

Nurses' knowledge about infection prevention and management after exposure to potentially infectious material

Stan wiedzy pielęgniarek na temat profilaktyki zakażeń krwio pochodnych oraz postępowania po ekspozycji na potencjalnie zakaźny materiał biologiczny

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Abstract

Background. Nurses are a professional group particularly exposed to contact with potentially infectious biological material while performing routine medical activities.

Objectives. Assessment of nurses' knowledge on the prevention of infections, rules of conduct after exposure to potentially infectious material and their application in everyday professional practice.

Material and methods. The survey was conducted in a group of 100 professionally active nurses in Silesian and Lesser Poland voivodeships (provinces). The research used an original, anonymous survey consisting of 23 questions.

Results. As many as 95% of respondents believed that they know how to report an accidental exposure to blood-borne material; however, only 56% of nurses indicated that in case of exposure, it is necessary to notify the supervisor. Every 3rd of the nurses surveyed had contact with contaminated biological material and did not report the situation to the relevant supervisor. The most commonly declared cause (44.4%) was the conviction of low risk of hepatitis B and C viruses or human immunodeficiency virus (HIV) infection in the patient. Up to 86% of respondents knew the proper code of conduct in case of contact of potentially infectious material with their mucosae or conjunctivae. An equally large group of respondents (89%) correctly indicated actions that should be performed when potentially infectious material gets into their mouth or nose, while only 42% of respondents knew the rules of proper conduct after an injury with a sharp medical tool.

Conclusions. The nurses have insufficient knowledge on blood-borne infections, their prevention and rules of conduct after exposure. There is an urgent need to implement regular theoretical and practical training for nurses.

Key words: knowledge, nurse, infection, exposure

Streszczenie

Wprowadzenie. Pielęgniarki to grupa zawodowa szczególnie narażona na kontakt z potencjalnie zakaźnym materiałem biologicznym podczas wykonywania rutynowych czynności medycznych.

Cel pracy. Ocena stanu wiedzy pielęgniarek na temat profilaktyki zakażeń i postępowania po ekspozycji na materiał zakaźny oraz wykorzystywania tej wiedzy w codziennej praktyce zawodowej.

Materiał i metody. Badanie przeprowadzono wśród 100 czynnych zawodowo pielęgniarek na terenie województw śląskiego i małopolskiego. W badaniu posłużono się autorską anonimową ankietą składającą się z 23 pytań.

Wyniki. Aż 95% badanych stwierdziło, że wie, jak raportować przypadkową ekspozycję na materiał krwio pochodny, jednakże zaledwie 56% odpowiedziało, że w przypadku ekspozycji w pierwszej kolejności należy powiadomić przełożonego. Co trzecia ankietowana pielęgniarka miała kontakt z zanieczyszczonym materiałem biologicznym i nie zgłosiła zaistniałej sytuacji odpowiednim organom. Najczęściej podawaną przyczyną (44,4%) nieskładania takiego raportu było wrażenie o niskim ryzyku nosicielstwa wirusowego zapalenia wątroby typu B i C lub wirusa ludzkiego niedoboru odporności. Aż 86% badanych znało prawidłowe postępowanie w przypadku kontaktu skażonego materiału ze słuzówkami lub spojówkami. Równie liczna grupa respondentek (89%) poprawnie wskazała na czynności, które należy wykonać, gdy jama ustna lub nos zostaną zanieczyszczone przez potencjalnie zakaźny materiał. Niepokojące jest natomiast, że zaledwie 42% badanych znało zasady prawidłowego postępowania w przypadku zranienia ostrym narzędziem medycznym.

Wnioski. Wiedza pielęgniarek na temat zakażeń krwio pochodnych, profilaktyki oraz postępowania po ekspozycji nie jest w pełni zadowalająca. Istnieje pilna potrzeba doksztalcania personelu medycznego w tym zakresie.

Słowa kluczowe: wiedza, pielęgniarka, zakażenie, ekspozycja

Introduction

Nurses are an occupational group particularly at risk of occupational diseases due to exposure to blood and other potentially infectious biological material during routine medical activities.^{1–3} The most frequent occupational exposure is related to infection with the hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). Studies show that 37.6% of HBV, 39% of HCV and 4.4% of HIV infections diagnosed among medical personnel worldwide are caused by a specific type of occupational exposure, namely needlestick injuries. This translates into about 65,000 HBV infections, 16,400 HCV infections and 1,000 HIV infections per year.⁴ In addition to these viruses, there is a risk of infection with more than 30 types of other blood-borne pathogens.^{1–2}

Most frequently, exposure to infectious material occurs during blood collection, at the time or immediately after drug administration with a needle or through a peripheral venous catheter, as well as during skin suturing. Apart from blood, the following fluids are considered to be potentially infectious: cerebrospinal, peritoneal, articular, pleural pericardial, and amniotic fluid. There is also a negligible risk of pathogen transmission during contact with fecal matter, urine, vomit, sputum, saliva, tears, perspiration, and nasal secretion. The likelihood of infection increases significantly when the aforementioned secretions contain traces of blood. Infection often occurs through contact of contagious material with damaged skin, even if it concerns microfractures caused by skin lesions due to latex allergy or excessively dry hands.^{5–7}

A properly implemented preventive measures can effectively counteract the occurrence of occupational exposures. When carrying out medical procedures that result in breaking the continuity of the skin, it is important to strictly follow the principles of aseptic and antiseptic.⁸

The aim of this work was to assess the nurses' knowledge on occupational exposure, prevention of infections and rules of conduct after exposure to potentially infectious material, as well as their application in everyday professional practice.

Material and methods

The survey involved 100 professionally active nurses from Silesia and Lesser Poland in 2015.

This study uses the diagnostic survey method. Under this method, the survey technique was used. An original questionnaire was applied as the research tool. The questionnaire was anonymous and participation in it was completely voluntary. It comprised 23 questions and was divided into 3 main parts. The 1st part concerned the prevention of occupational infections, the 2nd concentrated on knowledge of the management after direct exposure to potentially infectious biological material, whereas the 3rd part involved the general knowledge of blood-borne infections. The last 4 questions of the questionnaire were metric questions concerning age, gender, job seniority, and level of education. To achieve the assumed objectives of this article, the analysis of answers to individual questions was applied.

Results

Among the surveyed nurses, more than half (59%) had a bachelor's degree, 10% – a master's degree, while 31% of the surveyed population were certified nurses.

The most numerous group (45%) were people aged 36–40 years. The respondents with job seniority over 10 years constituted the highest percentage (56%).

Table 1 presents the nurses' answers to questions concerning blood-borne infections, infection prevention and management after exposure to infectious material. Figure 1 shows the nurses' answers to questions concerning the management after sharp injuries with a tool containing an infectious material.

The majority of nurses (78%) positively assessed their knowledge of exposure to infectious material and post-exposure management (14% of them marked the category "full" and 64% – "satisfactory"). As many as 96% of the respondents admitted that they were familiar with the rules of hygiene and safety at work in conditions of exposure to biological agents. Similarly, 95% of the respondents stated that they knew how to report accidental exposure to infectious material, but only 56% of them answered correctly that after exposure to infectious material the immediate supervisor should be notified first. Every 3rd respondent did not report any needlestick injury incident.

The most common (44.4%) reason for not reporting such an incident was the presumption of low risk of HBV/HCV/HIV carrier-state of the patient. The vast majority (86%) of the respondents knew the proper management rules after the contact of contaminated material with mucosae or conjunctivae. An equally large group of the respondents (89%) correctly indicated the steps required when the oral or nasal mucosae are contaminated by potentially infectious biological material. Only 42% of the respondents were well acquainted with the management rules after sharp injuries with a tool containing infectious material (Fig. 1). As many as 34% of the nurses surveyed admitted to replacing a guard on a used needle. In case of contact with a patient infected with HIV (45.7%) or HBV/HCV (48%), nearly half of the respondents did not implement additional precautions during medical procedures. The vast majority (76%) of the surveyed nurses correctly stated that there was a possibility of HBV/HCV other infection on than needlestick injury or injury with a contaminated medical device. Only 38% of the respondents are aware that 0.0004 mL of blood is sufficient for HBV infection. Only 31% of the respondents gave the right answer that HBV outside the human body could survive in dried blood up to 30 days. Only 44% of nurses correctly indicated that HCV infection is asymptomatic. As many as 15% of the respondents believe that there is a vaccine against HCV.

Table 1. The state of nurses' knowledge about blood-borne infections

Tabela 1. Stan wiedzy pielęgniarek na temat zakażeń krwiopochodnych

Questions	Answers	n	%
How do you assess your knowledge on the exposure to infectious material and post-exposure procedures?	full	14	14.0
	satisfactory	63	63.0
	selective	23	23.0
Have you become familiar with the regulations specifying the rules of hygiene and safety at work in conditions of exposure to biological agents, including viral hepatitis and HIV?	yes	96	96.0
	no	4	4.0
Have you ever been directly exposed to infectious material (injury with a contaminated needle or other medical device, contact of wounded skin with the patient's body fluids, etc.)?	yes	45	45.0
	no	55	55.0
Do you know how to report accidental exposure?	yes	95	95.0
	no	5	5.0
Who should be informed in the first instance about an accidental tissue rupture?	company doctor	5	5.0
	casualty department	17	17.0
	infection control team	5	5.0
	OHS inspector	1	1.0
	supervisor	56	56.0
	doctor on duty	15	15.0
	epidemiological nurse	1	1.0
Have you ever injured yourself with a needle or other medical instrument contaminated with blood-borne material and this situation has not been reported to the relevant authorities?	yes	36	36.0
	no	64	64.0

Table 1 cont. The state of nurses' knowledge about blood-borne infections**Tabela 1 cd.** Stan wiedzy pielęgniarek na temat zakażeń krwiopochodnych

Questions	Answers	n	%
If you have marked "yes" in the above question, please state the reason why you did not report it:	I did not know the procedure to follow in that case	1	2.7
	it seemed to me that the risk of carrying HBV/HCV/HIV by the patient-source was low	16	44.4
	I did not find time to report the exposure	6	16.7
	I had the impression that the type of exposure was associated with a low risk of infection	9	25.0
	not applicable, the incident has been reported	4	11.1
If contaminated material comes into contact with the mucosae or conjunctivae, it is necessary to:	rinse mucosae or conjunctivae once with water or 0.9% NaCl	86	86.0
	rinse mucosae or conjunctivae several times with water or 0.9% NaCl	14	14.0
When contaminated blood or other material gets into the oral cavity or nose, it is necessary to:	rinse mucosae or conjunctivae once with water or 0.9% NaCl	88	88.0
	rinse mucosae or conjunctivae several times with water or 0.9% NaCl	12	12.0
After using the needle, do you put its guard back on it?	yes	35	35.0
	no	65	65.0
Have you ever had contact with HIV-infected person?	yes	81	81.0
	no	19	19.0
If you have chosen the answer "yes": Did you use any additional personal protective equipment and implement special procedures for such a patient?	yes: special attention, gloves, gown, mask, glasses, hand disinfection	44	54.3
	I have not implemented any additional precautions	37	45.7
Have you ever had contact with HBV-/HCV-infected person?	yes	98	98.0
	no	2	2.0
If you have chosen the answer "yes": did you use any additional personal protective equipment and implement special procedures for such a patient? Name them.	yes: special attention, gloves, gown, mask, glasses, hand disinfection	51	52.0
	I have not implemented any additional precautions	47	48.0
Do you think that there is any other possibility of HBV/HCV/HIV infection than needlestick injury or injury with a contaminated medical device?	yes	76	76.0
	no	24	24.0
The smallest amount of blood that can cause HBV infection is:	0.1 mL	37	37.0
	0.01 mL	3	3.0
	0.001 mL	22	22.0
	0.0004 mL	38	38.0
The HBV vaccine protects:	against HBV/HCV/HDV infection	7	7.0
	against HBV/HDV infection	24	24.0
	only against HBV infection	65	65.0
	against all types of blood-borne viruses	4	4.0
Is there a vaccine against HCV?	yes	15	15.0
	no	78	78.0
	during clinical trials	7	7.0
In the case of HCV infection, usually there is:	asymptomatic infection	44	44.0
	benign hepatitis	10	10.0
	acute hepatitis	45	45.0
	hyperacute hepatitis	1	1.0
HBV can survive outside the human body in dried blood (on a needle or other medical instrument) and be a source of infection through:	7 days	59	59.0
	30 days	31	31.0
	365 days	6	6.0
	is unable to survive outside the human body at all	4	4.0
The highest probability of infection occurs after exposure to:	HBV	46	46.0
	HCV	32	32.0
	HIV	22	22.0

n – number of the analyzed characteristic in the sample.

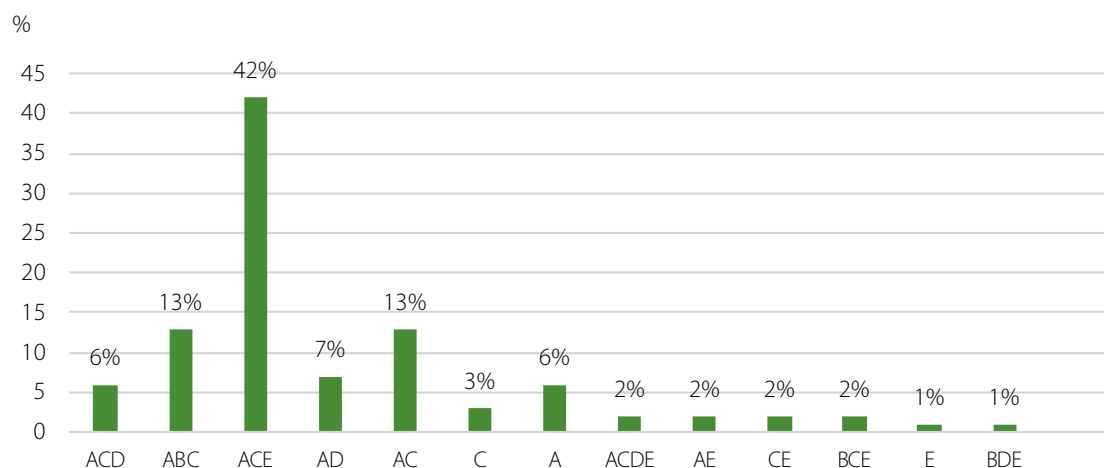


Fig. 1. Rules of conduct after injury with a sharp tool containing infectious material

Ryc. 1. Procedura postępowania po zranieniu ostrym narzędziem zawierającym materiał zakaźny

A – do not stop the bleeding; B – squeeze as much blood as possible from the wounded area; C – wash the skin with soap and water under running water; D – wash the wounded area first with an alcohol disinfectant; E – protect the wounded area with a waterproof dressing.

Discussion

Knowledge on occupational infections and management after exposure to potentially infectious biological material are the elements that significantly influence the health and safety of medical personnel. The studies indicate insufficient knowledge of the nursing personnel in the field of blood-borne infections, infection prevention and post-exposure management.

While the nurses themselves positively assess their knowledge of blood-borne infections, prevention and post-exposure management, the results obtained from the study conducted for the purpose of this work are contradictory to their beliefs. Only 57% of the respondents answered correctly that in case of exposure, the immediate supervisor should be notified first. Despite the positive subjective assessment of knowledge made by the respondents, as many as 33% of them did not report any such exposure at all. It is alarming that 44% of the respondents did not report such a report, based on the unjustified conviction of low risk of HBV/HCV/HIV carrier-state of the patient. Some of the nurses surveyed (16.6%) indicated the lack of time as the reason for not reporting exposure to potentially infectious material. Similar results were obtained by Gańczak et al. In their studies, almost 60% of the nurses indicated their belief that the patient posed no risk of infection as the reason for not reporting the exposures in the workplace.⁹ Another justification for health workers' failure to report exposures was, similarly to the own study, lack of time, as well as unawareness of the risk and obligation to report exposure to potentially infectious material.^{9–10}

It should also be noted, that the respondents are not familiar with the proper conduct after an injury with

a sharp medical tool containing potentially infectious material, such as blood. Only 42% of the respondents demonstrated adequate knowledge on how to manage of such an injury. Some of the respondents (16%) wrongly indicated that the correct procedure after injury or stabbing is to squeeze blood. This type of procedure is not recommended in such a case. Similar results were obtained by Bilski et al. In their survey, 24–32% of the nurses indicated that attempts to extrude blood are a specific management procedure after exposure to blood material.¹¹ However, in the survey conducted by Pasek et al., as many as 95.5% of the respondents did not know the order of proper management after exposure to blood or other potentially infectious material.¹²

In order to reduce the risk of blood-borne viral infection, an important aspect is to eliminate types of behavior conducive to the occurrence of exposure. Despite being aware of the high probability of needlestick injury, as many as 34% of the nurses surveyed put a plastic guard back on the used earlier injection needle. In the survey conducted by Rogowska-Szadkowska et al., as many as 64% of the respondents apply such procedure.¹³ This may be due to: insufficient access to secure containers for used sharp instruments, rush during medical procedures or inadequate education in this area. The application of similar types of practice is reprehensible. Such types of behavior should be eliminated from daily professional practice.

Despite being aware that the patient undergoing medical procedures is a carrier of HBV/HCV/HIV, the nurses often do not apply any additional measures to prevent exposure. The survey shows that in case of the contact with a HIV-infected patient, 46% of the respondents did

not implement any additional precautions, while during the contact with HBV-/HCV-infected patient, such a situation occurred in 48% of the respondents. In addition, general knowledge of HBV, HCV and HIV infections is not satisfactory either. The vast majority (77%) of the surveyed nurses correctly stated that there was a possibility of HBV/HCV infection other than needlestick injury or injury with a contaminated medical device. Only 38% of the respondents are aware that 0.0004 mL of blood is sufficient for HBV infection. Only 31% of the respondents gave the right answer that HBV could survive outside the human body in dried blood up to 30 days. Furthermore, only 44% of the respondents are aware that HCV infection is asymptomatic. It is alarming that despite the serious health effects resulting from HCV and HIV infection, nurses are not characterized with increased caution when carrying out medical activities in patients with diagnosed infections. Almost half of the nurses are not aware that the initial stage of HCV infection is usually asymptomatic, which can generally result in a late diagnosis of ongoing hepatitis C.

This survey shows that despite a number of interesting conclusions drawn so far, it should be extended. The size of the surveyed population was relatively small; therefore, the results obtained cannot be directly translated into the whole population of nurses. It is advisable to conduct further research on a much larger group of respondents. It should be emphasized, however, that this survey raises an important problem of insufficient nurses' knowledge of blood-borne infections and the management after exposure to potentially infectious biological material. Despite numerous scientific studies and training courses, the problem of occupational infections among medical personnel remains unresolved. Constant awareness-raising of the risk of direct contact with potentially infectious biological material and the skillful application of the knowledge gained during medical procedures is an extremely significant factor. In order to reduce the risk of blood-borne viral infection, it is advisable to eliminate types of behavior conducive to the occurrence of exposure. It is reasonable to conduct systematic training courses among medical personnel regarding post-exposure prevention, which, if properly performed, significantly reduces the risk of infection after exposure to infectious material.

Conclusions

The study indicates insufficient knowledge of the nursing personnel in the field of blood-borne infections, prevention and post-exposure management, as well as blood-borne viruses. There is an urgent need to develop and implement interdisciplinary, obligatory trainings on the principles of post-exposure management and the risks arising from failure to follow medical procedures in accordance with the applicable rules. Increased aware-

ness of the risks arising from occupational infections can significantly contribute to minimizing the frequency of exposure to blood-borne material, as well as enhancing safety during invasive medical procedures.

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