

KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS
PATIENT SAFETY AMONG UNDERGRADUATE HEALTH
SCIENCE STUDENTS OF JIMMA UNIVERSITY



TOFIK MOHAMMED (MD, INTERNAL MEDICINE
RESIDENT)

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JIMMA, ETHIOPIA

KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS PATIENT SAFETY AMONG UNDERGRADUATE HEALTH SCIENCE STUDENTS OF JIMMA UNIVERSITY

TOFIK MOHAMMED (MD, INTERNAL MEDICINE RESIDENT)

E-mail : tomrew53@gmail.com

Phone no: +251-920978215

ADVISORS:

1. ESAYAS KEBEDE GUDINA (MD, DTMH, PhD)
2. EMEBET WOLDEAREGAY (MD)
3. MASRIE GETNET (MSc)

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JIMMA, ETHIOPIA

Abstract

Background: Patient safety is the reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum. It has been identified as a global priority area where substantial knowledge gaps exist and where further knowledge would significantly contribute to improving patient safety and reducing harm. However, little is known about undergraduate health science students' knowledge, attitude, and practice towards patient safety in Ethiopia.

Objective: The aim of this study was to assess the knowledge, attitude, and practice about patient safety among undergraduate health science students in Jimma University (JU).

Methods: An institution based cross sectional study was conducted from May to November, 2021 on 678 health science students of JU who had exposure to clinical rotations. Self-administered questionnaire was used to collect the data. The collected data was entered into Epi data 3.1 and cleaned and analyzed using SPSS version 21. Bivariable and multivariable logistic regressions analyses were employed to identify factors associated with outcomes of interest. P-value of <0.05 was used as a level of statistical significance.

Results: The mean age of the participants was 23.93(\pm 1.606) years; 429(63.3%) were male. More than half, 355(52.4%) of them were medical students and 263(38.8 %) were in the fourth year of their training. Only 43.2% and 45.4% of the students had good knowledge and positive attitude towards patient safety, respectively. Moreover, only 19.9 % of the students had good practice towards patient safety. Year of study [AOR =14.371, 95% CI 2.311; 89.356], duration on practical attachment [AOR =2.645, 95% CI 1.186; 5.901], and knowledge about patient safety [AOR =1.958, 95% CI 1.141; 3.358] were associated with better patient safety practices.

Conclusion: Less than half of the student's had good knowledge and positive attitude towards patient safety. Moreover, only few of the students had good practice towards patient safety. Hence, patient safety courses should be included in the curriculum of health science students to address these gaps.

Key words: patient safety, knowledge, attitude, practice, undergraduate students

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Abbreviations

APPS: African Partnerships for Patient Safety

FMoH: Federal Ministry of Health

HSTP: Health Sector Transformation Plan

JU: Jimma University

JUIH: Jimma University Institutes of Health

JUMC: Jimma University Medical Center

KAP: Knowledge, Attitude, and Practice

Km: Kilo meter

PS: Patient Safety

USA: United States of America

WHO: World Health Organization

1. Introduction

1.1. Background

Patient safety is the reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum. An acceptable minimum refers to the collective notions of given current knowledge, resources available and the context in which healthcare was delivered weighed against the risk of non-treatment or other treatment (1). It is an attribute of healthcare system which minimizes incidence and impact of adverse events and maximizes recovery from these adverse events. Healthcare outcomes have significantly improved because of modern medicine. However, these benefits come with significant risks to patient safety. Admitted patients are at risk of suffering an adverse event, and patients on drugs have the risk of drug adverse reactions (2)

So far, the magnitude of harm resulting from unsafe patient care is said to be large in developing countries than in the developed nations (3). Until recently, patient safety in Africa was not included in national policies but now has undergone renaissance through the World Health Organization (WHO) African Partnerships for Patient Safety (APPS) and seen as a basic right within the context of universal health coverage (4). WHO figures for unsafe medications demonstrate that an estimated 25% of all medicines consumed in developing countries are probably counterfeit, thus contributing to unsafe healthcare.

Patient safety education and training is only beginning to occur at all levels. Medical students and other health science students as future healthcare givers must also be prepared to practice safe healthcare. Patient safety skills and behaviors should begin as the students enter healthcare service centers.

Patient safety education for health professionals in the higher educational programs has not kept up with workforce requirements (2). Study conducted in hospitals in Oromia and Amhara Regions found that there is a serious deficit of patient safety culture in Ethiopian public hospitals with overall level of patient safety culture of 46 %. Working hours, level of staffing, teamwork, communications openness, reporting an event and exchange of feedback about error were associated with patient safety culture (5, 6). Another Study done in Dessie town showed that the

overall level of patient safety culture was under 50% where good patient safety culture was taken as when knowledge score is above 50%. Good patient safety culture had positive association with working in primary hospital and negative association with professionals' age between 25–29 year, 30–34 year, and working in pediatrics and emergency wards (7).

1.2. Statement of problem

Patient safety is now an international public health issue affecting all types of healthcare systems whether in western or developing countries. Majority of patient safety problems are considered to be preventable. Patient safety is challenged by not only the complexity of healthcare processes but also the culture of denial and blame, the two characteristics that have dominated the environment of problem solving and learning. In addition, inconsistencies in the reporting and learning systems prevent collection and dissemination of information in a meaningful way (8).

There are champions all around the world who want to try and create a culture of safety in healthcare, but there is a limited knowledge on how to make this happen. The WHO has championed the issue of patient safety since the launching of the World Alliance for Patient Safety in 2004 (9). The WHO, working with governments, universities and schools worldwide, international professional associations in the disciplines of dentistry, medicine, midwifery, nursing and pharmacy and their related student associations, have made patient safety education relevant to the needs and requirements of good work place. The education and training of dentists, doctors, midwives, nurses, pharmacists and other healthcare professionals have long been the foundations of safe and high-quality healthcare. Yet, it has been under-utilized and under-valued as a vital tool for addressing the challenges of achieving improved patient safety (2)

A study conducted in the United State of America showed that medical errors led to loss of \$19.5 billion in 2008 alone (10). A report from the Institute of Medicine emphasized that incorporating patient safety education into clinical training programs is a key mechanism for improving patient safety (11). Until few years back, patient safety in Africa did not get an attention and not even incorporated in the national policies but now it has undergone renaissance through the World Health Organization -African Partnership for Patient Safety and increasingly seen as a basic right within the context of universal health coverage (4).

Despite a lack of research, patient safety in Ethiopia is believed to be a serious concern. A previous local study in the pediatric ward has shown an incidence of 9.2 adverse drug events per 100 hospital admissions, of which around 35% could be preventable (12). Currently, as part of the Health Sector Transformation Plan (HSTP), Ministry of Health-Ethiopia is undertaking various initiatives to improve the quality of healthcare delivery. Despite the efforts by the ministry of health, there is a significant information gap regarding patient safety in Ethiopia. It is difficult to talk about healthcare quality without addressing safety issues. Health science students are often overlooked as valuable participants in ensuring patient safety.

1.3. Significance of the study

Conducting this study will complement the very few studies conducted on patient safety in Ethiopia. The results of the study are hoped to reveal the true picture of the patient safety awareness level among undergraduate health science students of Jimma University. This will help curriculum developers and instructors in designing their courses based on students' needs and the identified gaps. This will further improve the quality of education as well as quality of healthcare. This study may also serve as a baseline data and reference for future studies to be conducted on patient safety among undergraduate health science students.

2. Literature Review

There is now overwhelming evidence that large numbers of patients are harmed from their healthcare either resulting in permanent injury, increased length of stay in hospitals and even death (2). Study done in United Kingdom in 2013 to contextualize the degree of harm that comes from unsafe medical care showed that globally there were about 16.8 million injuries annually due to these adverse events and from 100 hospitalizations, there were approximately 14.2 and 12.7 adverse events in high and low income countries respectively (13). Patient safety education and training is only beginning to occur at all levels (2). According to the study conducted on Italian physicians in 2012 to investigate physicians' attitudes on preventing and managing medical errors and to explore physicians' behavior when facing medical errors, it was found that 44.5 and 44.1% of physicians agreed or were uncertain respectively about the disclosure of errors to the patients.

The pattern of behavior showed that 7.6% of physicians reported to have never been involved in medical errors (14). Another study done in USA on medical trainees found that the participants responded averagely to 58.4% of items measuring knowledge on patient safety correctly. The score on knowledge of patient safety, which was defined as what percent of knowledge questions were answered, was associated with year of training (15). Study which was conducted in Brazil in 2013 to identify the understanding of graduate students in nursing and medicine at a public university on patient safety revealed that majority of students agreed to report to professors, managers, and colleagues when they face conditions that can lead to patient harm. However, only some of them agreed to communicate an error to the patient and family. Among 109 students who participated in this study, 91.7% and 93.6% disagreed or strongly disagreed that systems to report errors make little difference in reducing future errors and only doctors can determine the cause of the occurrence of errors respectively.

This study also found that most participants disagreed or strongly disagreed that students always perform internship activities in locations that promote good practices (72.5%) and whenever they identify situations that require improvements, they get the support of the institution for implementing safety measures (62.4%) (16). In the study done in Hong Kong on medical student perception about patient safety in 2010, it was found that majority of students agreed that

medical errors are inevitable and 70% of medical students had poor or very poor knowledge regarding patient safety when asked specific questions. Asking nonspecific question of whether they are well informed on patient safety or not, about half students have reported that they have fair knowledge(17). Study conducted on Undergraduate Medical Students in Saudi Arabia in 2011 found that more than half of the participants (52.7%) self- rated their general knowledge on patient safety on good level where 50% and more was considered good knowledge (18).

Skills scores increased as participants' clinical careers moved from beginner to expert (2). According to study done in Iran in 2013 to assess staff attitude about patient safety, about 34% and 16% study participants reported that patient safety score in their working ward was perfect or very good and weak or unacceptable, respectively (19). In another study done in same country in 2015, about 40% of students who participated in the study had poor knowledge while only 20% had good knowledge on patient safety. This study had also shown that there were some differences in knowledge among medical, nursing, and midwifery students. Eighty percent of the students had a belief that the care being provided was not the best possible care. Sixty four percent of students disagreed that healthcare providers do not make harmful medical errors. Sixty four percent of students agreed that most errors are due to things that physicians cannot do anything about. Nursing and midwifery students obtained significantly higher scores on perception towards patient safety than medical students (20).

Study done in Pakistan in 2015 showed that 57%, 26.2%, and 20% students agreed, disagreed, and responded neutral respectively regarding inevitability of medical errors. About 41% study participants responded that most errors are not related to physicians and this misconception was more among residents than health officers and undergraduate students (21).

In study conducted in 2017 in South Korea, the knowledge score of the participants increased with increasing age. Study participants who had received patient safety education had better knowledge than those who did not received patient safety education. Knowledge scores of hospital nurse preceptors were significantly higher than those of school clinical instructors. It was also found that study participants with doctoral degree had lower attitude score compared to those with master's degree (22).

In study conducted in six developing countries in 2020 to assess attitudes of pharmacy students towards patient safety, a positive attitude towards patient safety was found with a mean score of 66.8%. Female participants had a better attitudes towards patient safety scores as compared with male participants ($p=0.001$) (23).

In study done in Ghana in 2021 to assess Knowledge, perception and attitude of patient safety amongst clinical year physiotherapy students, it was found that 12.5 %, 70 % and 17.5 % of the respondents showed low, moderate and high level respectively on knowledge about ‘error and patient safety (24). In study conducted in 2017 in Ethiopian public hospitals, around 54% study participants hadn’t reported any events in previous twelve months while the remaining 46% had reported at least one event in previous twelve months (5).

A study conducted in 2017 Gondar University revealed that 80.7% students agreed that after an error occurs, an effective strategy is to work hard to be more careful. They also had a belief that peer-led education, such as from pharmacist colleagues or fellow students, can help their understanding of patient safety concepts. About 80% of the study participants stated that if they saw an error that did cause harm, they would not keep it to themselves and believed that they should routinely spend part of their professional time working to improve patient safety. About half of them disagreed on discussing and reporting errors to an affected patient and their family even if the patient is not harmed (25).

A study conducted in Jimma Zonal Hospitals in 2016 showed that medical students had vital role in prevention of patient harm. Students were able to prevent unsterilized body part from being incised by reporting the error to resident, notice prescribed but not administered drug, and prevent the transmission of tuberculosis from new patient to people around. Poor team communication, lack of formal practice of confirming that ordered drugs are administered, medical profession hierarchy limiting communication, language barrier, taking incomplete past history, and hesitancy of students to speak up errors were some of the factors contributing for unsafe care (6). As it can be observed from above discussions most of the studies conducted on patient safety among healthcare profession students are in countries other than Ethiopia.

3. Objectives of the study

3.1 General objective

To assess knowledge, attitude and practice towards patient safety among undergraduate health science students of Jimma University

3.2. Specific objectives

1. To determine knowledge of patient safety among undergraduate health science students of Jimma University
2. To determine attitude towards patient safety among undergraduate health science students of Jimma University
3. To determine practice of students regarding patient safety among undergraduate health science students of Jimma University.
4. To assess factors associated with patient safety practice among undergraduate health science students of Jimma University.

4. Methods and Materials

4.1 Study Area and Period

The study was conducted at Jimma University (JU). JU is located in Jimma town, 352 Km southwest of Addis Ababa. The town has two government hospitals, three health centers and is also home for different higher educational institutions. Jimma University Institute of Health has three faculties and nine disciplines namely medicine, dentistry, anesthesia, public health, pharmacy, medical laboratory, nursing, midwifery and environmental health. Currently, there are 2976 regular health science students at JUIH; of them, 1555 have exposure to clinical attachment. The study was conducted from May, 2021 to December, 2021

4.2 Study Design

An institution-based cross-sectional study design was employed.

4.3 Source Population

The source population for the study was all regular undergraduate students of JUIH in 2021.

4.4. Study Population

The study population was sampled regular undergraduate students who fulfilled the inclusion criteria.

4.5. Study unit

Individual student

4.6. Inclusion and exclusion criteria

Inclusion criteria

Medical internes, medical and dental students who are in fourth year and above, pharmacy students in 5th year, nursing, midwifery, public health officer, environmental health, anesthesia, and medical laboratory students who were above third year and all having at least three months of attachment were included.

Exclusion criteria

Students who were sick at the time of data collection were excluded.

4.7. Sample size determination and sampling technique

4.7.1 Sample size

The total sample size taken was determined by using single population proportion formula with 95% confident interval, marginal error (d) of 5% and $p=0.5$, as there is no a similar study to take the proportion it is assumed to be 50%.

$$n = \frac{(Z_{1-\alpha/2})^2 P(1-P)}{d^2}$$

Where, n – minimum optimum sample size

$Z_{1-\alpha/2}$ – is standard normal value at 95% C.I which is 1.96

P -The proportion of students with poor knowledge, attitude, and practice =0.5

d – Possible margin of sampling error tolerated which is 5%

$$n = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384$$

Because source population is <10,000 i.e., 1555, using the finite population correction formula:

$$n = \frac{n_0}{\left(1 + \frac{n_0}{N}\right)} = \frac{384}{1 + \frac{384}{1555}} = 308$$

Where, n_0 is the initial sample size calculated = 384

N is total source population = 1555

n is final sample size

Considering 10% non-response rate, the sample size was 339 and because stratification of participants undertaken and taking design effect as 2 the final sample size was 678

4.7.2 Sampling technique

Stratified sampling technique was used as the students were divided into different disciplines and then total sample size was proportionally allocated to each discipline. Then proportional sampling allocation method was used to select students in each of the class years within the discipline. Finally, simple random sampling technique was employed to select study participants from each stratum using their list. The total number of students having clinical attachment was 1555 and therefore the sample size allocation for each stratum and cluster was as shown in the table 1.

Table 1: Sample size allocations for each stratum and cluster for assessment of knowledge, attitude and practice towards patient safety among undergraduate health science students of Jimma University, Southwest Ethiopia, 2021

S.No	Discipline	Total n=1 555	6 th		5 th		4 th		3 rd year	
			Total	Selected	Total	Selected	Total	Selected	Total	Selected
1	Medicine	814	270	116	300	130	244	109	NC	--
2	Dental medicine	76	28	10	25	10	23	10	NC	-
3	Public health	101	NA	NA	NA	NA	49	21	57	24
4	Nursing	163	NA	NA	NA	NA	89	42	74	35
5	Midwifery	83	NA	NA	NA	NA	44	19	39	17
6	Anesthesia	52	NA	NA	NA	NA	25	11	27	11
7	Medical lab	127	NA	NA	NA	NA	69	30	63	28
8	Pharmacy	76	NA	NA	76	32	NC	NC	NC	NC
9	Environmental health	63	NA	NA	NA	NA	63	23	NC	NC

NA – not applicable

NC – no clinical attachment

4.8. Study variables

Dependent:

- Knowledge, attitude, and Practice of patient safety

Independent Variables:

- Age
- Sex
- Year of study
- Residence
- Duration of clinical attachment
- Lesson on patient safety
- Discipline of students

4.9. Data collection procedure

The data collection tools were developed from WHO patient safety curriculum and patient safety manuals and modified to fit in to the study context (2, 8). Some components of the questionnaire were directly adopted from research done on nurses working at Asella Referral and Teaching Hospital (26). The questionnaire has 18 questions on socio-demographic and personal related characteristics, 11 knowledge questions, 9 attitude questions and 10 practice questions. The questionnaire was prepared in English. A semi structured self-administered questionnaire was used to collect data from the selected students. A total of three BSc nurses' and three GP data collectors and two resident physician supervisors were recruited for the study.

4.10. Data Quality Control.

The measures that were undertaken to ensure quality of data include pre-testing of the data collection instrument by administering the questioner to five percent of the sample size (44) nurses and midwife working at Jimma University Medical Center two weeks ahead of data collection. Training on data collection for data collectors was done before data collection started and supervision of the data collection process, data storage and management were done by principal investigator.

4.11. Data Analysis Procedures

The collected data was checked, coded, and entered in to EPI Data version 3.1 and then exported to SPSS-version 21 for analysis. The outcome variables knowledge (poor knowledge and good knowledge), attitude (negative attitude and positive attitude), and practice (poor practice and good practice) were dichotomized. Then, these outcome variables were coded as knowledge (poor knowledge = 0 and good knowledge = 1), attitude (negative attitude = 0 and positive attitude = 1), and practice (poor practice = 0 and good practice = 1). Descriptive statistics were summarized by using tables, figures, and texts. Bivariable and multivariable logistic regression analyses were applied to identify variables associated with practice towards patient safety.

The model fitness was checked by Hosmer-Lemeshow's goodness-of-fit test for practice towards patient safety while the result was found to be ($X^2=14.458$), (Df =8), and (p-value =0.071). The crude odds ratio and adjusted odds ratio with the corresponding 95% (CI) were calculated to show the strength of the association. Finally, variables in the multivariable logistic regression with p-values <0.05 were considered as statistically significant.

4.12 Ethics approval and consent

Research was approved by Institution of Health Research Ethics Review Committee of Jimma University before conducting the study. Support letter was obtained from Jimma University Institute of Health. For the reason of privacy and confidentiality, personal identifiers were not used. The students were also informed that they have the right to withdraw from the study at any phase of the study. After taking full informed written consent of participants, the study was done by using the self-administered questionnaires.

4.13. Dissemination Plan

After completion of the study, the result will be submitted to Department of Internal Medicine, Jimma University Institute of Health, the Ministry of Health-Ethiopia and other concerned institutions. Finally, attempts will be made to present the results on scientific conferences and to publish the results of the study on peer reviewed journals.

4.14. Operational definition

Good knowledge: If the respondents were able to answer 70% or more of the knowledge items.

Good practice: when the study participants were at least able to answer 70 % or more practice items correctly.

Harm in healthcare: Is any negative effect of patient care.

Medical errors: Are any preventable adverse effects of healthcare.

Negative attitude: If the respondents answered less than 70% of attitude items.

Patient management: Interaction with patient at any time from initiation to completion of treatment.

Patient Safety: the reduction of risk of unnecessary harm associated with health care to an acceptable minimum.

Poor knowledge: If the respondents answered less than 70% of the knowledge items.

Poor practice: when the participants were unable to answer 70 % of practice items correctly.

Positive attitude: If the respondents were able to give the correct answer for 70% or more of attitude items.

5. Results

5.1 Socio-demographic characteristics of participants

Total of 678 students were enrolled in the study. The mean age of the participants was 23.93 (± 1.606) years with the range of 20 to 32 years. Majority, 465 (68.6%), of the students were less than 25 years of age. More than half, 429 (63.3%), of them were male. Most, 649 (95.7 %), of the students were single. Just over half 355 (52.4%) of them were medical students (Table 1).

Table 2: Socio-demographic characteristics of participants for assessment of knowledge, attitude and practice towards patient safety among undergraduate health science students of Jimma University, Southwest Ethiopia, 2021

Variables	Category	Frequency	Percent
Age	<25	465	68.6
	≥ 25	213	31.4
Gender	Male	429	63.3
	Female	249	36.7
Religion	Muslim	226	33.3
	Orthodox	261	38.5
	Protestant	162	23.9
	Catholic	12	1.8
	Wakefeta	17	2.5
Marital status	Single	649	95.7
	Married	29	4.3
Discipline	Medicine	355	52.4
	Nursing	77	11.4
	Medical Laboratory	58	8.6
	Dental medicine	30	4.4
	Health Officer	45	6.6
	Midwifery	36	5.3
	Anesthesia	22	3.2
	Environmental health	23	3.4
	Pharmacy	32	4.7

5.2 Attachment area and personal related characteristics

The majority, 263 (38.8%), of the students were 4th year. The clinical attachment area for most, 624 (92%), was at JUMC. Two hundred fifteen (31.7 %) and 153 (22.6%) of participants were on their 6 months to 1 year and 3- 6 month of practical clinical attachment respectively. Only 112 (16.5%) of the participants had formal education on patient safety. Majority of students 457(67.4%) had some information about patient safety. Only 142 (20.9%) students have their teachers (supervisors) encourage them on reporting of medical errors (Table 3).

Table 3: Attachment area and personal related characteristics of participants for assessment of knowledge, attitude and practice towards patient safety among undergraduate health science students of Jimma University, Southwest Ethiopia, 2021

Variables	Category	Frequency	Percent
Year of Study	3 rd	111	16.4
	4 th	263	38.8
	5 th	174	25.6
	6 th	130	19.2
Hospital /healthcare of current attachment	JUMC	624	92
	Agaro Hospital	12	1.8
	Shenengebe Hospital	11	1.7
	Yebu Hospital	13	1.9
	Genjogidiru Health Center	9	1.3
	Sarbo Health Center	9	1.3
For how long have you been in practical clinical attachment?	3-6 months	153	22.6
	6 months-1 year	215	31.6
	1 year-2 years	176	26
	> 2 years	134	19.8
Have you ever heard of the term ‘Patient Safety’?	Yes	457	67.4
	No	221	32.6
Any previous formal education (training) about patient safety?	Yes	112	16.5
	No	566	83.5
Ever cared for or managed patients independently?	Yes	203	29.9
	No	475	70.1
Do teachers (Supervisors) encourage reporting of medical errors?	Yes	142	20.9
	No	536	79.1
Current Practical Clinical attachment unit	Internal Medicine	135	19.9
	Surgery	104	15.3
	Obstetrics and Gynecology	132	19.5
	Pediatrics	96	14.2
	Laboratory Unit	63	9.3
	ICU	15	2.2
	Dermatology/psychiatry/ophthalmology (for clinical-2 medical students)	104	15.3
	Community attachment	24	3.5
	Pharmacy	5	0.8
Ever done harm on patients while you are practicing?	Yes	83	12.2
	No	595	87.8
Witnessed harm on patients by colleagues or other health workers	Yes	188	27.7
	No	490	72.3
Witnessed harm as a result of medical care to a close friend or family member?	Yes	102	15
	No	576	85

5.3. Student's knowledge, attitude and practice towards patient safety

The student's level of good knowledge towards patient safety was 43.2% (n = 293, [95% CI; 39.4, 47.2]). The level of positive attitude towards patient safety was 54.6% (n = 370 [95% CI; 50.9, 58.6]). The level of good practice towards patient safety was 19.9 % (n = 135 [95% CI; 17, 23]) (Figure 1).

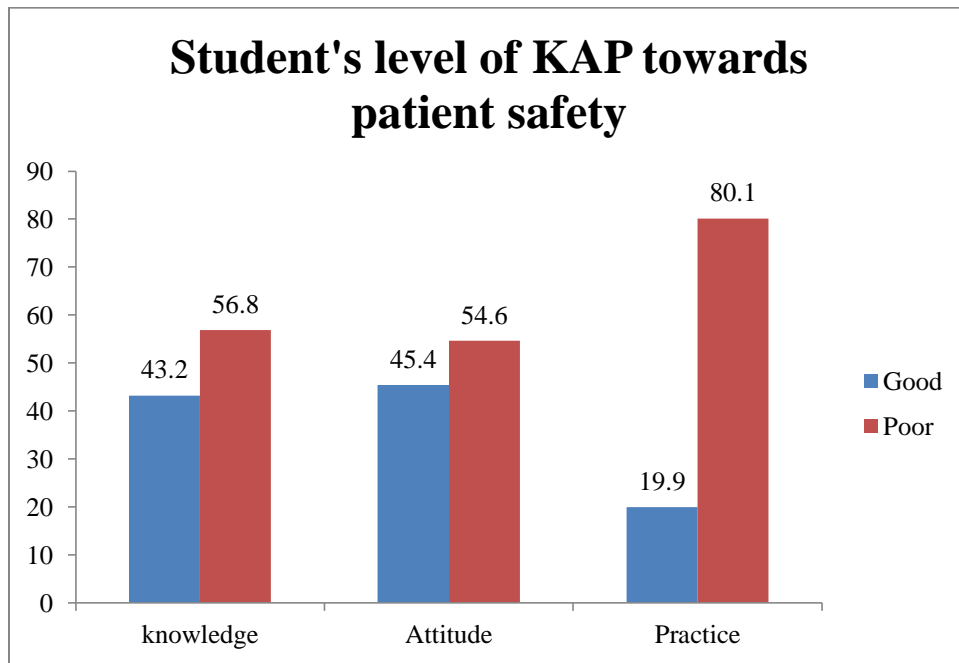


Figure 1: Student's level of knowledge, attitude and practice towards patient safety among health science students of Jimma University, Southwest Ethiopia, 2021, [n = 678]

5.4 Factors associated with practice towards patient safety

To identify independent factors associated with practice towards patient safety; age, gender, residence, marital status, discipline, year of study, total duration on practical attachment, attachment unit, having information regarding patient safety, having formal or education (training) on patient safety, knowledge towards patient safety, and attitude towards patient safety were variables entered in to both bivariate and multivariable logistic regression analysis. However, only year of study, total duration on practical attachment, and knowledge towards patient safety were factors significantly associated with practice towards patient safety. Those students who are in 4th year of study were 3.022 times [AOR=3.022, 95 % CI 1.155; 7.907], on 5th year of study were 10.195 times [AOR=10.195, 95 % CI 2.249; 46.228] and on 6th year of

study were 14.371 times [AOR=14.371, 95 % CI 2.311; 89.356] more likely to have a good practice towards patient safety when compared to students in 3rd year of study. The likelihood of having a good practice towards patient safety among students who had 6-12month total duration of practical attachment were 2.645 times [AOR = 2.645, 95% CI 1.186; 5.901] folds more when compared with students who were on their 3-6 month of practical attachment. The likelihood of having good practice towards patient safety among students who had good knowledge towards patient safety is 1.958 times [AOR =1.958, 95% CI 1.141; 3.358] more when compared with students who had poor knowledge towards patient safety (Table 4).

Table 4: Bivariable and multivariable logistic regression analysis of factors associated with practice towards patient safety among undergraduate health science students of Jimma University, Southwest Ethiopia, 2021 [n = 678].

Variables	Category	Practice		COR (95% CI)	AOR (95% CI)	P-value
		Good	Poor			
Age	<25	83 (17.8 %)	382(82.2%)	1	1	
	> 25	161(75.6%)	52(24.4%)	1.619(1.092,2.400)	1.046(0.609,1.796)	0.871
Residence	Urban	91(22.25 %)	318(77.75%)	1.736(1.151,2.617)	1.285(0.788,2.095)	0.316
	Rural	44(16.36 %)	225(83.64%)	1	1	
Discipline	Medicine	56(15.78%)	299(84.22%)	0.231(0.108,0.491)	0.260(0.055,1.225)	0.088
	Nursing	29(37.67 %)	48(62.33%)	0.735(0.318,1.700)	2.933(0.648,13.283)	0.163
	Medical Laboratory	3(5.17 %)	55(94.83%)	0.070(0.018,0.272)	0.544(0.075,3.933)	0.547
	Dental medicine	8(26.67 %)	22(73.33%)	0.468(0.161,1.362)	0.467(0.075,2.906)	0.414
	Health Officer	7(15.56%)	38(84.44%)	0.237(0.082,0.688)	1.781(0.294,10.801)	0.530
	Midwifery	7(19.44%)	29(80.56%)	0.310(0.105,0.915)	1.416(0.278,7.206)	0.676
	Anesthesia	8(36.37%)	14(63.63%)	0.735(0.241,2.240)	3.934(0.604,25.639)	0.152
	Pharmacy	14(43.75%)	18(56.25 %)	0.193(0.048,0.782)	1.601(0.275,9.309)	0.600
	Environmental health	3(13.04%)	20(86.96%)	1	1	
Year of study	3 rd	11(9.91%)	100(90.09%)	1	1	
	4 th	55(20.76%)	208(78.49%)	2.610(1.276,5.336)	3.022(1.155,7.907)	0.024*
	5 th	31(17.82%)	143(82.18%)	1.937(0.901,4.164)	10.195(2.249,46.228)	0.003*
	6 th	38(29.23)	92(70.77%)	4.489(2.123,9.493)	14.371(2.311,89.356)	0.004*
Total duration on attachment	3-6 month	27(17.65%)	126(82.35%)	1	1	
	6month -1 year	51(23.72%)	164(76.28%)	1.511(0.886,2.578)	2.645(1.186,5.901)	0.018*
	1 year -2 years	14(7.95%)	162(92.05%)	0.408(0.201,0.830)	0.555(0.180,1.712)	0.306
	>2 years	43(32.09%)	91(67.91%)	2.589(1.481,4.526)	1.587(0.419,6.004)	0.496
Having formal training on patient safety	Yes	31(27.68 %)	81(72.32 %)	1.762(1.105,2.809)	0.816(0.437,1.524)	0.523
	No	104(18.38%)	462(81.62 %)	1	1	
Have you ever cared for or managed patients independently	Yes	70(34.48%)	133(65.52%)	3.506(2.365,5.198)	0.637(0.371,1.094)	0.103
	No	65(13.69%)	410(86.31%)	1	1	
Teachers (Supervisors) encourage reporting	Yes	39(27.47%)	103(72.53%)	1.804(1.172,2.775)	0.939(0.538,1.640)	0.826
	No	96(17.91%)	440 (82.09 %)	1	1	
Knowledge towards patient safety	Good	49(12.73%)	336(87.27%)	3.062(2.057,4.557)	1.958(1.141,3.358)	0.015*
	Poor	86(29.35%)	207(70.65%)	1	1	
Attitude towards patient safety	Good	44(14.29%)	264(85.71%)	2.217(1.475,3.332)	1.149(0.634,2.081)	0.648
	Poor	91(24.60%)	279(75.40%)	1	1	

* Statistically significant

6. Discussion

This study showed that only less than half of the student's had good knowledge and positive attitude towards patient safety. Moreover, only few of the students had good practice towards patient safety. Year of study, total duration on practical attachment, and knowledge towards patient safety were factors significantly associated with practice towards patient safety.

The current study showed that the students' level of good knowledge towards patient safety was 43.2 % (n = 293). The result was lower when compared with the study done in USA which found that the knowledge of medical trainees towards patient safety was 58.4 % (15). Possible explanation for this variation could be better economy which affects the teaching (training) environment positively which intern increase knowledge level of trainees. The study finding was also lower when compared with a study conducted in Public University of Parana', Brazil, which reported the knowledge of nurses towards patient safety as 89.8% (29). The present study finding is also lower when compared with the study conducted in Saudi Arabia which reported the self-rated good level of knowledge on patient safety of 52.7% (18).The study finding is also lower when compared with the study conducted among nurses working at Asella Referral and Teaching Hospital where nurses' level of knowledge towards patient safety was 58.7% (n = 101) (26). The variation might be due to the differences in sample size and the study population. The finding was also lower when compared with a study conducted at University of Gondar Specialized Hospital where level of good knowledge towards patient safety was reported as 48.4% (27).

This study also showed that the students' level of positive attitude towards patient safety was 45.4 % (n = 308). The finding of the study was lower than the study conducted in six developing countries in 2020 to assess attitudes of pharmacy students which reported 66.8 % of positive attitude towards patient safety (23). The variation might be due to the fact that the study involved six different countries. The current study result was also lower than the study conducted in University of Gondar where the level of positive attitude of patient safety was (84.33%) (25). The current study finding was consistent with another study conducted in University of Gondar Specialized Hospital where level of positive attitude towards patient safety was 56.1% (27).

The student's level of good practice towards patient safety was 19.9% (n = 135, [95% CI; 17, 23]). This study had shown that there are some differences in practices towards patient safety among medical, nursing, midwifery, medical laboratory, dental medicine health officer, anesthesia, pharmacy and environmental health students. Pharmacy, nursing and anesthesia students have good practice level of 43.75%, 37.67 % and 36.37 % respectively.

Total duration of clinical attachment, year of study and knowledge towards patient safety were factors significantly associated with practice towards patient safety. Students who had total duration of clinical attachment for 6 month and above were more likely to have a good practice towards patient safety when compared to students who have less than 6 moth of clinical attachment. Students who were on their 4th or above year of study had good practice towards patient safety when compared to students who were on their 3rd year of study. The possible explanation could be being 4th year and above would increases total duration of clinical attachment which could improve the experience level of students, this in turn would affect the practice positively. The likelihood of having a good practice towards patient safety among students who had a good knowledge towards patient safety was more when compared with students who had a poor knowledge towards patient safety. This might be due to that having a good knowledge towards patient safety would affect the practice of patient safety in the positive direction.

7. Conclusion

In the current study, less than half of the student's had good knowledge and positive attitude towards patient safety and only quarter of the students had good practice towards patient safety. Total duration of clinical attachment, year of study and knowledge towards patient safety were factors significantly associated with practice towards patient safety. The results of this study argue strongly that effective educational interventions on patient safety are strongly needed given students' substantial knowledge, attitude and practice deficits in the topic.

8. Limitations of the present study.

The result of the study may not be generalized to all health science students in the Ethiopia since it is a single-centered study conducted solely on health science students of Jimma University.

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Annex - 1- Information sheet

Topic: Knowledge, attitude and practice towards patient safety among undergraduate health science students of Jimma University, southwest Ethiopia, 2021

Investigator: Dr. Tofik Mohammed (MD)

Organization: JUIH, Jimma University

Sponsor: JU, Institute of Health

Purpose of the research project

The purpose of this project is to assess the Knowledge, attitude and practice towards patient safety among undergraduate health science students of Jimma University, southwest Ethiopia, 2021.

Procedure

The study will use data obtained through self-administered questionnaire from study subjects. Permission will be obtained from Jimma University, hospitals and health centres where the students do practical attachment as well as study subjects.

Risk and/or Discomfort

By participating in this research project you will not feel any discomfort except wasting some time (around 15-20 minutes). Every piece of information will be kept confidentially. There is no risk in participating in this research.

Benefits

There will not be monetary benefits or any incentives provided to you for participating in this research project. However, the data you will provide will be used to improve patient safety for our community.

Confidentiality

The information collected for this research project will be kept confidential and information will be stored in a file and kept without your name, but a code number assigned to it. And it will not be accessed by anyone except the principal investigator.

Right to Refusal or Withdraw

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time without losing any of your right.

Person to contact

This research project will be reviewed and approved by the Ethical clearance Committee of Jimma University. If you have any questions or concerns about this study please contact me.

Dr. Tofik Mohammed: Phone no: +251-920978215 E-mail: tomrew53@gmail.com

Annex-2: Informed Verbal Consent form
Informed verbal consent form

Greeting!! My name is -----, I'm facilitating the data collection for the study undergoing by Dr Tofik Mohammed. The purpose of the study is to assess the knowledge, attitude, and practice of undergraduate health science students in JU. Using self-administered questionnaire, you will be asked some short questions about your background, knowledge, attitude, and practice about patient safety. Your answers will be recorded on a questionnaire. No personal identifiers will be attached or recorded to the questionnaire. All the data obtained will be kept strictly confidential by using code numbers. Your participation in the study is upon purely voluntary basis. The questionnaire will be filled individually and will take about 20 minutes. When filling the questionnaire, if you feel ambiguity, you can ask data collection facilitator for clarification. You have the right to withdraw at any time after you get involved in the study. Your active and honest participation in responding to the questions is very important for the study and highly appreciated.

Will you participate in this study? Yes No

Date and signature of the facilitator _____

Foormii eyyamaa afaaniin gaafatamu

Akkam jirtu! Maqaan kiyya -----jedhama. Ani qorannoo Dr. Tofik Mohammed geggeessaa jiranu irratti deetaa walitti qabuufan haala mijeessa. kaayyoon qorannoo kanaa beekumsa, ilaalchaafi shaakala barattoota fayyaa digrii jalgabaa yuunivaarsitii Jimmaa qorachuudha. guca gaaffii afaaniin guutaman fayyadamuun seenaa duubaa, beekumsa, ilaalchaafi shaakala nageenya dhukkubsataa irratti qabdu ni gaafatamta. deebiin ati deebistu unka gaaffii irratti guutama. Eenyummaan nama dhuunfaa unka gaaffii irratti galmaa'uu hin jiraatu. lakkoofsa koodiitti fayyadamuun deetaa argame iccitiin isaa eegama. Gaaaffii fi deebii kanarratti hirmaachuun fedhii irratti hundaa'ee. Unki gaaffii kun dhuunfaadhaan kan guutamu yoo ta`u naannoo daqiiqaa 20 fudhata. unka gaaffii kana irratti wanti siif hin galle yoo jiraate gaafachuun ni danda'ama. Yoo feete addaan kutuu ni dandeessa. Yeroo gaaffilee deebiftu Hirmaannaa si'ataadhaaf amanamaa ta`ee deebisuun qorannoo kanaaf baayyee barbaachisa.

qorannoo kanatti ni hirmaattaa

- eeyyee
- lakki

Guyyaafi mallattoo haala mijeessaa_____

መረጃ ያለው የቃል ስምምነት ቅጽ

ሰላምታ !! ስሜ -----ነው። በ ዶ / ር ቶሬቅ መሐመድ ለሚደረገው ጥናት የመረጃ አሰባሰቡን እያመቻቸሁ ነው። የጥናቱ ዓላማ በጅግ ዩኒቨርሲቲ ውስጥ የመጀመሪያ ደረጃ ጤና ሳይንስ ተማሪዎችን ዕውቀት ፣ አመለካከት እና ልምምድ መገምገም ነው። በራስ የሚተዳደር መጠይቅ በመጠቀም ስለ እርስዎ ዳራ ፣ እውቀት ፣ አመለካከት እና ልምምድ ስለ ታካሚ ደህንነት አንዳንድ አጭር ጥያቄዎች ይጠየቃሉ። መልሶችዎ በመጠይቁ ላይ ይመዘገባሉ። ወደ መጠይቁ ምንም የግል መለያዎች አያይዘውም ወይም አይመዘገቡም። የተገኘው መረጃ ሁሉ የኮድ ቁጥሮችን በመጠቀም በጥብቅ በሚስጥር ይቀመጣል ። በጥናቱ ውስጥ የእርስዎ ተሳትፎ በፍቃደኝነት ላይ ብቻ የተመሠረተ ነው። መጠይቁ በተናጠል ይሞላል እና 20 ደቂቃ ያህል ይወስዳል። መጠይቁን በሚሞሉበት ጊዜ ፣ አሻሚነት ከተሰማዎት ፣ ለማብራራት የመረጃ አሰባሰብ አስተባባሪን መጠየቅ ይችላሉ። በጥናቱ ውስጥ ከተሳተፉ በኋላ በማንኛውም ጊዜ የመውጣት መብት አለዎት ። ለጥያቄዎቹ ምላሽ ለመስጠት የእርስዎ ንቁ እና ሐቀኛ ተሳትፎ ለጥናቱ በጣም አስፈላጊ እና በጣም የተከበረ ነው።

በዚህ ጥናት ውስጥ ይሳተፋሉ? አዎ አይ

የአመቻቹ ቀን እና ፊርማ _____

Annex-3-Data Collection Tools

Questionnaire for assessment of knowledge, attitude and practice towards patient safety among undergraduate health science students of Jimma University.

Part I: Socio-demographic characteristics and general information

S. N	Questions	Response
1	Age	_____ (years)
3	Gender	a. Male <input type="checkbox"/> b. Female <input type="checkbox"/>
4	Religion	a. Muslim <input type="checkbox"/> b. Orthodox <input type="checkbox"/> c. Protestant <input type="checkbox"/> d. Catholic <input type="checkbox"/> e. other----
5	Marital status	a. Single <input type="checkbox"/> b. Married <input type="checkbox"/> c. Divorced <input type="checkbox"/> d. Widowed <input type="checkbox"/>
6	Residency	a. urban <input type="checkbox"/> b. rural <input type="checkbox"/>
7	Discipline	a. Medicine <input type="checkbox"/> b. Nursing <input type="checkbox"/> c. Medical Laboratory <input type="checkbox"/> d. Dental medicine <input type="checkbox"/> e. Health Officer <input type="checkbox"/> f. Midwifery <input type="checkbox"/> g. Anesthesia <input type="checkbox"/> h. Environmental health <input type="checkbox"/> i. Pharmacy <input type="checkbox"/>
7.	Year of Study	a. 3 rd <input type="checkbox"/> b. 4 th <input type="checkbox"/> c. 5 th <input type="checkbox"/> d. 6 th <input type="checkbox"/>

8.	Hospital /healthcare of current attachment	a. JUMC <input type="checkbox"/> b. Agaro Hospital <input type="checkbox"/> c. Shenengebe Hospital <input type="checkbox"/> d. Limu Hospital <input type="checkbox"/> e. Nada Hospital <input type="checkbox"/> f. Shebe Health center <input type="checkbox"/> g. Sarbo Health center <input type="checkbox"/> h. Asendabo Health center <input type="checkbox"/> i. Other (specify) _____
9.	Duration of stay in current attachment area	weeks/months/years (Underline)-----
10	For how long have you been in practical clinical attachment?	a. 3-6 months <input type="checkbox"/> b. 6month-1 year <input type="checkbox"/> c. 1year-2 years <input type="checkbox"/> d. > 2 years <input type="checkbox"/>
11	Have you ever heard of the term ‘Patient Safety’?	a. Yes <input type="checkbox"/> b. <input type="checkbox"/>
12	Have you ever taken any previous formal or education (training) about patient safety?	a. Yes <input type="checkbox"/> b. No <input type="checkbox"/>
13	Have you ever cared for or managed patients independently?	a. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
14	Do teachers (Supervisors) encourage reporting of medical errors?	a. Yes <input type="checkbox"/> b. No <input type="checkbox"/>
15	Current Practical Clinical attachment unit	a. Internal Medicine <input type="checkbox"/> b. Surgery <input type="checkbox"/> c. Obstetrics and Gynecology <input type="checkbox"/> d. Pediatrics <input type="checkbox"/> f. Laboratory Unit <input type="checkbox"/> g. Other (specify).....
16	Have you ever done harm on patients while you are practicing?	a. Yes <input type="checkbox"/> b. No <input type="checkbox"/>
17	Have you ever witnessed harm on patients by your colleagues or other health workers at	a. Yes <input type="checkbox"/> b. No <input type="checkbox"/>

	work place?	
18	Have you ever witnessed harm as a result of medical care to a close friend or family member?	a. Yes <input type="checkbox"/> b. No <input type="checkbox"/>

Part II. Knowledge questions

S.N.	Question	Response	
		Yes	No
1	Patient safety is the prevention of errors and adverse effects to patients associated with healthcare		
2	The way healthcare workers use different medical equipments can lead to errors on patients		
3	The clinical environment can be a cause of errors.		
4	Effective teamwork in healthcare delivery can have an immediate and positive impact on patient safety		
5.	The medical errors are a sign of incompetence.		
6.	Learning from error can occur at both an individual level and organizational level.		
7.	There should be a next step to be done after the occurrence of an errors		
8.	Human error is inevitable. .		
9.	Patients have an important role in preventing errors		
10.	The key dimension of patient safety is a culture		
11.	Encouraging patients to keep a written record of the medications that they take and details of any allergies help to reduce drug adverse events		

Part III. Attitude Questions

S.N	Question	Response				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
		5	4	3	2	0
1	Medical errors are nearly always	5	4	3	2	0

	caused by multiple factors.					
2	Health organization's culture is a significant contributor to patient safety.	5	4	3	2	0
3	Effective communications important for promoting patient safety	5	4	3	2	0
4	Appreciating the roles of different team members will help in the reduction of errors and improvement of healthcare	5	4	3	2	0
5	Systematic way of learning from failure is the best response for ensuring patient safety	5	4	3	2	0
6	Disclosure of medical errors to patients and families is valuable to health-care quality	5	4	3	2	0
7	Human factors are about understanding human limitations and designing the workplace and the equipment we use to allow for variability among humans and their activities	5	4	3	2	0
8	The process of delivering medications to patients often involves a range of health-care professionals.	5	4	3	2	0
9	Prevention of infection must always be the priority of all health-care workers	5	4	3	2	0

Part IV. Practice Questions

S.N		Response				
		Not competent	Somewhat competent	competent	Proficient	Expert
		1	2	3	4	5
1	I can routinely use checklists in my clinical practice, when there is an evidence-based way of selecting treatment.	1	2	3	4	5
2	I can describe the role of human factors in patient safety	1	2	3	4	5
3	Using a system approach, I can analyze the multiple factors increasing adverse events.	1	2	3	4	5
4	If I am a team leader I can effectively facilitate, coach and coordinate the activities of other team members	1	2	3	4	5
5	I can respond appropriately to patients and families after an adverse event	1	2	3	4	5
6	I can appropriately inform patients and obtain informed consent for treatments	1	2	3	4	5
7	I know what to do if exposed to blood or other bodily fluids	1	2	3	4	5
8	I can use standard precautions to prevent and control healthcare Associated Infections (HCAI)	1	2	3	4	5

9	I can follow verification processes to avoid wrong patient, wrong side and wrong procedure errors (e.g., a surgical checklist)	1	2	3	4	5
10	I can list some medications used in our area that are associated with high risks of adverse events	1	2	3	4	5

Annex 4: Assurance of Principal Investigator

Assurance of Principal Investigator

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Faculty of Public Health in effect at the time of grant is forwarded as the result of this application.

Name of Investigator: Dr. Tofik Mohammed

Department: Internal Medicine

Signature: _____ Date: _____

Approval of the advisors

Name of the first advisor: Professor Esayas Kebede (MD, DTMH, PhD)

Date. _____ Signature _____

Name of the second advisor Dr Emebet Woldearegay (MD)

Date _____ Signature _____

Name of the third advisor: Mr. Masrie Getnet (MSc)

Date _____ Signature _____