Differences between Hospital- and Community-Acquired Blood Exposure Incidents Revealed by a Regional Expert Counseling Center

P.Th.L. van Wijk, M. Pelk-Jongen, E. de Boer, A. Voss, C. Wijkmans, P.M. Schneeberger

Abstract

Objective: One year (2003) regional analysis of all blood exposure incidents from hospitals as well as from the community.

Design: Establishment of an easily accessible regional expert counseling center, operating 24 h a day, for all accidental blood exposures. Tasks of the center were to register incoming calls, to inform and counsel the victim, to assess the risk of the incident, and to provide a plan of further actions, including prophylactic measures.

Setting: A Dutch region (Northeast Brabant) with 500,000 inhabitants and two major hospitals (1,786 beds).

Results: A total of 454 incidents (1.2 per day) were recorded. Only half of the incidents occurred in the hospital setting (n = 234), whereas the others (n = 220) took place in the community setting. Nearly all (95%, n = 432) incidents occurred during work, and most of them (84%, n = 385) were related to health care activities. In the hospital setting injuries occurred with physicians (13%), nursing staff (45%), operating room (OR) staff (13%), ancillary (18%), others (10%). In the community setting, incidents took place among healthcare workers (48%), detention and police officers (10%), civilians (10%), general practitioners/dentists and their staff (8%), cleaning staff (4%) and work-related incidents not falling into any of the above categories (7%). More low risk incidents took place outside the hospital (87% vs. 68% in hospital), while high-risk incidents predominantly occurred within the hospital setting (23% vs. 6%). The hepatitis-B immunization rate was significantly lower in victims from the community than in those working in hospitals (38% vs. 96%). Reports from incidents in the community setting were delayed.

Conclusions: Incidents that expose individuals to blood-borne pathogens occur equally frequent in the hospital and non-hospital (community) setting. Therefore, a regional expert counseling center, accessible around-the-clock, for all types of blood-exposure incidents is needed. Blood-exposure prevention programs should aim at a reduction of high-risk incidents within hospitals, and at increasing the awareness for vaccination and early reporting within the community setting.

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Introduction

Exposure to blood poses a small but significant risk of transmission of blood-borne pathogens including hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) [1]. Apart from the risk of contracting an infection, such an incident may cause anxiety and stress among the victims for which adequate counseling is needed [2].

Most data on accidental blood exposure are from hospital settings [1, 3, 4]. The mean rate of reported incidents is estimated 4/100 full-time equivalent (FTE) health care worker (HCW) per year, or 10.3 and 8.8 per 100 FTE for medical and nursing staff, respectively [1, 4, 5]. However, blood-exposure incidents may also occur in health-care settings not related to hospitals, as well as in settings not related to health care at all [6, 7]. Data on the incidence of non-hospital related and community-acquired incidents are scarce [8].

Timely reporting of an incident to an experienced health care provider will allow the administration of proper preventive measures and counseling. Assessing the risk of transmission of blood-borne pathogens is a complex matter depending on variables, such as, the type of injury, the amount of blood transmitted, the infectiousness of the source, and the level of protective antibodies in the "victim". The success of prophylactic measures depends on the interval between the incident and its administration. In collaboration with all health care providers and public health services in our region,

P.Th.L. van Wijk, M. Pelk-Jongen, P.M. Schneeberger *(corresponding author)*
Dept. of Medical Microbiology en Infection Control, Jeroen Bosch Hospital, POB 90153, 5211 ME, 's-Hertogenbosch, The Netherlands;
Phone: (+31/73) 6992875, e-mail: p.schneeberger@jbz.nl
P.Th.L. van Wijk, E. de Boer, C. Wijkmans
Dept. of Infectious Diseases and Epidemiology, Public Health Service, Hart voor Brabant, 's-Hertogenbosch, The Netherlands
A. Voss
Dept. of Medical Microbiology and Infectious Diseases, Canisius-Wilhelmina Hospital, Nijmegen, The Netherlands
A. Voss
Nijmegen University Centre for Infectious Diseases, Radboud University Medical Centre, Nijmegen, The Netherlands

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we have established a regional expert counseling center for blood exposure incidents.

Materials and Methods

Regional Expert Counseling Center

A regional expert counseling center for blood-exposure incidents was established in collaboration with health care providers (medical specialist and general practitioners), the public health department and the occupational health department. The center operates 24 h a day and is easily accessible by telephone. The center is staffed by specifically trained infection control practitioners with back up from infectious disease specialists. It registers all incoming calls, provides risk assessment of the incident, informs and counsels the victim and provides a plan of action to start prophylactic measures. Reports and follow-up are given to the general practitioner or occupational health care officer. All registered data were reassessed on a weekly basis with one of the infectious disease specialists. Flaws in the protocol and breaches in handling of the protocol were discussed with the infection control practitioners.

Population and Region

The expert counseling center provides services to two hospitals with a total amount of 1,786 hospital beds (928 occupied beds per year) employing a total of 2,207 FTEs of HCWs per year. Furthermore, the center serves a semi-rural region with one major city above 100,000 inhabitants (1,250 km^2) with an overall population of 500,000 inhabitants. In the community there are estimated a total amount of 6,500 FTEs employees per year in home health care settings and nursing homes. There are estimated 260 general practitioners, 230 dentists and a total of 2,355 FTE police workers and prison officers.

Information about the counseling center throughout the entire region was given through flyers, newspaper articles and hospital seminars on a regular basis during the last 3 months of 2002 and the beginning of 2003.

Risk Assessment

The risk assessment of blood-borne transmissions was divided into three major categories: high risk percutaneous incident with hollow bore, blood-filled needles, low risk after percutaneous incident with a negligible amount of blood and no risk for an incident where no blood or body fluids were involved or the skin remained intact [9]. Other types of incidents, including human bites and scratches, spillage onto mucous membranes (mouth, eyes, non-intact skin) and sexual incidents are gauged according to above mentioned algorithm. Minute amounts of blood were considered to pose low risk, whereas considerable amounts of blood were considered high-risk incidents.

Counseling

All victims were counseled and assisted in having laboratory tests performed, as well as obtaining informed consent from possible sources to be tested. Medication was given in the emergency rooms of one of the two hospitals.

Registration and Reporting

Each reported incident was registered on a standardized form. All incidents were analyzed and assessed for adherence to the standard protocol on a weekly basis within the group of infection control practitioners and an infectious disease specialist/medical microbiologist. Reports were sent to the patient's general practitioners describing the nature of the incident and follow-up that was needed. The following data were registered per incident. Data from the victim: personal information, profession, HBV immune status, time of reporting. Data from the accident: time, place of occurrence, place of injury, the cause and the object of injury and the scaling of severity of the incident.

Results

During 1 year the counseling center received 980 phone calls resulting in a total of 454 reported incidents (Table 1). There were an almost equal number of incidents reported from the community (n = 234) compared to hospital related incidents (n = 220). Of the injuries, 95% (n = 432) occurred during work, whereas 15% (n = 69) incidents were not related to health care activity. In the hospital, we registered 10.6 incidents per 100 FTE HCW. Outside the hospital, the rate of incidents per 100 FTE was 1.7 in nursing homes, 0.81 within the police force and 1.06 within prisons, respectively.

Tables 2 and 3 show in which setting the incidents occurred. Most of the injuries outside the hospital occurred among HCWs in home health care and nursing homes (48%), whereas 10% took place in prison and at police work. In the community injuries took place when first aid was given by civilians (4%) or in situations such as burglary and molestation, fights, accidental needle sticks in park and human bites (15%). Table 4 shows the distribution of the type of blood exposures. In hospitals 49% of incidents occurred with non-blood filled needles and 24% with blood filled needles; in the community these numbers were 63% and 4%, respectively. Table 5 shows the risk of the injuries as they were assessed by the counseling center and HBV vaccination coverage in both settings. In the hospital 9% and in the community 7% of the incidents were judged not to pose risk either because the skin was intact or the needle was not contaminated. Hospital HCWs reported more high risk incidents (23%) than HCWs from outside hospitals (5%), while the total non-hospital related high risk incidents was 6%. Conversely, in the hospital more HCW (95%) who were exposed and reported needle stick incidents were vaccinated, compared to HCW outside

Table 1
Injuries categorized by occupation.

	Hospital (n = 234) %		Community (n = 220) %
Nursing staff	46	HCW not in hospital	69
Ancillary[a]	18	Prison/police	10
OR staff	13	Civilians	10
Physicians	13	Others work-related[b]	11
Others	10		

[a] Supporting staff such as laboratory and radiology staff; [b] cleaning staff, waitresses, kitchen staff, security staff, etc

Table 2
Hospital-acquired incidents categorized by place of occurrence.

	(n = 234) %
Medical/surgical units	33
Operating room	16
X-ray/radiology/laboratory	15
Outpatient/short stay	8
Emergency	6
Maternity	6
Dialysis	5
Sterilization room	4
Kitchen/cleaning/others	4
ICU	3

Table 3
Community-acquired incidents categorized by place of occurrence.

	(n = 220) %
Nursing homes	38
Other places not health-care-related	15
Home health care	10
General practitioners office	7
Mental hospital	6
Police work (street or office)	6
Dental care office	4
Prison	4
Refuge accommodation centers	4
First aid by civilians	4
Other healthcare (ambulance, midwives, etc.)	2

Table 4
Type of exposure.

	Hospital (n = 234) %	Community (n = 220) %
Injuries with non-blood-filled needles[a]	49	63
Injuries with blood-filled hollow-bore needles	24	4
Cuttings by sharps	15	8
Human bites and scratches	0	12
Spillage of blood or body fluids	6	8
Unprotected sexual intercourse	0	2
Non-used hollow-bore needles	6	3

[a] Subcutaneous and intra-muscular used needles and suture needles

Table 5
Risk assessment and level of immunization.

	Hospital (n = 234) %	Community (n = 220) %
High risk	23	6
Low risk	68	87
No risk	9	7
Total HBV vaccinated	95	37
Source known	80	74

High risk: percutaneous incidents with hollow bore, blood-filled needles; low risk: percutaneous incidents with a negligible amount of blood; no risk: an incident where no blood or body fluids were involved or the skin remained intact; other types of incidents, including human bites and scratches, spillage onto mucous membranes (mouth, eyes, non-intact skin) and sexual incidents are gauged according to above mentioned algorithm. Minute amounts of blood were considered to pose low risk, whereas considerable amounts of blood were considered high-risk incidents

hospitals (48%). Overall, in the community 37% of the injured was vaccinated against HBV.

Figure 1 shows the time lag between occurrence and reporting of the incident. Incidents within the hospital were reported earlier than those from the community. Within 2 h 86% of the hospital incidents and 62% of the community incidents were reported. For 2, 4, 8 and 48 h these figures were 86–62%, 89–69%, 92–77% and 98–96%, respectively.

Discussion

Setting up a 24 h a day accessible expert counseling service, we were able to prospectively register all blood exposure incidents from the community as well as from the hospitals in our region. During 1 year (2003), we registered 453 incidents; 234 occurred from a hospital setting and 220 incidents from the community. While our hospital data are comparable to other studies [1, 10, 11], we were surprised to find nearly 50% of incidents originating from the community. Data of such blood exposure incidents from the community are scarce [8, 12].

The severity of the incidents sustained in the community was lower than in hospitals, mainly because fewer incidents were due to blood filled hollow-bore needles. There is a short time frame for proper and effective prevention after an incident. HBV immunoglobulin has to be administered within 48 h after an incident [13], while for prevention of HIV post exposure prophylaxis has to be administered within 4–8 h after the incident [13]. Within this period, risk analysis and laboratory tests have to be performed, and treatment has to be supplied to the patient.

Needle stick injuries from the community, even though many of these were healthcare-related, were reported later than those from the hospital. A significant number of incidents were reported too late to effectively prevent potential HIV transmission and some were even reported too late to prevent potential HBV transmission. Moreover, if after reporting the incident, essential steps

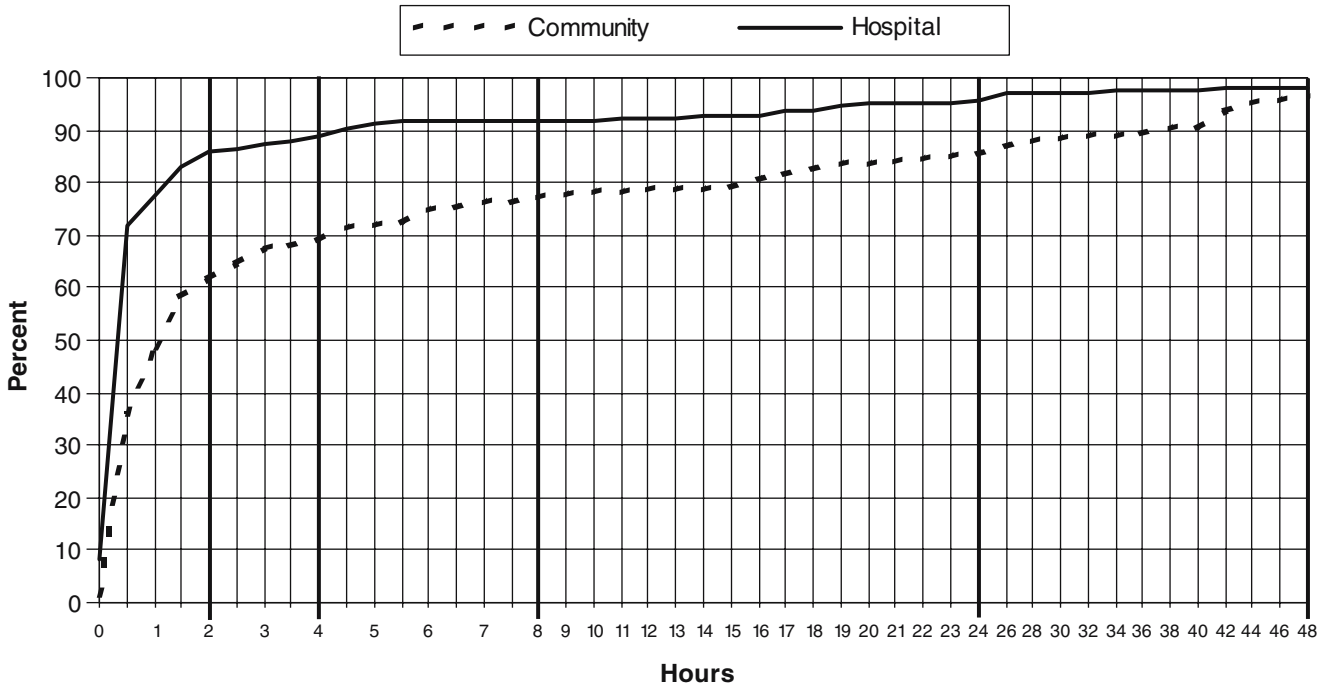

Figure 1. Time interval between occurrence and reporting of the incident; hospital incidents compared to community-acquired cases.

for the proper handling of the incident are not immediately taken, valuable time can be lost. We think our center may handle incidents faster than most other healthcare providers, because of our standardized operational procedures and experienced staffing.

HCWs working outside hospitals should be made aware of the need and importance to immediately report incidents.

The vaccination rate of the injured from outside the hospital was much lower, 37% overall and 48% for HCWs, compared to the injured from the hospital (97%). Even though the incidents from the community were less severe than those from the hospital, more medical interventions were needed. Due to the low vaccination rate in the community, more preventable measures such as HbiG, HBV vaccination, and sources testing had to be applied.

Although some of the civilians were involved in medical practices such as resuscitation, a total of 29% of the community-related incidents were not related to healthcare.

To consider interventions, the strategy in the community has to differ from the strategy in hospital settings. Whereas in hospitals we can focus on safety devices and safety protocols and training, in the community accidents are difficult to prevent; therefore, a higher level of immunization should be achieved. Active propagation of HBV immunization would be an intervention for certain major groups (HCW, police, and prison) to minimize future risks after blood exposure. We believe that increasing the awareness on the risk of needle stick incidents for HCW in the community should lead to an increase in vaccination rates among these workers, even though in our data the risk of an incident in the community was ten times lower than in a hospital.

In numerous countries programs to raise awareness on safety and prevention of occupational exposure were launched [4]. As a result, employers in the Netherlands are forced by law to register all incidents and to reduce the risk of blood exposure.

We conclude that there is a need for a 24 h a day accessible expert counseling center for hospital as well as for non-hospital blood exposure incidents. Within hospitals a reduction of high-risk incidents should be achieved, whereas outside hospitals more awareness about early reporting and vaccination should be created. Early reporting and speedy handling of needle incidents are critical to deliver adequate care for blood exposure incidents.

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