JBACHS
Journal of Basic and Clinical Health Sciences

J Basic Clin Health Sci 2021; 3: 179- 185
https://doi.org/10.30621/jbachs.974242
RESEARCH ARTICLE

EXAMINATION OF NURSING STUDENTS' MEDICAL ERROR ATTITUDES WITHIN THREE DIFFERENT EDUCATIONAL MODELS AND EFFECTING FACTORS

Yasemin AYHAN ONCU [1], Seyda SEREN INTEPELER [2], Selmin SENOL [3], Canan DEMIR BARUTCU [4]

[1] Mehmet Akif Ersoy University, Health Sciences Faculty, Nursing Management Department, Burdur, TURKEY
[2] Dokuz Eylul University, Nursing Faculty, Nursing Management Department, Izmir, TURKEY
[3] Kütahya Health Sciences University, Health Sciences Faculty, Pediatrics Nursing Department, Izmir, TURKEY
[4] Mehmet Akif Ersoy University, Health Sciences Faculty, Internal Medicine Nursing Department, Burdur, TURKEY

Address for Correspondence: Assistant. Prof. Yasemin AYHAN ONCU, **E-mail:** ya.ayhan@gmail.com
Received: 25.07.2021; **Accepted:** 18.09.2021; **Available Online Date:** 20.09.2021

Cite this article as: Ayhan-Oncu Y, Seren-Intepeler S, Senol S, Demir-Barutcu C. Examination of Nursing Students' Medical Error Attitudes within Three Different Educational Models. J Basic Clin Health Sci 2021; 3: 179- 185.

ABSTRACT

Objective: A cross-sectional comparative study was exposed within three Turkish public universities. This study aims to examine nursing students' attitudes towards medical errors who are trained within three different education models and to determine factors that affect these attitudes.

Methods: A personal and educational characteristics questionnaire and the Medical Error Attitude Scale were used. All students (n=1242) who agreed to participate in the research from the second, third and fourth grade nursing students of three universities were included to sample.

Results: It was found that nursing students trained with the integrated education model and problem-based learning model had higher scores on the Medical Error Attitude Scale than nursing students trained with classical education model. In the subscales of the Medical Error Attitude Scale, students trained in the integrated education model had a higher mean score in "perception" and "causes" subscales. A statistically significant difference was found in attitudes at different levels of training. Additionally, it was found that the mean scores of the second grade nursing students were higher in the medical error perception subscale.

Conclusions: The findings of research emphasized that there is difference between medical error attitudes of nursing students who are educated by different education models. It can be suggested that in all models nursing education models, medical errors and patient safety trainings should be given effective and practical level. In this way, results may help to integrate to clinical practice.

Keywords: Educational models, nursing students, medical error, medical error attitude scale, patient safety

INTRODUCTION

Medical error is defined as unintended, unexpected consequences during the health care provided to the patient (1). Medical errors, one of the main causes of death and injuries, are one of the inevitable events in the health system. In the literature it is stated that medical errors affect 3% to 16% of hospitalized patients with 30–70% being preventable (2). Although rates for healthcare professionals are known, studies on the contribution of students on this issue are

limited. Like nurses, nursing students make more interventions during patient care and this causes them witness more medical errors. Medical errors are common among nursing students, but these errors are often underreported (3). In very few studies on this subject, it is stated that about 25–40% of errors are not reported (4, 5, 6).

According a study conducted in Turkey, 38.3% students reported at least one medical error during clinical practice, but noted that 98.1%–fortunately–caused noharm to the patient. (4). Similarly a study conducted in Italy found that %28.8 students had participated in or witnessed an medical error or adverse event (7). One study revealed that thirty percent of nursing student participants made at least one error during their program of study and that the mean number of medication errors recalled per student was 1.93 (6). Cebeci et al. (2015) (4) found that 61.4% of errors were reported by nursing students, while Noland (2014) (5) found that 72.4% of nursing students in the USA reported their errors, and Koohestani and Baghcheghi (2009) (6) found that 75.8% of medication errors by nursing students in Iran were reported.

Asensi-Vicente et al (8) indicated that a few studies have analyzed nursing students' medical errors, and the current evidence suggests that the incidence of them is high. Studies about students' medical error attitudes are limited and mostly related to the effectiveness of training. According to Mansour's et al (9) study; education occupies an important place in providing safe and qualified healthcare services. A study by Latimer et al (10) reported that there is evidence to suggest many undergraduate nursing curricula do not adequately educate students about the factors that contribute to medication errors and possible strategies to prevent them. Given the importance of providing safe care in today's healthcare organizations, it is critical that students graduate with knowledge of medical errors and patient safety. In the training of healthcare professionals, the provision of medical error and patient safety training and the creation of information bases will contribute to skill integration into clinical application areas. This training will help healthcare professionals, the workforce of the future, to meet the demands of today's complex care system (11).

The education in the school of nursing generally includes the technical knowledge and skills which are necessary for the students in clinical applications. However, sufficient attention is not paid to the skills, attitudes, and behaviors necessary for students to be able to provide safe healthcare to their patients (12). While emphasis is placed on the development of the knowledge and skills aspect during training, the development of attitude and behavior can be postponed after graduation (13).

In Turkey, the most widely used is the Traditional Education Model (TEM) in which the teacher/faculty member plays more active role than students. In this model, topics related to medical error are given mostly as a presentation. The Integrated Education Model (IEM) and the Problem-based Education (PBE) Model are also used with nursing students in order to upskill lifelong learning. In the TEM, the students are exposed to medical error topics as one subject in the lessons that they take, whereas in the IEM and PBE models in which students and trainers actively participate, a student's self-learning is achieved by giving the students medical error issues in a scenario. The student's attention is focused on the topic both in pre-application preparation and during the application, and, as a parameter, it also plays a part in the assessment process.

Improving students' adaptation to complex healthcare services in clinical applications and making sure that issues of patient safety and the avoidance of medical errors is a part of the training of students and developing proper attitudes in students towards patient safety and medical errors is a significant problem for many countries (14). In order to overcome this problem, the first thing that is envisioned is that changes should be made in the education program in accordance with an enquiry into the awareness and susceptibility of students about the topic that will result in a guide for education administrators. This study aims to examine nursing students' attitudes towards medical errors who are trained within three different education models and to determine factors that affect these attitudes. From this point, this study was conducted with the aim of evaluating the attitudes of nursing students towards medical errors. The questions below were answered in line with this objective:

- Q1. Are there any statistically significant differences among the students' medical error attitudes who are educated within three different education models?
- Q2. Are there any statistically significant differences among the students' medical error attitudes at different classes?

- Q3. Are there any statistically significant differences between male and female students' medical error attitudes?

MATERIAL AND METHODS

Study Design and Participation

Research was applied in a descriptive, cross-sectional, and comparative design in the schools of nursing that provide education using the three different models. Without using any sampling method in the research, all of the students who agreed to participate in the research from the second, third, and fourth grade students of the nursing department of these three universities constituted the sample. First grade nursing students were not participated in the study because they had encountered no curriculum issues related to patient safety and medical errors, and these students have not yet been in the clinical practice settings. They are therefore less likely to encounter or be aware of medical errors.

A total of one thousand seven hundred twenty-six (N = 1762) students were given the survey and one thousand four hundred forty-two (N = 1242) surveys were completed for an overall response rate of 70%. Using the G-Power 3.0.10 program, %50 effect size, .80 power (1-ß), the minimum sample to be reached with 95% of the confidence level G. (15).

Data Collection

Question form regarding the personal characteristics and educational characteristics of the students includes eight questions related to age, gender, faculty, grade, taking lessons in medical error and patient safety and adaquancy, encounters with medical error situations, and courses they want to be included in the curriculum.

The Medical Errors Attitudes Scale developed by Gulec and Intepeler (16), is five-point Likert scale consisting of 16 questions. Written permission was obtained for the use of the scale. The scale consists of three factors: medical error perception, medical error approach, and medical error causes. The break point of the scale was determined as three. The medical error attitudes of participants whose mean score was under three were evaluated as negative, and medical error attitudes of participants whose mean score is three and above were evaluated as positive (16). The Cronbach α reliability coefficient of the scale is .75; in this study, it was found to be .85.

Data Analysis

In the study; descriptive statistics were used in the analysis of data regarding the personal information and educational characteristics of the students. The scores of gender, age, grade, whether students had taken adequate lessons about medical errors and patient safety, and Medical Error Attitudes scores were assessed by the significance test of difference between two mean and single direction variance analyses. Analysis was conducted using descriptive statistics in the Statistical Package for the Social Services SPSS 22.0 (SPSS Inc, Chicago, Illinois). A value of $p < .05$ (95% confidence interval) was considered statistically significant.

Ethics

The required permissions were obtained from the Non-Interventional Clinical Trials Ethics Committee (Decision date: April 07, 2016; Decision no.: 2016/06-09) of the university where the research was conducted. Furthermore, the purpose of the research was explained to the students who participated in the research, and their written consent was also obtained.

RESULTS

Of 1242 students participated in the study; 56.5% were trained with the integrated education model, 23.9% with the problem-based education model, and 19.6% with the traditional education model. The mean age of the students was 21.47±1.59, and 78.7 % of them were women. 43.3% of the students stated that they had taken lessons related to medical errors, and 70.3% of the students stated that they had taken lessons related to patient safety.

The mean scores medical error attitudes of nursing students educated in different methods are given in Table 1. For the answer of first research question, as a result of the variance analysis, it was found that the attitudes towards medical error of nursing students who were educated with the integrated education model and the problem-based education were higher. In the sub-dimensions of medical error attitudes scale, students educated with the integrated education method had higher mean scores in the "perception" and "causes" sub-dimensions; but it was found that the mean scores of the students who were educated with the problem-based education method had higher mean scores in the "approach" sub-dimension.

Table 1. Medical Error Attitudes Means of Nursing Students Educated with Different Methods

School	Integrated Education n=702		Problem Based Education n=297		Traditional Education n=243		F	p*
	Mean	SD	Mean	SD	Mean	SD		
Medical Error Perception	3.17	.55	2.73	.71	3.07	.74	49.93	.00
Medical Error Approach	3.64	.30	3.75	.34	2.34	.40	1536.30	.00
Medical Error Reasons	4.08	.38	3.95	.42	2.16	.44	2704.917	.00
Medical Error Attitudes	3.51	.25	3.43	.27	2.25	.30	2045.80	.00
*p<.05								

Table 2. Interclass Medical Error Attitudes Score Means

Year	Number	Medical Error Attitudes Mean	SD	F	P*
2	585	3.28	.53	3.212	.041
3	375	3.19	.52		
4	282	3.24	.63		
*p<.05					

Table 3. The comparision of medical error attitudes and sub-dimensions of nursing students according to the gender (n=1242)

Sub-dimension	Gender				t	p
	Female, n=978		Male, n=264			
	Mean	SD	Mean	SD		
Medical Error Perception	3.03	.64	3.11	.70	-1.825	.068
Medical Error Approach	3.45	.59	3.25	.73	4.676	.000*
Medical Error Reasons	3.73	.79	3.45	1.00	4.822	.000*
Medical Error Attitudes Mean	3.28	.51	3.10	.66	4.591	.000*
*p<.001						

The interclass medical error attitudes score means are shown in Table 2. For the answer of second research question, statistically significant difference was not found between classes in the medical error causes and approach sub-dimensions (p>0.05). However, the score means of second grade nursing students were found to be higher in medical error perception (p<.005).

The comparison of medical error attitudes and the sub-dimensions of nursing students according to gender is given in Table 3. For the answer of third research question, in the “approach” and “causes” sub-dimensions of the general mean of attitudes toward medical error, the score means of female students are statistically significantly higher (p<.001); however, in the “perception” sub-dimension, there was no statistically significant difference (p>.005).

Students were asked about the medical errors they witnessed in the clinical setting (response rate 46%). 43% of students stated that they encountered a medical error application, 38.9% stated that they witnessed sharp object injuries of nurses or other healthcare professionals, and 30% stated that they saw patient falls in the clinical setting.

DISCUSSION

In the study conducted to examine the medical error attitudes of nursing students trained in three different education models and to determine affecting factors; it was found that there were differences in the medical

error attitudes of the nursing students who were educated with different education models and even in the medical error attitudes of students in different grades.

The medical error attitudes mean scores of the students educated with IEM were found to be higher than those educated with TEM and PBE. In a study designed similar to the IEM, seven-week face-to-face trainings and case studies prepared for students were conducted. It was found that medical error education increases the knowledge and awareness of students regarding medical errors, and; medical error education decreases medical error tendencies and positively affects nursing students' attitudes toward medical errors (17). The medical error attitudes mean scores of nursing students, a part of the results of our study, was found to be lower for the students educated with TEM than with IE or PBE. As for the sub-dimensions of the medical error attitudes, in the score means of medical error approaches and results sub-dimensions, the score means of nursing students educated with PBE or IE models were found higher than those of students educated with the TEM. In an education intervention study which used a problem-based learning approach and experiantal learning concepts conducted by Hewitt et al (18); with a series of short digital recordings; it has been determined that it is effective in the prevention of systemic factors affecting medical errors, understanding the importance of communication in clinical practice, and learning of professional roles. Therefore, it can be said that students' professional role perceptions in PCI can also be effective in preventing medical errors. In this case, although the nursing students' perception of medical error is high, mean scores were of approaches found to be low. Especially, when nursing faculty has high workload at clinical practice, nursing students had to satisfy the nurses ruquests and nurses are not always present during medication process. Similarly in another descriptive study conducted by Walsh et al. (19), it has been found that professional socialization, in combination with supportive learning environments, may increase student comfort in reporting medication errors. In a systematic review it is indicated that all educational interventions seem to have positive effect, but the most effective interventions were a blended learning programme (20).

Besides learning programmes, internship is used for nursing students to get to know the areas they will work in and to adapt to real life more easily. Internships aim to reinforce the knowledge, skills, and attitudes gained during the three-year nursing education in a real life environment (21, 22). In other words, students are expected to be a nurse who is capable of thinking critically, to display problem solving and empathy skills and be ready to graduate. In a study by Sabancıoğulları and Doğan (23), 61% of nurses newly graduated from IEM were satisfied with their education, and 84% of them stated that their education to prepared them sufficiently for the profession. Similarly, in their study in which they examined the opinions of nursing students regarding the internship process, Sabancıoğulları and Doğan (23) noted that 94.8% of the students stated, "It improved my nursing care skills," and 97.4% stated, "My skills to recognize erroneous medical interventions in clinic/field applications were developed". In our study, fourth grade students of IEM and PBE have internships. The findings of our study are that internship create important developments in terms of medical errors attitudes scale mean scores than TEM in nursing students.

Considering the medical error attitude mean by individual classes in addition to interclass differences, these differences derive, not from the internship but from the second grade study program. In a systematic and meta-analysis study it has been determined that most common medical errors are medication errors. Medication errors' prevalence among nursing students was 39.68% and the prevalence of lack of reporting medication errors was 48.60% (24). In this sense, it can be thought that the findings obtained as a result of the analysis are generally caused by medication errors. Differences in pharmacology courses and practice given in education models can affect this finding. Pharmacology course requirements in the IEM and the PBE is eight hours in the third semester and 20 hours in the fifth and sixth semesters integrated with the related topics with a total of 28 hours. As for TEM, the generally given requirement for pharmacology courses are a total of 28 hours, two hours per week in the third semester. Requirements for lessons in basic skills for drug applications are given as 20-22 hours (12 hours theoretical + 8/10 hours laboratory practice), and students develop this knowledge during their undergraduate education in clinical applications (25). Because the pharmacology knowledge of second grade students is recently learned, and they experience the "fear of the unknown," it may be concluded that they behave

more cautiously. It may also be second grade students have less clinical practice, and teachers/nurses can be more descriptive as they are aware of this. Therefore, students can ask questions more easily in clinical practice and develop a common language with nurses. Vaismoradi et al (14) have proved that differences between the terminology used by professionals (clinical context) and that used by students (academic context) could lead to serious errors of interpretation. Consequently, standardization of the language used in all environments should be a priority. In addition, the excitement, interest and interaction with the instructor of the students in the second grade for the first time may also affect this result.

When the medical error attitudes of nursing students are examined according to gender differences, although it was lower at the “medical error perception” sub-dimension of female nursing students, it was found to be high on the other subscales and overall score mean. Likewise, when Kanbay et al. (26) examined the problem-solving and critical thinking skills of undergraduate nursing students, despite the high level of critical thinking skills of male nursing students, problem-solving skills were found to be lower than in female nursing students. Although there are studies showing that medical errors differ according to gender in nurses (27); Sanko et al (28) indicated that these differences may indicate that previous education or some other experience may play a role in medical error. Therefore, it can be said that female students tend to solve more problems, especially in terms of approaches to medical error, whereas male students are stronger in the perception dimension based on critical thinking.

The reported findings should be interpreted within the context of specific limitations of the study. The sample size comprised only three different education models to accommodate the completion of the work within a compressed time frame. Last, this study took place in Turkey with a group of nursing students, and it cannot be assumed to represent areas outside this context.

CONCLUSION

This study represents one of the first explorations into students’ medical error attitudes within different educational models. These findings point to a potentially overlooked population of interest in improving the nation’s healthcare patient safety problem. In both theoretical and clinical contexts, it would be desirable for clinicians and academic staff together develop a practice plan aimed at achieving greater competence in related knowledge, skills and attitudes. Therewithal, safety education has to be integrated thoughout courses in the nursing curriculum to increase the culture of safety. The aspects of patient safety and medical errors are changing in clinical and academic settings. Patient safety and medical error courses prepared for the training of healthcare professionals should be worked out in more detail. An awareness of medical errors and the consequences should be created in students, and they should be encouraged to be more careful and attentive. In addition, all courses should be accompanied by practices that will contribute to the conversion of students' behaviors to attitudes by ensuring the integration of these subjects.

Acknowledgments: This study has been presented at International Congress of Black Sea Nursing Education 2017 as oral presentation.

Conflict of interests: No conflict of interest has been declared by the authors.

Author contribution: Study design: YAÖ, ŞSİ. Data collection: YAÖ, SŞ, CDB. Data analysis: YAÖ, ŞSİ. Manuscript writing: YAÖ, ŞSİ, SŞ, CDB.

Peer-review: Externally peer-reviewed.

REFERENCES

1. National Patient Safety Foundation. 268 Summer Street · 6th Floor Boston. MA 02210 USA. 2009. Retrieved from http://www.npsf.org/about-us/
2. Raymond JM. Nursing students and patient safety: errors, curriculum, and perspectives (Doctoral dissertation). 2016. Retrieved from Qspace, https://qspace.library.queensu.ca/handle/1974/14154
3. Natan MB, Sharon I, Mahajna M, Mahajna S. Factors affecting nursing students' intention to report medication errors: An application of the theory of planned behavior. Nurse Educ Today 2017; 58: 38-42.
4. Cebeci F, Karazeybek GS, Kahveci R. Nursing students’ medication errors and their opinions on the reason of errors: a cross-sectional survey. J. Pak. Med. Assoc. 2015; 65 (5):457-462.
5. Noland CM. Baccalaureate nursing students accounts of medical mistakes occurring in the clinical setting: implications for curricula. J. Nurs. Educ. 2014; 53 (3), S34–S37.
6. Koohestani HR, Baghcheghi N. Barriers to the reporting of medication administration errors

among nursing students. Australian Journal of Advanced Nursing; 2009; 27(1), 66-74.
7. Stevanin S, Bressan V, Bulfone G, Zanini A, Dante A, Palase A. Knowledge and competence with patient safety as perceived by nursing students: the finding of a cross-sectional study. Nurse Education Today 2015; 35: 926-934.
8. Asensi-Vicente J, Jiménez-Ruiz I, Vizcaya-Moreno MF. Medication errors involving nursing students a systematic review. Nurse Educator 2018; 43(5): E1-E5.
9. Mansour JM, Shadafan SF, Abu-Sneineh FT, AlAmer MM. Integrating patient safety education in the undergraduate nursing curriculum: A discussion paper. Open Nurs J. 2018; 12, 125–132.
10. Latimer S, Hewitt J, Stanbrough R, McAndrew R. Reducing medication errors: Teaching strategies that increase nursing students' awareness of medication errors and their prevention. Nurse Educ Today 2017; 52: 7-9.
11. World Health Organization (WHO). Patient Safety Curriculum Guide: Multi-professional Edition. 2011 Retrieved from http://whqlibdoc.who.int/publications/2011/9789241501958_eng.pdf?ua=1
12. Sayek F. Report on Turkish Nationalities League. Patient Safety: Turkey and the World. 2010. Retrieved from https://www.ttb.org.tr/kutuphane/fsayek10_hasta guvenlik.pdf
13. Steven A, Magnusson C, Smith P, Pearson PH. Patient Safety in nursing education: Contexts. tensions and feeling safe to learn. Nurse Education Today 2014; 34: 277-284.
14. Vaismoradi M, Bondas T, Jasper M, Turune H. Nursing students' perspectives and suggestions on patient safety—Implications for developing the nursing education curriculum in Iran. Nurse Education Today 2014; 34:265–270.
15. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods 2007, 39:175–191.
16. Güleç D, Seren İntepeler Ş. Developing a scale of attitudes towards medical errors. Hemşirelikte Araştırma Geliştirme Dergisi 2013;15 (3): 26-41.
17. Yılmaz Ş, Yalım NY. The effect of medical error education on the knowledge and attitudes of nursing students. Süleyman Demirel Üniversitesi Sağlık Bilimleri Dergisi. 2020; 11(2): 170-177.
18. Hewitt J, Tower M, Latimer S. An education intervention to improve nursing students' understanding of medication safety. Nurse Education in Practice 2015; 15(1):17-21.
19. Walsh LL, Anstey AJ, Tracey AM. Student perceptions of faculty feedback following medication errors – A descriptive study. Nurse Education in Practice 2018; 33:10-16.
20. Harnaken M, Voutilainen A, Turunen E, Vehvilainen-Julkunen K. Systematic review and meta-analysis of educational interventions designed to improve medication administration skills and safety of registered nurses. Nurse Education Today 2016; 41:36-43.
21. Kelleci M, Gölbaşı Z, Doğan S, Tuğut N. Problem-solving abilities of the nursing students studying in integrated education: a follow-up study. İ.U.F.N. Hem. Derg. 2011; 19 (1): 23-28.
22. Turan GB, Tan M, Dayapoğlu N. Determining the opinions of clinic nurses and nursing students about internship. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi 2017; 20 (3):170-179.
23. Sabancıoğulları S. Doğan D. Ideas concerning school education of the nurses who newly graduated from an integrated school program and their professional identity levels. İ.Ü.F.N. Hem. Derg. 2012; 20 (3):84-192.
24. Dehvan F, Dehkordi AH, Gheshlagh RG, Kurdi A. The prevalence of medication errors among nursing students: A systematic and meta-analysis study. Int J Prev Med. 2021;12: 21.
25. Zaybak A, Taşkıran N, Telli S, Yaşar Ergin E, Şahin M. The opinions of nursing students regarding sufficiency of their drug administration knowledge. Hemşirelikte Eğitim ve Araştırma Dergisi 2017; 14 (1): 6-13.
26. Kanbay Y, Aslan Ö, Işık E, Kılıç N. Problem Solving and Critical Thinking Skills of Undergraduate Nursing Students. J of Higher Education and Science 2013;3(3):244-251.
27. Cheragi MA, Manoocheri H, Mohammadnejad E, Ehsani SR. Types and causes of medication errors from nurse's viewpoint. Iran J Nurs Midwifery Res. 2013; 18(3): 228-231.
28. Sanko JS, Kim Y, McKay M. Adverse event reporting following simulation encounters in accelerated and traditional bachelor nursing students. Nurse Education Today 2018;70:34-39.