

ACCIDENTAL EXPOSURE TO BIOLOGICAL MATERIALS AMONG NURSING STUDENTS

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Abstract

Biological risk is one of the main risks for healthcare workers and nursing students in their hospital activity. In particular, students represent a category at risk, due to inexperience and lack of technical skills. During hospital practice, they are in direct contact with biological materials (blood, saliva, other body fluids, respiratory aerosols, etc.) as well as with blood or other contaminated materials or instruments potentially infected biological material substrate. Exposure to biological risk is caused by accidental needlestick or sharps injuries (72%), followed by mucocutaneous contact (28%). The objective of this study was the identification of incidents that occurred as a result of exposure to biological agents and the use of protective measures during professional practices. An electronic questionnaire was administered to students attending the first, second and third years at the Faculty of Technical Medical Sciences, Elbasan. The questionnaire consisted of sociodemographic data, the rate of exposure to biological agents and the use of PPE. The results of the study showed 59.5% of cases of biological injuries where the highest number occurred in the practice of the first year. 47.8% of students suffered injuries from needle piercing, where the needle was sterile. The ward with the highest number of incidents turns out to be infectious with 53.9% of cases. According to 84% of the students, nurses must wash their hands and use a face mask, as well as sterile gloves as a protective measure before performing various medical techniques. Safety training should start early in the training curriculum with theoretical and practical courses as well including awareness sessions. Safety and biosecurity in the workplace must be integrated and modeled in undergraduate and postgraduate courses to create a clear safety culture.

Keywords: biological risk, nurse students, accidental exposure, protective measure

1. Introduction

Biological risk is the exposure of a biological agent that can generate a contagious and infectious process in the individual or health personnel, originating from the colonization of micro or macro organisms, which are harmful to the individual (Bravo et al, 2016).

The World Health Organization (WHO 2002) estimates that approximately three million people among the 35 million healthcare workers worldwide are percutaneously exposed each year to pathogens transmitted through infected blood, two million to hepatitis B virus (HBV), about 900,000 to hepatitis C virus (HCV) and 170,000 to HIV. Several studies carried out in recent years in Italian universities confirmed the involvement of nursing personnel in biological accidents (Veronesi et al, 2018 & La Torre et al, 2019) who can carry out the behavior in an unknown and complex clinical environment, which exposes them to potential people throughout the training period. Lack of experience (Bettancourt et al, 2011) and high level of stress (Antolín et al, 2007 & López et al, 2005) related to their uncertainty in this environment.

According to (Fang et al, 2015) the risk of infection by biological agents is recognized as one of the most important risks for health care personnel, particularly nurses, because in their role as clinical specialists they have direct and continuous contact with the patient, carrying out daily care activities that involve procedures of all kinds, and this implies exposure to pathogenic agents.

One of the most common hazards at work is the slow and sharp injury that occurs during nursing procedures

like administering medications, administering or receiving blood and performing others nursing activities containing sharp materials. The major causes of a needlestick and sharps injury are poor awareness of healthcare providers about the usage of sharps materials, its risks and the prevention of a needlestick injury and proper waste disposal. Nursing students are the most common healthcare professionals who face a needlestick and sharp injuries in their work (Trivedi et al, 2013). The study carried out in Dammam University found that 75% of nursing students were not trained in advance for physical work risks (Abd El-Hay et al, 2015).

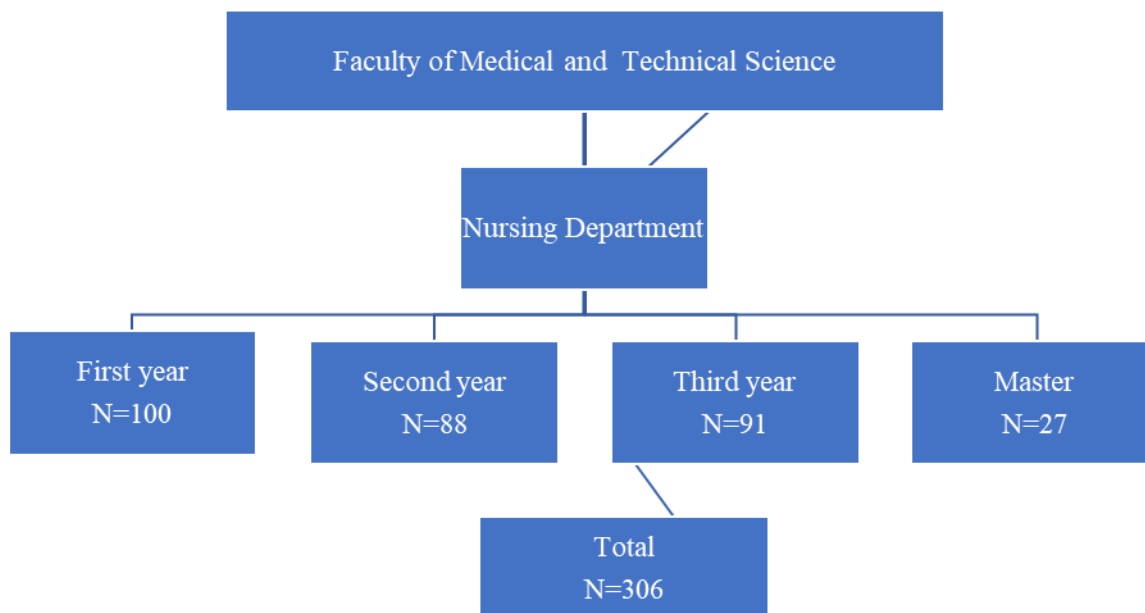
In a review of the literature "Knowledge about health accidents and health care practitioners" (Vieytes et al, 2017) reported that there was a high level of negligence on the part of students regarding protection as well as reporting at the time of exposure to a biological accident.

The aim of this study was the identification of incidents that occurred as a result of exposure to biological agents and the use of protective measures during professional practices.

Methods

The questionnaire was structured after the literature review and was adapted from previous studies related to occupational biohazard for nursing students. This study was conducted at the Faculty of Medical and Technical Sciences, University of Elbasan among nursing students who were part of the professional practice of the first, second, third and master's years in the period February-March 2022.

Study objectives, methods of achievement of informed consent and the description of the various the sections of the questionnaire were actively presented during a day of teaching. Students were given the opportunity to access the online questionnaire by email and were invited to complete it. Participation in the completion of the questionnaire was on a voluntary basis, students can complete the questionnaire at the same time using their mobile phone or other electronic device. The questionnaire was available on the Google Docs online platform from February 27 to March 27, 2022. The questionnaire was validated in a sample of 30 students and after it was considered valid, it was distributed to a group of 600 students, where only 306 of them answered.



Questionnaire

The questionnaire consists of questions divided into 3 sections. The first section contains socio-demographic information on age, sex, civil status, degree course. The second section presents the frequency of injuries, the situations in which they occurred, the source of the injury, contact with biological fluids, the department where the accidental injury occurred (eight questions). The following sections contains importance of using personal protective equipment, prophylaxis after the injury, vaccination status (nine questions).

Data Processing and Analysis

After data collection, the response was coded and entered into a computer using SPSS version 22 to process and analyze the data. The data were presented in texts, tables and figures. Data were calculated using the frequency and percentage.

Results

The table shows that 258 (84.3%) are female and 48 (15.7%) are male. 154 (50.3%) of them are in the 18-20 age range. In the study sample 32.7% are first-year students.

Table 1. Distribution according to sociodemographic data of nursing students

Variables	Characteristics	Frequency	Percent
Age	18-20	154	50.3
	21-23	132	43.1
	24-25	5	1.6
	>25	15	4.9
Gender	Female	258	84.3
	Male	48	15.7
Marital status	Married	14	4.6
	Married and not together	3	1
	Single	251	82
	Another relationship	38	12.4
Academic year	First year	100	32.7
	Second year	88	28.8
	Third year	91	29.7
	Master	27	8.8

Table 2. Biological accidents during professional practices

Variables	Indicators	f	%
Have you experienced a biological accident?	Yes	182	59.5
	No	124	40.5
If yes, specify how many times it happened:	1	72	39.7
	2	102	56

When did the biological injury occur?	>2	8	4.3
	The practice of the first year	84	46
	The practice of the second year	72	40
	The practice of the third year	26	14
In which procedures did the accidental injury occur?	During the preparation of the medication	80	43.9
	During the elimination of equipment	30	16.4
	During the closure of the needles	40	21.9
	During sampling	20	10.9
	In other situations	12	6.5
Specify the source of the injury:	Needle stick injury	87	47.8
	Contact with biological fluids	78	42.8
	Other	17	9.3
If you have had a needle stick, specify if the needle was:	Sterile	60	68,9
	Contaminated	27	31.1
If you have had contact with biological fluids, specify with which:	Blood	40	50.7
	Saliva	35	44.8
	Urine	1	1.6
	Other	2	2.9
Department in which the injury occurred:	Infection	57	31.3
	Pathology	23	12.6
	Surgery	55	30.2
	Reanimation	7	3.8

Regarding biological injuries, 59.5% of students had suffered biological injuries during professional practice where 56 % of them had 2 injuries, 39.7% reported 1 biological injury, and 4.3% more than two biological injuries.

In 46% of cases, the biological accidents has occurred in the practice of the first year, related to the lack of experience and the lower level of knowledge compared to students of other years. 40% of the injuries occurred in the practice of the second year and 14% occurred in the practice of the third year. Regarding the circumstances in which the biological injury occurred, it was found that in 43.9% of the cases it occurred during the preparation of the medication, 21.9% of the cases during the closing of the needles, 16.4% during the disposal of the used equipment, 10.9% during sampling and in 6.5% in other situations. In 47.8% of cases, the source of the injury was needle stick injury, 42.8% contact with biological fluids, and in 9.3% it happened in other circumstances.

Table 3. Use of PPE and their importance

Variables	Indicators	f	%	
Did you have protective measures when the accident happened?	Yes	56	30.7%	
	No	111	60.9%	
	I don't remember	15	8.4%	
If not,why ?	I thought that procedure could be done without PPE	36	20%	
	Unpleasant and uncomfortable	9	5%	
	Not available	137	75%	
	Which personal protective equipment do you use during your practice?	Gloves	150	49%
	Gloves+Mask	10	3.2%	
	Gloves+Shirt	5	1.6%	
	Gloves + Glasses	4	1.5%	
	Neither	137	44.7%	
	How informed were you by the nursing staff regarding biological hazards?	None	56	18.3%
		Low	106	34.6%
Moderate		105	34.4%	
High		39	12.7%	
Have you been specified what are the protective measures against these biological risks?	Yes	200	65.3%	
	No	106	34.7%	

The table shows that 60.9% were not equipped with protective measures during the biological accident, because 20% thought that the procedure could be done without PPE, 5% considered it uncomfortable and 75% stated that they were not available. The findings of this study evidence that the information provided by the nursing staff regarding possible exposures during professional practice was insufficient for 34.6% of cases and moderate for another 34.4%.

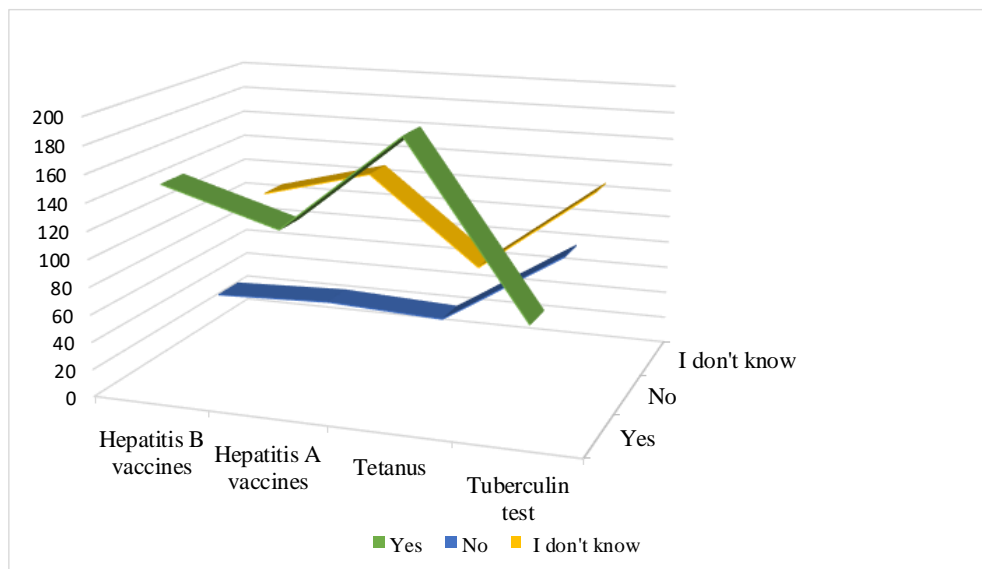


Figure 1. Prophylaxis after accidental injury

The results show that 49.3% of students had the hepatitis B vaccine, 41.2% the hepatitis A vaccine, 64.1% the tetanus vaccine and 25.2% the tuberculin test.

Discussion and conclusions

In this study, it was observed that the rate of exposure to needle puncture in nursing students was high as in the studies of (Yao et al, 2013 & Karadag et al, 2010 & Ozer et al, 2013 & Zoungrana et al, 2014 & Yamazhan et al, 2011) . The highest number of injuries occurred in the practice of the first year, data that agree with the study of (L. Veronesi et al, 2018) related to the lack of experience and non-use of personal protective equipment during hospital manipulations. The exposure propensity appeared to be lower with increasing knowledge capacity, findings similar to the results of (Petrucci et al, 2009 & Ozer et al, 2013 & Talas et al, 2009) but not with (Cheung et al, 2012). This study presents the need to carry out specific training for related students with the disposal of needles and other sharp instruments as well as the importance of using protective equipment during manipulations. (Vieytes et al, 2017) in a literature review, presents a lack of knowledge and negligence in the use of protective measures in nursing students, as well as in our study where approximately 60.9% of students were not equipped with protective measures during biological accident.

Safety training should begin early in the training curriculum with theoretical and practical courses as well as the inclusion of awareness sessions (Talas et al, 2009). Safety and biosecurity in the workplace should be integrated and modeled in undergraduate and postgraduate courses in order to create of an integrated safety culture. Biosafety professional associations in collaboration with institutes and universities would design and offer formal biosafety modules to move from passive training to active learning for the next generation of nurses who after to implement the biosecurity curriculum and to be equipped with a diploma of national and international level. These approaches would help these professionals to make the best security practices part of their work routine (Cheung et al, 2012).

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