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Identifying the Level of Nursing Students' Attention to Ergonomic Rules in Clinics

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Abstract

Background: All health professionals come face-to-face with biological, chemical, physical, environmental, psycho-social and biomechanic risks in the hospital environment.
Objective: This study was performed to determine the importance that nursing students attribute to ergonomic rules in clinics.
Methods: This study is a descriptive study examining a population of fourth year nursing students. Data were acquired using an informational form prepared according to the information in the literature.
Results: The most important ergonomic rules to nursing students were related to the prevention of infections, while only moderate importance was attached to the other ergonomic rules.
Conclusion: We believe that continuing education about this subject after graduation would be useful. Nursing students still need to understand the importance of ergonomic rules and the ways in which certain behaviors increase their risks of injury.

Keywords: Nursing students, Ergonomic rules, Clinics

Introduction

Ergonomics, which is synonymous with "human factors engineering," is a relatively new discipline that attempts to improve the match between a particular job and the required humans' physical abilities, information handling and workload capacities (Karwowski, 2005; Özel, 2005). Ergonomics can also be defined as the study of designing devices, systems, tasks and environment to fit the human body, its movement, its capabilities and limitations through the use and discovery of relevant information (Karwowski, 2005; Öztürk,Yılmaz &Demir, 2009). Working is an indispensable part of most people's lives. However, people who attempt to do a job using the wrong tools or those who work in an ergonomically insensitive work place may experience health problems. It is certain that both living and working in a healthy and safe workplace is one of the most basic human rights (Parlar, 2008).

Accidents that occur in workplaces have been studied in various disciplines, including medicine, engineering, psychology, educational sciences and administrative sciences. Therefore, distinct theories have been developed to account for the reasoning behind certain accidents; these include the domino theory and the multiple cause theory. The domino theory argues that an "accident" is one factor in a sequence that may lead to an injury. It further asserts that the factors can be visualized as a series of dominoes standing on edge; when one falls, the linkage required for a chain reaction is completed. Additionally, each of the factors is supposed to be dependent on the preceding factor. The other

dominant theory in ergonomics is the multi-causation theory, which argues that any accident occurs as a combination of a primary factors, sub-factors and accompanying factors. Eliminating the lack of information and incorrect attitudes that lead to these events could help avoid accidents and injuries (Seo, 2005; Özarslan, 2009)

Environmental factors, on the other hand, include dangers in the workplace, improper machinery and unsafe procedures in the workplace. (Özarslan, 2009)Such concerns are also valid for hospitals because health-care institutions do not only include patients but also their relatives, health-care workers and service providers (Alan, 2008). Health-care workers do not only interact with patients and other people but also with medical devices and environment. Therefore, certain ergonomic rules should be followed in order to meet the needs of both service providers and service receivers. (Özel, 2005)

Ergonomic rules play an important role in the presentation of high-quality and safe healthcare. Adhering to ergonomic rules within the scope of patient and employee safety will especially influence the quality of care. Our aim in this study was to determine the opinions of senior nursing students who spend most of their time encountering clinical applications and who will be starting their professional lives within a short time on the ergonomic rules of clinical practice. The results of this study will also be valuable in determining the efficacy of nursing school curriculum regarding ergonomic rules.

Material and Methods

Design and Setting

This study was planned and applied as a descriptive and a cross-sectional study; it was conducted in a military nursing school, the Gülhane Military Medical Academy (GAMMA) in April 2012.

Participants

The participants of the study were senior nursing students in the academic year of 2011-2012. The total number of senior nursing students included was 85; a sample was not chosen. The participants of the study represent 82 volunteer senior nursing students. The survey could not be administered to 3 students who were on leave at the time of the survey. Nurses in their first, second or third year were not included in the study, as they are only involved in short clinical practice sessions and have not completed their training on this issue. An integrated education model is used in military nursing school and, therefore, the curriculum is composed of committees. According to the integrated education system, courses are directed by committees in the 1st, 2nd, and 3rd years. Students study practical clinical applications for 3 weeks in their 2nd and 3rd years. Final-year nursing students serve as interns 4 days of the week in clinical practice, rotating through medical, surgical, emergency, and public health.

Measures

The investigators prepared a data collection form consisting of 22 statements following a literature survey to determine the importance students ascribe to ergonomic rules in clinical practice. Students were asked to score each item on a survey ranging from 1 to 10, where 1 indicated the least important and 10 indicated the most important. The success level of the students were obtained from the school's measurement and evaluation department.

Data Collection

The study was performed after obtaining the written approval from the ethical committee of the military education and research hospital and the approval of our application for permission from the school management.

Explanations of the current study’s goals and methods were provided to each participant using face-to-face communication.

Oral and written approvals for this study were obtained from the volunteer senior nursing students. After explaining the method used to fill out the questionnaire form to each participant, each participant completed his own questionnaire form. The survey took approximately 10 minutes.

Statistical Analysis

The SPSS 15.0 (Statistical Package of Social Sciences Inc. Chicago, IL, USA) package program was used to evaluate the data.

Descriptive statistics are shown in numbers (n) and percentages (%) for the variables obtained by counting and in means ± standard deviation ($\overline{X}$ ± SD) for variables obtained by measurement.

Results

We present our findings regarding the opinions of nursing students on ergonomic rules in clinical practice in this section. The average age of the senior nursing students was 21.70 years (sd: 0.54). Cronbach's alpha value was 0.913.

Table 1. Ergonomics mean scores of the participants

Statements	Mean	SD	Rank
1.Organized clinical setting	9.50	.93	10
2. Proper conditions for preparing medication in the clinical setting	9.26	1.68	14
3- Hand washing to avoid infection	9.73	.93	**4**
4- Regular air-conditioning of the clinical setting	9.48	1.23	11
5- Paying attention to body mechanisms while working on the computer	8.55	1.90	21
6- Using masks to avoid infection	9.17	1.55	16
7- Choice of flooring in the clinical setting	8.44	1.98	22
8- Using gloves to avoid infection	9.82	.85	**2**
9- Adjustable lighting system in the clinical setting	8.96	1.37	18
10- Paying attention to body mechanics while lifting something	8.84	1.75	19
11- Wearing comfortable shoes in the clinical setting	9.51	1.57	9
12- Regular cleaning of the clinical setting	9.78	.63	**3**
13- Having a place suitable for sitting and resting while working in the clinic	9.54	1.48	8
14- Throwing the needlestick and sharps tools used in treatment and care into the medical waste buckets	9.83	.70	**1**
15- Proper temperature in the clinical setting	9.65	.74	**5**
16- Paying attention to the body mechanics while caring for patients and treating them	9.27	1.18	13
17- Decreasing noise in the clinical setting	9.45	.96	12
18- Wearing apron to avoid infection	9.13	1.35	17
19. Using a medication tray while preparing medication	9.22	1.29	15
20. Comfortable nurses' uniforms	9.63	.94	6
21. Sufficient sphygmomanometers, stethoscopes and thermometers in the clinics	9.63	1.31	7
22. Choice of color in the clinical setting	8.62	2.09	20

Table 1 presents the numerical evaluation of the items by the participants. The first five items that were highly considered to be important by the participants are as follows:

Throwing the needlestick and sharp tools used in treatment and care into the medical waste buckets (mean score: 9.83, sd: 0.70);

Using gloves (mean score: 9.82, sd: 0.85);

Regular cleaning of the clinical setting (mean score: 9.78, sd: 0.63);

Hand washing to avoid infection (mean score: 9.73, sd: 0.93) and

Proper temperature in the clinical setting (mean score: 9.65, sd: 0.74).

Table 2 shows the frequency of the scores given by the participants to the items in the data collection tool. Of these items, the following ones were scored by the participants as the most highly important items (on a ten-point scale): throwing the needlestick and sharp tools used in treatment and care into the medical waste buckets (92.7%; n=76); using gloves (91.5%; n=75); sufficient sphygmomanometers, stethoscopes and thermometers in the clinics (89.0%; n=73); hand washing to avoid infection (87.8%; n=72) and regular cleaning of the clinical setting (86.6%; n=71).

Table 3 indicates the correlations between the participants' first-, second and third-grade mean achievement levels and their scoring on the items in the data collection tool. This correlation was found to be weak and positive for the first-grade mean achievement level (r=.045), but reversely weak for the second- (r=-.204) and third-grade mean achievement levels (r=-.204).

Scores

			0		1		2		3		4		5		6		7		8		9		10	
Items	x	sd	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	9,50	,93					1	1.2					1	1.2					10	12.2	8	9.8	62	75.6
2	9,26	1,68			1	1.2			1	1.2			2	2.4	4	4.9			5	6.1	9	11.0	60	73.2
3	9,73	,93							1	1.2									6	7.3	3	3.7	72	87.8
4	9,48	1.23							1	1.2	1	1.2					2	2.4	9	11.0	6	7.3	63	76.8
5	8,55	1,90					1	1.2	1	1.2	1	1.2	6	7.3	1	1.2	9	11.0	15	18.3	7	8.3	41	50.0
6	9,17	1,55							2	2.4			3	3.7			3	3.7	11	13.4	8	9.8	55	67.1
7	8.44	1.98							2	2.4	2	2.4	8	9.8	1	1.2	10	12.2	7	8.5	14	17.1	38	46.3
8	9.82	.85							1	1.2									2	2.4	4	4.9	75	91.5
9	8.96	1.37											1	1.2	3	3.7	12	14.6	13	15.9	6	7.3	47	57.3
10	8.84	1.75					2	2.4			1	1.2	1	1.2	1	1.2	11	13.4	11	13.4	9	11.0	46	56.1
11	9.51	1.57					1	1.2	1	1.2	2	2.4	1	1.2					1	1.2	6	7.3	70	85.4
12	9.78	.63															2	2.4	3	3.7	6	7.3	71	86.6
13	9.54	1.48					2	2.4			1	1.2					1	1.2	4	4.9	5	6.1	69	84.1
14	9.83	.70													2	2.4			2	2.4	2	2.4	76	92.7
15	9.65	.74															3	3.7	4	4.9	12	14.6	63	76.8
16	9.27	1.18											1	1.2	4	4.9	1	1.2	11	13.4	14	17.1	51	62.2
17	9.45	.96											1	1.2			3	3.7	8	9.8	15	18.3	55	67.1
18	9.13	1.35											4	4.9	1	1.2	4	4.9	11	13.4	13	15.9	49	59.8
19	9.22	1.29											1	1.2	3	3.7	8	9.8	8	9.8	7	8.5	55	67.1
20	9.63	.94									1	1.2					1	1.2	8	9.8	5	6.1	67	81.7
21	9.63	1.31					1	1.2			1	1.2	1	1.2			2	2.4	1	1.2	3	3.7	73	89.0
22	8.62	2.09	1	1.2					1	1.2	1	1.2	7	8.5	3	3.7	8	9.8	6	7.3	7	8.5	48	58.5

Table-2 Frequency of the scores given by the participants to the items in the data collection tool

Tablo-4 Correlation between the scorings of the participants concerning the items in the data collection tool

	Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Items	1	-.185	-.041	-.95	-.104	-.123	-.089	-.092	.021	-.036	-.051	-.208	.052	-.024	-.019	-.006	.074	-.110	.009	.039	-.121	-.208	-.012
1		1	.482	.653	.783	.536	.192	.291	.176	.351	.410	.530	.475	.656	.177	.436	.236	.511	.126	.328	.605	.762	.509
2			1	.702	.575	.476	.414	.330	.094	.479	.550	.366	.347	.558	.564	.093	.215	.550	.176	.363	.493	.465	.397
3				1	.793	.498	.305	.266	.140	.381	.582	.584	.489	.682	.498	.195	.292	.553	.216	.174	.779	.688	.283
4					1	.645	.241	.167	.179	.445	.444	.715	.440	.695	.268	.362	.295	.539	.110	.214	.678	.700	.378
5						1	.564	.412	.117	.557	.613	.410	.208	.490	.445	.394	.604	.549	.270	.219	.268	.420	.483
6							1	.352	.174	.166	.615	.161	.089	.326	.504	.074	.562	.255	.454	.197	.077	.177	.096
7								1	.269	.330	.509	.109	.039	.121	.313	.283	.362	.447	.527	.359	.114	.258	.490
8									1	-.006	.180	.275	.178	.208	.009	.464	.223	.255	.324	.162	.303	.228	.253
9										1	.433	.256	.264	.292	.162	.267	.137	.400	-.031	.152	.250	.310	.349
10											1	.264	.260	.479	.392	.194	.592	.531	.397	.230	.425	.411	.281
11												1	.464	.518	.080	.252	.312	.369	.107	-.001	.632	.685	.284
12													1	.488	.138	.122	.181	.248	.050	.015	.533	.571	.171
13														1	.449	.344	.407	.412	-.018	.106	.537	.601	.254
14															1	.167	.387	.301	.195	.083	.167	.227	.073
15																1	.364	.296	.134	.353	.273	.297	.421
16																	1	.406	.343	.099	.225	.297	.307
17																		1	.210	.440	.489	.537	.492
18																			1	.239	.225	.091	.328
19																				1	.221	.085	.512
20																					1	.644	.250
21																						1	.327
22																							1

Table 3. Correlation between the participants' achievement levels and ergonomics scores

	Ergonomics	First-grade	Second-grade	Third-grade
Ergonomics	1			
First-grade	.045	1		
Second-grade	-.128	.745	1	
Third-grade	-.204	.539	.684	1

Table 4 presents the correlation between the participants' mean achievement levels and the scoring of the participants concerning the items in the data collection tool. The scoring of the following items was found to be statistically significant in terms of their correlation: the item "using gloves" was, highly correlated with the item "proper environment for preparing the medication in the clinics" (r=.702); the item "regular air conditioning of the clinical setting", was found to be highly correlated with the item "having an organized clinical setting" (r=.783); the item "using comfortable shoes in the clinics" was found to be correlated with the item "regular air conditioning of the clinical setting" (r=.715); the item "nurses' uniform dresses should be comfortable" was found to be highly correlated with the item "hand washing to avoid infection" (r=.779); the item "sufficient sphygmomanometers, stethoscopes and thermometers in the clinics" was found to be highly correlated with the item "having an organized clinical setting" (r=.762); and, finally, the item "sufficient sphygmomanometers, stethoscopes and thermometers in the clinics", was also found to be highly correlated with the item "regular air conditioning of the clinical setting" (r=.700).

Discussion

In this section, we discuss the findings related to the opinions of senior nursing students on ergonomic rules in clinical practice in this section.

The first five items in our study were "throwing the needlestick and sharp tools used in treatment and care into the medical waste buckets", "using gloves to avoid infection", "regular cleaning of the clinical work area", "hand washing to avoid infection" and "proper temperature in the clinical work area". The place of protection from infection in these five items that took the first five places in the students' scores is interesting. The literature has revealed that nurses, including student nurses, are the practitioners most exposed to needlestick and sharp injuries (Unver, Tastan & Coskun, 2012).

Both the mean scores and the full scores in our study show that using gloves is seen to be more important than washing hands for protection from infection. Washing hands is a method that can minimize hospital infections (Naikoba & Hayward, 2001; Özel, 2005;). Related research suggests that using gloves has become the dominant way to avoid infection, replacing hand washing. The findings of their study also indicate that using gloves rather than hand washing is regarded as a primary way to avoid infection by the participants. The reason for this preference in the related research is given as the increased concern over the nosocomial infection (Toraman et al., 2009).Although washing hands before and after the contact with patients is an effective and controlling way to avoid bacteria causing infection, the rate of hand washing is reported to be very low (Naikoba & Hayward, 2001). On the other hand, protective quality of gloves in regard to injuries resulting from using the needlestick and sharps tools is limited and therefore, using gloves under such conditions is not completely safe. Instead, gloves should be used when the hands will directly contact with blood and other body fluids. After each contact with patients, gloves used should be changed, and hands should be washed (Özarslan, 2009).

The physical conditions of health-care institutions affect not only patients but also other people in the environment, including the relatives of patients, health-care workers and service-

providers. Regular cleaning is certainly needed to maintain a clean and dust-free health-care institution. It is well-established that effective, regular cleaning and drying is significant in avoiding infection in health-care institutions (Alan, 2008).

Research suggests that airless and noisy environments are among the factors curtailing high-quality sleep (Karagözoglu et al., 2007). There are numerous factors leading to noise in health-care institutions. Some of these factors include objects falling, the fast opening and closing of doors, alarm rings, workers, conversations during patient visits, meal distribution, radio and television, and others. It is known that noise negatively affects health and leads to sleeping disturbance, increase in blood pressure and anger (İncesesli, 2005).

The other significant point in clinical setting is the choice of colors. Colors should be chosen taking into account their reflection characteristics. Moreover, these colors should create an environment in which health-care workers fell themselves comfortable The emotional effects of warm and cold colors are different. Warm colors lead to happiness, alertness and vivacity while cold colors cause sadness, comfort and stillness. Mostly, light pastel colors should be used in health-care institutions, since these colors do not make the eyes tired (Özel, 2005).

Items related to body mechanics, such as "paying attention to body mechanics while working at the computer" and "paying attention to body mechanics when picking or lifting something from the floor," also placed close to last in our study. The results of our study indicate that the students have not developed an adequate awareness of body mechanics. The prevalence of waist pain in general population is 65-80 %. Waist pain is the most frequent musculoskeletal disorder experienced by health-care workers Waist and back pains are much more prevalent in the nurses who are in direct contact with patients (İncesesli, 2005). It is argued that the prevalence rate of waist pain is increased by increasing the duration of employment and that waist pain mostly occurs in the second year of clinical practice (Yılmaz & Özkan, 2006). Research concerning work-related health-care problems experienced by nurses has identified some common health problems that mostly include musculoskeletal disorders (Byrns et al.,2004; Karahan & Bayraktar, 2004). More specifically, 36.3 % of nurses had experienced waist pains; 10.9 % of them had experienced ankles/feet pains; 8.7 % of them reported to have experienced neck pain (Özarslan, 2009).Nurses as a professional group have higher potential of experiencing waist pains than other professional groups. It has been reported that, due to waist pains, there is a significant decrease in their working hours and that waist pains, as well as other musculoskeletal disorders, are one of the factors leading to an early retirement for nurses (Sikiru & Hanifa, 2010). Nurses mostly spend their working hours standing, and contact with patients mostly occurs while standing in the treatment room. This increases the tiredness of nurses. A standing body posture is known to have significant effects on health. Sitting, on the other hand, allows for a decrease in the muscular activity of the feet and low extremities. Therefore, it provides many ergonomic advantages by lowering the energy consumption and providing body stabilization for the activities performed by hand (Özel, 2005).

There is a long-standing debate regarding nurses' uniform dress. It is stated that these uniforms have effects on the professional identity and self-image of nurses. These uniforms are non-verbal reflections of nurses' possessing the knowledge and skills to provide health-care for patients.

There have been numerous modifications to the nurse uniforms to make it possible to perform a variety of activities. The different type of uniform, such as a dress or trousers, has an impact on nurses' professional perceptions and self-images. It has been stated that nurse uniforms should value the inheritance of the profession, but at the same time, be modern (Shaw &Timmons, 2010).

On the other hand, it has been argued that the uniforms worn by hospital staff may harbor hazardous bacteria. More specifically, sleeve ends, pockets and the abdominal areas of the uniforms are found to host bacteria. Therefore, it is recommended that nurses' uniforms should be washed after each shift or at least, after two shifts (Gullen-Grima et al., 2011).

The choice of shoes is also important in clinical settings. Many health-care institutions have strictly forbidden the wearing of open-toed shoes, because body fluids may be transmitted or work-related accidents may occur as a result of treading on cutting and piercing tools with the feet (Madwar, 2011).

It is certain that there are some factors that lead to a setting in which incorrect practices are performed. For instance, there should be no distracting elements while the nurses are preparing medications (Aygin &Cengiz, 2011). It has been further well-established that significant factors leading to workplace accidents and injuries are improper body mechanics and untidy and unorganized workplace settings (Özarslan, 2009). The adequacy of materials is another factor influencing proficiency at the workplace. Hospital management should supply materials such as proper sharps containers for sharp objects, masks, etc. that conform to standards to prevent biological risks and the related occupational diseases or workplace accidents. Once these materials have been supplied, it is the healthcare worker's responsibility to use them properly and to ensure that they are used (Özkan& Emiroğlu 2006).

Conclusion

It has been found that the senior nursing students participating in the study mostly paid attention to the ergonomic rules for avoiding infection. The nurses were found to attach significance to the other principles at a moderate level. Regardless of whether the domino theory or the multiple causation theory is followed, it is clear that if nursing students do not pay enough attention to these principles, they cannot improve their behavioral stances regarding these principles. Students who are about to graduate should realize that abiding by these principles will ensure that they work in a safe and healthy workplace, as well as that they are able to ensure a similar environment for patients through the same principles. Therefore, the following points should be taken into consideration:

*Nursing students should be taught to evaluate their working setting and environment in terms of the ergonomic rules,

*Nursing students should be informed about work-related health issues and safety,

*After entering into professional life, nurses should also be trained and informed about these topics through in-service activities.

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