







Research Article

Using Electronic Software for Nursing Documentation in Nursing Students

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Abstract

AIM: This study aimed to assess the effect of using electronic software for nursing documentation on students.

METHOD: A quasi-experimental study was performed. The study population comprised 80 nursing students who were randomly divided into 2 groups. The software used for nursing documentation was designed according to the nursing process model. Students in the experimental group received theoretical and practical training. The control group attended a 1-day course on the nursing process model. A questionnaire was used to assess student satisfaction in nursing documentation. The data were analyzed using the Statistical Package for Social Sciences software 16 (Chicago, USA). The standard and comprehensiveness of documentation were analyzed using the summative content analysis with the MaxQDA 10 software (USA). TREND statement was followed for reporting.

RESULTS: The analysis showed that the mean scores of satisfaction in both groups increased significantly ($p < .05$). Furthermore, the result of the summative content analysis showed that the comprehensiveness and the standard of nursing documentation increased significantly in the experimental group ($p < .05$).

CONCLUSION: The findings confirmed the usefulness of electronic software in improving the standard and comprehensiveness of nursing documentation and the students' satisfaction.

Keywords: Documentation, informatics, nursing

Introduction

Nursing documentation is the process of maintaining record of nursing interventions that are planned and implemented for every patient by nurses (Broderick & Coffey, 2013; Mykkanen et al., 2016). Its fundamental purpose is to manifest evidence of nursing care, communicate medical information effectively with others in the healthcare team, meet continuity of care, improve patient safety, and ensure compliance with legal and professional requirements (Broderick & Coffey, 2013; Sondergaard et al., 2017; Tasew et al., 2019). However, assessment of nursing documentation has shown that records are incomplete,

lack continuity, and do not involve the psychosocial aspects of care (Broderick & Coffey, 2013; Muller-Staub et al., 2007). For example, a study by Asmirajanti et al. (2019) showed that 54.7% of the nursing documentation data were of poor quality, and 71.6% were not complete (Asmirajanti et al., 2019).

Currently, with increasing nursing care, the quantities of nursing documentation data continue to increase. Therefore, to manage considerable amounts of data, in different countries, the use of computers has become more prevalent in health data recording, and it seems to be the simplest way of reporting nursing documentation data (Gonen et al., 2016). Evidence

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showed that electronic documentation systems were used in the late 1980s for the first time, and this trend has gradually increased in hospitals worldwide (for example, Canada, America, Europe, and India) (De Groot et al., 2019; Heidarizadeh et al., 2017).

In standard electronic nursing documentation, the structure of the documents follows the nursing process and contains standard terminologies for describing the phases of the nursing process (Mykkanen et al., 2016). Certain advantages, such as better access to preventative and treatment services, effective collaboration and communication among the healthcare team, and better outcomes, are the motives to reinforce the application of these systems in hospitals (Akhu-Zaheya et al., 2018; Ibrahim et al., 2019; Jenkins & Davis, 2019).

Despite the importance of documentation, studies in Iran have shown that the standard of nursing documentation is not satisfactory. Few studies that compared global standards with the results in Iranian studies revealed that nurses in other countries were more diligent regarding adherence to documentation principles and standards (Vafaei et al., 2018). In Iran, most recording systems function manually that may resemble writing a story without a special structure or framework. In most cases, there is no legal defense for a nurse owing to the gradual fading and illegibility of manual records (Heidarizadeh et al., 2017). As a result, the low quality of nursing documentation remains one of the challenges in the nursing profession in Iran, with years of clinical interventions failing to provide significant change (Vafaei et al., 2018).

In the present digital age, we are committed to preparing the nursing students for the knowledge-rich and technology-intensive workplaces. Therefore, the application of informatics should be incorporated into the nursing curriculum to enable nursing students to work efficiently at high-touch, technologically advanced centers in the 21st century (Gonen et al., 2016). In 2006, the Joint Commission on Accreditation of Health Care Organizations (JCAHO) established standardizing handover as a priority for enhancing patient safety. Therefore, Sabet Sarvestani et al. (2015) have suggested that the principles of nursing handover should be taught during the bachelor's degree to decrease the occurrence of reality shock in novice nurses who wish to commence their work in a clinical setting. Therefore, this study aimed to assess the effect of using electronic software in nursing documentation on nursing students in Iran.

Hypotheses of the study were as follows:

1. The mean score of nursing students' satisfaction in the experimental group is significantly higher than the control group.
2. The mean score of the standard of nursing documentation in the experimental group is significantly higher than the control group.
3. The mean score of the comprehensiveness of nursing documentation in the experimental group is significantly higher than the control group.

Method

Study Design

This was a quasi-experimental study.

Sample

The study population consisted of 80 nursing students in the 6th semester in 2018. For compliance with the inclusion criteria, the following were considered: the subjects should not participate in any teaching courses, should be assigned with the relevant internship credit earned during the research, and should enroll in the 6th semester. The exclusion criteria included absence from the course and nonparticipation in training sessions. For sampling, half of the students were randomly selected and categorized as the experimental group (taught through the application of the software) and the remaining students were considered as the control group (taught using the traditional method). The sample size calculation was determined as per methods described by a previous study. As the statistical test power was .8, Cronbach's α was .05, and confidence interval (CI) was 95%, the ideal sample size for each group was estimated to be 35 students. Owing to the probability of sample loss, the size of each group was considered 40 students. TREND statement was followed for reporting. Figure 1 illustrates the inclusion process in a flow chart.

Data Collection

A questionnaire was used to assess the nursing students' satisfaction in nursing documentation. The questionnaire included few demographic questions about age, sex, and interest in nursing, and 25 questions that explored nursing students' satisfaction in nursing documentation. The questionnaire was assessed according to a 5-point Likert scale ranging

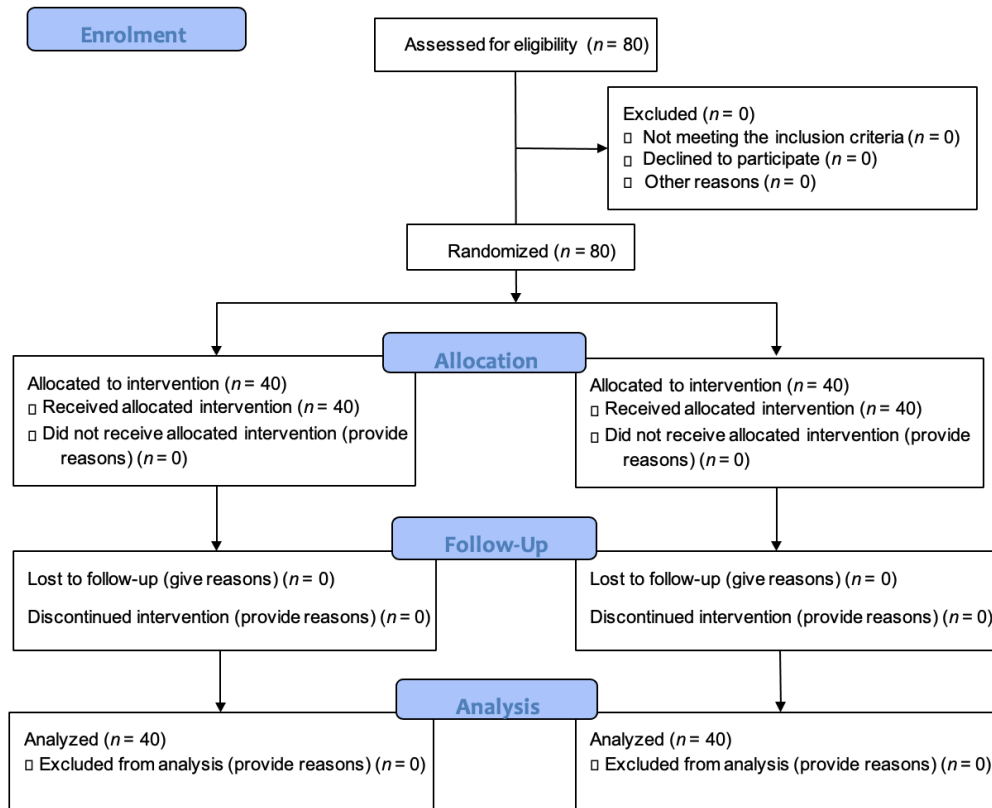


Figure 1
The Flow Chart of the Inclusion Process (TREND Statement)

from 1=very low to 5=very high. The minimum score was 1, and the maximum was 125. The initial questions of this questionnaire were designed on the basis of review of literature and expert panel opinions. To assess content validity, the questionnaire was assessed by 12 faculty members of nursing, and the result showed that the content validity ratio was .85, and the content ratio index was .82. The face validity of the questionnaire was also assessed by 15 nursing students, resulting in an item impact score of 1.63. For reliability, 35 nursing students submitted responses to the questionnaire twice in a 14-day interval. The test-retest correlation coefficient was .921. Moreover, the Cronbach's alpha of the questionnaire was .89. The scope of questions covered aspects, such as writing different sections of the nurses' notes, the convenience of writing, the time devoted for writing, and so on. During this study, a checklist was used to calculate the sort and frequency of data written in the nurses' documentation. Based on this checklist, we assessed the standard of nursing documentation and its comprehensiveness. This checklist contained the following 100 parameters divided into 5 main groups: assessment (20 parameters); diagnosis (20 parameters); planning (20 parameters);

intervention (20 parameters); and evaluation (20 parameters). To evaluate the validity and reliability of this checklist, we used the content validity method and Cronbach's alpha ($\alpha = .96$).

Procedure

To conduct the study, the software of nursing documentation was designed according to the principles of the nursing process model (NPM). Meeting sessions were held and assistance of a software designer was sought for designing the software. A total of 3 sessions were held with nursing specialists, and few suggestions were received. The software was designed after incorporation of modifications.

The new software consisted of a comprehensive nurse note according to the nursing process steps that begins with the acquisition of patient information. In the first step, the nurses are expected to document their assessment in a written format. The written assessment includes collation of information on different body systems beginning with the neurologic system and followed by respiratory, cardiovascular, integumentary, digestive, urinary, and genital systems. Furthermore, it includes documentation

of the mental condition, family, and spiritual status. In the second step, the nurses are expected to perform diagnosis and prioritize the patients' diagnoses on the basis of the North American Nursing Diagnosis Association (NANDA) list. In the third step, nurses are expected to write about their nursing interventions and care provided. Finally, in the last step, the nurses are expected to write about the evaluation. This software contain certain features that enable the nurses to use drop-down lists and choose between different items. Furthermore, it helps the nurses to access the results of laboratory tests and the previous notes of the patients easily.

Students in the experimental group received education for 4 hours each on 2 days. The goal of imparting education was to improve the students' knowledge about the standards of nursing documentation with the use of a new electronic software. The topics taught on the first day included the principles of the NPM, comprehensive assessment of the patients, writing nursing diagnosis, planned interventions, and expected outcomes. On the second day, the nursing students learned the methods of using the software. The students in the control group simply attended a session on NPM. At the beginning of the study, we requested both groups to write a nursing document manually and to complete the nursing documentation satisfaction form. After completion of the study, the experimental group used the electronic software, and the control group wrote their notes manually according to the NPM. Both groups completed the nursing documentation satisfaction form again. Then, the standard and comprehensiveness of nursing documents were assessed by evaluating their contents using the checklist with the MaxQDA 10 software (USA) for summative analysis.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences software version 16 (Chicago, USA) with a few descriptive and analytical tests (chi-squared, t-test, and paired t-test). The statistical significance was considered at $p < .05$. To assess the standard and comprehensiveness of documentation, a qualitative summative content analysis was used. In this approach, the texts are usually assessed as one word or a specific content, and word frequency is calculated manually or by using a computer (Hsieh & Shannon, 2005; Sabet Sarvestani et al., 2015).

Ethical Considerations

The director of the research facility of the university approved the research protocol (approval ID: IR.FUMS.REC.1398.031; date: 14/05/2019). All participants provided written consent and were cognizant of the objectives of the study. They were also informed that their participation was voluntary, and they had the liberty to withdraw from the study at any instance. The students were assured that their data would remain confidential. No patients were directly involved in the execution of this study.

Results

The mean age of students in the experimental and control group was 21.22 ± 1.041 and 21.49 ± 1.709 years, respectively. The results of the Mann-Whitney and chi-squared tests showed that both groups were homogeneous in terms of variables, such as age, sex, and interest in nursing before commencement of the study (Table 1). For the first hypothesis, the analysis showed that the mean score of satisfaction of nursing students in both groups increased significantly after the study, and the mean score of

Table 1

Comparison of Demographic Variables in Nursing Students in Two Groups

Variables	Experimental group mean (%)	Control group mean (%)	<i>p</i>
Age	21.22 ± 1.041	21.49 ± 1.709	.751
Sex			
Male	17 (21.25)	18 (22.5)	.637
Female	23 (28.75)	22 (27.5)	
Interest in field			
Interested	37 (46.25)	36 (45)	.363
Uninterested	3 (3.75)	4 (5)	

Note. The two groups were the same before the study with $p > .05$

Table 2

The Mean and SD of Scores of Satisfaction in the Two Groups

Satisfaction dimensions	Experimental group mean (SD)	Control group mean (SD)	Independent t-test
Before study	72.23 ± 3.24	74.23 ± 1.98	$p = .211^*$
After study	118.21 ± 13.12	92.21 ± 12.11	$p = .007^{**}$

Note. The two groups were the same before the study with $*p > .05$; $**p \leq .05$

satisfaction in the experimental group was significantly more than that in the control group ($p < .050$) (Table 2). For the second hypothesis, the results of

the summative content analysis showed that the standard of nursing documentation increased in both groups after completion of the study, and the

Table 3
Comparison of the Quality of Nursing Documentation in Both Groups

Quality of documentation	Experimental group mean (SD)		Control group mean (SD)		Independent t-test
	Before	After	Before	After	
Assessment (20 parameters)	10.22 ± 2.12	18.23 ± 1.33	10.34 ± 2.56	15.23 ± 2.45	$p = .023^*$
Diagnosis (20 parameters)	8.23 ± 2.11	17.33 ± 2.14	8.56 ± 3.21	14.23 ± 3.98	$p = .002^*$
Plan (20 parameters)	12.34 ± 2.12	19.32 ± 2.12	11.98 ± 1.90	16.23 ± 4.34	$p = .001^*$
Intervention (20 parameters)	10.33 ± 2.19	18.90 ± 1.34	10.67 ± 3.22	15.56 ± 1.25	$p = .004^*$
Evaluation (20 parameters)	9.42 ± 2.12	19.12 ± 1.76	10.11 ± 1.24	14.87 ± 1.99	$p = .001^*$

Note. * $p \leq .05$

Table 4
Comparison of the Comprehensiveness of Nursing Documentation before and after the Study

Dimensions	Experimental mean (%)		Control mean (%)		p
	Before	After	Before	After	
General appearance	30 (75)	38 (95)	29 (72.5)	34 (85)	$\leq .05^*$
Consciousness level	25 (62.5)	38 (95)	24 (60)	32 (80)	$\leq .05^*$
Vital signs	40 (100)	40 (100)	40 (100)	40 (100)	$\leq .05^*$
History of allergy	21 (52.5)	39 (97.5)	23 (57.5)	30 (75)	$\leq .05^*$
Nutritional screening	25 (62.5)	38 (95)	23 (57.5)	31 (77.5)	$\leq .05^*$
Pain	15 (37.5)	40 (100)	18 (45)	28 (70)	$\leq .05^*$
Risk of fall	12 (30)	38 (95)	10 (2.5)	22 (55)	$\leq .05^*$
Risk of pressure ulcer	14 (35)	39 (97.5)	12 (30)	18 (45)	$\leq .05^*$
Educational need	15 (37.5)	37 (92.5)	14 (35)	25 (62.5)	$\leq .05^*$
Cultural need	4 (10)	39 (97.5)	3 (7.5)	17 (42.5)	$\leq .05^*$
Biology assessment	29 (72.5)	38 (95)	28 (70)	32 (80)	$\leq .05^*$
Psychology assessment	5 (12.5)	39 (97.5)	3 (7.5)	19 (47.5)	$\leq .05^*$
Spiritual assessment	0 (0)	38 (95)	0 (0)	17 (42.5)	$\leq .05^*$
Cultural assessment	0 (0)	37 (92.5)	0 (0)	12 (30)	$\leq .05^*$
Nursing diagnosis	2 (5)	40 (100)	2 (5)	12 (30)	$\leq .05^*$
Discharge planning	6 (15)	38 (95%)	7 (17.5)	14 (35)	$\leq .05^*$
Quality of life	3 (7.5)	39 (97.5)	5 (12.5)	10 (25)	$\leq .05^*$
Education	16 (40)	40 (100)	15 (37.5)	25 (62.5)	$\leq .05^*$
Vital sign intervention	40 (100)	40 (100)	40 (100)	40 (100)	$\leq .05^*$
Other intervention	40 (100)	40 (100)	40 (100)	40 (100)	$\leq .05^*$
Drug administration	40 (100)	40 (100)	40 (100)	40 (100)	$\leq .05^*$
Monitoring vital sign	40 (100)	40 (100)	40 (100)	40 (100)	$\leq .05^*$
Monitoring activity	13 (32.5)	39 (97.5)	15 (37.5)	35 (87.5)	$\leq .05^*$
Other monitoring	23 (57.5)	40 (100)	21 (52.5)	31 (77.5)	$\leq .05^*$
Mobilization	29 (72.5)	40 (100)	27 (67.5)	31 (77.5)	$\leq .05^*$
Rehabilitation	20 (50)	38 (95)	21 (52.5)	23 (57.5)	$\leq .05^*$
Outcomes	12 (30)	40 (100)	11 (27.5)	24 (60)	$\leq .05^*$
Discharge education	24 (60)	40 (100)	25 (62.5)	30 (75)	$\leq .05^*$

Note. * $p \leq .05$

increase in the experimental group was significantly more than that in the control group ($p < .050$) (Table 3). Furthermore, for the third hypothesis, the results of the summative content analysis in each domain showed that the comprehensiveness of nursing documents increased in both groups after the study, and the increase in the experimental group was significantly more than that in the control group ($p < .05$) (Table 4).

Furthermore, this study results showed that the mean time necessary for conducting nursing documentation using an electronic software was approximately 5.21 ± 1.11 minutes, whereas manually, it was approximately 8.22 ± 2.12 minutes for a patient. The t-test analysis showed that the time in the experimental group was significantly less than that in the control group ($p < .050$).

Discussion

This study was conducted by including 80 nursing students enrolled in the 6th semester and aimed to investigate the effect of using electronic software for conducting nursing documentation on nursing students. Application of the electronic software increased satisfaction and increased the standard and comprehensiveness of documentation in nursing students and decreased the time devoted to writing.

This study conducted to validate the first hypothesis, the mean scores of satisfaction of nursing students in both groups increased significantly after the study; however, the mean scores of satisfaction of individuals in the experimental group who used electronic software for documentation were significantly more than those in the control group. This observation affirmed that imparting knowledge on NPM and using an electronic software could increase the nursing students' satisfaction in performing nursing documentation, but the satisfaction of the individuals in the experimental group that used electronic software was greater. It showed that nursing students preferred to perform nursing documentation using an electronic software. This study results were similar to the results reported by other studies. Moody et al. (2004) found that 81% of the nurses believed that electronic documentation could help them in providing efficient patient care, and 75% showed confidence using the nursing documentation. Nurses in another study also reported that they could finish their work sooner with elec-

tronic documentation compared with those using paper-based documentation. Despite these benefits, few studies reported negative experiences such as low intention, satisfaction, and discomfort with the use of an electronic documentation method (Ibrahim et al., 2019). The reasons of occurrence of frustration provided by nurses with the application of electronic documentation, included difficulty in providing individualized care, different medical expressions, difficulty in finding a computer, password recall, and the low speed of the processing systems in computers. Other problems reported were the differences in the shape of the program formats in digital systems and routine nursing documentation (Kelley et al., 2011). Although the reviews reported that the use of electronic documentation was preferred over the use of paper-based documentation, user-friendly and time-saving attributes were the chief preferences (De Groot et al., 2019). The existing literature has also laid emphasis on the importance of using uniform nursing terminology that enables the easy conveyance of data analyzed using these systems (De Groot et al., 2019). In the present era, nurses continue to embrace rapid improvement in information technology because of the dynamic needs of the healthcare systems globally (Adereti & Olaogun, 2018). Despite these challenges in using new information technology, our study showed that nursing students, usually comprising individuals of the young generation, were interested in adopting new advances in technology and preferred them in contrast to the older generation who might show hesitation in using the latest technologies.

For the second hypothesis, the results of summative content analysis conducted in our study showed that the standard of nursing documentation increased in both groups after the study. However, the increase in the experimental group was significantly more than that in the control group. Nursing documentation in each domain of the nursing process, such as assessment, diagnosis, plan, intervention, and evaluation, showed marked improvements. Different studies published on nursing documentation showed that nurses usually could not perform all steps of the nursing process. They usually perform patient assessment but exhibit difficulty in formulating a nursing diagnosis, in creating nursing care plans, and in linking these steps together (Darmer et al., 2004). Consensus exists among authors on application of electronic documentation to support and enhance the nursing documentation process

(Adereti & Olaogun, 2018). For instance, a qualitative study reported that electronic documentation significantly increased patient safety by providing on-time alerts, which might prevent the generation of inadvertent errors, especially medication-related errors. Others have also affirmed that information technology has the potential to enhance the accuracy and efficiency of care and to reduce the risk of generating human error (McCarthy et al., 2019).

For the third hypothesis, comparison of the nursing documentation in both groups after the study showed that the comprehensiveness of nursing documents in the experimental group was significantly more than that in the control group. As indicated by data in table 4, nursing documentation in the experimental group that used software involved the following dimensions: patient education; nursing diagnosis; psychosocial, spiritual, and cultural aspects; family status; and planning. The control group, however, did not include these aspects. The literature highlighted that the content of nursing handovers should be holistic and must include information on the physical, psychosocial, spiritual, medical, and familial needs of patients (Rushton, 2010). Sabet Sarvestani et al. (2015) reported that nursing handovers lacked such holistic approaches, and the medical paradigm and physical needs of patients were more evident and dominant. Other studies confirmed this finding. Irajpour et al. (2012) and Yektatalab et al. (2012), in two different studies, confirmed that the healthcare system in Iran was based on the medical paradigm, and nurses considered patients as biological individuals. They only focused on physical needs, and thus overlooked other domains of care like patient education (Irajpour et al., 2012; Yektatalab et al., 2012). Furthermore, Momennasab et al. (2012) mentioned the essentials of addressing the spiritual needs of patients, especially in a religious country like Iran. Nikbakht et al. (2004) have recommended that nursing schools should revise their curriculum to include and highlight cultural perspectives.

Finally, this study showed that the time required for conducting nursing documentation using electronic software was significantly less than manual methods, although the review of the literature highlighted different findings. For instance, a study showed that the time required to perform nursing documentation increased significantly in the electronic method by 14 minutes per shift, whereas a second study reported that documentation time decreased

by 20 minutes per shift. Nurses were concerned that the use of electronic nursing documentation would decrease the time required for providing direct and individual care. Few other studies detected no statistically significant change in time using electronic nursing documentation. Almost all electronic systems include flow sheets to report information about the patient's needs and plan of care. They also include new features, such as copy and paste and drop-down menus, that cannot be found in a paper-based format. Furthermore, electronic documentation software can be used to automatically transfer information rapidly and easily across multiple processing systems. These features may change the manner in which a nurse performs documentation, formulates decisions, communicates information with others, and thus may influence the quality of care provided and time devoted to the patients (Kelley et al., 2011).

Considering challenges encountered in health systems and aspects of the nursing profession in Iran (personnel shortage, high workload, and lack of time for care), certain strategies such as improving relationships, developing hardware- and software-based methods for documentation, imparting constant education, and providing support is highly recommended to enhance the standard of nursing documentation (Tajabadi et al., 2019).

Study Limitations

A limitation of this study included the questionnaire, which relied on the recall of the students. To ensure equality, the two groups of students (experimental and control groups) completed the questionnaire within the same time-frame. Another limitation included the use of the Likert scale, which might affect the averages owing to inequality arising between the choices selected.

Conclusion and Recommendation

The findings of this study support the use of electronic software in improving nursing documentation in nursing students. To meet the dynamic medical needs in the 21st century, nursing education and curriculum must be upgraded in parallel with information technology to facilitate rapid adaptation of students to the working aspects of a clinical setting. Therefore, it is recommended that the application of electronic software be included in the current nursing education regarding nursing documentation.

Future research is warranted to investigate the opinions of other healthcare teams regarding the use of electronic software and the ways to improve its usage.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Fasa University of Medical Sciences with the number of IR.FUMS.REC.1398.031 at 14/5/2019.

Informed Consent: Written informed consent was obtained from students who participated in this study.

Peer-review: Externally peer-reviewed.

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Conflict of Interest: The authors have no conflicts of interest to declare.

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