Anxiety and perception of risk of HIV and hepatitis B infection among health-care workers reporting accidental exposures to blood and other body fluids

Abstract
We noticed considerable variation in anxiety among staff reporting blood exposure incidents and therefore undertook a study to investigate this. We studied 100 consecutive staff reporting blood or other body fluid exposures to the Occupational Health Unit. The nurse seeing the staff member administered a questionnaire about worries related to the incident, knowledge of HIT and hepatitis B transmission risks, perception of risk from the particular incident and predicted reaction of others that would be told. Level of anxiety was recorded on a visual analogue scale. Staff were then given information and counselling as usual, and asked to re-attend after a week, when the questionnaire was repeated We found that the initial level of anxiety was not related to knowledge of HIV or hepatitis B transmission risks, but was related to perception of risk from the incident and to predicted reaction of others that would be told. The eight staff involved in exposures to known HIV-infected blood were not more anxious than the remainder. There was a reduction in anxiety between visits, which was significantly greater in women, in those who had a non-parental exposure and in those where the source patient was known. Knowledge of transmission risks also improved significantly between visits. This study underlines the importance of adequate counselling of staff who have suffered blood exposures.

Introduction

Health-care workers and students are concerned about their risks of contracting blood-borne virus infections through accidental contacts with patients' blood (Elford & Cockcroft, 1991). Although the risk of transmission for hepatitis B (Grady et al., 1978) is much greater than that for HIV (Royal College of Pathologists Working Group, 1992), anxiety about HIV risks is particularly high (Royal College of Surgeons of England, 1990; Ross & Hunter, 1991; Gallop et al., 1992).

Official guidelines advise the development and implementation of coherent policies for prevention of blood exposure incidents and for management of such incidents when they occur (Centers for Disease Control, 1989, 1990; British Medical Association, 1990; UK Health Departments, 1990). The physical aspects of management of reported incidents should include arranging to test identified source patients for infection with HIV, hepatitis B and (more recently) hepatitis C. The staff member reporting the incident can then be offered appropriate treatment. This may include hepatitis B immune globulin and immunisation as prophylaxis against hepatitis B, consideration of the use of zidovudine as prophylaxis against HIV, storage of a baseline blood sample and follow-up blood tests to exclude seroconversion for either HIV or hepatitis B. Attention should also be paid to the emotional needs of staff members reporting blood exposures. Psychological morbidity after blood exposure incidents, especially from HIV-positive source patients, can be severe and should be properly addressed (Gerberding & Henderson, 1992).

We have noted considerable variation in the level of apparent anxiety among staff members reporting blood exposures and were interested to explore the factors that were related to this level of anxiety. We also wanted to examine changes in anxiety over time, following our intervention at the time of reporting the incident. Our policy for management of reported blood exposures is well developed and has been described elsewhere (Oakley et al., 1992; Oakley, 1992). In all cases there is an interview with a member of the Occupational Health team; this allowed us the opportunity to examine anxiety and other variables for the purpose of the present study.

Methods

One-hundred consecutive staff reporting blood or other body fluid exposure incidents to the Occupational Health Unit over several months in 1991 were entered into the study. The staff were seen as usual by one of a group of Occupational Health Nurses who all had accurate knowledge of HIV and hepatitis B transmission rates after accidental blood exposures, were familiar with the protocols for managing such exposures, and had access to further help and advice if necessary. The nurse recorded details of the incident, the source patient (if identified) and the hepatitis B immunity status of the staff-member. Again

as usual, the nurse contacted the clinical team of identified source patients to arrange for testing, with counselling and consent, for hepatitis B and HIV.

At the time of the study, identified source patients were not routinely tested for hepatitis C infection, although this is now policy. Issues about transmission of hepatitis C were only discussed with staff exposed to blood of patients already known to be infected with hepatitis C; there were no such incidents in this reported series. More recently, hepatitis C transmission risk is part of our routine discussions with staff reporting blood exposures.

For the purposes of this study the nurse then asked the staff member to answer a few more questions to help us to evaluate our service; no-one refused to do this. Staff were asked what particular worries they had about the reported incident, with several options and an 'open' category. They were asked to choose what they thought was the correct risk of transmission of HIV and hepatitis B, respectively, from six options: 0-1, 1-10, 10-30, 30-50, 50-70 and 70-100%. They were invited to rate their perception of the risk of transmission of HIV or hepatitis B, respectively, from this incident, with options of 'nope', 'low', or 'high'. Staff were also asked who they planned to tell about the incident (colleagues, manager, partner, family, friends, others) and how they thought these people would react. Finally, staff were asked to mark a 10-cm visual analogue scale to rate their level of anxiety about the incident.

After completing this questionnaire with the staff member, the nurse then gave information about the risks of infection transmission after blood exposure incidents and made arrangements for any identified source patient to be approached for testing as usual. The staff member was advised to have a baseline blood sample stored and testing for hepatitiS B immunity was arranged if necessary. All staff members were asked to return to the Occupational Health Unit about 1 week later. At this second visit they were informed about any remaining test results and the questionnaire about anxiety was repeated. On this second occasion, they were asked about how those they had told about the incident had actually reacted.

Analysis

The results on the anxiety analogue scale were skewed and a square root transformation was therefore performed, giving a 1-10 scale. Answers to the question about the reactions of other people were grouped: by combining 'did not tell' with 'not worried' categories and 'slightly worried' with 'very worried' categories; and by combining people potentially told into those at work, family and friends. The responses to the question about transmission risk for hepatitis B and HIV were divided into 'correct' and 'incorrect' categories. For HIV, the 'correct' transmission risk was 0-1% and for hepatitis B the 'correct' transmission risk was 10-30%.

The level of anxiety was examined in relation to other variables. One-way analysis of variance was used to compare the anxiety level for groups with different levels of categorical variables. Subjects who did and did not attend for the second interview were compared for a range of variables using chi-square statistics. Changes over time in the anxiety level were examined by paired t-statistics and changes over time in categorical variables were compared by changes in proportions (with confidence intervals) for matched observations. The effects of variables on the change in anxiety over time were examined using repeat measures analysis of variance and one-way analysis of variance of time changes within strata for categorical variables.

Results

Of the 100 staff attending to report a blood exposure, 80 were women and 20 men. Their median age was 27 years (range 19-59 years). Fifty-two per cent were nurses or student nurses, 21% doctors or medical students, 7% paramedical staff and 20% ancillary or other staff. Basic data about the reporting staff and the reported exposures are given in Table 1. Of the 100 reported exposure incidents, 76 were from identified source patients, the remainder being from used needles or other sharp instruments not obviously related to a particular patient (for example, needles in plastic rubbish bags). Twenty-nine of the staff had had a previous sharps incident; 15 of these staff had reported at least one previous incident to Occupational Health. Of the identified source patients, eight were HIV positive and four were hepatitis B surface antigen positive (all four staff members in these incidents were immune to hepatitis B). None of the identified source patients was positive for both HIV and hepatitis B together. Three of the staff

reporting incidents from HIV positive patients were working in areas with a known high proportion of HIV infected patients. No staff needed to be given hyperimmune globulin prophylaxis against hepatitis B and none chose to take prophylactic zidovudine. Seventy-two of the staff returned for a follow-up interview about a week after the first visit. Two of the staff reporting incidents from HIV positive source patients decided to have follow-up blood tests for HIV. One staff member reporting an incident where the HIV Status of the source patient was not determined also decided to have follow-up tests for HIV; this person was also concerned about recent sexual risks for HIV transmission.

More people correctly identified the risk of HIV transmission (after an infected needle-stick) than correctly identified the risk of hepatitis B transmission. There was no evidence of systematic overestimation of HIV transmission rate in relation to hepatitis B transmission rate. The knowledge about transmission rates of HIV and hepatitis B after infected needle-sticks was no better in those 15 who had previously reported incidents to Occupational Health than in the remainder of subjects reporting for the first time.

The effects of variables on the initial anxiety level are shown in Table 2. The mean anxiety level on the 10-point scale for all 100 reporting staff was 5.30 (95% CI 4.81-5.79). For both HIV and hepatitis B, there was little difference in mean anxiety level for subjects having correct and incorrect knowledge of transmission rates. However, there was a difference in level of anxiety between those who perceived a 'high' risk from the particular incident and those who perceived 'low or no' risk. This difference reached statistical significance at the 5% level for perception of hepatitis B risk. Not surprisingly, th e level of anxiety was significantly higher in those 91 staff who cited a specific worry about the incident than in those nine who denied any worries. The level of anxiety scored by individuals was related to the reaction they predicted among their colleagues, family and friends. When the analysis was repeated for the staff member's partner alone, the result was similar to that using the combined family response shown in the table. The mean anxiety level was not related to occupational group nor to whether the source patient was known or not. Those eight staff who had an exposure from known HIV positive source patients were not apparentlY more anxious (mean anxiety 5.34, 95% CI, 3.01-7.66) than the remaining 92 staff (mean anxietY 5.30, 95% CI, 4.78-5.81). The number of staff choosing to have follow-up blood tests for HIV was so small (three in all) that it was not possible to compare their anxiety with that of the rest of the group.

The 72 staff who attended for the follow-up interview were not significantly different to the 28 who did not with respect to the variables in Table 2. The changes over time in these 72 may therefore be a reasonable representation of the changes in the whole group.

Among the 72 staff who attended both interviews, there was a highly significant decrease in the mean anxiety level; the mean decrease was 2.27 (95% CI, 1.62-2.92). This represents a decline of 42% in relation to the initial level of 5.36 for this group. For both hepatitis B and HIV, in a matched analysis there was a highly significant increase in the proportion of staff having correct knowledge at the second interview (Table 3). For example, in relation to knowledge of HIV transmission, 25 people who had incorrect knowledge on the first occasion had correct knowledge on the second occasion, but the reverse was true for only two people. Staff members' estimates of transmission risks of HIV and hepatitis B at the first and second interviews are given in Table 4. There was a marked reduction in the proportion of people over-estimating the risks at the second interview. Changes in perception of HIV and hepatitis B risk from the particular incident were less marked (Table 3). Although there was a reduction in the proportions perceiving 'high' risks, the changes did not reach statistical significance, perhaps because there were relatively few perceiving 'high' risk on the first occasion. The proportion of subjects with specific worries about the incident fell significantly between the two interviews (Table 3).

The reaction of colleagues, family and friends that actually occurred (as reported by the staff member in the second interview) was not significantly different to that predicted by the staff member in the first interview.

The decrease in mean anxiety level between visits was not uniform between groups of staff defined in terms of several of the initial variables. Table 5 shows the mean anxiety levels at initial and follow-up interviews for different strata of three variables which affect the decline in anxiety level. Women had a slightly higher initial anxiety level than men at the first interview, but the decrease over time was more

marked among women. People who had reported blood splash incidents had a more marked drop in anxiety between interviews than those who had reported sharp injuries. The decrease in anxiety between interviews was greater for staff involved in incidents where the source patient was known. The reduction in anxiety was not related to occupational group and numbers were too small to examine possible interactions between variables related to decline in anxiety between visits.

Discussion

This study has confirmed that staff experience quite high levels of anxiety after blood exposure incidents, as noted by other authors with experience in dealing with such incidents (Gerberding & Henderson, 1992). Not surprisingly, staff who denied any specific worries about the incident had lower anxiety levels than those who had worries. It should be remembered that reported incidents are only a small fraction of the incidents that are sustained by staff (Astbury & Baxter, 1990; Williams et al., 1993). It seems likely that those incidents that were reported were those that caused higher than average levels of anxiety but we cannot be certain of this. Similarly, we cannot comment on whether the reporting rates were different between the staff groups in this study, as we only had information on those incidents that were actually reported. Incidents where the source patient is known to be HIV-positive are probably more likely to be reported and this could explain the relatively high frequency of HIV-positive source patients (8%) in this study.

It was interesting that in this study we could not detect a significant association between knowledge of HIV and hepatitis B transmission risks, and the initial level of anxiety. Many staff education programmes about blood-borne viruses focus on giving correct information about transmission risks; these results suggest that this is unlikely to be useful in helping staff to cope when they experience a blood exposure incident. There was a trend for staff perceiving more risk from the incident itself to have higher levels of anxiety, although this reached statistical significance only for hepatitis B. In assessing the risk from the particular incident, staff will have taken factors other than transmission risk into account, including the severity of the exposure and their estimate of how likely the source patient is to be infected with HIV or hepatitis B. Even so, the association between perceived risk from the incident and the level of anxiety does not seem to be very strong and other factors clearly play a part. It is perhaps surprising that the level of anxiety among staff haying an incident from a known HIV positive source patient did not seem to be greater than among other reporting staff Three of them were working in areas with a known high proportion of patients with HIV infection so may have considered how they would react to such an incident beforehand. However, it should be remembered that the number of subjects was relatively small so that the power of the study to detect small differences was low.

The predicted reaction of people that would be told about the incident seemed to be related to the staff members' anxiety. It could be argued that this was simply because the predicted reaction of others was a reflection of the individual's anxiety. However, although there was a significant fall in level of anxiety between visits, the reported actual reaction of others was similar to that predicted at the first visit and not less marked as might be expected if it was merely a reflection of the individual's own feelings. We did not interview any work colleagues, partners, family or friends of staff in this study, but it would be interesting to do so in a further study. We have noted informally that there is often a transient increase in the anxiety levels of staff reporting blood exposures after they have told partners, family and friends about the incident. Staff might be better prepared to cope with blood exposure incidents if they are given the opportunity to consider in advance how they might feel, how they would deal with their feelings, who they would tell, how these people might react and how they might deal with these reactions. We now include this in our sessions with groups of staff about prevention and management of blood exposure incidents. This approach of thinking about difficult issues before they arise has been advocated for counselling people in relation to other difficult issues concerned with HIV infection (Bor et al., 1992).

The knowledge of staff about transmission risks for HIV and hepatitis B after infected needlesticks was usually inaccurate on their first visit (see Table 3), but there was significant improvement by the time of the second visit. This suggests that giving information was effective, even in the fraught and anxious circumstances of reporting a blood exposure. Learning is generally thought to be less good in such circumstances (Cohen et al., 1986). The improved knowledge may not persist, as suggested by the lack of better knowledge among those who had reported previous incidents. At present, we do not give staff

reporting blood exposures written material about risks and follow-up to take away with them, but we are considering doing so in the future to help them retain information, and to help them in their discussions with partners, family and friends.

The results of this study suggest that our intervention with staff reporting blood exposures may be having a useful effect on anxiety, but there was no control group and, therefore, the marked reduction in anxiety between visits could be simply the effect of time It would be difficult to construct a study where counselling was denied to some staff, but a study of different methods of counselling may be possible. The greater reduction in anxiety over time for staff sustaining non-parenteral exposures may be because we were able to offer them greater reassurance about their risks. The staff in this study were seen by several different Occupational Health nurses; all the nurses operate within the same guidelines and have been given training in dealing with incidents, but some may have been more effective in reducing anxiety than others. The numbers were too small to examine this possibilitY. All the nurses were women; we do not know if this was related to the greater reduction in anxiety between visits in female staff.

Most official advice about management of blood exposure incidents understandably concentrates on the necessary physical measures to be taken and we agree that this is important. However, the psychological morbidity of individuals in these circumstances is easily under-estimated. This study supports the idea that talking to staff about their concerns following blood exposures can help them to deal with their own fears and those of their family and friends. Whatever else is offered, this counselling is an essential component of the management of reported blood exposures.

Table 1. Baseline data on 100 staff reporting blood exposure accidents

Item	Category	Number
Reason for reporting	Follow policy	57
	Worried about incident	31
	Saw posters	3
	Other	8
Type of worry	Infection	58
	Should not happen	9
	Patient at risk	10
	Other	14
	Not worried	9
Type of incident	Needlestic sharps	78
	Splash	22
Hepatitis B immunity	Immune	77
	Non-immune	22
	Unknown	1
Source patient	Identified	76
	Not identified	24
Previous sharps-incident	Yes	29
	No	67
	Unknown	4

Table 2. Variables related to anxiety level at initial interview

PART I

Factor	Category	n	Mean anxiety level	F	p
Knowledge of HIV risk	Correct	36	4.93	1.25	NS
	Incorrect	63	5.51		
Knowledge of Hepatitis B risk	Correct	18	5.87	1.36	NS
	Incorrect	80	5.12		

Perception of HIV risk	None + Low	84	5.12	2.65	0.11
	High	16	6.22		
Perception of Hepatitis B risk	None + Low	66	4.87	6.08	0.02
	High	34	6.13		
Worry	Worried	91	5.62	10.9	0.0001
	Not Worried	9	2.09		
Reaction of work colleagues	Worried	66	6.05	21.5	0.0001
	Not Worried	34	3.84		
Reaction of family	Worried	45	5.80	4.27	0.05
	Not Worried	54	4.79		
Reaction of friends	Worried	31	6.68	15.9	0.0001
	Not Worried	67	4.66		

PART II

Factor	Difference	95% CI of difference
Knowledge of HIV risk	0.58	- 0.45-1.61
Knowledge of Hepatitis B risk	0.75	- 0.53-2.03
Perception of HIV risk	1.09	-0.24 2.42
Perception of Hepatitis B risk	1.26	0.25-2.27
Worry	3.52	1.95-5.10
Reaction of work colleagues	2.21	1.26-3.15
Reaction of family	1.00	0.04 1.97
Reaction of friends	2.02	1.02-3.02

Table 3. Changes over time in staff members, knowledge of transmission risk, perception of risk from particular incident and specific worries about incident

PART I

First interview	2nd interview
Knowledge of HIV transmission risk (n = 71)	
33.8% correct	66.2% correct
Knowledge of hepatitis B transmission risk (n = 71)	
16 9% correct	42.3% correct
Perception of HIV risk from this incident (n = 69)	
14.5% 'high risk'	5.8% 'high risk'
Perception of hepatitis B risk from this incident (n = 69)	
34.8% 'high risk'	24.6%'high risk'
Specific worries about incident (n= 72)	
90.3% with worries	62.5% with worries

PART II

Difference (95%O CI) Statistical significance
32.4% (19.6-37.3%) Z = 4.23, p c 0.0001
25.4% (14.2-28.1%) Z = 3.80, p < 0.0005
8.7% (- 1.6-13.8%) Z= 1.58, NS
10.1% (- 2.7-22.9%) Z= 1.31, NS
27.8% (15.3-32.6%) Z= 3.88, p< 0.0001

The 95% confidence intervals and the statistics shown in the table refer to a matched analysis of proportions. See Methods for the how staff knowledge of HIV and hepatitis B transmission risk after infected needlesticks was tested. The 'correct' risk for HIV was the category 0-1% and the 'correct' risk for hepatitis B was the category 10-30%. Staff were asked to categorize their perception of HIV and hepatitis B risk from the particular incident as `none', `low' or `high'.

Table 4. Staff estimates of needlestick transmission rates for HIV and hepatitis B, respectively, on their first and second visits to occupational Health

(a) Estimates of transmission rate of HIV

1st estimate of transmission rate (%)	2nd estimate of transmission rate (%)						
	0-1	1-10	1-30	30-50	50-70	70-100	Total
0-1	22	1	1	0	0	0	24
1-10	10	5	1	1	0	0	17
10-30	4	2	1	1	0	0	8
30 50	7	2	1	0	0	0	10
50-70	1	2	0	0	0	0	3
70 100	3	1	0	2	1	2	g
Total	47	13	4	4	1	2	71

(b) Estimates of transmission rate of hepatitis B

1st estimate of transmission rate (%0)	2nd estimate of transmission rate (%)						
	0-1	1-10	10-30	30-50	50-70	70-100	Total
0-1	0	1	1	0	0	0	2
1-10	3	7	5	1	0	0	16
10 30	0	1	11	0	0	0	12
30-50	1	3	7	3	0	0	14
50-70	2	4	4	2	3	1	16
70 100	0	4	2	2	1	2	11
Total	6	20	30	8	4	3	71

Table 5. Changes in mean anxiety level betweern the first and second visits to Occupational Health in relation to sex, type of incident (splash with blood or sharps injury) and whether the source patient was idenified or not

			Mean anxiety level			
Factor	Groups	n	Time 1	Time 2	Diff	95% CI of cliff.
Sex	Male	14	5.08	3.76	1.32	0.20-2.44
	Female	58	5.43	2.93	2.50	1.74-3.26

Type of incident	Sharps	57	5.19	3.29	1.91	1.26-2.56
	Splash	15	6.00	2.34	3.66	1.73-5.59
Source patient	Identified	54	5.42	2.77	2.65	1.86-3.44
	Not identified	18	5.19	4.04	1.15	0.17-2.13

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