



# The Open Nursing Journal

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## RESEARCH ARTICLE

# Patient Safety Competencies among Senior Students of Health Professions: An Iranian Evaluation Study

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### Abstract:

#### Introduction:

Patient safety refers to preventing and reducing adverse events that might harm the patient while providing care. Enhancing patient safety competence upon entering the clinical environment requires introducing and integrating it in health professions' education.

#### Aim:

This study aimed to investigate patient safety competence among senior health professions students.

#### Methods:

This study was conducted in 2020 using a cross-sectional study. In total, 390 senior health professions students of Isfahan University of Medical Sciences, Isfahan, Iran, including medicine, nursing, pharmacy, midwifery, surgical technologist (operating room technician), and anesthesia were selected through a stratified convenience method. Data were collected using the Health Professional Education in Patient Safety Survey – H-PEPSS from August to September 2020 and analyzed using descriptive and analytical statistics. All statistical computations were carried out using SPSS version 16. A significant level of 5% was considered ( $P < 0.05$ ).

#### Results:

The mean scores of patient safety in health professions education in the classroom and clinical setting were 0.51 and 0.47, respectively. Among Health Professional Education in Patient Safety Survey – H-PEPSS domains, the highest mean score was obtained in the effective communication domain (0.61 in the classroom and 0.57 in the clinical setting). In contrast, domains of working in teams with other health professions showed the lowest mean score (0.39 in the classroom and 0.38 in the clinical setting).

#### Conclusion:

Patient safety in health profession education, particularly working in teams with other health professions, is at a moderate level in the classroom and a weak level in the clinical setting. Regarding the importance of interprofessional collaboration in promoting patient safety, it is recommended that the health sciences curriculum in Iran be reviewed to motivate students for interprofessional collaboration and the perception of its significance in reducing health profession's errors.

**Keywords:** Patient Safety, Education, Health professions, Student, Competence, Quality improvement.

### Article History

Received: December 16, 2021

Revised: January 21, 2022

Accepted: March 03, 2022

## 1. INTRODUCTION

The release of the Institute of Medicine (IOM) report prompted a global focus on patient safety in health care centers

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[1]. Patient safety refers to preventing and reducing adverse events and consequences that may lead to patient harm while providing care [2]. According to the World Health Organization (WHO), adverse events in hospitalized patients are 10%. In the Eastern Mediterranean region in which Iran is located, it is 18%, of which 3% is allocated to severe adverse events. However, 83% of these adverse events are preventable

[3].

In Iran, one out of every 150 people dies due to the consequences of health professional errors, including medicine, nursing, pharmacy, midwifery, surgical technologist, and anesthesia in health care centers. Based on the results of a review in Iran, about 17% of patients admitted to healthcare centers suffer from complications [4]. Annually, more than one million individuals die from surgery complications worldwide, half of which are preventable. Nanji *et al.* (2016) reported that out of 3671 anesthesia injections performed during 277 surgeries, 193 medication errors had occurred [5]. According to the WHO, about 810 women die per day worldwide due to preventable causes related to pregnancy and childbirth. However, timely management and treatment can prevent maternal and infant mortality [6].

To provide safe care for patients, health care providers must be required to be qualified in the domains of patient safety culture, teamwork, effective communication, safety risk management, optimization of human and environmental factors, and identification and reporting of adverse events [7]. Patient safety culture is a set of values, attitudes, perceptions, beliefs, and behaviors that support the safe activities of the healthcare teams in providing care and play an imperative role in improving patient safety and reducing health professions errors in healthcare centers [8, 9].

Improving patient safety requires all health professions [10]. The participatory approach improves health care quality and reduces health professions errors, readmission, and costs [11]. In addition, proper communication skills between health professions positively affect health-related outcomes and patient satisfaction [12]. Communication problems in handoffs and transitions of care (*i.e.*, between care areas or shift changes), and failure to provide important information about the patient's condition and care plan lead to delayed or inappropriate treatment, thus threatening patient safety [13].

Managing safety risks is another factor affecting patient safety that is performed to improve and ensure the safety of care provided to patients. Risk management-based approaches are a solution to prevent adverse events and enhance patient safety in health care centers [14]. In addition, environmental factors, including poor lighting, excessive noise, high workload, a large number of patients, and human factors, including fatigue from overwork, insufficient medication knowledge, are among the leading factors threatening patient safety, correction of which improves patient safety [4, 15, 16]. Reporting errors and converting them into an opportunity to improve the health care system is also a fundamental step in preventing errors. The National Health Services (NHS) Confederation in England has recommended reporting errors to health organizations to improve patient safety [17].

Enhancing patient safety competence upon entry into the clinical setting requires its introduction and integration into health professions education. Therefore, the mentioned domains should be included in the health professions curriculum to acquire the required competence and apply it in the clinical setting. As senior health professions students will soon play key roles in frontline patient care, their preparedness for safe, reliable care provision is particularly important [18]. Given the importance of promoting patient safety in health

profession education, it is imperative to determine care providers' perspectives on acquiring patient safety competence upon entering the clinical setting [7]. Therefore, this study aimed to investigate patient safety competence among senior health professions students.

## 2. MATERIALS AND METHODS

### 2.1. Study Design and Sample

In the present review, a cross-sectional study was used. The participants were selected among senior health professions students of Isfahan University of Medical Sciences, Isfahan, Iran, including medicine, nursing, pharmacy, midwifery, surgical technologist (operating room technician), and anesthesia. Sampling was performed in two steps. In the first step, each field was considered as a category. Later, according to the relative frequency of students in that field, the number of each category sample was obtained. In the second step, sampling in each category was performed using the conventional method, and in total, the sample size was 390 individuals, taking into account 10% attrition. Inclusion criteria included Iranian nationality, willingness to participate in the study, and a senior student in medicine, nursing, pharmacy, midwifery, surgical technologist, and anesthesia at Isfahan University of Medical Sciences, Isfahan, Iran. Exclusion criteria included completion of patient safety courses as extracurricular training.

### 2.2. Data Collection Method

Data collection tools included the Health Professional Education in Patient Safety Survey (H-PEPSS) designed by Ginsburg *et al.* (2012) [7]. The H-PEPSS is a self-report tool assessing patient safety education in the classroom and the clinical setting and comprises four sections. The original scale is in English and has been translated into several other languages including Italian, Dutch, Chinese, and Turkish, and its validity and reliability have been verified [19 - 22].

The first section consists of 4 items related to clinical safety, including hand hygiene, infection control, safe medication practice, and safe clinical procedures, and 23 items related to six socio-cultural patient safety dimensions. These dimensions reflect six patient safety competence domains, including working in teams with other health professions (6 items), effective communication (3 items), managing safety risks (3 items), understanding human and environmental factors (3 items), recognizing, respond to and disclose adverse events and close call (4 items), and safety culture (4 items). The second section (7 items) is related to taking into account patient safety in health profession education. The third section (4 items) is about the free discussion about patient safety, and the fourth section is related to demographic characteristics (age, sex, semester, field of study, patient safety experiences). The range of questions in each domain varies from 3 to 7. The questions are rated on a five-point Likert scale from strongly agree (5) to strongly disagree (1). The "I do not know" choice was not used to analyze the data. Scores were converted from the five-point Likert scale to 0-1 scores. To calculate the score of each dimension from 0-1 in the first step, the negative items were reversed. Afterward, the score of each dimension was first divided by five (due to the use of the five-point Likert

scale) and later by the number of items in that dimension. To calculate the mean total score of patient safety climate, the score obtained from the entire questionnaire was divided by five and the total number of items. A score higher than 0.75 was considered good, 0.50-75 as moderate, and 0.25-0.50 as a weak safety climate [7].

The validity and reliability of the Persian version of the H-PEPSS were examined after obtaining permission from the original author. Face validity was performed by consulting 15 experts in patient education and safety, and the impact score of all items was greater than 1.5. The content validity was assessed by consulting 11 experts in patient education and safety; the Content Validity Index (CVI) score was calculated to be 0.91, and the Content Validity Ratio (CVR) score was between 0.64 and 1. Alpha Cronbach’s coefficient was (P = 0.936) in the classroom and (P = 0.949) in the clinical setting, and Pearson correlation coefficient based on test-retest results was (r = 0.935) and (r = 0.965) in the classroom and in the clinical setting, respectively.

**Table 1. The Participants’ characteristics.**

Discipline	Number (%)
Medicine	161(41.28)
Nursing	90(23.07)
Pharmacy	80(20.51)
Surgical technologist	21(5.38)
Midwifery	20(5.13)
Anesthesia	18(4.62)
Total	390(100)

**2.3. Data Collection Procedure**

The ethics committee of Isfahan University of Medical Sciences approved this study (IR.MUI.RESEARCH.REC.1399.357). We used numeric codes in place of personal names to secure confidentiality. Informed consent was obtained from the participants to comply with the goals and necessary information related to the research, and it was emphasized to them that they could withdraw from the study at any time they wished without any consequences. The link to the questionnaire was sent to the study samples in Google Forms via WhatsApp messenger.

**2.4. Data Analysis**

Descriptive and analytical statistics, including mean,

standard deviation, Paired sample t-test, analysis of variance (ANOVA), and Pearson correlation coefficient (r), were used to analyze the data. Data analysis was performed using SPSS Inc., Chicago, IL, USA, V16. The maximum accepted error was 5% (P <0.05) in all tests (Table 1).

**3. RESULTS**

**3.1. Characteristics of the Study Participants**

The study participants consisted of 390 individuals, of whom 214 were female and 176 were male. The samples’ age ranged between 21 and 45 years. The number of students is presented in Table 1 by their field of study.

The mean total score of patient safety in health professions education was 0.51 and 0.47 in the classroom and clinical settings, respectively. The result of paired sample t-test showed the mean score was higher in total in the classroom than in the clinical setting. The mean scores by patient safety domain are presented in Table 2. The highest mean score was obtained in the effective communication domain (0.61 in the classroom and 0.57 in the clinical setting), and the domain of working in teams with other health professions showed the lowest mean score (0.39 in the classroom and 0.38 0 in the clinical setting). The mean score of clinical safety was 0.72 and 0.67 in the classroom and the clinical setting, respectively. The mean scores in the second section (attention to patient safety in health professions education) and the third section (free discussion on patient safety) of the scale were 0.40 and 0.29, respectively.

The mean patient safety scores in health profession education are presented in Tables 3 and 4 by the field of study. The field of midwifery obtained the highest score in both the classroom and clinical settings (0.64 in the classroom and 0.66 in the clinical setting), while the lowest score was for the field of medicine in the classroom (0.40) and the field of pharmacy in the clinical setting (0.37). The result of Tukey showed The field of midwifery obtained the highest score in clinical settings in comparison to medicine(0.01) and pharmacy(0.002), also obtained the highest score in classroom compared to medicine(0.005). The Pearson correlation coefficient showed a correlation between the patient safety scores in health profession education in the classroom and the clinical setting (r = 0.575, p <.001). The highest and lowest correlation was related to the safety culture (r = 0.567) and communicating effectively (r = 0.465) domains.

**Table 2. The comparisons mean scores of H-PEPSS dimensions between classroom and clinical setting.**

H-PEPSS Dimensions	Classroom	Clinical setting	t	P value*
	M(SD)	M(SD)		
Communicating effectively	0.61(0.41)	0.57(0.43)	1.82	0.007
Recognize, respond to and disclose adverse events and close call	0.54(.039)	0.50(0.40)	2.43	0.016
Managing safety risks	0.52(0.43)	0.50(0.45)	0.92	0.361
Understanding human and environmental factors	0.50(0.40)	0.49(0.41)	0.76	0.45
Safety culture	0.48(0.39)	0.39(0.40)	4.92	<0.001
Working in teams with other health professions	0.39(0.33)	0.38(0.35)	0.52	0.601
Total	0.51(0.30)	0.47(0.31)	2.61	0.009

M= Mean, SD= Standard Deviation, \*= The results of the paired sample t- test.

**Table 3. The comparisons mean total scores of H-PEPSS among senior health professionals students in classroom setting.**

Discipline	Classroom setting	F	P value*
	M(SD)		
Midwifery	0.64(0.25)	9.38	0.001
Nursing	0.62(0.26)		
Surgical technologist	0.61(0.25)		
Pharmacy	0.54(0.30)		
Anesthesia	0.52(0.22)		
Medicine	0.40(0.29)		

M= Mean, SD= Standard Deviation, \*=The results of the ANOVA.

**Table 4. The comparisons mean total scores of H-PEPSS among senior health professionals students in clinical setting.**

Discipline	Clinical setting	F	P value*
	M(SD)		
Midwifery	0.66(0.26)	6.97	0.001
Surgical technologist	0.61(0.26)		
Anesthesia	0.58(0.31)		
Nursing	0.55(0.29)		
Medicine	0.42(0.30)		
Pharmacy	0.37(0.32)		

M= Mean, SD= Standard Deviation, \*=The results of the ANOVA.

#### 4. DISCUSSION

This study aimed to assess the patient safety competence among senior health professions students in Isfahan, Iran. The results showed that patient safety levels in the six domains of health professions education varied from weak to moderate. The mean total patient safety score was moderate (0.51) in the classroom and poor (0.47) in the clinical setting. Students in the classroom and clinical setting had not received adequate patient safety education. While in similar studies, students' scores were high, indicating a favorable patient safety status in health profession education in other countries [18, 19, 22 - 24]. Considering the 50% of preventable adverse effects while providing health care in Iran, it is crucial to pay attention to patient safety education in health professions [4].

The highest mean score was related to the communicating effectively domain (61% in the classroom and 57% in the clinical setting), which was in line with other studies [20, 22]. Communicating effectively is an indispensable tool in conversing with the patient to identify medication problems, treatment effects, interactions, and adverse effects. Ineffective communication is one of the leading causes of medication error as the foremost factor threatening patient safety [12]. Therefore, it is required that communication skills in health profession education be emphasized and applied upon entering the clinical setting [25]. The lowest mean score was related to working in teams with other health professions (0.39 in the classroom and 0.38 in the clinical setting), which was consistent with other studies [19, 26]. In Iran, no medical curricula have teamwork education content. Therefore, this study sample's uncertainty in acquiring sufficient knowledge and competence in working in teams with other health professions is justified. Due to the ever-changing nature of health care and the gap between health professions, students

are required to receive the necessary education in teamwork [11]; interprofessional education (IPE) can improve interprofessional collaboration (IPC) and patient care [27]. Indeed, the interprofessional education (IPE) and interprofessional collaboration (IPC) are a dimension of the theory and practice of patient safety [28].

The mean score was higher in total in the classroom than in the clinical setting, which was in agreement with other studies [20, 22, 24]. The results showed that patient safety education primarily occurs in the classroom, while patient safety education in the clinical setting is likewise of particular importance due to direct communication with the patient and potential patient safety hazards. It needs to be considered in clinical education.

By comparing the mean scores of students in the classroom and clinical settings in different domains, it was found that there was a correlation between the classroom and clinical setting scores. The highest and the lowest correlation were related to the domains of safety culture ( $r = 0.567$ ) and communicating effectively ( $r = 0.465$ ), respectively. However, in the study by Hwang *et al.* (2016), there was a significant difference between the scores of the classroom and the clinical setting, and the mean scores in the domain of 'understanding human and environmental factors' and 'managing safety risks in the clinical setting' were significantly higher compared to the classroom [18]. Among the fields of study, the highest score was reported by midwifery students (0.64 in the classroom and 0.66 in the clinical setting). The study results by Khorasani *et al.* (2017) showed that midwives' knowledge and attitude towards reporting errors, as one of the important domains of patient safety, was high and positive as 79.12% of midwives had reported their errors during their employment. The higher rate of error reported by midwives compared to

physicians and nurses was due to the higher sensitivity of health center managers to midwives about maternal health, which is an important indicator of community development [29].

In medicine, midwifery, and anesthesia, the scores related to the clinical setting were higher than in the classroom. In contrast, in nursing and pharmacy, the scores related to the classroom were higher than those in the clinical setting. In the field of surgical technologists, the scores of the classroom and the clinical setting were approximately similar. Therefore, it can be noted that medicine, midwifery, and anesthesia students, unlike nursing and pharmacy students, had more opportunities in the clinical setting to learn subjects related to patient safety. The lowest score in the clinical setting was related to pharmacy students. Since there is a significant difference between the scores of pharmacy students in the classroom and in the clinical setting (0.54 in the classroom and 0.37 in the clinical setting), providing more opportunities to teach diverse domains of patient safety in the clinical setting, these students seem indispensable.

Conducting a study with different health professions disciplines is the study's strength. During this study, several lessons were learned, including identifying the gap between theory and practice in medical science education and increasing pay attention of educational managers to health professional education in patient safety. The present study had some limitations. In this study, the convenient sampling method was used, limiting the results' generalizability. COVID-19 pandemic was another limitation that made it impossible to access the research samples in person.

## CONCLUSION

The present study showed that the patient safety competence in health profession education, particularly in working in teams with other health professions, was not favorable. Considering the significance of interprofessional collaboration (IPC) in promoting patient safety, it is recommended that the health professions curriculum in Iran be revised to encourage students to follow interprofessional collaboration (IPC) and realize its significance in reducing health professions errors. Using the results of this study, health profession educators can examine their educational strategies and revise their curriculum to bridge the gap between theory and practice, which lay the foundation for improving patient safety in health care delivery centers and reducing health professions errors and life-threatening events.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The ethics committee of Isfahan University of Medical Sciences approved this study (IR.MUI.RESEARCH.REC.1399.357). Informed consent was obtained from the participants. We used numeric codes in place of personal names to secure confidentiality. The participants were free to withdraw from the study anytime.

## HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All procedures

performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committee and with the 1975 Declaration of Helsinki, as revised in 2013.

## CONSENT FOR PUBLICATION

All students participated on a voluntary basis and gave their informed consent.

## STANDARDS OF REPORTING

STROBE guidelines were followed.

## AVAILABILITY OF DATA AND MATERIALS

The data supporting the article's findings are available from the corresponding author [S. F.] on reasonable request.

## FUNDING

This study was supported by grants provided by the Isfahan University of Medical Sciences (project number: 399328).

## CONFLICT OF INTEREST

The authors declare no conflict of interest financial or otherwise.

## ACKNOWLEDGMENTS

The author is grateful to the senior health professions students of Isfahan University of Medical Sciences in 2020, as well as the education managers and other participants in this study. This study is the result of a Master's thesis in nursing. We also appreciate the Vice Chancellor for Research of Isfahan University of Medical Sciences for financial support.

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