


Nursing Students' Occupational Health and Safety Problems in Surgical Clinical Practice

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Semra Eyi¹  and İbrahim Eyi² 

Abstract

Student nurses are exposed to hazards in terms of occupational health and safety (OHS) problems in Turkey. Researching these problems in the clinical setting, improving the health and safety of student nurses is an issue that needs to be investigated. The aim of this study is to present OHS-related impressions and OHS experiences of nursing students in relation to the risk assessment process and from an educational perspective. A descriptive and cross-sectional study was conducted with 140 students at a nursing school. The study indicated that almost all of the students' OHS knowledge and awareness level were low, were exposed to contact with blood and body fluids as most dangerous situations, have difficulties in the provision of personnel protective equipment (PPE), were subjected to verbal assault, and experienced anxiety and irritability. They encountered dangerous situations applying treatment in the clinic, preparing drugs, following vital signs, giving general care, and during the intervention in the emergency room, and experienced back pain, headache, increased tendency to sleep, fatigue, and forearm, wrist, hand, and finger injuries. Because of contact with hand antiseptic/latex, skin irritation, and burning eyes, nose, and throat, allergy symptoms were detected. Carelessness and intensive work tempo were the most common causes of workplace accidents. The clinical practice areas are limited in terms of OHS; students are exposed to physical, psychological, and chemical risks with respect to OHS, and they are most psychologically affected by experiencing anxiety and irritability, as well as physiologically, and have symptoms similar to burnout syndrome; they are at risk of getting burnout syndrome.

Keywords

nursing, behavioral sciences, student nurse, occupational health and safety accidents, protective equipment usage, clinical practice

Introduction

As the health sector is one of the most risky groups in terms of occupational accidents and diseases, the World Health Organization emphasizes that hospitals are the primary priority in preventing workplace hazards (Cheah et al., 2012; Elewa & Sahar Banan, 2016). To draw attention to the importance of the occupational safety in hospitals, the International Council of Nurses published themes of the week for nurses as “Positive Work Environments, Quality Workplaces = Quality Patient Care” (International Council of Nurses, 2016). Clinical environments in hospitals consist of intense work hazards and risky environments, complex business processes, and the intensive use of technology (Cebeci, 2013; Ulutaşdemir et al., 2015). The unit and characteristics of the clinic also affect the possibility of encountering hazards (Parlar, 2008). Surgical clinics are environments with high-risk closed units such as operating rooms and intensive care units (ICUs), where critical thinking, quick decision making,

and urgent interventions are intensive (Erdağı & Özer, 2015). Nurses, who are the most important members of the health care team, who provide direct care to the patient in surgical units, are exposed to numerous occupational hazards, such as drugs, chemicals, infectious agents, lack of materials and ergonomic conditions, heavy working, and excessive workload, and also they have physical (needle stinging, penetrating stab injuries, musculoskeletal disorders and pain, cancer resulting from night work, hearing loss, and varicose veins), chemical (skin problems, latex allergies), biological (infectious diseases), and psychological (stress, burnout syndrome, mental health problems, sleep disorders) problems (Anandh

¹Trakya University, Edirne, Turkey

²Istanbul Aydın University, Turkey

Corresponding Author:

Semra Eyi, Assistant Professor, Department of Nursing, Keşan Hakkı Yörük School of Health, Trakya University, Edirne 22880, Turkey.
Email: semra_il@yahoo.com



et al., 2015; Attar, 2014; Attarchi et al., 2014; Bernal et al., 2015; Broadwater & Brueck, 2017; Elewa & Sahar Banan, 2016; Hammerius et al., 2018; Rathore et al., 2017; Samulin Erdem et al., 2017; Xiong et al., 2017).

Literature shows that nursing students face numerous occupational health hazards as qualified nurses face during their work (Boucaut & Cusack, 2016). In particular, nursing students may be experiencing stress and anxiety (Taşdelen & Zaybak, 2013; N. Yıldırım et al., 2017) and exposed to occupational hazards due to their underdeveloped abilities, lack of knowledge, and other professional health professionals in the clinical setting (Cheung et al., 2015). Like qualified nurses, nursing students are exposed to violence from verbal/nonverbal to physical violence by fellow students, faculty or hospital staff, patients, and patients' relatives in surgical clinical settings (Seibel, 2014). It is also reported in the literature that nursing students are exposed to patient infections as a result of stab wounds and needle stinging (Scaggiante et al., 2013). Dermatitis, often caused by washing hands and wearing gloves, is another occupational situation experienced by nursing students (Akan et al., 2012; Visser et al., 2014). Nursing students, like qualified nurses, face difficulties with transport, carry of patient and equipment and musculoskeletal disorders. Researchers in the United Kingdom and Australia suggest that students face difficulties in safe handling practices in clinical situations; some nursing students have experienced severe low back pain due to lifting and bending characteristics (Cornish & Jones, 2010; Kneafsey et al., 2012; Mitchell et al., 2008). Nursing education in universities in Turkey requires 4 years of full-time university study and 4,600 hr; 50% includes theoretical training, and 50% includes clinical practice training. Clinical practice, which covers an important part of education, is an intensive part of the contemporary nursing curriculum and is an essential element of nursing education. This training is conducted in a variety of clinical settings that provide the basis for the continuous development of students' critical thinking and decision-making skills; it also improves professional practice competence (Ören & Zengin, 2019). In Turkey, during the first year of university programs (consisting of a year of two semesters), students take lessons in basic science courses (anatomy, including physiology and biochemistry) and "Basic Principles and Practices of Nursing Courses."

In the second and third years, there are 8 hr of theoretical courses and 14 hr of clinical practice for Surgical Nursing, Internal Medicine Nursing, Obstetrics and Gynecology, and Pediatric Nursing. For these clinical courses, students attend formal clinical practice in surgical clinics/areas of hospitals 2 or 3 days a week (16–24 hr). For this reason, in the second and third years of their education, students are actively involved in clinical practice in surgical units. Students can participate in clinical practice under the supervision of academicians. The number of nursing schools studying in Turkey has increased in recent years. Unfortunately, the number of academicians has not increased at the same level. This raises the risk of students

being exposed to occupational hazards in clinical practice due to lack of instructors (Council of Higher Education, 2018). Student nurses are at risk because of diseases and injuries resulting from clinical applications especially in surgical clinics such as operating rooms and ICUs, where critical thinking, quick decision making, and emergency interventions are intensive. Besides, some nursing students who do not have a good economic situation face financial pressures to work in paid work during the time they have left their classes and this causes them to experience fatigue. In the literature, it is stated that this fatigue affects the academic achievement of students, and they are not prepared enough for the nursing profession (Rella et al., 2009); it is also reported in the literature that nursing students are prone to experience stress in their clinical training and theoretical training (Pulido-Martos et al., 2012). The fatigue and stress of the students cause accidents to increase, and the safety of the patients remains under threat. The occupational health and safety (OHS) issue is an important component of clinical practice skills, which reflects what student nurses have learned in theoretical practice and theoretical knowledge. Therefore, it is vital that student nurses work safely during clinical practice. Besides, academicians and educators have responsibilities for students, including the OHS risks that their students may face in clinical practice.

As a result of the reviewed literature, in summary, the fact that nursing students are more weighted in surgical clinical applications and take a more active role in clinical applications especially in their second and third years of education period clearly shows OHS is a matter of importance and serious concern.

In this study, it is aimed to present the views and experiences of the student nurses about the OHS and OHS experiences in surgical units in relation to the risk assessment and to evaluate them from an educational perspective.

Study Aim

The aim of this study is to gather information about occupational accidents, occupational diseases, and problems related to OHS during clinical practices in the second and third years of the education in which the surgical clinical applications are more weighted and the students have more active role in the clinical practices; to provide information about nursing students' level of knowledge and awareness about OHS, to determine the status of compliance with OHS measures in relation to the risk assessment; and to evaluate them from an educational perspective. The research questions are as follows:

Research Question 1: What occupational threats and risks are experienced by nursing students in clinical practice? (*identifying threats*)

Research Question 2: What level of awareness and knowledge do nursing students have in relation to OHS? (*detection of OHS situation in nursing students*)

Research Question 3: What is nursing students' level of compliance with OHS measures and personnel protective equipment (PPE) usage? (*evaluation of risk control*)

Research Question 4: What are nursing students' thoughts about hazard sources and preventive measures? (*assessment*)

Method

Survey Design

This was a descriptive design that used a self-administered questionnaire, developed specifically for this study.

Sample Group

Students enrolled in a health college consisted of the population of the study. A questionnaire was applied with a sample of nursing students performing hospital clinical rotations. The population of the study consisted of 140 students studying in the second and third years of the nursing department. As the whole population was taken as a sample group, no sampling method was used. The first-grade students who take university basic science courses (including anatomy, physiology, and biochemistry) and "Basic Principles and Practices of Nursing" and fourth-grade students who take Public Health Nursing and Mental Health Nursing courses were excluded from the study because they did not attend clinical practice in surgical units.

Data Collection and Measurement Tool

The researchers developed a questionnaire based on the research knowledge in the literature and the experience of the researchers (in consultation with the nursing teacher, academician, hospital nurse, and OHS specialist). There are 29 questions in the questionnaire: four questions to determine students' demographic characteristics and 25 questions to measure their attitudes and awareness about OHS in which they explain the problems they face in the clinical practice environment, and the answers given are classified under four subheadings (identifying threats, detection of OHS situation in nursing students, evaluation of risk control, and assessment) (Table 1).

Expert opinion was obtained to determine whether the questions were appropriate for the study and whether the information requested was sufficient. All questions were analyzed and coded in such a way that each author independently identified the risk within the scope of risk assessment, categorizing them under identifying threats, detection of OHS situation in nursing students, evaluation of risk control, and assessment subheadings. Risk assessment, as Boucaut and Cusack (2016) point out, allows students to link the Nursing Process and the risk assessment process, help them incorporate OHS risk management into their clinical logic,

and extend students' patient care to self-care. The first stage of the Nursing Process involves collecting, organizing, verifying, and documenting data; this stage is similar to the hazard identification of the risk assessment process. The "Planning" and "Implementation of Interventions" stages of the Nursing Process include both the risk assessment and control stages of Risk Management to prevent or reduce harm to both itself and staff. The final stage of both models is "Assessment." Comparing the similarities between the Nursing Process model and the risk assessment process can facilitate nursing students to consider their safety, particularly by encouraging students to consider self-care and patient care as part of their clinical logic processes (Boucaut & Cusack, 2016).

Then, 10 students who did not participate in the study were given a questionnaire, and questions that were not understood in this pilot test were rewritten. The questionnaires were given to the students on the first day of their visit to the hospital between February and June 2018, and collected on the last day of clinical rotations (clinical rotations are totally 11 weeks).

The questionnaires were distributed by academicians who were not part of the research, and explained the purpose of the study and how to complete the form.

Data Analysis

The data were analyzed using the SPSS 21 computer software package (SPSS, Chicago, IL, USA). Percentages and the chi-square test were used in the evaluation. The p value of $<.05$ was considered to be statistically significant.

Ethical Considerations

The required written permission was received from the facilities for conducting the study (October 12, 2017, No. 33505391-044-E.167490). All participants provided informed written consent after the research aim had been explained to them. Before starting the survey, the students were informed about the research topic and given instructions about form. The students were informed that participation in the research was voluntary, that they were free to complete the form without any limitations, that they would not be rewarded or punished for participating in the study, and that this research would have no impact on their grade. It was also said that data obtained from the questionnaire would not be used anywhere else from research and would remain confidential.

Results

The findings were handled within the framework of risk assessment, identifying threats, detection of OHS situation nursing students, risk control assessment, and evaluation subheadings.

Table I. Questionnaire With Research Subheadings.

Risk management framework	Questionnaire	Research questions
1. Identifying threats	<p>What kind of dangerous situations related to OHS did you encounter in clinical practice?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Contact with blood and body fluids <input type="checkbox"/> Supervisor nurse/doctor physical/verbal assault <input type="checkbox"/> Taking blood sample/IM, IV, SC needle stick after injection <input type="checkbox"/> Falling, slipping, strain, material drop <input type="checkbox"/> Academicians' physical/verbal assault <input type="checkbox"/> Contact with chemical additives or liquid material <input type="checkbox"/> Colleagues' physical/verbal assault <input type="checkbox"/> Sharp-driller tool injury (scalpel, scissors, etc.) <input type="checkbox"/> Patient/patient's relatives' physical/verbal assault <input type="checkbox"/> Other . . . <p>What kind of PPE usage problems did you have in clinical practice?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Handle with single glove due to insufficient gloves <input type="checkbox"/> Rebuked for changing gloves due to insufficient gloves <input type="checkbox"/> Providing care to multiple patients with the same single glove <input type="checkbox"/> Entering rooms of patients with respiratory contagious diseases without mask due to nonexistence of masks <input type="checkbox"/> Not wearing gown or goggles due to nonexistence/insufficient number of gowns, goggles during body care <input type="checkbox"/> Other . . . <p>What kind of symptoms did you experience in clinical practice?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Headache <input type="checkbox"/> Early fatigue <input type="checkbox"/> Exhaustion <input type="checkbox"/> Increased tendency to sleep <input type="checkbox"/> Hair loss <input type="checkbox"/> Burning eyes and throat <input type="checkbox"/> Nose bleeding <input type="checkbox"/> Irritation on skin <input type="checkbox"/> Allergy <input type="checkbox"/> Breathing difficulty <input type="checkbox"/> Crying <input type="checkbox"/> Backache <input type="checkbox"/> Anxiety, Anger <p>If you were injured, what are the common areas of the body injured in clinical practice?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Head (head, eye, face, etc.) <input type="checkbox"/> Forearm, wrist, palm, finger <input type="checkbox"/> Patella, calf, foot <input type="checkbox"/> Mental damage <input type="checkbox"/> Other <p>Which chemicals did you have to contact in clinical practice?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Hand antiseptic <input type="checkbox"/> Formaldehyde, Glutaraldehyde, Ethylene oxide, Antineoplastic cancer drugs <input type="checkbox"/> Latex <input type="checkbox"/> Other <p>Do you think OHS is related to your profession and affects it? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Do you have any knowledge about OHS regarding your profession? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>What are the information sources for OHS?</p> <ul style="list-style-type: none"> <input type="checkbox"/> In the lesson <input type="checkbox"/> Academicians <input type="checkbox"/> OHS course <input type="checkbox"/> Meetings of subject matter experts <input type="checkbox"/> Media <input type="checkbox"/> Friends <p>Do you know the definition of occupational disease? <input type="checkbox"/> No <input type="checkbox"/> Yes: It is . . .</p> <p>Do you want if there is an OHS class in the curriculum? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Do you know the national regulation of OHS?</p> <ul style="list-style-type: none"> <input type="checkbox"/> 2547 (Law Nu) <input type="checkbox"/> 657 (Law Nu) <input type="checkbox"/> 926 (Law Nu) <input type="checkbox"/> 6.331 (Law Nu) <p>Do you know the OHS hazard classification of hospital service?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Less Dangerous <input type="checkbox"/> Dangerous <input type="checkbox"/> Very Dangerous <p>Do you know OHS commitments and rights of patients and health workers in case of a hazardous situation? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Do you have knowledge of OHS regulation novelties? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Do you give the required sensitivity to OHS rules in clinical practice? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Do you think OHS measures taken are sufficient? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>As a student, do you give required sensitivity to PPE usage in clinical practice? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Do you think that your profession requires PPE usage? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>What kind of equipment do you use in clinical practice? <input type="checkbox"/> Glove <input type="checkbox"/> Mask <input type="checkbox"/> Gowns/Goggles <input type="checkbox"/> Bone</p> <p>What were you doing when you faced dangerous situations related to OHS in clinical practice?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Giving regular care to patient <input type="checkbox"/> Preparing drugs for treatment <input type="checkbox"/> During intervention in emergency service <input type="checkbox"/> Applying treatments in clinic <input type="checkbox"/> Tracking vital signs in clinic <input type="checkbox"/> Recapping needles <input type="checkbox"/> During taking patient story <input type="checkbox"/> Delivering laboratory samples (blood, urine, stools) of patient <input type="checkbox"/> Taking patient to bed or transferring to another place <input type="checkbox"/> During clinic medical visit/academician visit <input type="checkbox"/> Other <p>Did you get any rest leave when you experienced clinical hazards? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Whom did you notify in case of a hazardous incident?</p> <ul style="list-style-type: none"> <input type="checkbox"/> I didn't tell to anyone <input type="checkbox"/> I informed the supervisor nurse and he or she interested <input type="checkbox"/> I told my responsible academician and he or she took an immediate interest <p>Is it documented when you encounter a dangerous situation? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>What is the reason for occupational accidents, according to you?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Intensive work tempo <input type="checkbox"/> Lacking in attention <input type="checkbox"/> Not using PPE <input type="checkbox"/> Long working hours <input type="checkbox"/> Inexperience <p>What is your priority when you face a dangerous situation?</p> <ul style="list-style-type: none"> <input type="checkbox"/> I comply if our institution takes every precaution <input type="checkbox"/> My own health is my top priority <input type="checkbox"/> My priority is my job 	<p>What are the occupational threats and risks regarding OHS faced by nursing students in clinical practice?</p> <p>What is the knowledge and perception of nursing students regarding OHS?</p> <p>What is the status of nursing students to comply with OHS measures and PPE use in clinical practice?</p> <p>What are nursing students' thoughts about the origin of risks, threat sources, and actions during the OHS issue?</p>
2. Detection of OHS situation of nursing students		
3. Evaluation of risk control		
4. Assessment		

Note. OHS = occupational health and safety; IM = intramuscular; IV = intravenous; SC = subcutaneous; PPE = personnel protective equipment.

Table 2. Students Identifying Characteristics and Vaccine Status.

Character	n	%
Sex		
Female	96	68.6
Male	44	31.4
Class		
2	80	57.1
3	60	42.9
Working in a job after school for extra money		
Yes	20	14.3
No	120	85.7
Vaccines received before clinical practice		
Hepatitis B	79	56.4
DaBT	75	53.5
Measles, epidemic parotitis, German measles	13	9.3
Influenza	6	4.3
Varicella	5	3.6

Note. DaBT = diphtheria, pertussis, tetanus; DTaP = diphtheria, tetanus, and acellular pertussis.

Characteristics of the Participants

Of the participants, 68.9% were female and 31.4% male; 14.3% of students stated that they work in another job. Some students had been vaccinated in the hospital before beginning clinical practice (Table 2).

Identifying threats. To identify threats, the students were asked the questions shown in Table 1. Students were exposed to hazards related to OHS in clinical practice such as contacting blood and body fluids (90.7%), physical/verbal assault by patients/patients' relatives (60%), nurses and doctors (40.7%), sharp injuries (scalpel, scissors; 30.7%), and needle stick injuries (27.8%). Students who contacted blood, body fluids, chemicals, or other fluids and who experienced slipping, falling, strain, and material fall were female and in the second class, whereas students who experienced physical/verbal assault by patients/patients' relatives/nurses/doctors, sharp injuries (scalpel, scissor), and needle stick injuries were female but in the third class. The difference in problems encountered based on sex was not statistically significant ($p > .05$), while the difference between classes was statistically significant ($p < .05$).

They identified the following problems with PPE usage: Students did not wear protective gowns or use goggles during body care of patients (44.2%), either because gowns/goggles were unavailable or their availability was limited. They had to use a single glove due to insufficient supply of gloves (42.1%) or because they were reprimanded for changing gloves (37.1%), they had to care for more than one patient with a single glove (36.4%), and they had to enter the rooms of patients with respiratory contagious diseases without masks, due to the nonexistence of masks (22.1%). As shown in Table 3, most students who faced these problems were females in their third year. While no statistically

significant difference was found for these problems based on sex ($p > .05$), the difference between classes was statistically significant ($p < .05$).

Proportionate with the problems they faced, students mostly experienced anxiety, anger (77.8%), headache (71.4%), increased tendency to sleep (70.7%), exhaustion (68.5%), backache (61.4%), and early fatigue (57.8%) during clinical practice. The most commonly injured body areas were forearms, palms, wrists, and fingers (52.8%). Most students who experienced these symptoms were in the second class and female (Table 3); no statistically significant difference for injuries was found based on sex ($p > .05$), but the difference based on class was significant ($p < .05$).

Hand sanitizer (89.2%) and latex (60.7%) were the chemicals most used by students. Most students who reported using these chemicals were female and in the second class, and a statistically significant difference was found between both sexes and classes ($p < .05$).

Detection of OHS situation in nursing students. To measure nursing students' OHS knowledge and awareness, subtitled "Detection of OHS situation in nursing students," all students provided positive responses to the fact that OHS relates to and affects their profession. Regarding sociodemographic characteristics, most were female and in the second class, but this was not statistically significant ($p > .05$). Almost all students (95.7%) reported having some knowledge of OHS, from sources such as OHS courses (52.8%), experts' information meetings (48.5%), classes (37.1%), academicians (37.1%), media (20.7%), and friends (15%). The difference between OHS information sources between sex and classes was statistically significant ($p < .05$). Students knew the definition of occupational diseases (90.7%), the national OHS regulations/laws (43.5%), the hazard classification of hospital services in OHS (32.1%), and rights

Table 3. Nursing Students' Experiences of Occupational Hazards and Risks of OHS in Clinical Practices.

	Sex				Class				Total	
	Female		Male		2		3			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Identifying threats										
Dangerous situations related to OHS encountered in clinical practice										
Contact with blood and body fluids	89	70.0	38	29.9	67	52.7	60	47.2	127	90.7
Patient/patient's relatives' physical/verbal assault	66	78.5	18	21.4	40	47.6	44	52.3	84	60.0
Supervisor nurse/doctor physical/verbal assault	44	77.1	13	22.8	20	35.0	37	64.9	57	40.7
Sharp-driller tool injure (scalpel, scissors, etc.)	33	76.7	10	23.2	18	41.8	25	58.1	43	30.7
Take blood sample/IM, IV, SC needle stick after injection	29	74.3	10	25.6	20	51.2	19	48.7	39	27.8
Falling, slipping, strain, material drop	25	59.5	17	40.4	24	57.1	18	42.8	42	30.0
Contact with chemical additives or liquid material	25	71.4	10	28.5	23	65.7	12	34.2	35	25.0
Colleagues' physical/verbal assault	12	66.6	6	33.3	2	11.1	16	88.8	18	12.8
Academicians' physical/verbal assault	5	50.0	5	50.0	4	40.0	6	60.0	10	7.1
χ^2/p value	32.534/ <i>p</i> = .090				70.668/ <i>p</i> = .000					
PPE usage problems in clinical practice										
Not wearing a shirt or goggles due to nonexistence/insufficient number of shirts and goggles during body care	48	77.4	14	22.5	30	48.3	32	51.6	62	44.2
Handle with single glove due to insufficient gloves	46	77.9	13	22.0	24	40.6	35	59.3	59	42.1
Rebuked for changing gloves due to insufficient gloves	41	78.8	11	21.1	20	38.4	32	61.5	52	37.1
Providing care to multiple patients with the same single glove	35	68.6	16	31.3	21	41.1	30	58.8	51	36.4
Entering rooms of patients with respiratory contagious diseases without masks, due to nonexistence of masks	24	77.4	7	22.5	17	54.8	14	45.1	31	22.1
χ^2/p value	7.432/ <i>p</i> = .385				42.717/ <i>p</i> = .000					
Findings and symptoms in clinical practice										
Anxiety, anger	80	73.3	29	26.6	63	57.8	46	42.2	109	77.8
Headache	70	70.0	30	30.0	58	58.0	42	42.0	100	71.4
Increased tendency to sleep	65	65.6	34	34.3	51	51.5	48	48.4	99	70.7
Exhaustion	65	67.7	31	32.2	56	58.3	40	41.6	96	68.5
Backache	60	69.7	26	30.2	48	55.8	38	44.1	86	61.4
Early fatigue	58	71.6	23	28.4	51	62.9	30	37.0	81	57.8
Crying	17	85.0	3	15.0	15	75.0	5	25.0	20	14.2
Irritation on skin	17	85.0	3	15.0	7	35.0	13	65.0	20	14.2
Burning eyes and throat, nose bleeding	13	76.4	4	23.5	5	29.4	12	70.5	17	12.1
Allergy	14	82.3	3	17.6	12	70.5	5	29.4	17	12.1
Hair loss	11	68.7	5	31.2	9	56.2	7	43.7	16	11.4
Breathing difficulty	10	76.9	3	23.0	4	30.7	9	69.2	13	9.2
χ^2/p value	23.256/ <i>p</i> = .107				37.038/ <i>p</i> = .002					
Common areas of the body injured in clinical practice										
Forearm, wrist, palm, finger	54	72.9	20	27.0	43	58.1	31	41.8	74	52.8
Anger	10	83.3	2	16.6	4	33.3	8	66.6	12	8.5
Patella, calf, foot	7	70.0	3	30.0	2	20.0	8	80.0	10	7.1
Head (head, eye, face, etc.)	4	66.6	2	33.3	2	33.33	4	66.6	6	4.2
χ^2/p value	5.986/ <i>p</i> = .649				17.774/ <i>p</i> = .023					
Chemicals contacted in clinical practice										
Hand antiseptic	90	72.0	35	28.0	68	54.4	57	45.6	125	89.2
Latex	69	81.1	16	18.8	53	62.3	32	37.6	85	60.7
Formaldehyde, glutaraldehyde, ethylene oxide, antineoplastic cancer drugs	22	57.8	16	42.1	12	31.5	26	68.4	38	27.1
χ^2/p value	23.437/ <i>p</i> = .003				24.363/ <i>p</i> = .002					

Note. OHS = occupational health and safety; IM = intramuscular; IV = intravenous; SC = subcutaneous; PPE = personnel protective equipment. Bold value significance that $p < .05$ and statistically significant difference was found.

Table 4. Nursing Students' OHS Knowledge and Awareness.

	Sex				Class				Total	
	Female		Male		2		3			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Detection of OHS situation in nursing students										
Thinking of OHS is related to their profession and effects it										
Yes	96	68.5	44	31.4	80	57.1	60	42.8	140	100
Having knowledge of OHS										
True	93	69.4	41	30.6	76	56.7	58	43.2	134	95.7
χ^2/p value	1.926/ <i>p</i> = .165				1.070/ <i>p</i> = .301					
Information sources of students for OHS										
OHS course	54	72.9	20	27.0	45	60.8	29	39.1	74	52.8
Meetings of subject matter experts	48	70.5	20	29.4	33	48.5	35	51.4	68	48.5
In the lesson	37	71.1	15	28.8	27	51.9	25	48.0	52	37.1
Academicians	33	63.4	19	36.5	34	65.3	18	34.6	52	37.1
Media	15	51.7	14	48.2	11	37.9	18	62.0	29	20.7
Friends	7	33.3	14	66.6	11	52.3	10	47.6	21	15.0
χ^2/p value	21.791/ <i>p</i> = .001				13.593/ <i>p</i> = .035					
Knowing definition of occupational disease										
True	92	72.4	35	27.5	72	56.6	32	25.2	127	90.7
χ^2/p value	9.502/ <i>p</i> = .002				0.113/ <i>p</i> = .737					
Wanting an OHS class in curriculum										
Yes	78	70.2	33	29.7	62	55.8	49	44.1	111	79.2
χ^2/p value	0.718/ <i>p</i> = .397				0.362/ <i>p</i> = .547					
Knowing national OHS regulation/law										
True	47	77.0	14	22.9	37	60.6	24	39.3	61	43.5
χ^2/p value	3.605/ <i>p</i> = .058				0.545/ <i>p</i> = .460					
Knowing OHS hazard classification of hospital service										
True	35	77.7	10	22.2	22	48.8	23	51.1	45	32.1
χ^2/p value	2.127/ <i>p</i> = .145				1.583/ <i>p</i> = .208					
Knowing OHS commitments and rights of patients and health workers that might be result from hazardous situations										
Yes	26	60.4	17	39.5	19	44.1	24	55.8	43	30.7
χ^2/p value	1.684/ <i>p</i> = .194				3.868/ <i>p</i> = .049					
Having knowledge of OHS regulation novelties										
Yes	3	30.0	7	70.0	5	50.0	5	50.0	10	7.1
χ^2/p value	7.434/ <i>p</i> = .006				0.224/ <i>p</i> = .636					

Note. OHS = occupational health and safety.

Bold value significance that $p < .05$ and statistically significant difference was found.

and legal commitments (30.7%) that might result from workers and patients encountering dangerous OHS incidents. A total of 79.2% of students wanted separate classes regarding OHS as part of the curriculum. Although students reported having knowledge of OHS and thought that it relates to their profession, only 7.1% were aware of new OHS regulations/laws. The difference between sexes and classes with regard to knowledge of OHS and regulations, desiring an OHS class as part of the curriculum and knowing the hazard classification of hospital services, was not significant ($p > .05$). A statistical difference was found for sex in resources of OHS knowledge, new OHS regulations, and knowing the definition of occupational illness, while a significant difference was found for classes in terms of legal commitments and rights resulting from dangerous incidents in OHS ($p < .05$; Table 4).

Evaluation of risk control. Table 5 shows to evaluate risk control measures. In total, 92.1% of students stated that they gave the required sensitivity to OHS rules. Most students thought that their profession required PPE usage (97.1%) and that they were sensitive enough to use PPE (97.8%). The difference between sex and classes in this respect was not significant ($p > .05$). When asked what kind of PPE they used in clinical practice, most reported using gloves (100%), masks (90%), and bone (36.4%). As seen in Table 4, a significant difference was found between classes and sex with regard to the scope of PPE that was used ($p < .005$). The percentage (11.4%) of students who felt that OHS precautions were sufficient for the problems they faced was very low. No significant difference was found between classes in terms of considering "OHS precautions sufficient" ($p > .005$), but a significant difference was found between sexes ($p < .005$).

Table 5. Nursing Students' Compliance With OHS Measures and PPE Usage.

	Sex				Class				Total	
	Female		Male		2		3			
	n	%	n	%	n	%	n	%	n	%
Evaluation of risk control										
Giving required sensitivity to OHS rules in clinical practice										
Yes	89	68.9	40	31.0	72	55.8	57	44.1	129	92.1
χ^2/p value	0.135/ $p = .713$				1.184/ $p = .277$					
Thinking that OHS measures taken are sufficient										
Yes	5	31.2	11	68.7	10	62.5	6	37.5	16	11.4
χ^2/p value	11.675/ $p = .001$				0.212/ $p = .645$					
Giving required sensitivity to PPE usage in clinical practice										
Yes	94	68.6	43	31.3	77	56.2	60	43.8	137	97.8
χ^2/p value	0.005/ $p = .943$				2.299/ $p = .129$					
Thinking that nursing profession requires PPE usage										
Yes	94	69.1	42	30.8	76	55.8	60	44.1	136	97.1
χ^2/p value	1.737/ $p = .187$				2.329/ $p = .127$					
PPE equipment used in clinical practice										
Glove	96	68.5	44	31.4	80	57.1	60	42.8	140	100.0
Mask	90	71.4	36	28.5	69	54.7	57	45.2	126	90.0
Bone	29	56.8	22	43.1	6	11.7	45	88.2	51	36.4
Gowns/goggles	30	85.7	5	14.2	8	22.8	27	77.1	35	25.0
χ^2/p value	15.788/ $p = .007$				90.835/ $p = .000$					

Note. OHS = occupational health and safety; PPE = personnel protective equipment.
 Bold value significance that $p < .05$ and statistically significant difference was found.

Assessment. The students mostly encountered occupational hazards while executing treatment in clinics (54.2%), preparing drugs for treatment (41.4%), tracking fire-pulse-blood pressure (25%), maintaining general care (22.1%), during intervention in emergency services (22.1%), and recapping needles (20.7%). No significant difference was found between sexes for work during dangerous situations ($p > .005$), but the difference for classes was significant ($p < .005$). Most students reported incidents related to occupational hazards to supervisor nurses (54.3%), and supervisor nurses showed instant interest. Students stated that occupational accidents were caused by lack of attention (84.2%) and intensive work tempo (81.4%). They reported that when they face hazardous situations, they give priority to their health first (65%). No significant difference was found for sex or classes in taking rest leave, the person to whom incidents were reported, documentation of incident, or practice type in which they were exposed to hazards ($p > .05$; Table 6).

Discussion

The discussion is handled within the framework of the risk assessment process based on the findings, within the framework of the identifying threats, detection of OHS situation in nursing students, evaluation of risk control, and assessment subheadings, and presented in Table 7 in comparison with the relevant literature.

Conclusion

This study has demonstrated that the conditions of OHS in clinical practice areas are very limited for students. Students in this study were exposed to physical, chemical, and physiological risks, and were mainly affected psychologically, followed by physically. It was concluded that the students were at risk of getting burnout syndrome before they start the nursing profession by experiencing similar symptoms to burnout syndrome (anxiety and irritability, low back and back pain, headache, increased tendency to sleep, exhaustion, early fatigue). Although nearly all students reported having knowledge of OHS at the end of their study, their knowledge and awareness of OHS were revealed to be very low. Moreover, in terms of OHS-related hazardous incidents, students were mostly exposed to contact with blood and body fluids and had serious problems accessing PPE, which comprises a protective measure against exposure to physical/verbal assault. They experienced anxiety and irritability in clinical practice. Most students also reported symptoms of backache, headache, increasing tendency to sleep, exhaustion, and fatigue. The chemicals with which students had most contact were latex and hand antiseptic, which they reported to have caused skin irritation, burning eyes and throat, nose bleeds, and allergy. Students faced hazardous incidents when applying treatments in clinics, preparing drugs, tracking fire-pulse-blood pressure, recapping needles, and making interventions in emergency services. Most such

Table 6. Nursing Students' Thoughts on Hazard Sources and Compliance With OHS Precautions.

Evaluation	Sex				Class				Total	
	Female		Male		2		3			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Practice made and hazardous situation exposed in clinic										
Applying treatments in clinic	52	68.4	24	31.5	36	47.3	40	52.6	76	54.2
Preparing drugs for treatment	43	74.1	15	25.8	31	53.4	27	46.5	58	41.4
Tracking vital signs in clinic	27	77.1	8	22.8	19	54.2	16	45.7	35	25.0
Giving regular care to patient	18	58.0	13	41.9	13	41.9	18	58.0	31	22.1
During intervention in emergency service	19	61.2	12	38.7	15	48.3	16	51.6	31	22.1
Recapping needles	19	65.5	10	34.4	15	51.7	14	48.2	29	20.7
During taking patient story	16	66.6	8	33.3	5	20.8	19	79.1	24	17.1
Delivering laboratory samples (blood, urine, stools) of patient	17	70.8	7	29.1	17	70.8	7	29.1	24	17.1
Taking patient to bed or transferring to another place	12	80.0	3	20.0	7	46.6	8	53.3	15	10.7
During clinic medical visit/academician visit	4	40.0	6	60.0	5	50.0	5	50.0	10	7.1
χ^2/p value	16.427/ <i>p</i> = .288				32.127/ <i>p</i> = .004					
Taking rest leave for incidents in clinic										
Yes	2	33.3	4	66.6	2	33.3	4	66.6	6	4.2
χ^2/p value	3.326/ <i>p</i> = .068				1.413/ <i>p</i> = .235					
Notified person in case of hazardous incident										
I informed the supervisor nurse and he or she was interested	50	65.7	26	34.2	48	63.1	28	36.8	76	54.2
I did not tell anyone	20	80.0	5	20.0	14	56.0	11	44.0	25	17.8
I told my responsible academician and he or she took immediate interest	9	81.8	2	18.1	4	36.3	7	63.6	11	7.8
χ^2/p value	4.484/ <i>p</i> = .344				7.481/ <i>p</i> = .113					
Documentation in case of dangerous situation										
Yes	23	71.8	9	28.1	20	62.5	12	37.5	32	22.8
χ^2/p value	0.431/ <i>p</i> = .512				0.566/ <i>p</i> = .452					
Reasons for occupational accidents										
Lacking in attention	77	65.2	41	34.7	64	54.2	54	45.7	118	84.2
Intensive work tempo	82	71.9	32	28.0	60	52.6	54	47.3	114	81.4
Not using PPE	64	66.6	32	33.3	46	47.9	50	52.0	96	68.5
Long working hours	61	67.7	29	32.2	43	47.7	47	52.2	90	64.2
Inexperience	50	64.1	28	35.9	47	60.2	31	39.7	78	55.7
χ^2/p value	9.267/ <i>p</i> = .099				28.029/ <i>p</i> = .000					
Facing with dangerous situation										
My own health is my top priority	57	62.6	34	37.3	50	54.9	41	45.0	91	65.0
I comply if our institution takes every precaution	31	81.5	7	18.4	28	73.6	18	47.3	38	27.1
My priority is my job	4	57.1	3	42.8	6	85.7	1	14.2	7	5.00
χ^2/p value	4.926/ <i>p</i> = .177				3.657/ <i>p</i> = .301					

Note. OHS = occupational health and safety; PPE = personnel protective equipment. Bold value significance that $p < .05$ and statistically significant difference was found.

injuries occurred to their forearms, wrists, palms, and fingers. The most frequently cited reasons for occupational accidents were lack of attention and heavy/intensive work tempo. This study is limited as the study sample came from a single center; thus, the results cannot be compared with other centers and the findings cannot be generalized to all nursing schools.

Recommendations

Despite these limitations, we have provided several recommendations below. Because nurses and other medical

workers face common occupational risks, it may be possible to apply these recommendations to other medical students as well. To prevent occupational exposure and its effects on nursing students, burning out syndrome, and other occupational harms before entering the nursing profession, it is recommended that all students take OHS training. This study and relevant literature reveals that nursing students have two main platform working area and learning area, that is, the college and hospital setting. To protect students from occupational hazards and to acquire an occupational safety culture in students, students have to be trained in both college and hospital settings. In college, nursing students

Table 7. Discussion.

Problem	Related literature Author, Year	Problem prevalence (%) and explanation in related literature	Problem prevalence (%) and explanation in current study	Comments
I. Identifying threats				
Vaccination status	Çelikalp et al. (2017) Togan et al. (2015) Kömerik et al. (2005) Altrok et al. (2009) www.mevzuat.gov.tr/ MevzuatMetin/1.5.6331.pdf	In literature, it is stated that the students had health examination tests done before clinical practice within the scope of OHS, and hepatitis markers (Hepatitis B, Hepatitis C), ELISA test, chest radiography, and blood count are among the first of these tests. Hepatitis B vaccination rate was found to be 83.6% in Togan et al. and 71% in the study conducted by Kömerik et al. Çelikalp et al. found that the rate of vaccination against hepatitis B was 95.2%, and Altrok et al. found that the hepatitis B vaccination rate was 79.5% for health workers	In our study, 56.4% of the students had the Hepatitis B vaccine and 53.5% had DaBT vaccines before clinical practice	In the second paragraph of Article 15 of the "Occupational Health and Safety Law No. 6331" in Turkey, it is stated that employees cannot be started to work without health reports. In this case, a health report indicating health status is requested from the students who will start the internship by the institutions. It is assessed that almost half of the students had to have vaccination done before clinical practice, as a result of the obligation imposed by law
Contact with blood and body fluids	Doig (2000) Tarantola et al. (2003) Hsieh et al. (2006) Adesunkanmi et al. (2003)	In the study of Doig, students' contact with blood and body fluids was reported as 32%. Tarantola et al. stated that blood and body fluid exposure was 60% in nurses and nursing students in the study with 7,649 health care workers in 61 hospitals. Hsieh et al., investigating the exposure of health care workers to blood and body fluids, reported that the exposure to health care workers was 60.6%. Adesunkanmi et al., investigating the prevalence of accidental injuries and exposure to body fluids among staff during general surgery, reported 10.5% of surgical personnel were exposed to severe injuries and body fluids	In this study, 90.7% of the students came into contact with blood and body fluids	Contact with blood and body fluids carries risks for health care workers, and it is a common characteristic of health care services. Giving that health care workers are under risk in terms of OHS, the risk is higher for unexperienced nursing students. Therefore, OHS training is more important for nursing students than actual health care workers
Physical/verbal assault (from patient/ patient's relatives— supervisor nurse/ doctor—colleagues— academicians)	Samadzadeh and Aghamohammadi (2018) Budden et al. (2017) Tee et al. (2016) Koç and Batkın (2016) Eljedi (2015) Timm (2014) Seibel (2014) Unal et al. (2012) Clarke et al. (2012) Magnavita and Heponiemi (2011)	International reports indicate that student nurses, such as nurses working in many countries, are often exposed to unpleasant violence in the clinical setting. These experiences range from dissatisfaction, witnessing, or experiencing verbal or nonverbal assault to physical violence. In the literature, the frequency of violence experienced by nursing students is high. The clinical exposure of nursing students to violence was at a ratio of 34% in Italy, 35.3% in Iran, 42.2% in the United Kingdom, and 50.3% in Turkey. They are exposed to violence by the patient and his family, faculty or hospital staff, nurses, and instructors. It is also stated in the literature that there is violence due to other nursing students	In this study, 60% of the students were physically/verbally attacked by patient/ patient's relatives and 40.7% by clinical nurses and doctors. Although it was not statistically significant in terms of gender, females who were subjected to physical/verbal assault by the patient/patient's relatives/clinical nurses/ doctors were the most ones and the third grade was found to be statistically significant between the grades	Our results are consistent with the studies in the literature, but it is not compatible with Tee et al.'s study at some point. Although Tee et al. found that nursing students were exposed to physical/verbal attack more frequently by nurses, hospital staff, and administrators (31.1%) and less frequently (4.9% to 1.2%, respectively) by patients and their relatives, in our study, they were more frequently experienced from physical/verbal attack by patients/relatives and less frequently by physical nurses and doctors. The results of the study, relatively higher from other studies, may be partly explained by differences in definitions of clinical violence due to socioeconomic cultural diversity of populations in other studies. Students may not be familiar with the definition of violence.

(continued)

Table 7. (continued)

Problem	Related literature Author, Year	Problem prevalence (%) and explanation in related literature	Problem prevalence (%) and explanation in current study	Comments
Sharp instrument injuries (scalpel, scissor, etc.) and needle stick injury	Aghajloo et al. (2011) Jackson et al. (2011) Çelebioğlu et al. (2010) Ferns and Meerabeau (2009) Zhang et al. (2018) Suliman et al. (2018) Budden et al. (2017) Nawafleh et al. (2017) Qayn and Einhellig (2017) Büyüç et al. (2016) Yıldırım and Özpulat (2015) Prasuna et al. (2015) Ünver et al. (2012) Irmak and Baybuga (2011) Karadağ (2010) Smith and Leggat (2005)	The incidence of sharp instrument injuries during the clinical applications of the students ranged from 18.1% to 84.0% in the literature. Smith and Leggat reported that the incidence of sharp instrument injuries was 15.0% in Taiwanese students and 18.0% in Italian nursing students, and these rates ranged from 22.0% to 72.0%. The prevalence of sharp instrument injuries among nursing students was 35.0% in Singapore, 30.0% to 33.0% in the United States, 29.0% in Australia, 24.0% in France, and 12% in the United Kingdom. Students are particularly susceptible to needle stick injuries due to lack of awareness of workplace safety and having limited clinical experience. The frequency of needle stick injury studies conducted in Turkey ranges between 19.4% and 52.5%, and in other countries ranged from 13.9% to 59.9%	In this study, 30.7% of the students experienced sharp instrument injuries (scalpel, scissors, etc.), and 27.8% experienced needle stick injuries after taking blood samples/IM, IV, SC injection	Also, due to cultural values and norms in Turkey, especially in hospitals and/or clinics, universities have lower rates of violence by staff; it may be explained because they are more obedient and respectful to senior elders. Although the nurse is a caregiver, the violence caused by hospital staff is a major concern. However, the causes of such violence are not well understood. Future research is needed to explain the factors contributing to such clinical violence and to identify intervention approaches to reduce violence in clinics. Research-based information on the causes and increasing nature of violent incidents will facilitate the planning of interventions Exposure to blood-borne pathogens, which result in serious occupational diseases due to needle stick injuries, is a potential risk factor for nursing students. In this study, sharp instrument injury and needle stick injury's results are higher than studies in other countries but are close to similar studies in Turkey. The injuries rate is high because students are at the risk of exposure to occupational hazards in clinical practice due to lack of trainers and an increasing number of students working in many active laboratories, increasing laboratory hours in nursing curricula, and decreasing clinical practice hours may decrease the students' exposure to clinical risks
PPE usage problems in clinical practice	Duminy (2010) Ganczak and Szych (2007)	In the studies conducted, it was stated that the compliance of surgical nurses to the use of PPE varies according to PPE; that there is not enough PPE in the study areas, and that if there is a deficiency in protective equipment, compliance with standard measures may be affected. In a study by Ganczak and Szych, gloves were shown to be the most commonly used protective equipment that reflects the long-term tradition of wearing. However, regular glove use was reported to be 17% in the survey participants. In the study of Ganczak and Szych, 9% of the nurses reported	When the problems experienced by the students about the use of PPE in clinical applications were investigated, students managed with a single glove because they were scarce (42.1%) or rebuked (37.1%) with each glove replacement, and had to treat/care for more than one patient during the internship with one glove (36.4%); because there was no mask, they had to enter the room of the patients with respiratory disease without mask (22.1%).	Our findings are consistent with the literature. In our study, as in the literature, gloves are the most commonly used PPE, while difficulties in the procurement of PPE are the main factors. A comprehensive understanding of infection prevention and control is important for nurses who want to protect themselves, patients, colleagues, and the general public from infection. PPE, such as gloves, gowns, and/or gowns and eye protection, is an important aspect of infection prevention and control for all health care personnel, including nurses.

(continued)

Table 7. (continued)

Problem	Related literature Author, Year	Problem prevalence (%) and explanation in related literature	Problem prevalence (%) and explanation in current study	Comments
Findings and symptoms in clinical practice	Abou-Elwafa et al. (2017) Huang et al. (2016) Ejedi (2015)	that they wear protective goggles regularly and showed the lack of supplies as a reason for not using PPE	In addition, they did not wear any gowns and did not wear any goggles (44.2%) during body care because of the lack of gowns and goggles	Occupational safety regulations require employers to provide employees with adequate protection against harmful substances, including microorganisms, and this issue needs to be addressed with institutional support. Supplying adequate equipment can result in high costs, but the resulting cost will be much lower than all costs associated with the treatment of health care workers
Common areas of the body injured in clinical practice	Yildirim and Özpulat (2015) Önder et al. (2011) Omaç et al. (2010)	In the literature, it was determined that nursing students had musculoskeletal complaints, mostly leg/foot (55.8%) and back pain (46.7%). In the study of Abou-Elwafa et al., it was stated that musculoskeletal complaints and occupational injuries differed significantly between female students (75.4%, 71.7%) compared with male students (24.6%, 28.3%, respectively). In the study of Abou-Elwafa et al., 74% of the students reported that musculoskeletal complaints were more frequent in the legs/feet (55.8%) and back (46.7%) and that the musculoskeletal morbidity of women is higher than men	Students reported that they experienced symptoms of most anxiety and irritability during their clinical practice (77.9%), headache (71.4%), increased tendency to sleep (70.7%), exhaustion (68.5%), low back and upper back pain (61.4%), and early fatigue (57.8%). It was found that the majority of the students who experienced these symptoms and injuries were females and second grade	Our results are consistent with the study of Abou-Elwafa et al. The higher incidence of symptoms in women may be that women are more vulnerable to the health impact of certain demands and constraints that they face with patient care during clinical practice
Chemical contacted in clinical practice	Abou-Elwafa et al. (2017) Elewa and Sahar-Banan (2016) Kartal et al. (2015) Lamberti et al. (2015) Katrancha and Harshberger (2012)	In the study of Omaç et al., the injury area in the body of nurses was questioned and reported as the right hand (41.3%), the left hand (40.0%), the arm (5.9%), and then the other regions (12%, 8—trunk, feet, legs). In the study of Önder et al., 18.6% of the nurses stated that they had hand—finger cuts, 6.4% of them had pinch—bruise wounds, and 13.8% of them had an accident in the form of needle prick. In the study of A. Yildirim and Özpulat, the injury sites were questioned according to the frequency of injury: 65.0% (67 people) of the right hand, 32.0% (25 people) of the left hand, 2.1% of the arm, and 0.9% of other parts (trunk, leg, foot). They also reported that they were injured due to drug preparation for injector, lancet—scalpel use, injector, and ampoule fractures	As a result of these dangerous situations, the most injured body area of the students was found to be the forearm, wrist, hand, and finger (52.8%). Students encountered dangerous situations and were injured while applying the treatments in the clinic (54.3%), preparing drugs for treatment (41.4%), following vital signs (25%), giving general care to the patient (22.1%), during the intervention in the emergency department (22.1%), and closing the needle tip (20.7%)	Our results are consistent with the literature. The high incidence of needle stick and sharp instrument injuries, which can be prevented by safe tool use, is thought due to the lack of information on safe tool use
Chemical contacted in clinical practice	Abou-Elwafa et al. (2017) Elewa and Sahar-Banan (2016) Kartal et al. (2015) Lamberti et al. (2015) Katrancha and Harshberger (2012)	Worldwide, latex sensitivity is reported to be 1% in the general population and 5% to 12% for occupational latex sensitivity. In a study conducted with students, the frequency of skin problems related to the use of latex gloves was reported to be 4%, which was lower in students than in health care workers.	Hand antiseptic (89.2%) and latex (60.7%) were found to be the most commonly contacted chemicals by students in clinical practice. In this study, students experienced symptoms of skin irritation (14.2%); burning in the eyes, nose, and throat; bleeding from the nose (12.1%); and allergies (12.1%).	Our results are consistent with the literature. In this study, it was shown that female students were at high risk in terms of latex allergy as it conforms with similar studies/ literature.

(continued)

Table 7. (continued)

Problem	Related literature Author, Year	Problem prevalence (%) and explanation in related literature	Problem prevalence (%) and explanation in current study	Comments
	Çelik et al. (2013) Yalçın et al. (2011) Eliakimu et al. (2008) Diéguez et al. (2007) Leggat and Smith (2007)	Elewa stated that most nursing students had irritation in their eyes, nose, and throat due to natural latex gloves and other latex-containing medical devices. Similarly, the students were exposed to chemical hazards and experienced allergic reactions ranging from skin rash, asthma, dermatitis, to severe itching and irritation. Eliakimu et al. reported that the use of chemicals such as antiseptics and disinfectants used in hospitals for cleaning contributes to the burning of the skin. In the study by Kartal et al., dermatitis-like skin lesions were the most common clinical complaints developed after contact with medical latex products. Allergic complaints due to latex like dermatitis and urticaria in health school students are also in the foreground in similar studies in the literature. The study of Kartal et al. reported that nursing students had complaints of swelling around the eyes, mouth, and throat, and had complaints of severe respiratory system problems	It was found statistically significant that the majority of the students who experienced these symptoms and injuries were female and second grade	It has been reported in the studies about the continuation of latex contact, and the lack of treatment increases the risk of systemic allergic reactions to skin irritations due to the use of latex gloves. It is important to identify individuals who are at risk for susceptible or latex allergy during school years and to take preventive measures in these individuals to prevent life-threatening reactions such as anaphylaxis in the future
2. Detection of OHS situation in nursing students				
Having knowledge of OHS and information sources	Elewa and Sahar-Banan (2016) Boucaut and Cusack (2016) Burdurlu (2014) Al-Dabbas and Abu-Rmeileh (2012) Baniyousef et al. (2015) Aluko et al. (2016) www.mevzuat.gov.tr/ MevzuatMetin/1.5.6331.pdf Tavolacci et al. (2008)	In the literature, it was observed that the students had a wide awareness of OHS despite the lack of clinical experience in the first years. In the third year, it was found out that they had knowledge and experience on OHS issues besides awareness. It was also revealed that nursing students gained their knowledge about occupational safety in their courses. In the study conducted in Palestine, it was reported that the majority of the participants obtained information about blood-borne infectious disease mainly from official lectures and then books. In the study conducted in Saudi Arabia, it was stated that the source of information was the education curriculum. It was seen that in Burdurlu's (2014) study, 33.1% of the participants had good knowledge of OHS and 36.5% received OHS training. Aluko et al.'s study found 57.6% had high knowledge of occupational hazards, 42.6% low knowledge of occupational hazards, 58% acquired through professional training, 67% aware of job aids, and 93% aware of PPE	In this study, almost all of the students (95.7%) stated that they have knowledge of OHS, and they showed as information source of the OHS course (52.8%)	In Turkey, with the second article of the Occupational Health and Safety Law No. 6331, Occupational Health and Safety Trainings are compulsory for the students with the inclusion of the students accepted to do internships in the workplaces within the scope of employee safety. It can be assessed that is because of that law the students got training before clinical practice

(continued)

Table 7. (continued)

Problem	Related literature Author, Year	Problem prevalence (%) and explanation in related literature	Problem prevalence (%) and explanation in current study	Comments
Knowing the definition of occupational disease	Çelikalp et al. (2017)	To prepare the students for work-life during the education process and to predict the dangers they may face in their professional life, the students should have knowledge about occupational diseases and preventive practices. In the study conducted by Çelikalp et al. (2017), it was determined that the knowledge level of the students about the definition of occupational accidents and occupational diseases before education was very insufficient. The same study found that 12.9% of the health workers were fully aware of their occupational risks and needed serious consideration	In this study, 90.7% of the students knew the definition of occupational disease	This ratio (90.7%), which is high in our study, is important in terms of showing that the training given to students on workplace risk factors is effective. However, low results in the literature reveal the necessity of training programs on the subjects
Wanting an OHS class in curriculum	Aksoy et al. (2013) Al-Momani et al. (2013) Yang et al. (2007)	Aksoy et al. (2013) evaluated the OHS training given to students studying in some associate degree programs, and the students agreed that OHS courses they took during the associate degree programs increased their occupational safety awareness. Al-Momani et al. described training as an important factor in reducing the risk of needle stick and sharp instrument injuries. Yang et al. found that the rate of needle stick and sharp instrument injuries in nursing school students decreased to 25.2% after education from 50.5%	In our study, 79.3% of the students wanted to have courses in the curriculum related to worker health and safety	As is seen in the studies, OHS training should be compulsory in terms of providing OHS, and the willingness of the students in this regard can be considered as a reflection of their lack of knowledge about OHS
Knowledge of OHS' regulations/OHS' commitments, novelties, rights of patients, and health workers	Burdurlu (2014)	Burdurlu (2014) reported that almost half (48.1%) of the health workers receiving OHS training knew their rights in the event of an occupational accident; it is stated that those who have knowledge about the regulations do not know much about innovations	In this study, 43.6% of the students stated they knew about the OHS law in our country and 30.7% about the legal obligations and rights that may arise as a result of dangerous situations that both employees and patients may experience. Although the students know and say that OHS is related to their professions, the percentage of students who have knowledge of the innovations introduced by the OHS regulations is 7.1%	Even if there is somehow knowledge of OHS regulations, it is not effective to protect nursing students without the proper acquisition of OHS culture. Informative approach, practice, and monitoring in OHS training may have a positive effect on behavioral acquisition and OHS culture
3. Evaluation of risk control				
Giving required sensitivity to PPE usage in clinical practice and thinking of the nursing profession requires PPE usage	Duminy (2010) Ganczak and Szych (2007)	In the studies conducted in the literature, it was stated that the compliance of surgical nurses to the use of PPE varies according to PPE types, that there is not enough PPE in the study areas, and that if there is a deficiency in the protective equipment, compliance with standard measures may be affected	In this study, 97.8% of the students stated that they showed sensitivity to use PPE in clinical applications, and most of them (97.1%) stated that their profession requires PPE	The main role of PPE is to decrease the risk of microorganism transmission between health care workers and patients. Even so, there is a high score of students' sensitivity to use PPE; their PPE usage scores (in the "Identifying Threats" section) show that PPE may not be effectively used as intended

(continued)

Table 7. (continued)

Problem	Related literature Author, Year	Problem prevalence (%) and explanation in related literature	Problem prevalence (%) and explanation in current study	Comments
PPE equipment used in clinical practice	Burdurlu (2014) Timm (2014) Magnavita and Heponiemi (2011) Altrok et al. (2009) Güngör Özdemir and Şengöz (2012) Çalışkan (2017)	In the study of Burdurlu (2014), the majority of the employees (71%) were using protectives such as wearing gloves, masks, and so on, during their work. The study conducted by Çalışkan and Akdur was seen as individual measures taken by the nurses against the risks they face in their working environments; the use of gloves and masks was 62.8%, infection prevention 33.4%, compliance with personal hygiene rules 30.4%, and vaccination 13.1%. Önder, Ağırbaş,, Yaşar, and Aksoy stated that those who regularly use PPE against occupational risks are 13.4% among physicians and 32.3% among nurses. In their study, Altrok et al. found that the rate of use of protective materials among health workers, in general, was quite high (72%). In their study, Güngör Özdemir and Şengöz determined the usage of protective materials as gloves 45%, mask 19%, gown 17%, and glasses 4%, respectively. In Çalışkan's study, the behaviors of the personnel to use PPE according to their gender; women's behaviors of using PPE were higher than men.	100% of the students stated that they wear gloves as PPE equipment and 90% of the students wear masks as PPE equipment. Consistent with the study of the Çalışkan, in our study, female students used PPE at higher levels compared with men, which is statistically significant	It can be said that women are careful to take precautions against job risks compared with men, that the sense of protection is more intense because of the role of women and mother and they give importance to using PPE
4. Assessment				
Hazardous situation exposed in clinic	Yeshitila et al. (2015) A. Yildirim and Özpulat (2015) Amini et al. (2016) Kepenek and Şahin-Eker (2017) Kurşun and Arslan (2014) Nawafleh et al. (2017) Abou-Elwafa et al. (2017)	In the literature, needle stick and sharp instrument injuries occur during injection, when the patient moves suddenly; during intravenous administration; and during the transportation or disposal of waste. It has been found in the literature that needle stick injuries often occur when preparing treatment and closing the injector cap	Students encountered dangerous situations and were injured while applying the treatments in clinical practice (54.3%), preparing drugs for treatment (41.4%), following vital signs (25%), giving general care to the patient (22.1%), during emergency room intervention (22.1), and closing the needle tip (20.7%)	Numerous obstacles may arise during clinical treatment. It has to be proper procedures to follow treatments in the clinical environment. The nursing students should also be trained to follow procedures
Documentation in case of dangerous situation in clinic/taking rest/ notified person	Suliman et al. (2018) Nawafleh et al. (2017) Prasuna et al. (2015) Azadi et al. (2010) Altrok et al. (2009) Talas (2009)	Similarly, the frequency of noninjury reporting among nursing students ranged from 43.0% to 86.3%. The low rate of reporting of accidents and injuries of students is important in terms of making it difficult to determine the risks that students face in clinics. In a study conducted in Taiwan, it was stated that only 39.0% of nursing students reported after injury. In the study of Azadi et al. on the incidence of needle stick and sharp instrument injuries that were not reported among Iranian nurses, it was found that approximately	Nevertheless, the ratio of students who documented a dangerous situation in clinical practice was as low as 22.9%. The students (54.3%) explained the dangerous situation mostly to the clinical nurse and stated that the clinical nurse was immediately interested	The necessity of keeping records and inspections related to OHS systems, occupational accidents, occupational diseases, and dangerous situations in enterprises is considered as a subject accepted by both national and international experts. The rules regarding the content of the data to be collected regarding occupational accidents are stated in the "Recording and Notification of Occupational Accidents and Diseases" published by ILO in 1996 (Uçak, 2009).

(continued)

Table 7. (continued)

Problem	Related literature Author, Year	Problem prevalence (%) and explanation in related literature	Problem prevalence (%) and explanation in current study	Comments
	Büyüç et al. (2016) Yang et al. (2004) www.mevzuat.gov.tr/ MevzuatMetin/1.5.6331.pdf Uçak (2009)	45% of the students were injured with needle stick and sharp instrument injuries at least once during their clinical experience and about 36% of these injuries were reported. Injury reporting rates were 12.7% in the study of Altrok et al., 43.9% in the study of Talas, and 14.8% in the study of Büyüç et al.		It is stated that if accidents occur in the workplace where the student is an apprentice or trainee, the Social Security Institution should be notified within three working days by the second paragraph of Article 14 of the Occupational Health and Safety Law No. 6331 in Turkey. Although notification of accidents is mandatory by law in Turkey, the notification rates were low. It is considered that it is because of ineffective OHS training received by the students involved in occupational accidents and the ignorance of supervisors who guide students
Reasons for occupational accidents	Burdurlu (2014) Souza-Borges et al. (2014) Yeshitilla et al. (2015) Huang et al. (2016)	In the literature, the reasons for occupational accidents and occupational diseases include inexperience; not using protective, carelessness, long working hours; and intensive work tempo. In the study of Burdurlu (2014), health workers stated that occupational accidents and occupational diseases were preventable and for occupational accidents stated reasons as intensive work tempo, long working hours, lack of protective use, carelessness, and inexperience. Lack of supervision of the academician, technical mistakes made by the student, crowded working environment, and lack of skills are also mentioned for occupational accidents	In this study, the students stated that the most common causes of occupational accidents were inattention (84.3%) and intensive work tempo (81.4%), while they stated that their priority was their health (65%) when faced with a dangerous job	The results of this study confirm previous studies. That reason comes from the characteristics of the working environment. Hospitals are intense working areas, and therefore there are lots of things happening at the same time and also require monitoring activities for 24 hr. It is highly possible for an instant change in the working area. Intensive work tempo is indispensable and could bring inattention with time. Organizational measures and enough health workers could decrease risks for occupational accidents

Note. OHS = occupational health and safety; ELISA = enzyme-linked immunosorbent assay; DaBT = diphtheria, pertussis, tetanus; IM = intramuscular; IV = intravenous; SC = subcutaneous; PPE = personnel protective equipment. ILO = International Labour Organization.

should take an extra class for OHS especially for health care workers, and after clinical practice, students could discuss the work environment in the class and increase their awareness. In hospital settings and in clinical practice, it should be given OHS pretraining before starting any clinical practice by a responsible OHS person, and nursing students should be monitored and checked. It is recommended that all students take OHS training, including the wide concepts of the recommended OHS education before and after clinical practice. Both the previous literature and our study reveal that there is a lack of common understanding of OHS for health students, regarding how to educate students in OHS and how to apply a professional approach to OHS in medical areas. It is also recommended that amendments be added to the required legal regulations in schools and clinical practice areas and that students' OHS situations be tracked.

Limitations of the Study

The present study is a pilot study with small focus group numbers. However, the participating students provided valuable information about their impressions and experiences on various OHS issues. We recognize that the views presented in small numbers may not represent the views of the wider student population. Although the results are not generalized to other nursing students, the findings provide useful materials for consideration by other nursing schools and health sciences faculty who have students in clinical placement. Findings and related literature support the need for further studies in this field.

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ORCID iDs

Semra Eyi  <https://orcid.org/0000-0003-0680-1063>

İbrahim Eyi  <https://orcid.org/0000-0002-9604-6876>

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Author Biographies

Semra Eyi is an assistant professor at Trakya University, Keşan Hakkı Yörük School of Health. Her research interests include surgical nursing and care, and nursing education.

İbrahim Eyi is a doctoral student at Istanbul Aydın University, Institute of Science and Technology, Department of Occupational Health and Safety. His research interests include occupational safety matters on all subjects, including medical areas.