

Original Article

Injury Experiences and Precautions Taken by Nurses Working in Pediatric Wards Towards Penetrative/Incisive Tools

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Abstract

Background: Nurses and other health professionals are exposed to various occupational risks during their working life, such as needlestick and sharp injuries

Aim: A descriptive study was conducted in order to determine experiences of nurses who were working in the pediatric clinics of a university hospital and injured with penetrative-incisive tools, and the precautions taken by them.

Results: In the study, 74 voluntary nurses of 92 nurses working in the pediatric clinics were included. The data were collected by using a questionnaire prepared in line with literature. The data were assessed by numbers, percentage, and chi-square test. It was determined that 67.6% of the nurses participating in the study had injury experiences with penetrative-incisive tools, 20.3% were injured with a contaminated tool, and only 16.0% of them reported the injury. 31.4% of the nurses cleaned the injured area with Baticon®, 25.9% cleaned the injured area with water, and 18.5% dressed this area. 58.1% of the nurses declared that they did not have necessary knowledge about injuries by penetrative-incisive tools.

Conclusion: Most of the subjects don't take the precautions towards injuries caused by penetrative-incisive tools due to lack of comfortable movement, time constraint, being allergic to materials, and lack of materials. The reported injuries were limited and because due to the perception that patients had a low contamination risk, and not knowing the necessity of reporting the injury. Moreover half of the subjects did not have sufficient knowledge, and more than half of them wanted to receive education about injuries.

Key words: injury, nurse, pediatric, penetrative/incisive tools, precautions.

Introduction

Healthcare staff, especially nurses are exposed to various occupational risks during healthcare delivery. Primary occupational accident and risk exposed by the healthcare staff is needlestick and sharp injuries. The state of the clinic, lack of tools and devices, insufficient number of

personnel, working conditions, lack of experience and attention increase the risk of needlestick and sharp injuries (Korkmaz 2008, Mangırlı & Özşaker 2014). Injuries with penetrative and incisive tools, which is a very important problem for healthcare staff, constitute a serious risk in terms of blood-borne pathogen contamination

and spreading of infection (Dokuzoğlu 2003, Gammon et al.2008, Mangırlı & Özşaker 2014).

Within injuries with penetrative and incisive tools, needle stick injuries are ranked as the first. In related studies, it has been stated that the rate of needle stick and other percutaneous injuries is 36.2-86.5%, and most of the injuries have not been reported (Eğri & Pehlivan 2000, Kışioğlu et al., 2002, Ayrancı & Kosgeroğlu 2004, Kılıçarslan et al., 2006, İlhan et al., 2006, Kuyurtar & Altıok 2009, Altıok et al., 2009, Samancıoğlu et al., 2013).

According to International Labor Organization (ILO), nurses are exposed to needle stick injuries at most among the healthcare staff (Elmiyeh et al. 2004). It is stated that needle stick injuries are the most frequent occupational injuries exposed of the nurses (Hashmi et al., 2012, Sarı et al., 2004, Zhang et al., 2015).

National Institute for Occupational Safety and Health (NIOSH) has emphasized the importance of initiation of interventions required for prevention of needle sticks which constitute the greatest risk among healthcare staff (Henry & Campbell 1995, Epinet 1999). For this purpose, safe tools are suggested to be used to protect the health of healthcare staff who are in contact with contaminated tools while providing medical care to the patient (Türk et al., 2002). Only by using safe tools, injuries caused by penetrative and incisive tools can be prevented by 80.0%. In the studies it has been determined that healthcare staff do not pay necessary attention to the use of safe tools, they do not take protective precautions, and they have lack of knowledge about the issue (Türk et al., 2002, Doebbeling et al., 2003, Jovic-Vranes et al., 2006, Korkmaz 2008).

However, it is reported that the healthcare staff do not show necessary awareness even for usage of glove one of the simplest precautions. In a study conducted by Polat et al., (2011), 58.3% of the nurses did not use glove while working; in the study of Özyazıcıoğlu et al. (2010), 40.5% of the nurses used glove occasionally; and in the study of Asera et al., (2009) the nurses did not use glove as recommended.

Moreover, all healthcare staff are expected to take precautions that protect the health of both the patients and themselves, within the scope of delivery of health care in a safe and quality manner. In the studies on injuries caused by

penetrative-incisive tools, it has been determined that the nurses generally tend not to report injuries by penetrative-incisive tools, and not to take medical assistance (Altıok et al., 2009, Samancıoğlu et al., 2013).

These results make us think that nurses do not have knowledge and sufficient awareness in this regard.

Methods

This descriptive study was conducted between 01 and 31 December 2014 in order to determine experiences of nurses who were working in the pediatric clinics of a university hospital and injured with penetrative-incisive tools and the precautions taken by them towards these injuries.

Sample

The population of the study consisted of 92 nurses working in the pediatric clinics of a university hospital. No sampling method was used and all nurses were included in the study. However, as 17 nurses were on maternity leave and sick leave and 1 nurse rejected to participate in the study, the study was completed with 74 nurses.

Data collection

A questionnaire with 19 questions designed by the researchers in line with literature, was used to collect data (Kuyurtar & Altıok 2009, Altıok et al. 2009, Samancıoğlu et al., 2013, Özyiğit et al., 2014, Patterson et al., 2003, Yang et al., 2004). The questionnaire consisted of 2 main parts; while in the first part, there were 5 descriptive questions for the nurses included in the study; the second part involved 14 questions determining injury experiences of the nurses with penetrative and incisive tools, and the precautions taken by them after injury.

Data analysis

The data of the study were analyzed by using number, percentage, and chi-square test.

Ethical considerations

Ethics committee approval and official permit from related hospital were received to conduct the study. Additionally, the nurses were informed about the study before data collection, and their verbal consent were taken. The nurses were assured of their right to refuse to participate or to withdraw from the study at any stage. The anonymity and confidentiality of the nurses were guaranteed.

Results

It was determined that average age of the nurses participating in the study was 32.18 ± 7.46 (18-

49), 70.3% of them had undergraduate and graduate education, and 45.9% worked in the pediatric clinic for 7 years and more (Table 1).

Table 1. Demographic valuables (n = 74)

Characteristics	Number	%
Age Group		
≤30	32	43.2
30>	42	56.8
Average Age	32.18 ± 7.46 (18-49)	
Educational Status		
Less than undergraduate	22	29.7
Undergraduate and graduate	52	70.3
Total period of occupational experience		
≤6 years	29	39.2
≥7 years	45	60.8
Period of working in the pediatric clinic		
≤6 years	40	54.1
≥7 years	34	45.9

It was determined that average age of the nurses participating in the study was 32.18 ± 7.46 (18-49), 70.3% of them had undergraduate and graduate education, and 45.9% worked in the pediatric clinic for 7 years and more (Table 1).

Table 2 illustrates experiences of the nurses injured with penetrative-incisive tools and their practices after injury. The participating nurses stated that most of the injuries occurred while closing the needle tip, breaking the ampoule, diluting the medicine and withdrawing medicine from the ampoule.

Table 3 illustrates distribution of injury statuses of the nurses by medical penetrative-incisive tools according to their descriptive characteristics. It was determined that the nurses, who were 30 years old and older, graduate and postgraduate, had an occupational experience for 7 years and more, worked in the pediatric clinic for less than 6 years, had hepatitis B vaccine, and received education regarding injuries caused by penetrative-incisive tools before, were exposed more to injuries caused by medical penetrative-incisive tools. While there was a statistically significant difference between period of working

in the pediatric clinic and having injuries caused by medical penetrative-incisive tools, no difference was found between age, educational status, and total period of occupational experience and having injuries caused by medical penetrative-incisive tools (Table 3).

Table 4 illustrates distribution of status of the nurses regarding taking precaution against injuries with penetrative-incisive tools and the precautions taken by them. In this study, it was found that only 37.8% of the nurses took precautions against injuries caused by penetrative-incisive tools. It was determined that 83.8% of the nurses were immunised for hepatitis B virus and took various individual precautions. The individual precautions taken by the nurses mostly were respectively as follows; paying attention to personal hygiene rules (20.5%), paying attention to disinfection (19.8%), and using glove and mask (19.6%). It was determined that 86.4% (n=64) of the nurses participating in the study stated that they could not apply the precautions towards injuries caused by penetrative-incisive tools due to lack of comfortable movement, time constraint, being allergic to the materials, and lack of materials.

Table 2. Experiences of the nurses injured with penetrative-incisive tools and their practices after injury (n=74)

	Number	%
<i>Injury with penetrative-incisive tools (n=74)</i>		
Injured	50	67.6
Not injured	24	32.4
<i>Tool causing injury(n=50)</i>		
Injector needle	45	90.0
IV cannula needle	3	6.0
Sterilized pieces of glass	1	2.0
Lancet/ bistoury	1	2.0
<i>Reasons of injury (n*=106)</i>		
While closing needle tip	34	32.1
While breaking the ampoule, diluting medicine and withdrawing medicine from the ampoule	22	20.8
While separating needle from the injector	16	15.1
During treatment	11	10.4
While inserting intravenous cannula / taking blood	8	7.5
By accident while in the hand of a colleague	6	5.7
While throwing the waste bin	4	3.8
While cleaning the materials	3	2.8
While helping my friend	1	0.9
During intravenous/intramuscular medications	1	0.9
<i>Injury with contaminated penetrative-incisive tools (n=74)</i>		
Injured	15	20.3
Not injured	59	79.7
<i>Practices after injury (n=54)*</i>		
Washing with baticon	17	31.4
Washing with water	14	25.9
Dressing	10	18.5
Drawing blood	4	7.4
Making examination	3	5.6
Notifying the infection committee	3	5.6
Doing nothing as it is a sterilized material	2	3.7
Making the patient be checked/examined	1	1.9

* More than one answer was given.

Table 3. Distribution of injury statuses of the nurses by medical penetrative-incisive tools according to their descriptive characteristics

	Injury by medical penetrative-incisive tools				Statistics	
	Injured		Not injured		X²	p
	Number	%	Number	%		
Age Group						
30 years and below	22	44.0	10	41.7	X ² =0.36	p=0.850
30 years and above	28	56.0	14	58.3		
Educational Status						
Less than graduate	16	32.0	6	25.0	X ² =0.38	p=0.537
graduate and postgraduate	34	68.0	18	75.0		
Total period of occupational experience						
≤6 years	23	46.0	6	25.0	X ² =3.001	p=0.083
≥7 years	27	54.0	18	75.0		
Period of working in the pediatric clinic						
≤6 years	31	62.0	9	37.5	X ² =3.919	p=0.048
≥7 years	19	38.0	15	62.5		
Status of having Hepatitis B vaccine						
Having	40	80.0	22	91.7		
Not having	10	20.0	2	8.3		
Status of receiving education regarding injuries caused by penetrative-incisive tools						
Yes	41	82.0	22	91.7		
No	9	18.0	2	8.3		

Table 4. Distribution of status of the nurses regarding taking precaution against injuries with penetrative-incisive tools and the precautions taken by them

	Number	%
Status of taking precaution against injuries with penetrative-incisive tools		
Taking	28	37.8
Not taking	46	62.2
Status of having Hepatitis B vaccine		
Having	62	83.8
Not having	12	16.2
Taking individual precaution (n=317)*		
Paying attention to personal hygiene rules	65	20.5
Paying attention to disinfection	63	19.8
Using glove, mask	62	19.6
Protection against infection	56	17.7
Being vaccinated	41	12.9
Notifying authorities about the problems	30	9.5

* More than one answer was given.

In this study, it was found that only 16.0% of the nurses reported the injuries caused by penetrative-incisive tools. The reasons behind why the nurses did not report the injuries were respectively as follows; injury by sterilized tool (25.0%), thinking that the patient has a low contamination risk (16.7%), not knowing the necessity of reporting the injury (16.0%), not being anxious about the injury (9.4%), being immune (8.0%), not knowing what kind of a process to follow (5.3%), lack of such committee in the hospital (5.3%), and not allocating time (2.7%). In the study, it was found that 51.8% of the nurses did not have sufficient knowledge about injuries with penetrative-incisive tools, and 66.2% wanted to receive education in this subject.

Discussion

Contaminated penetrative and incisive tools constitute a significant infection risk for healthcare staff and patients. Although approaches such as single use of most of penetrative and incisive tools, taking blood with vacuum tube, throwing penetrative and incisive tools into impenetrable infectionwaste bins reduce the risk for patients, the healthcare staff have high risk of being infected during the intervention (Ayrancı & Kosgeroğlu 2004, Kılıçarslan et al., 2006, Gershon et al., 2009).

In this study, it was determined that more than half of the nurses (67.6%) had an experience of injury by penetrative or incisive tools. In the study conducted by Kermodé et al. at 7 health care centers in India, it was found that 63% of healthcare staff experienced at least one percutaneous injury within the last year; and in the study conducted by Cho et al., (2013) in South Korea, it was also determined that 70.4% of the nurses experienced at least one percutaneous injury within the last year. In the study conducted by Clarke et al., (2007), 23.7% of the nurses working at the intensive care unit in Canada were exposed to injury. In the study, it was determined that most of the injuries occurred due to injector needle stick (90.0%). In a study conducted by Singru and Banerjee (2002) in India, it was determined that the rate of injuries caused by injector needle was 92.2%; and in the study of Tarantola et al., (2003), it was found that injuries caused by injector needle stick were ranked as the first. In another study, conducted by Amy et al., (2011), 66.0% of the injuries were associated with the injection needle. Various

studies conducted on this subject in Turkey have revealed that the rate of percutaneous injuries varies between 36.2% and 86.5%, and the injuries were caused by injection needle at most (Eğri & Pehlivan 2000, Kişioğlu et al., 2002, Ayrancı & Kosgeroğlu 2004, İlhan et al., 2006, Kuyurtar & Altıok 2009, Altıok et al. 2009, Samancıoğlu et al., 2013). Our results show similarity with the studies of Singru and Banerjee, and Tarantola et al. The nurses participating in the study stated that the injuries mostly occurred while closing the needle tip (32.1%), breaking the ampoule, diluting the medicine, and withdrawing medicine from the ampoule (20.8%). Altıok et al., (2009) stated that 31.1% of the injuries were caused during and after treatment while closing the needle tip, separating the needle from the injector and throwing into the waste bin; and 19.2% of them occurred while making suture. In the study of Samancıoğlu et al., (2013), 72.2% of the nurses stated that their injuries occurred while closing the cover of the needle, 27.7% of the injuries occurred while taking the needle connectors, 27.7% after intravenous (IV) intervention, and 49.4% while breaking the ampoule or vial and 4.8% while cleaning the medical tools. Clarke et al., (2007) found that 73.3% of American nurses working at the intense care unit and 64.7% of Canadian nurses working at the intense care unit got injured while connecting IV lines. In the guideline developed by the Center of Disease Control and Prevention (CDC) on prevention of contaminated penetrative and incisive tools under the name of “Universal Precautions”; it is recommended that the used injectors should be thrown into impenetrable injection waste bin without closing the covers again and taking needles of the injectors off, used needles, injectors, bistouries and other incisive tools should be thrown into sound and impenetrable boxes for disposal (Güler et al., 1990, Karadakovan 2002, Öztürk 2007, Kuyurtar & Altıok 2009). Results of our study make us think that injuries occurred due to the fact that the nurses did not have sufficient awareness on this subject and did not pay attention to universal precautions sufficiently.

In this study, it was determined that one fifth of the nurses (20.3%) were injured by a contaminated tool. In their study, Samancıoğlu et al., (2013) found that 21.2% of intense care nurses were injured by a "contaminated" penetrative-incisive tool; and in their study,

Altıok et al., (2009) determined that 60.9% of intense care nurses were injured by a "contaminated" penetrative-incisive tool. Our results show similarity with the study of Samancıoğlu et al.

In the study, it was found that after injuries with penetrative-incisive tools, 31.4% of the nurses cleaned the injured area with baticon, 25.9% of them cleaned with water, and 18.5% of them made dressing. In their study, Gücük et al., (2002) have determined that after injury, 44.6% of the nurses cleaned the injury area with betadine. In the study of Samancıoğlu et al., (2013), the nurses gave the following answers to the question "what do you do after being injured with penetrative and incisive tools?": 25.8% said "I make it bleed at first, wash the area with soap and disinfectant, and make the necessary examinations; 19.9% said "I wash only with betadine"; 19.9% said "I wash with Betadine and make necessary examinations"; 15.9% said "I wash with disinfectant, I make examinations and have tetanus vaccine". In the study of Dişbudak (2003), it was determined that the procedures applied after injury were as follows: washing with antiseptics, washing with soap, dressing and making blood examination⁴⁰. In the study of Özdemir and Şengöz (2013), the most frequent practice made after injury was washing of the area with water and soap.

It was determined in this study that nurses, who were 30 years old and older, undergraduate and graduate, had an occupational experience for 7 years and more, worked in the pediatric clinic for less than 6 years, had hepatitis B vaccine and received education related to injuries caused by penetrative-incisive tools before, were exposed more to injuries caused by medical penetrative-incisive tools. In this study, a statistically significant difference was found between period of working in the pediatric clinic and having injuries caused by medical penetrative-incisive tools ($p < 0.05$); whereas, no difference was found between age, educational status and total period of occupational experience, and having injuries caused by medical penetrative-incisive tools. In their study, Samancıoğlu et al., (2013) found that there was no statistical difference between injury status of intense care nurses with penetrative and incisive tools and age, working unit, working years in nursing and period of working in the clinic. In the same study, it was determined that rate of being injured 1-3 times in nurses at the age of 30 and below was 1.6 times higher; and

rate of being injured 4-6 times in nurses at the age of 31 and above was 2.4 times higher. In the study conducted by İlhan et al., (2006) they determined that being 24 years old and younger and working as a nurse for 4 years or less were the factors increasing the injury caused by penetrative and incisive tools. In their study, Smith et al., (2006) found that risk of injury in nurses younger than 27 years old was 3.1-4.5 times higher. In the study conducted by Merih et al., (2009) it was determined in their study that 77.2% of the healthcare personnel having injuries caused by penetrative and incisive tools received education on these injuries before and 43.9 had HBV vaccine before. In their study, Altıok et al., (2009) found that as working period of healthcare staff increased, the rate of having hepatitis B vaccine decreased ($p < 0.001$). Our results show similarity with results of Samancıoğlu et al., with relation to age of nurses and total years of working in nursing, as well as with the results of study of Merih et al.

In our study, it was determined that only one third of the nurses took precautions against injuries with penetrative-incisive tools. It was found that most of the nurses had hepatitis B vaccine against injuries with penetrative and incisive tools, 20.5% paid attention to personal hygiene rules, 19.8% paid attention to disinfection, and 19.6% used glove and mask. In the studies conducted on injuries with penetrative and incisive tools, it has been determined that primary standard precautions taken are washing hands and using glove; rate of using mask and glasses is lower (Türk et al., 2002, Doebbeling et al., 2003, Jovic-Vranes et al., 2006). In other related studies, it has been found that nurses take mostly precautions towards injuries with penetrative and incisive tools, such as using protective materials, having hepatitis B vaccine, washing hands before each procedure, using glove, drying hands and preventing cracking, and preventing penetration of microorganisms from skin (Türkistanlı et al., 2000, Kişioğlu et al., 2002, Altıok et al., 2009, Samancıoğlu et al., 2013). While results of these studies related to hepatitis B vaccine support our study, low rate of using glove and mask in our study makes us think that the nurses did not pay necessary attention to protective precautions.

It was found that most of the nurses included in the study could not apply the precautions towards injuries caused by penetrative-incisive tools due to lack of comfortable movement, time

constraint, being allergic to the materials, and lack of materials. In various studies, it has been revealed that healthcare staff cannot apply protective precautions due to lack of comfortable movement, time constraint, and lack of materials. In the same studies, it has been determined that the healthcare staff who use glove do not need to wash their hands or they use glove in order to wash their hands less and protect their hands (Türk et al., 2002, Erol et al., 2005, Akyol 2007). Studies examining use of glove among healthcare staff contacting with contaminated tools while providing medical care to the patient have revealed that 58.3% of the nurses do not use glove while working, and 40.5% sometimes use glove or do not use the glove in the recommended manner (Asare et al. 2009, Özyacıoğlu et al., 2010, Polat et al., 2011).

In this study, it was found that only 16.0% of the nurses reported injuries caused by penetrative-incisive tools. The reasons behind why the nurses did not report the injuries were as follows: injury by sterilized tool, thinking that the patient has a low contamination risk, and not knowing the necessity of reporting the injury. Samancıoğlu et al., (2013), in their study, determined that 13.8% of the nurses reported the injuries, and 5.8% of them did not know that they would report it. Singru and Banerjee (2008) found that 32.8% of the healthcare staff reported the injuries, Merih et al. (2008) found that 40.0% of nurses reported the injuries. Results of these studies show that health care workers generally tend not to report the injuries.

In various studies examining reasons of nurses for not reporting the injuries with penetrative and incisive tools, it has been determined that they do not report the injuries because of following reasons: not knowing the necessity of reporting, not being anxious about the injury, lack of knowledge, personnel not informed sufficiently by infection control committee, and consideration of having bad clinical skills (Ayrancı & Kosgeroğlu 2004, Smith et al., 2006). In other related studies it has been reported that rate of reporting the injury is not at the desired level although there is a serious awareness about protective precautions, especially vaccination (Kutlu 2007, Demircan 2008).

In our study, it was determined that although 85.1% of the nurses stated that they got information about injuries caused by penetrative-incisive tools before, half of them did not have

sufficient knowledge, and more than half of them wanted to receive education about injuries with penetrative-incisive tools. In the study conducted by Dişbudak (2013) it was found that 72.2% of all nurses received education about injuries with penetrative-incisive tools. Contrary to our results, in the study of Akgür (2010), 60.2% of the nurses did not receive information about injuries with medical penetrative –incisive tools (Akgür 2013). As nurses who received information about this subject had more injury experiences, it makes us think that their knowledge was insufficient.

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