that 41% were clustered on a single mixed ward, the rest were distributed evenly among mixed and male wards. Four of the 17 were positive for HBsAg and while none was positive for HBeAg, two were negative for anti-HBe. None was positive for anti-HBc IgM. Two of the 17 had received blood transfusions but all UK blood donations were being screened for HBsAg at the time. Four of the 17 had a history of pressure sores or ulcers though these were not clustered in any particular ward. None of the patients positive for anti-HBc was known to be sexually active.

There was a high prevalence of risk behaviours for transmission of blood-borne viruses within the wards. Twenty-five out of 134 (18.7%) patients had a history of biting other patients or staff and 48 (36%) a history of self injury. Epilepsy was very common in the patients studied (60%) and as a consequence minor cuts and abrasions were frequent. Seven out of 134 (5%) patients had been sexually active but none had a history of intravenous drug use. Review of the case notes indicated that the prevalence of HBV markers in the patients would not have been suspected from routine investigations as only 1 of the 17 cases had previously been tested for HBV and only 2 out of 17 had documented abnormalities of hepatic enzymes (LFT). The results are summarized in Table 1.

*Staff*

Seventy-five members of staff (28 male, 47 female) out of a total of 95 completed the questionnaire. The mean age was 35.7 years with a mean length of service of 8.5 years. As the aim of this study was to look at transmission of hepatitis B and C viruses within a hospital we did not test staff sera for antibodies to HCV when no patients were positive, although consent for HCV testing was initially obtained.

One member of staff out of 61 was positive for anti-HB. The only risk factor was eczema of the hands and there was no history of needle-stick injury or bites from patients. No staff were positive for HBsAg or anti-HBc IgM. Twenty-nine of 75 (39%) gave a history of significant bites from patients, 52 of 75 (69%) gave a history of cuts or scratches sufficient to break the skin. Thirty-nine of 75 (52%) had received 3 or more doses of hepatitis B vaccine; the antibody status of 35 had subsequently been tested and 31 had satisfactory levels of antibody. Only 7 out of 75 (9.3%) of staff reported a needle stick injury during their service. These results are summarized in Table 2.

## DISCUSSION

Our study confirms the value of DHSS guidelines which recommend vaccination of staff and new admissions to hospitals for the mentally handicapped where the incidence of hepatitis B is known to be high [10]. A similar study in New Zealand found that 61% of patients had evidence of past exposure to HBV and 37% were carriers. The duration of admission was significantly associated with likelihood of infection, but like the present study no significant correlation with behavioural attributes was found [11]. The prevalence of antibodies to hepatitis B core antigen is surprisingly low in staff at Greaves Hall Hospital. The relatively high uptake of HBV vaccine, widespread use of gloves when dealing with potentially infected body fluids, and infrequent use of parenteral medication may all contribute to this.

Prior to this study a systematic screening of all mentally handicapped patients in Greaves Hall Hospital had not been performed due to lack of resources. However 20 patients, including 5 with Down's syndrome and 15 others felt to be at particular risk because of behavioural disturbance, were screened for HBsAg in 1987. None of these patients was positive and this may have given a false impression of the prevalence. A further 11 patients had been tested intermittently over the last 11 years; of these 1 was positive for HBsAg. The finding that 28% of patients had abnormal liver enzymes at some stage (probably due to treatment with anticonvulsants and phenothiazines), and that none of the patients with markers of past exposure to HBV had a history of jaundice suggests that surrogate markers of hepatitis are unreliable and only a comprehensive serological survey will indicate its true prevalence. It is alarming that seven completely unsuspected cases were clustered on a single ward. This ward accommodates patients with severe physical as well as mental handicap; the increased nursing care these patients require may explain the high prevalence, though the numbers in this study were too low to test this hypothesis. There is nothing to suggest a higher incidence of sexual activity among patients on this ward. Although 2 out of 17 patients positive for anti-HBc had received blood transfusions, this is unlikely to be relevant as the transfusions were given in the 1980s when all donations were screened for HBsAg.

A striking finding of this study is that all 17 patients positive for anti-HBc were male. These patients are not all cared for on the same ward, and do not differ significantly in behavioural attributes from those negative for anti-HBc. There was no significant difference in mean length of stay of male and female patients. It is possible that these patients were all cared for on the same male-only ward in the past; records are not sufficiently detailed to determine this. We are unable to offer any other explanation for this finding.

Our results indicate that hepatitis C is not a major risk in this hospital though we do not feel this result should be extrapolated to other institutions in the UK. With a seroprevalence of less than 0.3% in the general population [12] it may be that no patients with HCV have ever been admitted to Greaves Hall. In the absence of a vaccine, serological markers of infectivity, or a complete understanding of how HCV is transmitted, it would be unwise to ignore this virus in hospitals for the mentally handicapped. Martinez and colleagues reported 36%

prevalence of anti-HCV in a Spanish hospital for the mentally handicapped, compared with 0.8% seroprevalence in local blood donors [13]. Finally we suggest that mental handicap hospitals screen their patients for HBV and vaccinate as necessary before patients are transferred into community care. If all patients and staff positive for HBsAg are negative for anti-HBc IgM, (as was the case in Greaves Hall) it is likely that infection occurred some time ago, has 'burnt out' in that population in the past and screening of new admissions should prevent any new cases of hepatitis B.

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