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WORK SAFETY AMONG POLISH HEALTH CARE WORKERS IN RESPECT OF EXPOSURE TO BLOODBORNE PATHOGENS

BEZPIECZEŃSTWO PRACY POLSKICH PRACOWNIKÓW OCHRONY ZDROWIA
W KONTEKŚCIE NARAŻENIA NA MATERIAŁ KRWIPOPOCHODNY

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ABSTRACT

Objectives: Viral hepatitis is the second most often identified infectious illness acquired at work and it is mostly registered among health care personnel. This group of workers is at greater risk of exposure to blood and bloodborne pathogens, including hepatitis B and C viruses. The aims of this study were to evaluate the efficacy of methods promoting work safety in healthcare settings, to assess the frequency of exposures in the last 12 months prior to the study and to determine a rate of reporting them to appropriate authorities. **Methods:** A total of 1138 Polish healthcare workers were interviewed during the study period (between 2009 and 2010). **Results:** Sustaining accidental occupational percutaneous exposure during last 12 months was declared by 242 workers (21% of the whole group). Only in 146 cases these incidents were reported to authorities. Exposure incidents were associated with self-perception of high risk of exposure (OR = 3.69, p = 0.0027), employment in out-patient (vs. hospital-based) healthcare setting (OR = 1.71, p = 0.0089), conviction that the level of information about bloodborne infections conveyed at work was insufficient, lack of both exposure reporting system and knowledge about the ways of reporting. **Conclusions:** Despite the different established proposals of the post-exposure procedures, it turns out that particularly in small, not providing 24 hours service healthcare settings these procedures are not known or are not respected. More attention should be given to education, especially in regard to the risk of infection, advantages of post-exposure prophylaxis and reporting exposure incidents. Med Pr 2013;64(1):1–10

Key words: healthcare workers, needlestick injuries, bloodborne pathogens, exposure notification

STRESZCZENIE

Wstęp: Wirusowe zapalenie wątroby jest drugą najczęściej stwierdzaną zakaźną chorobą zawodową i rozpoznawaną głównie u pracowników ochrony zdrowia. Ta grupa zawodowa jest najbardziej narażona w miejscu pracy na ryzyko ekspozycji na patogeny krwiopochodne, w tym wirusy HBV i HCV. Celem badania była ocena skuteczności działań ukierunkowanych na bezpieczeństwo pracy w placówkach ochrony zdrowia, częstości incydentów ekspozycji na materiał biologiczny w ostatnich 12 miesiącach poprzedzających badanie oraz ich zgłaszalności. **Materiał i metody:** Do analizy użyto badania kwestionariuszowego przeprowadzonego w latach 2009–2010 wśród 1138 pracowników ochrony zdrowia. **Wyniki:** Ekspozycja na materiał biologiczny miała miejsce u 242 pracowników (21% całej grupy). Tylko 146 osób zgłosiło te zdarzenia odpowiednim służbom. Przypadkowe przerwanie ciągłości tkanek miało związek z postrzeganiem pracy jako obciążonej wysokim stopniem narażenia (OR = 3,69, p = 0,0027), zatrudnieniem w ambulatoryjnych (w porównaniu ze stacjonarnymi) placówkach ochrony zdrowia (OR = 1,71, p = 0,0089), przekonaniem o niewystarczającym poziomie przekazywanych przez zakład pracy informacji na temat zakażeń krwiopochodnych oraz brakiem procedur i wiedzy dotyczących raportowania ekspozycji. **Wnioski:** Mimo prezentowania w różnych publikacjach wytycznych dotyczących postępowania poekspozycyjnego, szczególnie w placówkach nieświadczących usług całodobowych, procedury te są nieznanne bądź nieprzestrzegane. Powinien być kładziony większy nacisk na szkolenie pracowników, szczególnie w zakresie ryzyka transmisji zakażeń oraz korzyści płynących z przestrzegania procedur poekspozycyjnych i zgłaszania przypadków ekspozycji. Med. Pr. 2013;64(1):1–10

Słowa kluczowe: pracownicy ochrony zdrowia, urazy z ukłucia igłą, patogeny krwiopochodne, zgłoszenie ekspozycji

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Received: 2012, December 20, accepted: 2013, January 31

INTRODUCTION

In Poland, in 2011, there were in total 2562 occupational diseases (ODs) diagnosed. Infectious diseases were the second most frequent and they made up 25% of all ODs. Viral hepatitis was the second most often identified infectious illness acquired at work and as an occupational disease mostly registered among healthcare workers (HCWs) (1). This group of workers is at greater risk of exposure to blood and bloodborne pathogens, including hepatitis B and C viruses and HIV. According to the CDC (Centers for Disease Control and Prevention), there are around 385 000 needlesticks and other sharps-related injuries each year sustained by the United States hospital-based healthcare workers (2). It is known that occupational exposure to blood and body fluids increases the risk of infection with bloodborne pathogens. Introduction of vaccination against hepatitis B (in Poland obligatory for HCWs since early 1990s) has significantly reduced the incidences of occupationally acquired hepatitis B virus infections. It is worth mentioning that working in healthcare settings was associated with increased risk of death from HIV, HBV among males, and death from HCV among both males and females (3).

Risk of occupational bloodborne pathogen infections can be reduced by decreasing the risk of exposure, therefore primary prevention should be focused on this matter. This can be achieved by educational programs, standardized post-exposure procedures, evaluation of work environment, better sharps disposal systems, personal protective equipment, introduction of safety-engineered sharp devices, rationalization/avoidance of unnecessary procedures, appropriate employees workload with adequate staff-patient ratios, counseling and follow-up visits for HCWs who sustained occupational exposure (4,5). It is known that insufficient knowledge of bloodborne pathogens, ways of transmission, methods of prevention and lack of or neglecting post-exposure procedures increase the risk of infection. In Poland there are no uniform and standardized education programs, ways of gathering information on exposures and post-exposure procedures concerning bloodborne infections. The aims of this study were to assess employee's perception of methods promoting work safety in healthcare settings, frequency of sustained exposures and reporting them, if an appropriate reporting system of occupational exposures to bloodborne pathogens was present at the respondents' workplace.

MATERIAL AND METHODS

This study was conducted between 2009 and 2010. Using a table of random numbers we selected 10 healthcare settings in the Łódź Voivodeship in Poland. These were selected from a list obtained from the Łódź Voivodeship Health Department and asked for a consent to conduct a survey. Five of them that responded were included into this study. There were in total 1878 workers employed in these healthcare settings, of whom a group of 600 workers was randomly selected by using a table of random numbers. 520 of them agreed to take part in a study (87%). To enlarge the study group, we decided to conduct this survey also among healthcare workers during 5 conferences on work safety organized at this time by Polish Nurses Association. All of them (980 persons) were asked to fill out a questionnaire and we managed to get it back from 636 individuals (65%). Due to incomplete data, 18 questionnaires were rejected. Finally, a total of 1138 individuals' answers were analyzed.

All participants completed a questionnaire designed by the authors, it was partly based on questions presented in a Survey of Healthcare Personnel on Occupational Exposure to Blood and Body Fluids developed by the CDC and described in Sharps Injury Prevention Workbook (6). Among 50 workers (that we included in the final study population) a pilot study was conducted. Comments obtained from this group gave the ground for the revision of some questions. The questionnaire included questions on: job category (nurses, surgical medical staff, ward attendants, non-surgical medical staff, dental personnel (dentists and dental assistants), laboratory staff, place of work (hospital, out-patient clinic) and job seniority. Respondents were asked about their opinion whether employees' safety is the top priority in their workplace, their working place encourages to report all abnormalities related to employees' safety, the problems with employees' safety are solved relatively quick after the information about the risk is transferred to management, sharps containers are available wherever and whenever needed, education concerning safety at work is a part of trainings and meetings, their organization provides devices and help to prevent needlestick injuries and whether they are not afraid of being criticized nor reprimanded in the case of submitting incidental needlestick injuries or cuts. There were 5 possible answers, from total neglecting to full agreement with each statement. Afterwards, answers were converted to continuous variable (score scale of evaluation of actions

reducing the risk of occupational exposure), according to the following scheme:

- I totally disagree – grade: 1.
- I rather disagree – grade: 2.
- I have no opinion – grade: 3.
- I rather agree – grade: 4.
- I totally agree – grade: 5.

The minimum score possible to achieve was 7 (when declaring a total disagreement with all 7 statements) and maximum – 35 (when declaring full agreement with all 7 statements).

The questionnaire also enclosed questions about self-opinion on the risk of bloodborne infections at work (high, medium and low) and whether the level of information about bloodborne infections conveyed at work was sufficient. Furthermore, we asked about frequency of sustained exposures, existence of post-exposure reporting system of such incidents in respondents' workplaces (answers: yes, no, I don't know), whether they had knowledge about the ways of reporting them (answers: I know or don't know). Whenever a term of exposure is used, we mean breaking skin continuity by needlestick injuries or cuts. Sustaining accidental occupational percutaneous exposure during last 12 months prior to this study was analyzed with special attention. Those who declared being exposed were asked to give a number of exposures, information on whether it was reported. In case of not reporting, we asked about the reasons for not doing it. Individuals that declared and didn't declare an occupational exposure in the last 12 months were compared in respect of age, job seniority, occupation, place of work, self-opinion on the risk of bloodborne infections at work, level of information about bloodborne infections conveyed at work, existence of exposure reporting system in their workplaces, knowledge of ways of reporting and self-opinion on hygiene and safety in their workplaces (according to the point scale of evaluation of actions reducing the risk of occupational exposure (min: 7, max: 35)).

Continuous variables were expressed as mean values \pm standard deviations (SD) while the nominal variables as numbers and percentages. Associations between dependent variable and group of independent variables were assessed in logistic regression analysis. The odds ratios describing the strength of association between discrete variable and nominal or categorized independent variables were estimated in univariate model. All statistical analyses were performed using Statistica 8.0. $P < 0.05$ was used as a definition of statistical significance.

RESULTS

The study group comprised 827 (72.7%) nurses, 78 (6.8%) surgical medical staff, 53 (4.6%) ward attendants, 66 (5.8%) non-surgical medical staff, 57 (5%) dental personnel, 25 (2.2%) laboratory staff and 32 (2.8%) other HCWs. The subjects were employed: 951 (83.6%) in hospitals (including 57 subjects working in admission rooms), 133 (11.7%) in out-patient departments, 54 (4.7%) in other places. The mean age of the subjects was 46.4 ± 8.7 years (min. 22, max. 75), while the mean job seniority in health care was 21 ± 9.4 years (min. 2 months; max. 45 years). The HCWs' opinions concerning safety and hygiene at work are presented in Table 1.

Among 951 hospital workers, 786 (82.6%) confirmed the existence of post-exposure reporting system; whereas among 133 out-patient clinics workers only 69 individuals (51.8%) confirmed the existence of such a procedure. The conviction that the level of information delivered by workplace management about bloodborne infections had been sufficient was found in 693 subjects (60.9%), insufficient – in 289 (25.4%) and 156 (13.7%) could not give an opinion. In respect to the place of employment, among hospital workers the level of information was described as sufficient by 61.4% (584 workers), as insufficient – by 25.8% (245 workers) and 12.8% (122 workers) could not give an opinion. In out-patient clinics, the percentage was 58.6% (78 workers), 26.3% (35 workers), and 15% (20 workers) respectively.

Experiencing at least one needlestick exposure incident during total work activity was declared by 420 workers (36.9%). With regards to incidents sustained during 12 months preceding the interview, this number lowered to 242 subjects. Of these, only 146 (60.3%) reported a exposure to appropriate services. The mean number of incidents per worker varied from 1 to 30 exposures (Table 2).

Experiencing an occupational exposure was less common in a group with job seniority between 11–20 and 21–30 years (OR = 0.65, $p = 0.0476$ and OR = 0.64, $p = 0.0396$). More cases of exposure were observed in the subjects with perception of one's high risk of exposure (OR = 3.69, $p = 0.0027$), employed in out-patient healthcare setting (OR = 1.71, $p = 0.0089$) and with the conviction that the level of information about bloodborne infections conveyed at work was insufficient (OR = 1.99, $p < 0.0001$). Lack of exposure reporting system and lack of knowledge about the ways of reporting were also significant predictors of needlestick exposure incidents (OR = 2.19, $p = 0.0032$ and OR = 1.64,

Table 1. The HCWs' opinions concerning safety and hygiene at work
Tabela 1. Opinie personelu medycznego na temat zagadnień dotyczących bezpieczeństwa i higieny pracy

Statement on safety and hygiene at work Zagadnienie dotyczące bezpieczeństwa i higieny pracy	Respondents Badani (N = 1138) [n (%)]				
	I totally disagree całkowicie się nie zgadzam	I rather disagree raczej się nie zgadzam	I have no opinion nie mam zdania	I rather agree raczej się zgadzam	I totally agree całkowicie się zgadzam
Employees' safety is the top priority in my workplace / / Bezpieczeństwo pracowników jest jednym z podstawowych priorytetów w moim miejscu pracy	64 (5.6)	137 (12.0)	74 (6.5)	341 (30.0)	522 (45.9)
Working place encourages to report all abnormalities related to employees' safety / / Zakład pracy zachęca do raportowania wszelkich zaobserwowanych nieprawidłowości związanych z bezpieczeństwem	43 (3.8)	116 (10.2)	134 (11.8)	386 (33.9)	459 (40.3)
Problems with employees' safety are solved relatively quickly after the information about the risk is transferred to management / / Problemy związane z zagrożeniami i przekazywane kierownictwu są rozwiązywane stosunkowo szybko	49 (4.3)	131 (11.5)	132 (11.6)	424 (37.3)	402 (35.3)
Sharps containers are available where and when I need them to dispose of needles and other sharp devices / / Pojemniki na zużyte igły czy inne ostre narzędzia są dostępne w każdym miejscu i chwili	24 (2.1)	43 (3.8)	24 (2.1)	221 (19.4)	826 (72.6)
Education concerning safety at work is a part of trainings and meetings / / Edukacja dotycząca bezpieczeństwa w miejscu pracy jest częścią różnych szkoleń i spotkań	51 (4.5)	113 (9.9)	78 (6.9)	420 (36.9)	476 (41.8)
Working place provides devices and help to prevent needlestick injuries / / Zakład pracy dostarcza wszelkich możliwych narzędzi i pomocy, mających na celu zapobieganie urazom związanych z przerwaniem ciągłości tkanek	44 (3.9)	118 (10.4)	84 (7.4)	418 (36.7)	474 (41.7)
I am not afraid of being criticized nor reprimanded in the case of submitting incidental needlestick injuries or cuts / / Nie czuję obaw przed byciem skrytykowanym/ą bądź upomnianym/ą w przypadku zgłoszenia przypadkowego zakłucia czy skaleczenia	39 (3.4)	77 (6.8)	97 (8.5)	320 (28.1)	605 (53.2)

Table 2. Prevalence of needlestick exposure incidents sustained in the last 12 months in a group of healthcare workers
Tabela 2. Częstość ekspozycji zawodowej w ciągu ostatnich 12 miesięcy poprzedzających badanie w grupie pracowników medycznych

Frequency of exposures per worker Częstość ekspozycji przypadająca na pracownika	Respondents Badani (N = 1138) [n (%)]
Exposure / Ekspozycja [n]	
total / w sumie	242 (21.3)
1	117 (10.3)
2	60 (5.3)
3	24 (2.1)
≥ 4	41 (3.6)
No exposures / Brak ekspozycji	896 (78.7)

$p = 0.0024$ respectively). There was no significant difference depending on occupation. Better valuation of actions reducing the risk of occupational exposure at one's workplace lowered the number of workers who sustained needlestick injuries (OR = 0.95, $p < 0.0001$). Detailed results are shown in Table 3.

Among 242 workers who sustained needlestick exposure incidents in the last 12 months, a similar comparison was made in regard to the individuals that declared and did not declare reporting an exposure to appropriate services. Results were shown in Table 4.

Our data revealed that not reporting occupational exposures sustained in the last 12 months was more common in dental auxiliary staff (OR = 10.5, $p = 0.0311$) and in those employed in out-patient clinics, when compared to hospital-based workers (OR = 2.32,

Table 3. Association between independent variables and dependent variable: exposure vs. lack of exposure in the last 12 months in a group of workers

Tabela 3. Związek między grupą zmiennych niezależnych a zmienną zależną: ekspozycja vs brak ekspozycji zawodowej w ciągu ostatnich 12 miesięcy w grupie pracowników

Independent variables Zmienne niezależne	Respondents Badani (N = 1138)			
	OR*	-95% CI	95% CI	p
Job seniority [years] / Staż pracy [w latach]				0.1763
≤ 10	ref	-	-	-
11–20	0.65	0.42	1.00	0.0476
21–30	0.64	0.42	0.98	0.0396
> 30	0.67	0.40	1.12	0.1256
Occupation / Zawód				0.0614
nurse / pielęgniarka	ref	-	-	-
dentist / dentysta	0.73	0.32	1.67	0.4505
non-surgical medical staff / niezabiegowy personel medyczny	0.47	0.22	1.01	0.0519
laboratory staff / laborant/ka	0.30	0.07	1.27	0.1023
surgical medical staff / zabiegowy personel medyczny	1.26	0.75	2.13	0.3878
technician / technik	0.18	0.02	1.35	0.0959
ward attendant / salowa	0.52	0.23	1.17	0.1152
life saver / ratownik	0.98	0.20	4.75	0.9778
student / student	0.00	0.00	-	0.9993
dental assistant / personel stomatologiczny	2.40	0.90	6.38	0.0804
Risk perception of HBV and HCV infection / Postrzeganie ryzyka zakażenia wirusem HBV i HCV				0.0001
low / niskie	ref	-	-	-
medium / średnie	2.05	0.85	4.95	0.1107
high / wysokie	3.69	1.57	8.67	0.0027
Place of work / Miejsce pracy				0.0018
hospital / szpital	ref	-	-	-
out-patient clinic / przychodnia	1.71	1.14	2.54	0.0089
other / inne	0.31	0.11	0.86	0.0244
Level of information about bloodborne infections conveyed at work / / Przekazywany poziom informacji w pracy na temat zakażeń krwiopochodnych				0.0001
sufficient / wystarczający	ref	-	-	-
insufficient / niewystarczający	1.99	1.44	2.74	< 0.0001
no opinion / brak zdania	1.48	0.98	2.26	0.0640
Existence of exposure reporting system / Istnienie rejestru ekspozycji zawodowych				0.0071
yes / tak	ref	-	-	-
no / nie	2.19	1.30	3.69	0.0032
I don't know / nie wiem	1.34	0.91	1.96	0.1345
How to report an exposure: I don't know vs. I know / Wiedza na temat raportowania ekspozycji: nie wiem vs wiem	1.64	1.19	2.25	0.0024
Actions reducing the risk of occupational exposure** / Działania redukujące ryzyko narażenia zawodowego – zmienna ciągła**	0.95	0.93	0.97	< 0.0001

HBV – hepatitis B virus / wirus zapalenia wątroby typu B; HCV – hepatitis C virus / wirus zapalenia wątroby typu C.

OR – odds ratio / iloraz szans; CI – confidence interval / przedział ufności.

* Dependent variable: occupational exposure in the last 12 months / Zmienna zależna: ekspozycja zawodowa w ciągu ostatnich 12 miesięcy.

** Point scale of evaluation of actions reducing the risk of occupational exposure (min: 7, max: 35) / Skala punktowa oceny działań redukujących ryzyko narażenia zawodowego (min. 7, maks. 35).

ref – reference category / referencyjna kategoria zmiennej skategoryzowanej.

Table 4. Association between independent variables and dependent variable: not reporting vs. reporting an exposure sustained in the last 12 months in a group of workers

Tabela 4. Związek między grupą zmiennych niezależnych a zmienną zależną: niezgłoszenie ekspozycji vs zgłoszenie ekspozycji zawodowej w grupie pracowników w ciągu ostatnich 12 miesięcy

Independent variables Zmienne niezależne	Respondents Badani (N = 242)			
	OR*	-95% CI	95% CI	p
Job seniority [years] / Staż pracy [w latach]				0.4499
≤ 10	ref	-	-	-
11-20	0.89	0.41	1.94	0.7728
21-30	1.46	0.69	3.07	0.3202
> 30	1.29	0.51	3.25	0.5897
Occupation/ Zawód				0.4461
nurse / pielęgniarka	ref	-	-	-
dentist / dentysta	4.38	0.83	23.16	0.0826
non-surgical medical staff / niezabiegowy personel medyczny	1.05	0.24	4.53	0.9479
laboratory staff / laborant/ka	-	-	-	0.9994
surgical medical staff / zabiegowy personel medyczny	1.08	0.43	2.73	0.8759
technician / technik	-	-	-	0.9996
ward attendant / salowa	0.70	0.13	3.71	0.6749
life saver / ratownik	1.75	0.11	28.43	0.6940
student / student	-	-	-	0.9993
dental assistant / personel stomatologiczny	10.50	1.24	89.05	0.0311
Risk perception of HBV and HCV infection / Postrzeganie ryzyka zakażenia wirusem HBV i HCV				0.8544
low / niskie	ref	-	-	-
medium / średnie	1.47	0.25	8.67	0.6701
high / wysokie	1.28	0.23	7.16	0.7805
Place of work / Miejsce pracy				0.0225
hospital / szpital	ref	-	-	-
out-patient clinic / przychodnia	2.32	1.17	4.59	0.0157
other / inne	5.44	0.56	53.31	0.1456
Level of information about bloodborne infections conveyed at work / / Przekazywany poziom informacji w pracy na temat zakażeń krwiopochodnych				0.1270
sufficient / wystarczający	ref	-	-	-
insufficient / niewystarczający	1.62	0.91	2.86	0.0995
no opinion / brak zdania	1.89	0.90	4.00	0.0941
Existence of exposure reporting system / Istnienie rejestru ekspozycji zawodowych				< 0.0001
yes / tak	ref	-	-	-
no / nie	8.51	3.02	23.99	0.0001
I don't know / nie wiem	2.58	1.31	5.08	0.0063
How to report an exposure: I don't know vs. I know / Wiedza na temat raportowania ekspozycji: nie wiem vs wiem	4.43	2.47	7.93	< 0.0001
Number of exposure incidents in the last 12 months / Liczba ekspozycji zawodowych w ostatnich 12 miesiącach	1.15	1.02	1.31	0.0268
Actions reducing the risk of occupational exposure** / Działania redukujące ryzyko narażenia zawodowego – zmienna ciągła**	0.95	0.91	0.99	0.0083

*. ** Abbreviations as in Table 3 / Objasnienia jak w tabeli 3.

$p = 0.0157$). Naturally, lack of exposure reporting system and lack of knowledge about the ways of reporting was associated with underreporting ($OR = 8.51$, $p = 0.0001$ and $OR = 4.43$, $p < 0.0001$ respectively). Lower valuation of actions reducing the risk of occupational exposure at one's workplace and a higher number of exposures were also significant predictors for not reporting ($OR = 0.95$, $p = 0.0083$ and $OR = 1.15$, $p = 0.0268$ respectively). Underreporting was independent of job seniority, perception of one's risk of exposure and the level of information about bloodborne infections conveyed at work. Those individuals who didn't report an accidental occupational percutaneous exposure were asked to give reasons for not doing it. The most frequent reason for not reporting accidental exposure was lack of time (28.1% of cases). All the answers are shown in Table 5.

gens, data on frequency of exposures, reporting them and self-perception of work safety in healthcare settings is not well established in Poland. This is due to the lack of a national reporting system of these incidents and not standardized (uniform) safety trainings. Meanwhile, the knowledge on frequency and number of exposures to blood and body fluids seems to be crucial during the process of implementing Directive 2010/32/UE. It states that Poland (like other EU countries) shall bring into force the laws, regulations and administrative provisions necessary to comply with the Framework Agreement on prevention from sharp injuries in the hospital and healthcare sector concluded by HOSPEEM (European Hospital and Healthcare Employers' Association) and EPSU (European Public Services Union) by 11 May 2013 (8,9). This gave a reason to conduct this survey.

Table 5. The reasons for not reporting accidental occupational percutaneous exposure, data from questionnaire
Tabela 5. Powody niezgłoszenia przypadkowego przerwania ciągłości tkanek – dane kwestionariuszowe

Reason Powód	Respondents Badani (N = 96) [n (%)]
I had no time to report / Nie znalazłem/am czasu na dokonanie zgłoszenia	27 (28.1)
I thought the type of exposure was low risk for HIV and/or HBV or HCV / Wydawało mi się, że rodzaj ekspozycji, której doznałem/am, był obarczony niskim ryzykiem transmisji wirusa HIV, HBV czy HCV	21 (21.9)
I thought the source patient was low risk for HIV and/or HBV or HCV / Wydawało mi się, że ryzyko nosicielstwa wirusów HIV, HBV czy HCV u „pacjenta-źródła” było niskie	18 (18.7)
I was afraid of being blamed or getting in trouble for having the exposure / Obawiałem/am się, że zgłoszenie ekspozycji będzie źle postrzegane	14 (14.6)
I didn't know the reporting procedure / Nie znalazłem/am procedury postępowania w takim przypadku	13 (13.6)
I didn't think it was important to report / Nie miałem/am świadomości, że raportowanie ekspozycji jest ważne	4 (4.2)
I was concerned about the confidentiality of the results of HBV and HCV tests / Miałem/am wątpliwości co do zapewnień o nieujawnieniu wyników moich badań HBV i HCV osobom trzecim	2 (2.1)
Other / Inne	3 (3.1)

HIV – human immunodeficiency virus / ludzki wirus niedoboru odporności.
Other abbreviations as in Table 3 / Objaśnienia innych skrótów jak w tabeli 3.

DISCUSSION

In Poland, in the recent years, there have been yearly around 30–45 occupational cases of hepatitis B and between 99–119 of occupational hepatitis C recognized, while there was only one case of HIV transmission so far, recognized as an occupational disease (in the year 2007) (7). As employment in healthcare is known to constitute a risk of exposure to bloodborne patho-

The questionnaire was anonymous what aimed to encourage respondents to give frank answers. The inclusion of HCWs that participated in the above mentioned conferences into this study had no influence on its aims, as we didn't mean to analyse results in selected healthcare settings but wanted to get a general picture of healthcare work safety in Poland.

Our study showed that only 242 (21.3%) of respondents have experienced an accidental occupational percutane-

ous exposure (once or more) during last 12 months. The rate of occupational exposures in HCWs varies in different studies. For instance, McCarthy et al. showed that occupational exposure in the past year prior to the study was reported by 67% of respondents (in 4107 Canadian dentists). In a study conducted among surgeons in sub-Saharan Africa, 91% declared 1 or more percutaneous injuries (10,11). Among Polish nurses it was revealed that almost half of respondents had at least 1 puncture exposure during the last year before the survey (12). We think that low frequency of needlestick injuries revealed in our study doesn't reflect true situation. The reason for that could be the fear of being considered as a careless worker, although the questionnaire was anonymous. We also revealed a low rate of formal notification of exposure (60.3%). Although it's still higher than the one showed in a study conducted in Iowa (US) medical organization (34%), in correctional healthcare facilities (49%) and in a study conducted by Makary et al. in surgeons in training (49%) (13–15). Underreporting was also described in other Polish studies, and revealed that the rate of formal reporting of an exposure was between 14–26% only (12,16).

Less frequent exposure incidents observed in a group with employment period between 11–20 and 21–30 years could be explained by better skills and work experience. Such relationship was also described in other studies. Wicker et al. demonstrated that German dentistry students experienced twice as many injuries dentists with at least 10 years job seniority (17). In Italian and British studies prevalence of these incidents was found to be higher in residents than in experienced personnel (18,19). Surprisingly our study revealed that percutaneous exposures were more frequent in out-patient clinics than in hospital-based settings. We think that it could be caused by a generally lower level of employees' education and training in out-patient clinics in respect of ways of bloodborne infection prevention and by frequent lack of post-exposure procedures. Similar findings were described in Scotland, where lack of education programs was declared by 52% of respondents employed in ambulatory services (20). We didn't find any relationship between occupation and the risk of exposure, although there were several studies indicating nurses as being the most vulnerable (21–24).

We revealed a low number of official reporting exposure incidents (60.3%), although it is still higher than other Polish studies showed, where it has been estimated that approximately 75–85% of blood exposures were unreported (12,16,25). According to the world literature underreporting concerns about 50% of cases,

although it's possible to gain reporting rate at the level of 85% (26–29). It's alarming that not reporting was associated with the individuals' frequency of exposures. This gives evidence for neglecting the problem and for a false approach that these incidents are something common and naturally assigned to the performed occupation. Similar findings were described in Great Britain, where underreporting was the most common in the highest risk group (30). We observed a difference in being aware of the existence of post-exposure reporting system between hospital-based and out-patient clinics' HCWs. Its more frequent occurrence in hospitals is probably associated with obligatory existing of an infection control team in these healthcare settings in Poland. Small ambulatory services, especially not providing 24 hours service do not have such a team, therefore it is quite often that there is no one to engage in establishing post-exposure procedures. The same reason could be for differences between hospital-based and out-patient clinics' employees in the frequency of reporting exposures (higher rate in hospitals).

As it was mentioned above, lack of time was the most common reason for not reporting accidental exposure. The second one was a self-impression that the type of exposure was low risk for HIV and/or hepatitis B or C, what was pointed as a main reason in another Polish study (16). The reason of being concerned about confidentiality of the results of HBV and HCV tests, although very rare, in our opinion should have never appeared. The conviction of total confidentiality of laboratory tests is one of the priorities in medicine, although sometimes it could be very difficult to keep the results in secret, in the case of the introduction of medications' administration being necessary. It must be remembered that infected professional is also a patient and revealing his/her sero-status to others may be out of control in further spread of this information.

Another result worth mentioning is the rate of 10% of respondents who indicated that they could be afraid of being criticized or reprimanded in case of submitting incidental needlestick injuries or cuts. A similar finding was also observed in those who experienced a percutaneous injury and have not reported it (14.6% were afraid of being blamed or getting in trouble for having the exposure). Employees should always be supported and encouraged to report these incidents and none of them can have any objections or fears. They should be assured that this kind of exposure is associated with their job and reporting is crucial for their health and serves improving of the work safety.

In conclusion our results show the importance of putting more emphasis on education, especially in regard to the risk of getting an infection and on advantages of post-exposure prophylaxis and reporting. Introducing standards of recognizing hepatitis B or C as an occupational disease in respect of only officially notified incidents of exposure could also be considered. Maybe, being aware that official reporting is one of the important factors in decision making whether acquired HBV or HCV infection is an occupational or not-occupational disease would improve it.

Despite different established proposals of the post-exposure procedures, it turns out that particularly in small, not providing 24 hour service healthcare settings, these procedures are not known or are not followed up. Therefore national unified standards should be introduced with adequate control measures.

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