

## Students' Assessment on the Patient Safety Education: The Case of College of Medicine and Health Sciences, University of Gondar

### Abstract

**Background:** It is well-known that clinical practice could never be free from medical errors. Respectively, in the case of a large number of students with a huge diversity of disciplines, the breach of patients' safety is not uncommon. Thus, this study aimed to assess students' evaluation of patients' safety education in their curriculum. **Materials and Methods:** A cross-sectional study was conducted among 338 students at the University of Gondar. A descriptive analysis was done by using Stata version 13 software and data were presented in tables and text. **Results:** As stated by 33.40% of medical interns and 51.10% of nursing students, patients' safety education was given as a chapter of a course. On the contrary, 48.20% of midwifery and 32.10% of health officer students stated that it was given as a small portion in a chapter in their curriculum. Almost 60% of students of all professional categories self-reported that their average level of knowledge on the patients' safety rested between "fair" and "poor." Likewise, more than half of students of all professional categories had a "neutral" to "disagree" level of attitude for attitude items. Concerning teaching methods, most students preferred real-life examples and problem-based learning approaches as helpful in patients' safety education. **Conclusions:** Patients' safety education has been given less emphasis. Students also self-reported that their average level of knowledge was low. Real-life examples and problem-based learning approaches were preferred learning methods among most of the students.

**Keywords:** Education, medical errors, patients, safety

### Introduction

Patients' safety is a global public health priority.<sup>[1]</sup> Though preventable, adverse events that occurred worldwide during patient management are estimated to be as high as 42.7 million annually and resulted in 23 million disability-adjusted life years per year.<sup>[2]</sup> Equally, the current measurement approach indicated that adverse events in hospitals are ten times higher than the previous.<sup>[3]</sup>

Evidence suggested that an intolerable number of patients are harmed every day in healthcare. This indicates that patient safety is an issue of countries at all levels of development.<sup>[4]</sup> As pointed out in studies, adverse events are global concerns at large.<sup>[5,6]</sup> For instance, in 1999 the United States Institute of Medicine estimated that 44000–99000 deaths occurred each year due to medical errors which could have been prevented.<sup>[7]</sup> In the era of modern technology and sufficient funds, an average

of one out of ten patient injuries is reported in developed countries.<sup>[8]</sup> When it comes to developing countries, the burden of adverse events is estimated to be approximately two-thirds of the global burden.<sup>[2]</sup>

Patients' safety breach or adverse event is mainly related to the care received in health institutions than the underlying patient and facility reasons.<sup>[9]</sup> For instance; adverse safety related to a surgical procedure is about 27%, medication errors about 18%, and a health service associated infection is about 12%.<sup>[10]</sup> Moreover, handoff errors and diagnostic errors are among the commonest adverse events reported so far.<sup>[11]</sup> The length of study in the hospitals similarly found to carry higher risks for the adverse events to occur.<sup>[12]</sup>

A good patient safety culture in hospitals is related to lower rates in in-hospital adverse events and complications.<sup>[13]</sup> However, the prevailing organizational culture in the healthcare environment and the attitude of healthcare providers towards medical

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errors have been amongst the major obstacles. Accordingly, a suitable education is suggested as the best strategy to improve the appropriate attitude toward patient safety.<sup>[14-16]</sup> Likewise, the World Health Organization (WHO) suggested that patient safety education and training programs are among the key strategies to improve safety.<sup>[10]</sup> In medical education, it is also good to know an appropriate approach to deliver patients' safety education.<sup>[17]</sup>

Due to limited studies in this area predominantly in developing countries, the findings of patients' safety education-related studies might create new insight for further research and instructional design. Hence, this study aimed to describe patient safety in medical education particularly students' evaluation of their curriculum, students' self-reported knowledge, students' attitude toward patients' safety items, and students' learning preference in patients' safety education among final year medical and paramedical students in our setup.

## Materials and Methods

This institution based cross-sectional study was conducted from December 2015 to March 2016 in the college of medicine and health sciences at the University of Gondar. The university is located in Northwest Ethiopia, 741 km northwest to Addis Ababa. At that time, the college was teaching over 5000 students in both undergraduate and postgraduate programs and amongst these students, over 700 graduating class undergraduate and postgraduate students were practicing at the University of Gondar comprehensive specialized hospital. All graduating class baccalaureate medical, midwifery, health officer, and nursing students were the study population, and students who were included in the study were selected randomly. A sample size of 403 participants was calculated based on the following assumptions; 700 students at clinical practice, 50% of students having a good and above level of knowledge on patients' safety since previous studies reported similar findings were lacking, 5% margin of error and 95% Confidence Level (CI). Students were stratified based on their study program and the sample size was then proportionally allocated and a simple random sampling technique was applied to select study participants from each stratum.

A structured questionnaire that was adapted from the studies of Madigosky and his colleagues<sup>[18]</sup> and Leung<sup>[19]</sup> was used in this study. The tool has a sociodemographic part including age, Sex, and profession. The remaining parts included 2 questions to evaluate the curriculum, 6 questions to evaluate the self-reported level of knowledge, 12 questions to evaluate students' attitudes on patients' safety education, and 15 questions to assess students' preference on teaching items and methods. Each question in the knowledge, attitude, and teaching item preference was measured by five-point Likert scales.

Twenty recently graduated medical, midwifery, and nursing staff filled the questionnaire a month before data collection. Each item of the questionnaire was checked to make sure that whether the items were clear for respondents and whether the intended information was collected. The internal consistency of items was also checked by reliability analysis using Cronbach's  $\alpha$ . All collected questionnaires were checked for completeness of responses manually. Then, data were coded and entered into Epi Info version 7 and analyzed by using Stata version 13 statistical software. Descriptive analysis that reporting frequency and the percentage were done and results were eventually presented in tables and text.

## Ethical considerations

Ethical clearance was obtained from the Ethical Committee in the college that was led by the Department of Midwifery (a coordinating department of Nursing Education Partner Initiative (NEPI) program at the time). After receiving an ethical clearance letter which has a ref. no. MIDW/10/380/2008 on Dec. 3, 2015, the college associate registrar was communicated and a sampling frame of students list obtained. Subsequently, participants were informed about the purpose of the study. Besides, they were informed that they have the right to discontinue or refuse to participate in the study. Finally, verbal consent was obtained from each study participant. Accordingly, the confidentiality of information and privacy was maintained in all levels of data management.

## Results

### Students' evaluation of the patients' safety education

Around 338 (83.90%) participants completed and returned the questionnaire among whom 246 (72.78%) students were male. Among all the participants, 130 (38.50%) were medical interns. Midwifery students were 85 (25.10%) and health officers were 78 (23.10%). Whereas, nursing students were 45 (13.30%) of the study participants.

A higher proportion, 33.40% of medical interns and 51.10% of nursing students evaluated that patients' safety education was given as a chapter of a course in their curriculum. Whereas, a larger proportion of midwifery 48.20% and health officer 32.10% of students evaluated that it was delivered as a small portion in the chapter in their curriculum [Table 1].

For the question asked to rate the level of patients' safety education, most medical interns 60.80% and health officers 30.80% rated it as "fair" while 40% midwifery and 57.80% nursing students rated it as "good" [Table 1].

### Students' self-reported level of knowledge on patient safety

Students were asked to respond to six items about their level of knowledge [Table 2]. All the items have a five-point

**Table 1: Percentage of students' evaluation of patient safety education in their current curriculum**

Item	Students (n)*	A**	B**	C**	D**	
Which alternative best fits patient safety education in your curriculum?	Medical interns	17.70	35.40	23.80	23.10	
	Midwives	27.10	17.60	48.20	7.10	
	Health officers	28.20	16.70	32.10	23.10	
	Nurses	13.30	51.10	33.30	2.20	
Item	Students (n)*	Very Good	Good	Fair	Poor	Very Poor
How do you rate the level of patient safety education in your medical/health sciences curriculum?	Medical interns	0.00	15.40	60.80	23.10	0.80
	Midwives	20.00	40.00	21.20	18.80	0.00
	Health officers	7.70	26.90	30.80	26.90	7.70
	Nurses	26.70	57.80	8.90	4.40	2.20

\*Medical interns=130, Midwives=85, Health officers=78, and Nurses=45. \*\* (A) Patient safety education is given as one independent course/subject, (B) Patient safety education is given as a chapter of a course/subject, (C) Patient safety education is given as a small topic in the chapter, and (D) Patient safety education is not given in my curriculum

**Table 2: Percentage of students' self-reported level of knowledge on patient safety**

Items	Students (n)*	Very Good	Good	Fair	Poor	Very Poor
The number of preventable adverse events reported each year by the Ministry of Health	Medical interns	3.80	6.90	33.10	52.30	3.80
	Midwives	3.50	47.10	34.10	14.10	1.20
	Health officers	5.10	44.90	26.90	15.40	7.70
	Nurses	17.80	42.20	15.60	24.40	00
The number of preventable adverse events each year reported by international bodies	Medical interns	3.80	10.00	28.50	53.80	3.80
	Midwives	5.90	29.40	35.30	27.10	2.40
	Health officers	5.10	33.30	29.50	28.20	3.80
	Nurses	15.60	26.70	42.20	15.60	00
The estimate of the percentage of hospitalizations with adverse events	Medical interns	1.50	5.40	61.50	30.00	1.50
	Midwives	3.50	29.40	45.90	20.00	1.20
	Health officers	6.40	21.80	39.70	26.90	5.10
	Nurses	13.30	24.40	33.30	26.70	2.20
Characteristics of a successful error reporting system	Medical interns	1.50	12.30	43.80	39.20	3.10
	Midwives	3.50	15.30	29.40	42.40	9.40
	Health officers	3.80	15.40	35.90	32.10	12.80
	Nurses	15.60	11.10	17.80	48.90	6.70
Dentition/Collection of latent/ underlying factors of errors	Medical interns	4.60	7.70	51.50	35.40	0.80
	Midwives	1.20	28.20	35.30	29.40	5.90
	Health officers	2.60	16.70	37.20	32.10	11.50
	Nurses	17.80	15.60	28.90	35.60	2.20
You are generally well informed on "patient safety"	Medical interns	3.80	23.80	63.80	3.10	5.40
	Midwives	18.80	42.40	24.70	9.40	4.70
	Health officers	15.40	33.30	21.80	20.50	9.00
	Nurses	24.40	40.00	17.80	15.60	2.20

\*Medical interns=130, Midwives=85, Health officers=78, and Nurses=45

Likert scale which ranges from (1) very poor to (5) very good. The items had internal reliability of (Cronbach's  $\alpha$  of 0.76 [95% CI: 0.72, 0.80]) that reflects a good internal consistency.

A self-reported level of knowledge was asked using one general and five specific questions. Accordingly, medical interns self-reported that their average level of knowledge of the five specific questions was 'fair' among 43.70% of respondents and 'poor' among 42.10%. Furthermore, self-reported knowledge among midwifery students was assessed and 30.00% of them responded "good," 36.00%

of them responded "fair," and 26.60% of them chose the "poor" option in the scale [Table 2].

From health officer students, the average self-reported knowledge of the five specific questions was "good" among 26.40%, "fair" among 33.80%, and "poor" among 27%. Similarly, 24%, 27.60%, and 30.20% of nursing students self-reported "good," "fair," and "poor" levels of knowledge for the five specific questions, respectively. For the general knowledge question, more than 50% of students of all categories in aggregate identified themselves in the good and fair level of self-reported knowledge [Table 2].

### Students' attitude toward patient safety

Using twelve items, students' attitude toward patients' safety was assessed by the five-point Likert scale. These items were internally consistent with the reliability of Cronbach's  $\alpha$  of 0.75 (95% CI: [0.71–0.79]).

More than 60% of students in all categories agreed that making errors in medicine is inevitable. Similarly, more than 80% of participants in each professional category agreed on the disparity of what is known as "best practice" and "day-to-day" practice. Whereas the majority disagreed on the concepts "Competent physicians do not make medical errors that lead to patient harm" and "Most errors are due to things that physicians cannot do anything about" [Table 3].

Concerning error management, more than 50% of students had "neutral" to "disagree" level of attitude for items such as keeping an error secret, not addressing an error unless harm occurs, physicians are the only professional groups to determine the cause of an error, the contribution of the reporting system for future error, and routine reporting of error. Whereas more than 75% of students in all professional categories agreed on the item "After an error occurs, an effective strategy is to work harder and to be more careful" [Table 3].

### Preference of students on the patients' safety topics

On the assessment of teaching items, more than 75% of students in all categories of profession agreed on the items given in Table 4. Similarly, over 75% of students in all professional categories agreed on teaching patients' safety skills in the form of "supporting and advising a peer who must decide on how to respond to an error" and "analyzing a case to find the cause of an error." Whereas, more than 50% of students in all professional categories do not prefer disclosing an error to a patient as an approach of skill teaching [Table 4].

### Students' preference for the methods of patient safety education

Large lecture as a method of teaching for patient safety was considered as less helpful by more than 50% of the medical interns. Real-life examples presented by physicians and patients as well as problem-based learning approaches were considered as helpful methods of patient safety education among most of the students in all professional categories [Table 5].

### Discussion

This study tried to explore the extent of patients' safety education in the medical and paramedical curriculum in the college of medicine and health sciences at the University of Gondar. Besides, students self-evaluated their level of knowledge and attitude on patients' safety. This study also determined students' preference for items and methods for patients' safety education.

The majority of students in all categories of profession perceived that patients' safety education is not given as a standalone course in their curriculum. It was delivered either as a chapter in the subject or a subchapter in a chapter. By the same token, most medical interns and nursing students evaluated that patients' safety education was delivered as a chapter and subchapter of a course in their curriculum. As well, the subchapter level of patients' safety education according to most midwifery and health officer students' evaluations could reflect the extent of patients' safety education in most of the universities across the country.

Related to the self-reported level of knowledge, the majority of medical interns self-reported that their average level of knowledge for the five specific questions ranged from "fair" to "poor." Similarly, in greater than 50% of para-medical students, the self-reported level of knowledge ranged from "fair" to "poor." Leung's study<sup>[19]</sup> from Hong Kong and Bahram's study<sup>[20]</sup> from Azerbaijan also reported the "poor" to "fair" level of knowledge about patients' safety education. This similarity could reproduce the level of attention given to patients' safety education in developing countries.

Like that of others finding,<sup>[21]</sup> regardless of the professional category, most students agreed that making errors in medicine is inevitable. Similarly, more than 80% of participants in each professional category agreed on the disparity of what is known as best practice versus routine practice. The results of Leung's,<sup>[19]</sup> Bahram's,<sup>[20]</sup> and Yoshikawa's<sup>[22]</sup> studies also reported similar findings. This could represent the level of self-confidence of students in terms of clinical competency as presented in this finding in which the majority disagreed on the concepts: "Competent physicians do not make medical errors that lead to patient harm" and "Most errors are due to things that physicians cannot do anything about." The attitude of attributing errors to inevitability might be reverted when practitioners stick to best practices than habits.

More than half of students in this study had "neutral" to "disagree" level of attitude for items concerning error management such as keeping an error secret, not addressing an error unless harm occurs, a single profession that determines the cause of an error, the contribution of the reporting system for future error and routine reporting of an error. The findings from Leung's<sup>[19]</sup> and Bahram's<sup>[20]</sup> studies also reported a similar level of students' attitude toward the items, and this might be attributed to the fearfulness in taking responsibility and becoming accountable for such a sensitive issue in medical practice.

For the item, "After an error occurs, an effective strategy is to work harder and to be more careful," the attitude of more than three-fourth of the students was at the level of agreement. The finding was as well supported by Leung's<sup>[19]</sup>

**Table 3: Percentage of students' attitude on patient safety**

Items	Students (n)*	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>Causes of errors</b>						
Making errors in medicine is inevitable.	Medical interns	42.30	55.40	0.80	0.80	0.80
	Midwives	16.50	60.00	11.80	7.10	4.70
	Health officers	20.50	44.90	12.80	17.90	3.80
	Nurses	31.10	48.90	8.90	8.90	2.20
There is a gap between what physicians knew as "best care" and what is being provided on a day-to-day basis.	Medical interns	14.60	66.90	10.00	7.70	0.80
	Midwives	23.50	61.20	8.20	5.90	1.20
	Health officers	38.50	50.00	3.80	5.10	2.60
	Nurses	22.20	62.20	8.90	6.70	0.00
Competent physicians do not make medical errors that lead to patient harm.	Medical interns	3.10	32.30	24.60	38.50	1.50
	Midwives	5.90	21.20	11.80	48.20	12.90
	Health officers	11.50	29.50	15.40	30.80	12.80
	Nurses	22.20	22.20	8.90	33.30	13.30
Most errors are due to things that physicians cannot do anything about.	Medical interns	0.80	19.20	44.60	33.80	1.50
	Midwives	3.50	22.40	11.80	51.80	10.60
	Health officers	3.80	30.80	19.20	42.30	3.80
	Nurses	6.70	40.00	26.70	22.20	4.40
<b>Error management</b>						
If I saw a medical error, I would keep it to myself.	Medical interns	0.00	3.80	24.60	42.30	29.20
	Midwives	2.40	22.40	11.80	37.60	25.90
	Health officers	6.40	17.90	19.20	44.90	11.50
	Nurses	8.90	24.40	8.90	31.10	26.70
If there is no harm to a patient, there is no need to address an error.	Medical interns	0.00	9.20	26.90	60.00	3.80
	Midwives	2.40	11.80	8.20	56.50	21.20
	Health officers	7.70	14.10	9.00	42.30	26.90
	Nurses	6.70	15.60	15.60	35.60	26.60
Only physicians can determine the causes of a medical error.	Medical interns	1.50	13.80	20.80	54.60	9.20
	Midwives	0.00	11.80	2.40	50.60	35.30
	Health officers	5.10	9.00	6.40	53.80	25.60
	Nurses	4.40	13.30	15.60	40.00	26.70
Reporting systems do little to reduce future errors.	Medical interns	7.70	33.10	13.80	37.70	7.70
	Midwives	10.60	31.80	9.40	34.10	14.10
	Health officers	7.70	30.80	12.80	29.50	19.20
	Nurses	13.30	31.10	13.30	26.70	15.60
After an error occurs, an effective strategy is to work harder and to be more careful.	Medical interns	23.30	53.10	23.10	0.80	0.80
	Midwives	37.60	52.90	3.50	3.50	2.40
	Health officers	32.10	43.60	11.50	10.30	2.60
	Nurses	22.20	55.60	6.70	13.30	2.20
Physicians should not tolerate uncertainty in patient care.	Medical interns	6.20	51.50	37.70	3.80	0.80
	Midwives	8.20	32.90	27.10	23.50	8.20
	Health officers	9.00	33.30	19.20	33.30	5.10
	Nurses	6.70	46.70	24.40	15.60	6.70
The culture of medicine makes it easy for providers to deal constructively with errors.	Medical interns	7.70	32.30	38.50	21.50	0.00
	Midwives	11.80	44.70	25.90	17.60	0.00
	Health officers	6.40	43.60	28.20	17.90	3.80
	Nurses	15.60	28.90	20.00	28.90	6.70
Physicians routinely report medical errors.	Medical interns	4.60	24.60	51.50	19.20	0.00
	Midwives	8.20	25.90	20.00	32.90	12.90
	Health officers	6.40	16.70	29.50	34.60	12.80
	Nurses	20.00	31.10	11.10	22.20	15.60

\*Medical interns=130, Midwives=85, Health officers=78, and Nurses=45

and Bahram's<sup>[20]</sup> studies. This indicates that students are at the level of less readiness to not tolerate error before

it occurs, and this is contrary to the strategy so-called prevention is better than cure.

**Table 4: Percentage of students' assessment of their preference for teaching items in patient safety education**

Items	Students (n)*	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>Education</b>						
Physicians should routinely spend part of their professional time of working to improve patient care.	Medical interns	18.50	76.90	4.60	0.00	0.00
	Midwives	37.60	49.40	5.90	5.90	1.20
	Health officers	44.90	37.20	2.60	9.00	6.40
	Nurses	37.80	40.00	8.90	6.70	6.70
'Patient safety' is an important topic.	Medical interns	43.10	56.20	0.80	0.00	0.00
	Midwives	68.20	29.40	0.00	2.40	0.00
	Health officers	57.70	35.90	2.60	2.60	1.30
	Nurses	60.00	37.80	0.00	2.20	0.00
Learning how to improve patient safety is an appropriate use of time in medical school.	Medical interns	17.70	73.10	9.20	0.00	0.00
	Midwives	45.90	47.10	2.40	3.50	1.20
	Health officers	47.40	39.70	7.70	5.10	0.00
	Nurses	64.40	35.60	0.00	0.00	0.00
You would like to receive further teaching on patient safety.	Medical interns	20.00	73.80	5.40	0.80	0.00
	Midwives	47.10	41.20	2.40	8.20	1.20
	Health officers	39.70	43.60	12.80	3.80	0.00
	Nurses	40.00	55.60	4.40	0.00	0.00
<b>Skill</b>						
Supporting and advising a peer who must decide how to respond to an error	Medical interns	16.20	60.80	20.80	2.30	0.00
	Midwives	25.90	56.50	5.90	9.40	2.40
	Health officers	20.50	62.80	7.70	7.70	1.30
	Nurses	20.00	66.70	13.30	0.00	0.00
Analyzing a case to find the cause of an error	Medical interns	21.50	60.00	15.40	3.10	0.00
	Midwives	29.40	55.30	1.20	11.80	2.40
	Health officers	29.50	52.60	9.00	6.40	2.60
	Nurses	33.30	48.90	13.30	4.40	0.00
Disclosing an error to a patient	Medical interns	3.80	14.60	60.80	14.60	6.20
	Midwives	10.60	24.70	23.50	32.90	8.20
	Health officers	7.70	35.90	23.10	28.20	5.10
	Nurses	15.60	20.00	28.90	26.70	8.90
Disclosing an error to a faculty member	Medical interns	0.80	43.10	41.50	13.80	0.80
	Midwives	14.10	43.50	11.80	21.20	9.40
	Health officers	14.10	37.20	21.80	23.10	3.80
	Nurses	33.30	35.60	6.70	24.40	0.00

\*Medical interns=130, Midwives=85, Health officers=78, and Nurses=45

Regarding teaching items and preference of teaching methods for patients' safety education, most students in all professional categories agreed on teaching patients' safety skill in the form of "supporting and advising a peer who must decide on how to respond to an error;" an approach found to be effective,<sup>[10,14,16,23]</sup> and "analyzing a case to find the cause of an error" whereas, more than 50% of students do not prefer disclosing an error to a patient to be part of the skill teaching approach. Large classroom lecture as a method of teaching for patient safety was considered as less helpful by more than 50% of the medical interns. Likewise, the finding in another study,<sup>[24]</sup> real-life examples presented by physicians and patients as well as problem-based learning approaches were considered as helpful methods of patient safety education among most students in all professional categories.

This study showed some important directions for educators to look at while teaching patients' safety. However, the

study is entirely limited to one university and might not represent students in the country as well as teaching approaches in other universities. Besides, approaches such as observational study incorporating patients' perspectives and factor analysis could supplement further for patients' safety education.

## Conclusion

In this study, based on students' evaluation, patients' safety education has been given less emphasis. Students are also self-reported that their average level of knowledge rested on the "fair" to "poor" range on the scale and more than half of the students had "neutral" to "disagree" level of attitude for attitude items. Most students preferred real-life examples presented by physicians and patients as well as problem-based learning approaches as helpful methods of patient safety education.

**Table 5: Students' preference for methods of patient safety education**

Items	Students (n)*	Very helpful	Helpful	Less helpful	Undecided	Not helpful
Large Lecture	Medical interns	2.30	36.90	51.50	2.30	6.90
	Midwives	22.40	50.60	23.50	2.40	1.20
	Health officers	25.60	44.90	21.80	2.60	5.10
	Nurses	40.00	44.40	13.30	0.00	2.20
A real-life example of mistakes and errors presented by physicians	Medical interns	32.30	64.60	0.80	2.30	0.00
	Midwives	49.40	43.50	5.90	1.20	0.00
	Health officers	43.60	46.20	6.40	3.80	0.00
	Nurses	48.90	40.00	8.90	0.00	2.20
Independently completed computer modules	Medical interns	6.90	65.40	24.60	3.10	0.00
	Midwives	22.40	47.10	24.70	5.90	0.00
	Health officers	23.10	42.30	23.10	9.00	2.60
	Nurses	28.90	40.00	28.90	2.20	0.00
Disclosing a medical error to a standardized patient	Medical interns	3.80	48.50	31.50	8.50	7.70
	Midwives	14.10	34.10	24.70	15.30	11.80
	Health officers	19.20	25.60	41.00	9.00	5.10
	Nurses	20.00	35.60	33.30	6.70	4.40
Real-life examples of mistakes presented by patients	Medical interns	20.00	64.60	12.30	3.10	0.00
	Midwives	32.90	43.50	17.60	0.00	5.90
	Health officers	24.40	47.40	19.20	9.00	0.00
	Nurses	40.00	46.70	11.10	0.00	2.20
Independent study with reading and reflection	Medical interns	7.70	51.50	33.80	6.90	0.00
	Midwives	22.40	51.80	21.20	3.50	1.20
	Health officers	21.80	46.20	25.60	5.10	1.30
	Nurses	28.90	55.60	6.70	8.90	0.00
Problem-based learning	Medical interns	74.60	23.80	1.50	0.00	0.00
	Midwives	57.60	37.60	4.70	0.00	0.00
	Health officers	56.40	29.50	11.50	1.30	1.30
	Nurses	51.10	44.40	2.20	2.20	0.00

\*Medical interns=130, Midwives=85, Health officers=78, and Nurses=45

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## Conflict of interest

Nothing to declare.

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