

KNOWLEDGE AND ATTITUDES REGARDING THE PROTOCOL AFTER ACCIDENTAL EXPOSURE TO BLOOD-BORNE INFECTIONS AMONG DENTAL NURSES IN IASI

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Abstract: Post-accidental exposure refers to injuries caused by stabbing and cutting with sharp objects, as well as skin and mucosal exposure to blood and contaminating fluids. The aim of this study to assess the level of knowledge and attitudes of dental nurses regarding prophylaxis after accidental exposure to blood-borne infections. **Material and methods:** A cross-sectional study was carried out on a group of dental nurses working in dental offices in the city of Iași. The subjects completed a questionnaire that includes questions about skin lesions that can occur accidentally during dental procedures, the causes and means by which the accident occurred, questions that evaluate the level of knowledge regarding the post-accidental exposure protocol to blood-borne infections, assesses knowledge regarding immunization. Data were analysed with SPSS version 20.0 software (SPSS, Chicago, IL, USA). **Results:** The study group was formed of 26 dental nurses from Iași. 42.3% fell into the 20-30 age group, 30.8% - 31-40-year-old group, 23.1% - 41-50 year old group and 3.8% in the "over 50" age group. 82% from the urban area. 85% of the participants know what a skin lesion is, 38.1% suffered stabbing or cutting accidents, most frequent accidents occurred during the use of the syringe needle (65.4%). 84.6% of nurses admit that both HIV, hepatitis B and hepatitis C are transmitted through blood. Only 50% of the nurses are vaccinated against the hepatitis B virus. 80.8% of the nurses knows compliance with Universal Precautions, is mandatory for all medical personnel and applies to all patients. **Conclusions:** Nurses who work in dental surgeries and have more than 6 years of experience have a level of knowledge and attitudes regarding both the prevention of stabbing/cutting accidents and post-exposure prophylaxis measures to blood-borne infections. Although the level of knowledge is good, the applicability of measures to prevent accidents and post-exposure prophylaxis leaves something to be desired.

Introduction

Post-accidental exposure is a very broad term that includes injuries caused by stabbing and cutting with sharp objects, as well as skin and mucosal exposures to blood and contaminating fluids. Professionally, PPE is the most common route of transmission of blood-borne infections from patients to dentists and dental staff(1).

During dental procedures, saliva is known to become contaminated with blood. Even if there is a small risk of transmission, the dentist and ancillary staff must be cautious about any occupational exposure to oral fluids regardless of their quantity.

The risk of transmission is influenced by the type and number of microorganisms present in the blood but also by the method of contamination (2).

Efforts to prevent accidental exposure to blood-borne infection have led to an increase in the number of initiatives to ensure safe working conditions within the healthcare system. The CDC's 2010 Human Health and Safety Goals and Objectives for Health call for the elimination or prevention of needlestick injuries (3) among health care professionals.

The risk of transmission of blood-borne infections both by preventing these accidents through a correct operative

conduct and by the correct management of accidents that may occur during operations can be influenced by improving the level of knowledge and attitudes related to the prevention of stabbing accidents among medical staff. Continuous education of medical personnel is an effective way to reduce the risk of injury by cutting or stabbing with sharp/cutting instruments. This study was designed to assess the level of knowledge and attitudes of dental nurses regarding prophylaxis after accidental exposure to blood-borne infections.

Material and methods

A cross-sectional study was carried out on a group of dental nurses working in dental offices in the city of Iași. The subjects were fully informed about the purpose of this study and after written consent was obtained, they completed a questionnaire that includes questions about skin lesions that can occur accidentally during dental procedures, the causes and means by which the accident occurred, evaluate the level of knowledge regarding the post-accidental exposure protocol to blood-borne infections, assesses knowledge regarding immunization (Q1. Do you know what a percutaneous injury is?;Q2. Have you suffered injuries during your dental studies or practice?;Q3. Have you reported these accidents?;Q4. Do you know

if the patient had an infectious disease?;Q5. What diseases can be transmitted through blood?;Q6. What is the transmission rate of HBV?;Q7. Are you vaccinated against hepatitis B?;Q8. PPE involves the use of the following type of medicine...;Q9. Post-accident prophylactic treatment must begin...;Q10. Do you follow universal precautions when treating all patients?).

The collected data was checked for completeness and consistency. Coded data were entered and evaluated using SPSS version 20.0 software (SPSS, Chicago, IL, USA). Descriptive statistics were performed using frequencies and proportions. A p-value of 0.05 or less was used as the cut-off level for statistical significance.

Result

The study group was made up of 26 dental nurses who work in offices within the radius of the city of Iași. The participants were divided into age groups as follows: 42.3% fell into the 20-30 age group, 30.8% into the 31-40 year old group, 23.1% into the 41-50 year old group and 3.8% in the "over 50" age group. All subjects were female, 82% of them coming from the urban environment (Table 1).

Table 1. Demographic characteristic

	Variables	No	%
Age	20-30 years	11,0	42.3
	31-40 years	8	30.8
	41-50 years	6	23.1
	> 50 years	1	3.8
Gender	Female	26	100
	Male	0	0
Residence	Urban	21	80.8
	Rural	5	19.2
Speciality	general dentistry	9	34.6
	surgery	8	30.8
	pedodontics	4	15.4
	orthodontics	5	19.2

Seniority in work	0-5 years	7	26.9
	6-10 years	10	38.5
	>10 years	9	34.6

The subjects were also distributed according to the type of activity carried out in the office, thus, 34.6% of participants work in a general dentistry office, 30.8% work in an office where mainly surgical procedures are performed, 15.4% in a pediatric dentistry office and 19.2% in the

office where orthodontics is practiced (Table 1). Also, the study participants were distributed according to their seniority at work, as can be seen in table 5: 26.9% have a seniority between 0-5 years, and 38.5% for seniority between 6-10 years and 34.6% with older than 10 years (Table 1).

Table 1. Distribution of the answers to the questions in the questionnaire

		Group age				Speciality				Seniority in work		
		26-30 years	31-40 years	41-50 years	> 50 years	dentistry	surgery	pedodontics	orthodontics	0-5 years	6-10 years	> 10 years
Q1	No	36.4%	0.0%	0.0%	0.0%	33.3%	0.0%	25.0%	0.0%	57.1%	0.0%	0.0%
	Yes	63.6%	100.0%	100.0%	100.0%	66.7%	100.0%	75.0%	100.0%	42.9%	100.0%	100.0%
p		0,092				0,181				0,002		
Q2	No	45.5%	0.0%	0.0%	0.0%	44.4%	0.0%	25.0%	0.0%	71.4%	0.0%	0.0%
	Yes	54.5%	100.0%	100.0%	100.0%	55.6%	100.0%	75.0%	100.0%	28.6%	100.0%	100.0%
p		0,038				0,076				0,000		
Q3	No	63.6%	87.5%	33.3%	100.0%	66.7%	25.0%	100.0%	100.0%	100.0%	50.0%	55.6%
	Yes	36.4%	12.5%	66.7%	0.0%	33.3%	75.0%	0.0%	0.0%	0.0%	50.0%	44.4%
p		0,172				0,015				0,077		
Q4	No	45.5%	0.0%	0.0%	0.0%	44.4%	0.0%	25.0%	0.0%	71.4%	0.0%	0.0%
	Yes	54.5%	100.0%	100.0%	100.0%	55.6%	100.0%	75.0%	100.0%	28.6%	100.0%	100.0%
p		0,038				0,076				0,000		
Q5	HBV	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	11.1%
	HCV	9.1%	0.0%	33.3%	0.0%	11.1%	25.0%	0.0%	0.0%	14.3%	0.0%	22.2%
	All from above	90.9%	100.0%	66.7%	0.0%	88.9%	75.0%	75.0%	100.0%	85.7%	100.0%	66.7%
p		0,000				0,232				0,331		
Q6	< 30%	54.5%	100.0%	83.3%	0.0%	66.7%	75.0%	50.0%	100.0%	71.4%	70.0%	77.8%
	< 50%	27.3%	0.0%	16.7%	100.0%	11.1%	25.0%	50.0%	0.0%	14.3%	20.0%	22.2%
	> 30%	18.2%	0.0%	0.0%	0.0%	22.2%	0.0%	0.0%	0.0%	14.3%	10.0%	0.0%
p		0,117				0,238				0,856		
Q7	No	27.3%	50.0%	83.3%	100.0%	33.3%	62.5%	75.0%	40.0%	42.9%	20.0%	88.9%
	Yes	72.7%	50.0%	16.7%		66.7%	37.5%	25.0%	60.0%	57.1%	80.0%	11.1%
p		0,115				0,440				0,010		
Q8	antimicrobial drugs	45.5%	25.0%	83.3%	0.0%	33.3%	87.5%	25.0%	20.0%	42.9%	40.0%	55.6%
	antiretroviral drugs	36.4%	75.0%	16.7%	100.0%	44.4%	12.5%	75.0%	80.0%	28.6%	60.0%	44.4%
	antifungal drugs	18.2%	0.0%	0.0%	0.0%	22.2%	0.0%	0.0%	0.0%	28.6%	0.0%	0.0%
p		0,163				0,059				0,159		
Q9	in at most half an hour after the accident	0.0%	12.5%	0.0%	0.0%	11.1%	0.0%	0.0%	0.0%	0.0%	10.0%	0.0%
	at most one hour after the accident	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%	40.0%	0.0%	20.0%	22.2%

	in no more than 24 hours	100.0%	12.5%	66.7%	100.0%	88.9%	75.0%	50.0%	20.0%	100.0%	50.0%	55.6%
	in no more than 72 hours	0.0%	25.0%	33.3%	0.0%	0.0%	25.0%	0.0%	40.0%	0.0%	20.0%	22.2%
p		0,015				0,055				0,385		
Q10	Yes	81.8%	75.0%	100.0%	0.0%	77.8%	100.0%	75.0%	60.0%	71.4%	80.0%	88.9%
	it depends on the risk the patient presents	18.2%	25.0%	0.0%	100.0%	22.2%	0.0%	25.0%	40.0%	28.6%	20.0%	11.1%
p		0,121				0,330				0,677		

To the question "Do you know what a skin lesion is?" 85% of the participants answered positively, the subjects being part of the age group 31-40 years old (36.4%), working in the office specializing in surgery (36.4%) and having a seniority of work between 6-10 years (45.5%). (Table 2).

Accidents produced by stabbing or cutting with sharp objects are relatively frequent in dentistry. Endodontic needles, burs, suture needles and scalpel blades are frequently used instruments, instruments that present a high risk of stabbing or

cutting if not used correctly. 38.1% of the subjects in the age group 31-40 years, who work in surgery (38.1% for more than 10 years (42.9%) suffered stabbing or cutting accidents, answered positively to the question " You suffered injuries during your studies or dental practice" but, only 34.6% of nurses reported accidents, equally distributed between the 20-30 and 41-50 age groups (44.4%). The subjects who answered positively have a working experience of 6-10 years (55.6%) and work in dental surgeries (77.6%) (Table 2).

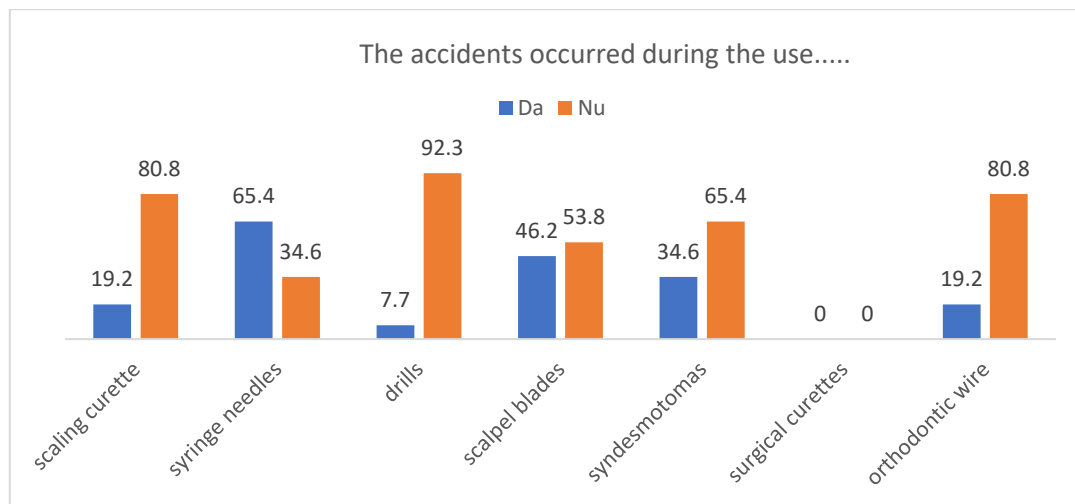


Figure 1. Distribution of responses to the statement "The accidents occurred during the use....."

The most frequent accidents occurred during the use of the syringe needle (65.4%), followed by the use of scalpel blades (46.2%), elevators (34.6%) and in

equal proportions (19.2%) the injuries were caused by the incorrect use of scaling curettes and orthodontic wires/springs (Figure 1).

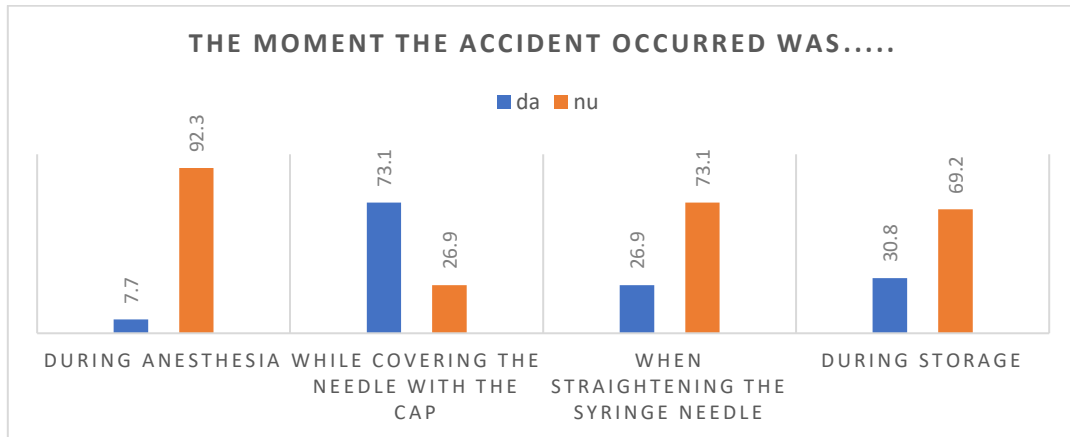


Figure 2. Distribution of responses to the statement "The moment the accident occurred was..."

When the syringe was used, most stabbing accidents occurred during the recap of the syringe needle (73.1%) or when the needles were stored incorrectly or when the contaminated waste was not handled correctly (Figure 2).

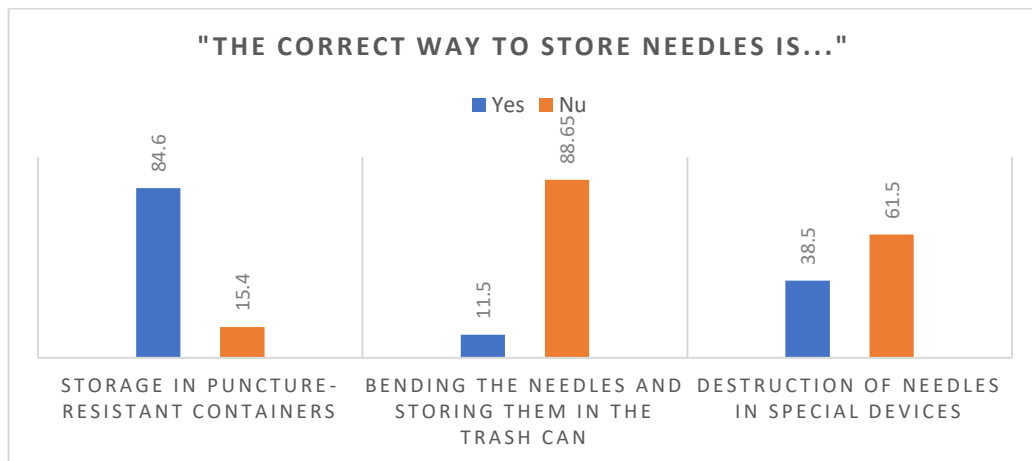


Figure 3. Distribution of answers to the statement "The correct way to store needles is..."

Regarding the method of storing needles, 84.6% of the nurses answered correctly by choosing the answer "storage in puncture-resistant containers" followed by the nurses who chose the answer option "needles destruction with special devices". There were also 11.5% of nurses who stated that needles can be bent and thrown in the trash (Figure 3).

From the total, 84.6% of nurses admit that both HIV, hepatitis B and hepatitis C are transmitted through blood. The highest rate of correct answers was recorded in the

age group of 20-30 years old (45.5%), who work in a general dentistry office (36.4%) and have been 6-10 years old (Table 2).

Immunization of medical personnel is necessary to reduce the risk of transmission of infection because this professional category is at high risk of contamination. The results of the analysis show us, however, that only 50% of the nurses are vaccinated against the hepatitis B virus, the only disease apart from the flu that benefits from a vaccine, most of the nurses being part of the age group of 20-30 years old,

working in the office of general dentistry and are between 6 and 10 years old (Table 2).

The results of the study indicate a relatively low level of knowledge related to the medication administered post-exposure. Only 46% of nurses answered the question correctly, who work in general dentistry and orthodontics, with a seniority between 6-10 years. 65.4% of the nurses answered that the medication must be administered within the first 24 hours after the accident. 64.7% of them belong to the age group of 20-30 years, work in a general dentistry office, and have a seniority between 0-5 years (Table 2).

Compliance with Universal Precautions, a set of rules that help us prevent the transmission of infection in the office, is mandatory for all medical personnel and applies to all patients regardless of their infectious status. 80.8% of the nurses answered this question correctly, 33.3% of them work in the general dentistry practice and have more than 6 years of experience (Table 2).

Discussions

The burden of occupational disease is increasing at an unprecedented rate. The proportional development of human resources in health and safety at work did not occur at the same time. The medical community has systematically ignored the importance of occupational health and safety and disaster management in teaching, training and epidemiological research. (4-6) In 1985, to increase awareness among health care workers of the dangers of sharps injuries and other types of disease transmission, the Centers for Disease Control (CDC) and the Occupational Safety and Health Administration (OSHA) in the United

States introduced "Universal Precautions", which have become the world standard in both hospitals and the community(7).

The field of dentistry has responded to the challenges commonly associated with stab and cut injuries with several revolutionary engineering technological solutions, thereby eliminating injuries that occur either during needle recoating or needle disposal through the use of syringes with safety systems. and the use of sharp tools with safety measures (protective equipment, correct work technique). In our study, 81% sustained puncture injuries during needle resheathing, this incidence is higher than the incidence found in a study by Norsayani et al.(5).

The influence of reporting skin injuries was demonstrated in the study (7) done by Chaco et al showed that 23.7% of participants never reported an incident of injury, but in our study 19% which is high. Attitudes regarding needle disposal in our study, 19.8% threw in the trash, others reported in their study that 11% of participants threw needles directly in the trash, therefore emphasis should be on the correct disposal of needles and sharp objects in practice. Regarding awareness of percutaneous wound management in our study, 31% believed in promoting active bleeding at the wound site, while others reported a percentage of 26% of participants who would promote active bleeding (7-9) at the wound site.

The CDC recommends testing for antibodies after completing three shots of HBV vaccine, and if negative, give a second three-dose vaccine and test again for anti-HbsAg antibodies. If there is no antibody response, further vaccination is not recommended. If an employee has a

blood exposure to a patient known or suspected to be at high risk for HBsAg seropositivity, they should receive HBIGx2 (one month apart) or HBIG and initiate (10) revaccination. Many participants, even if vaccinated, did not timely assess seroconversion status after vaccination, as reported by Barone et al.

Our study showed that knowledge, awareness and adherence to the risks associated with percutaneous injuries and the use of preventive measures were inadequate. Guidelines should be formulated and the precautions to be taken when handling blood and body fluids should be specified(11-13). It should also contain procedures for reporting and managing all percutaneous injuries. Lectures, CDE program on prophylaxis, prevention and post-exposure prophylaxis in the dental community should be held regularly, more focus on awareness of these

issues is needed(14-16). Emphasis should be placed on an effective occupational health and safety program that includes immunization, use of protective equipment, and dental surveillance.

Conclusions: Nurses who work in dental surgeries and have more than 6 years of experience have a level of knowledge and attitudes regarding both the prevention of stabbing/cutting accidents and post-exposure prophylaxis measures to blood-borne infections . Although the level of knowledge is good, the applicability of measures to prevent accidents and post-exposure prophylaxis leaves something to be desired. Educational programs must include relevant information on skin injuries caused by pricking or cutting, ways to prevent accidents with stabbing/cutting instruments and especially information on post-accidental exposure prophylaxis for blood-borne infections.

References

1. Hanrahan A, Reutter L. A critical review of the literature on sharps injuries: epidemiology, management of exposures and prevention. *J AdvNurs*1997; 25:144-154.
2. Cleveland JL et al. Use of HIV postexposure prophylaxis by dental health care Personnel: an overview and updated recommendations. *Journal of the American Dental Association* 2002; 133:1619–26.
3. U.S. Department of Health and Human Services. Healthy people 2010 objectives: Objective 20-10—Reduce occupational needle stick injuries among health care workers.
4. Lum D, Mason Z, Meyer-Rochow G, Neveldsen GB, Siriwardena M, Turner P, et al. Needle stick injuries in country general practice. *N Z MedJ*1997; 110: 122-5.
5. Norsayani MY, Noor Hassim I. Study on incidence of needle stick injury and factors associated with this problem among medical students. *J OccupHealth*.2003May;45(3):1728.
6. Kim EY, Moon KJ. Prevalence rate and risk factors for needlestick and sharps injuries in education practicum among nursing students. *J Health Info Stat*.2019;44(3):262–70. <https://doi.org/10.21032/jhis.2019.44.3.262>.
7. Chacko J, Isaac R. Percutaneous injuries among medical interns and their knowledge & practice of post-exposure prophylaxis for HIV. *IndianJPublicHealth*.2007Apr-Jun;51(2):127-9.
8. U.S. Public Health Service. Updated U.S. public health service guidelines for the management of occupational exposures to HBV, HCV, and HIV and recommendations for postexposure prophylaxis. *MMWR. Recommendations and Reports*. 2001;50(RR11):1-52.
9. Romanec, C; Rosu, S; (...); Olteanu, ND. Morphofunctional Features in Angle Second Class Malocclusion on Dental Gypsum Models. *Materiale Plastice*, Dec 2018, 55 (4) , pp.686-690

10. Guruprasad Y, Chauhan DS. Knowledge attitude and practice regarding risk of HIV infection through accidental needlestick injuries among dental students of Raichur,India. *NatlJMaxillofacSurg*2011; 2: 152-5.
11. Savin, C; Murariu, A; (...); Balan, A. Dental material biocompatibility: a cross-sectional study. *I. J.M.D.* 2017, 21 (2), pp.94-97
12. Centers for Disease Control. Perspective in disease prevention and health promotion update, Universal precautions for prevention of transmission of HIV, HBV and other blood-borne pathogens in health care settings. *MMWR*1988;37:24.
13. Gańczak M, Topczewska K. Risk of occupational exposure to blood-borne pathogens in paramedics. *Med Pr.* 2018;69(6):685–94. <https://doi.org/10.13075/mp.5893.00741>.
14. Barone P, Sciacca A, Lupo F, Leonardi S, Hepatitis B vaccination in young nurses of a general hospital, *AnnIg*1995;7:251-5.
15. Abubakar S, Iliyasu G, Dayyab FM, Inuwa S, Wada RAT, Sadiq NM, et al. Post-exposure prophylaxis following occupational exposure to HIV and hepatitisB: an analysis of a 12-year record in a Nigerian tertiary hospital. *J Infect Prev.*2018;19(4):184–9. <https://doi.org/10.1177/1757177417746733>
16. Jeong IS, Jeong JS, Sohn JS, Choi JH, Jeong SY, Han SH, et al. Prospective and retrospective incidence and post-exposure reporting of needlestick injuries. *Korean Journal of Nosocomial Infection Control.* 2015;20(1):29-36. <https://doi.org/10.14192/kjnic.2015.20.1.29>