Peer reviewed article

Anxiety in health care workers after exposure to potentially HIV-contaminated blood or body fluids

Fabian Meienberg[a], *Heiner C. Bucher*[a, b], *Lucas Sponagel*[a], *Christine Zinkernagel*[c], *Niklaus Gyr*[a], *Manuel Battegay*[a]

[a] Outpatient Department of Internal Medicine, University Hospital Basel and Division of Infectious Diseases
[b] Institute of Clinical Epidemiology, University Hospital Basel
[c] Outpatient Department of Psychiatry, University Hospital Basel

Summary

In order to measure anxiety in health care workers (HCWs) reporting occupational exposures to potentially contaminated body fluids, we enrolled 55 HCWs in a prospective study. Percutaneous and mucous membrane exposures were most frequent. 27% of study participants estimated their risk of HIV-infection as above 1%. Personality bound anxiety was not high, but acute anxiety showed a high variability. In a multiple regression model high personality bound anxiety, lower age and being a HCW other than physician independently predicted higher acute anxiety scores. No HIV or hepatitis C virus infection occurred. HCWs encounter significant anxiety after occupational exposure to potentially contaminated body fluids despite the possibility of potent post exposure prophylaxis.

Key words: health care workers; HIV; exposure

Introduction

Extensive measures have been undertaken to prevent transmission of human immunodeficiency virus (HIV) in health care workers (HCW) [1–2]. Nevertheless, exposure to potentially infectious blood or other body fluids, in particular needle stick injuries, is still frequent and probably underreported [3–8]. The risk of HIV-transmission after percutaneous exposure to HIV-infected blood is approximately 0.3% [9].

In our experience HCWs are often subject to anxiety following occupational exposure to potentially contaminated material. Studies examining this issue are scarce or lacking, especially for the period following introduction of the potent antiretroviral therapies [10–12]. Despite the dramatic reduction of morbidity and mortality of HIV-infection and effective post exposure prophylaxis, anxiety may still be high after occupational exposure [13–15]. Hence, our aim was to investigate anxiety at the time of reporting occupational exposure.

Patients and methods

In line with Swiss National Guidelines, the University Hospital of Basel, Switzerland, has exactly defined procedures for occupational exposure to potentially HIV-contaminated blood or other body fluids. These are in close agreement with the CDC guidelines [1].

HCWs consulting the occupational health service following occupational exposure were asked to participate in the study. HCWs seen at the division of emergency medicine when the occupational health service was closed (eg. at night), did not participate. The study was conducted during a six month period (June–December 2000). Ethical committee approval was obtained for this study and HCWs gave their written informed consent. Serological data confirming HIV and/or hepatitis C virus seronegativity were collected up to 9 months later.

Data were collected prospectively using questionnaires filled in by the nursing staff. HCWs were asked to estimate their risk of HIV-transmission in their present situation (scale: <1%, 1–5%, >5%). Anxiety tests were completed prior to the knowledge of the HIV-test result in the source patient as HIV-testing usually lasted 90–120 minutes.

State Trait Anxiety Inventory (STAI). All HCWs were asked to fill in the STAI [16]. The STAI assesses environment dependent anxiety influenced by various psychic

This work was supported by the Cantonal Authorities of the Canton Basel-Stadt, Switzerland and the University Hospital Basel

processes. We used the validated German version with two scales. State anxiety is an emotional state characterised by tension, worry, nervousness, and fear of impending events, varying in time and depending on the situation. Trait anxiety is a relatively stable property of an individual, associated with the tendency to interpret a situation as harmful. State and trait values are generated by 20 questions with answers rated from 1–4. The normal values of the inventory were derived in 1977 from a reference population of 2385 subjects [16].

Statistical analysis. We used the Mann-Whitney test for differences of scores between different subgroups. We conducted a stepwise backwards multiple regression to define factors predicting state anxiety. The following factors were included in the model: trait anxiety, gender, age, type of exposure (percutaneous versus others), self-estimated risk of HIV transmission (<1% versus >1%) and occupational group (physician versus others).

Results

Table 1

Demographics of health care workers (HCWs), description of exposures, and self-perceived HIV transmission risk by HCWs (n = 55).

Patient characteristics	mean	range	n	%
age (years)	37	21–60		
gender (male)			18	33
occupational group				
nursing staff			27	49
physician			12	22
medical student			6	11
nursing staff in training			5	9
laboratory staff			3	5.5
radiology staff			2	3.5
type of exposure				
percutaneous			40	73
mucous membrane			10	18
eye			8	14
mouth			2	4
nonintact skin				59
percutaneous exposures				
device prior in source patient's artery or vein				
yes			17	42.5
no			19	47.5
unknown / not reported			4	10
type of device				
needle			26	65
blade			4	10
scissors			3	7.5
wire			2	5
others			4	10
unknown			1	2.5
depth of injury				
deep (local bleeding)			27	67.5
superficial (scratch)			11	27.5
unknown / not reported			2	5
visible blood on device				
yes			21	52.2
no			18	45
unknown / not reported			1	2.5
self-perceived risk*				
<1%			40	73
1–5%			9	16
>5%			6	11

* Health care workers were asked to assess the risk for HIV transmission in their present situation.

In the 6-month study period 129 HCWs consulted the occupational health service (n = 57) or the emergency division (n = 72) after occupational exposure. Of the 57 HCWs, 55 participated in the study; two HCWs refused without giving a specific reason. Most participants belonged to the nursing staff (n = 27), followed by physicians (n = 12) (table 1). Time between exposure and consultation varied between less than 5 minutes and up to 6 days with a median of 90 minutes ± 1452 (range).

The most frequent type of exposure was percutaneous (73%) and most of these percutaneous injuries were deep (n = 27) (table 1). In 21 cases (52%) of percutaneous exposure the object which led to the injury was contaminated with visible blood (table 1). Further details about exposures and perceived risk are given in table 1. In 51 cases the source patient was known, in four cases unknown. Though HIV-testing was performed immediately, serology results of source patients were known to physicians and HCW only after completion of the questionnaire. Beforehand, one source patient was known to be HIV-infected and another hepatitis C virus infected.

Measures of trait anxiety levels are shown in table 2. The mean levels of trait anxiety of men and women were below the mean levels of the reference population. Average state anxiety scores of men showed similar levels compared to reference scores of men in the reference population, whereas state anxiety scores of women showed significantly higher levels compared to reference scores (table 2).

Men experienced significantly lower levels of state anxiety than women (p = 0.04). Physicians had significantly lower state anxiety levels than other HCWs (Mann-Whitney, p = 0.01) (table 2). HCWs with a low (<1%) self-perceived HIV transmission risk tended to have lower state anxiety levels than those HCWs, who considered their risk to be higher (p = 0.09). HCWs with percutaneous exposures with or without deep injuries did not demonstrate higher state anxiety. In the two cases where HIV or hepatitis C virus infection was known beforehand, state anxiety was not particularly high. Stepwise multiple regression showed that higher trait anxiety, younger age and occupational groups other than physician independently and significantly predicted higher state anxiety

Table 2

Trait and state anxiety at the time of reporting occupational exposure.

	n	mean	std. dev.	median	range	p-value***
Trait anxiety*						
Trait entire study population	54	32.2	7.4	30	21–57	
Trait men	18	29.7	6.8	26.5	21–46	
Trait women	36	33.5	7.5	32	24–57	
State anxiety**						
Analyses by subgroups						
State entire study population	55	44.6	13.8	43	22–75	
State men	18	38.7	8.0	38.5	27–55	
State women	37	47.5	15.1	50	22–75	0.04
State physicians	12	36	8.7	35	27–55	
State non-physicians	43	47.0	14.0	44	22–75	0.01
State self-perceived HIV						
transmission risk <1%	40	42.9	13.8	40	22–75	
State self-perceived HIV						
transmission risk >1%	15	49	13.1	44	28–75	0.09
State percutaneous exposures	40	44.8	14.1	43	23–75	
State other type of exposures	15	44.1	13.3	41	22–75	0.96
State deep injury	27	45	13.8	44	23–75	
State superficial injury	11	43.8	16.4	40	27–75	0.64
State time to consultation <8 h	33	43.4	14.0	40	23–75	
State time to consultation >8 h	6	38.8	14.0	35	22–64	0.42

* Scores of the reference population; men: n = 1107, mean score 34.5 ± 8.8; women: n = 1278, mean score 37.0 ± 10.0.

** Scores of the reference population; men: n = 1107, mean score 36.8 ± 9.8; women: n = 1278, mean score 38.1 ± 10.3.

*** p-values were calculated by Mann-Whitney test comparing the two subgroups.

Table 3

Multiple regression-state anxiety.*

	coef.	std. err.	p-value
Trait anxiety score	.86	.21	<0.01
Age	.34	.15	0.02
Non-physicians versus physicians	8.63	3.66	0.02
Type of exposure (percutaneous versus others)	2.07	1.92	0.29

* Following factors were included in the model: age, gender, occupational group (physician versus others), trait-anxiety scores, self-perceived HIV transmission risk (<1% versus >1%), type of exposure (percutaneous versus others). This table shows factors contributing to the model (R-squared = 0.3948). The type of exposure, gender and self-perceived HIV-transmission risk did not contribute to the model.

(table 3). The type of exposure, gender and self-perceived risk for HIV transmission did not contribute to the model.

In six situations (11%) post exposure prophylaxis was recommended and started. In 41 cases (75%) a post exposure prophylaxis was not recommended. In the eight remaining HCWs (14%) the physician offered a post exposure prophylaxis, which was declined by all. Serological testing performed within the next 9 months demonstrated that no HIV and no HCV transmission occurred.

Discussion

In this prospective study analysing anxiety of HCWs consulting the occupational health service after exposures to potentially HIV-contaminated material, the main findings were that (1) acute anxiety levels showed a high variability and that (2) an anxious personality, occupational group other than physician, and lower age independently predicted higher acute anxiety.

In 1991, Cockcroft et al. using a 10 cm visual analogue scale found only a modest variability in anxiety in 100 HCWs reporting accidental exposures [12]. This is in contrast to the high variability we found in our study. This difference may be due to the different tests used to assess anxiety. It may well be that measuring both acute state anxiety and personality bound trait anxiety enabled a more in depth analysis than a visual analogue scale.

Not unexpectedly, higher trait anxiety predicted higher state anxiety. Our findings are in accordance with the STAI definition and indicate that this test is a very good tool for measuring relevant aspects of anxiety in such a situation [16]. Interestingly, the measured mean trait anxiety of our study population was lower than that of the reference population [16]. This result is important since it shows that HCWs who report occupational exposures should per se not be judged as overanxious.

Physicians demonstrated less acute anxiety

than other occupational groups. Better knowledge about HIV and risk of transmission may possibly explain this finding. This in turn may indicate that educational efforts should be made to improve knowledge and alleviate anxiety of HCWs involved in the care of HIV infected patients [5–6]. Experience and knowledge as well as more mature self-reflection on life in older individuals may also explain why younger subjects were found to be more anxious in our study. Knowledge, however, was not assessed in this study and, due to the small numbers, perceived risk of transmission could not be correlated with different occupational groups.

In the univariate analysis we could confirm the finding of Cockcroft et al., that female gender was associated with higher anxiety levels. This is in line with studies reporting higher anxiety levels in women in different settings [17–19]. However, gender did not turn out to be an independent factor predicting anxiety. Our results indicate that the association between gender and state anxiety was confounded by occupational group and trait anxiety.

The type of exposure is an important risk factor for accidental HIV transmission [7–8]. We found no association for acute anxiety with this risk factor. This may demonstrate that detailed knowledge about this risk factor is not prevalent among HCWs. In the same way, the self-perceived HIV transmission risk tended to predict the level of anxiety. There was a remarkable variance in time between exposure and the consultation at the occupational health service. We could not find a statistically significant difference in state anxiety between HCWs reporting an occupational exposure earlier or later. It must, however, be mentioned, that this analysis was limited by the small number of HCWs reporting exposures after more than 8 hours (n = 6). Possibly, in a larger population other factors, e.g. self-perceived risk for HIV transmission, would also have been significantly associated with different anxiety levels.

To the best of our knowledge this study is the first to prospectively examine anxiety when reporting occupational exposures to potentially contaminated material in the era of potent antiretroviral therapy. Many HCWs suffer from anxiety after occupational exposures. Hence, anxiety should be a central issue in counselling directly after an occupational exposure and during further follow up. Whether such measures improve counselling of HCWs needs to be analysed in further studies.

The authors thank the nursing team of the occupational health service, Eva Thoma, Ruth Zaugg and Astrid Recher, for additional collection of data and Michèle Girard for excellent secretarial assistance.

Correspondence:
Prof. Manuel Battegay
Outpatient Department of Internal Medicine
University Hospital of Basel
Petersgraben 4
CH-4031 Basel
E-Mail: mbattegay@uhbs.ch

References

1 Centers for Disease Control and Prevention. Updated US Public Health Service guidelines for the management of occupational exposures to HBV, HCV and HIV and recommendations for postexposure prophylaxis. MMWR Morb Mortal Wkly Rep 2001;50(RR-11):1–42.
2 Gerberding JL. Management of occupational exposures to blood-borne viruses. N Engl J Med 1995;332:444–51.
3 Luthi JC, Dubois-Arber F, Iten A, et al. The occurrence of percutaneous injuries to health care workers: a cross sectional survey in seven Swiss hospitals. Schweiz Med Wochenschr 1998; 128:536–43.
4 Guo YL, Shiao J, Chuang YC, Huang KY. Needlestick and sharps injuries among health-care workers in Taiwan. Epidemiol Infect 1999;122:259–65.
5 Mangione CM, Gerberding JL, Cummings SR. Occupational exposure to HIV: frequency and rates of underreporting of percutaneous and mucocutaneous exposures by medical house staff. Am J Med 1991;90:85–90.
6 Osborn EH, Papadakis MA, Gerberding JL. Occupational exposures to body fluids among medical students. A seven-year longitudinal study. Ann Intern Med 1999;130:45–51.
7 Cardo DM, Culver DH, Ciesielski CA, et al. A case-control study of HIV seroconversion in health care workers after percutaneous exposure. Center for Disease Control and Prevention Needlestick Surveillance Group. N Engl J Med 1997; 337:1485–90.
8 Ippolito G, Puro V, Heptonstall J, Jagger J, De Carli G, Petrosillo N. Occupational human immunodeficiency virus infection in health care workers: worldwide cases through September 1997. Clin Infect Dis 1999;28:365–83.
9 Bell DM. Occupational risk of human immunodeficiency virus infection in healthcare workers: an overview. Am J Med 1997; 102:9–15.
10 de la Tribonniere X, Dufresne MD, Alfandari S, et al. Tolerance, compliance and psychological consequences of post-exposure prophylaxis in health-care workers. Int J STD AIDS 1998;9:591–4.
11 Treloar CJ, Higginbotham N, Malcolm JA, Sutherland DC, Berenger S. The personal experience of Australian health-care workers accidentally exposed to risk of HIV infection. AIDS 1995;9:1385–6.
12 Cockcroft A, Oakley K, Gooch C, Mastin S. Anxiety and perception of risk of HIV and hepatitis B infection among health-care workers reporting accidental exposures to blood and other body fluids. AIDS Care 1994;6:205–14.
13 Egger M, Hirschel B, Francioli P, et al. Impact of new antiretroviral combination therapies in HIV infected patients in Switzerland: prospective multicentre study. Swiss HIV Cohort Study. BMJ 1997;315:1194–9.
14 Mocroft A, Vella S, Benfield TL, et al. Changing patterns of mortality across Europe in patients infected with HIV-1. EuroSIDA Study Group. Lancet 1998;352:1725–30.
15 Zinkernagel C, Taffé P, Rickenbach M, et al. Importance of mental health assessment in HIV infected outpatients. J Acquir Immune Defic Synd 2001;28:240–49.
16 Spielberger C, Gorsuch R, Lushene R. Manual for the State-Trait Anxiety Inventory. Palo Alto, California: Consulting Psychologists Press; 1970.
17 Jang KL, Stein MB, Taylor S, Livesley WJ. Gender differences in the etiology of anxiety sensitivity: a twin study. J Gend Specif Med 1999;2:39–44.
18 Hojat M, Glaser K, Xu G, Veloski JJ, Christian EB. Gender comparisons of medical students' psychosocial profiles. Med Educ 1999;33:342–9.
19 Linzer M, Spitzer R, Kroenke K, et al. Gender, quality of life, and mental disorders in primary care: results from the PRIME-MD 1000 study. Am J Med 1996;101:526–33.

Swiss
Medical Weekly

Official journal of
the Swiss Society of Infectious disease
the Swiss Society of Internal Medicine
the Swiss Respiratory Society

The many reasons why you should choose SMW to publish your research

What Swiss Medical Weekly has to offer:

- SMW's impact factor has been steadily rising, to the current 1.537
- Open access to the publication via the Internet, therefore wide audience and impact
- Rapid listing in Medline
- LinkOut-button from PubMed with link to the full text website http://www.smw.ch (direct link from each SMW record in PubMed)

- No-nonsense submission – you submit a single copy of your manuscript by e-mail attachment
- Peer review based on a broad spectrum of international academic referees
- Assistance of our professional statistician for every article with statistical analyses

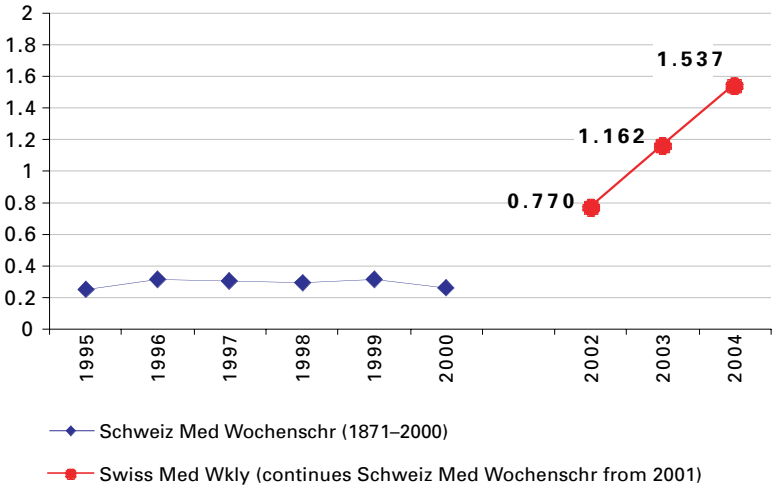
- Fast peer review, by e-mail exchange with the referees
- Prompt decisions based on weekly conferences of the Editorial Board
- Prompt notification on the status of your manuscript by e-mail
- Professional English copy editing
- No page charges and attractive colour offprints at no extra cost

We evaluate manuscripts of broad clinical interest from all specialities, including experimental medicine and clinical investigation.

We look forward to receiving your paper!

Guidelines for authors:
http://www.smw.ch/set_authors.html

Impact factor Swiss Medical Weekly



EMH FMH Schwabe
Editores Medicorum Helveticorum

All manuscripts should be sent in electronic form, to:

EMH Swiss Medical Publishers Ltd.
SMW Editorial Secretariat
Farnsburgerstrasse 8
CH-4132 Muttenz

Manuscripts: submission@smw.ch
Letters to the editor: letters@smw.ch
Editorial Board: red@smw.ch
Internet: http://www.smw.ch