


Perceptions of Patient Safety Competence Using the Modified Version of the Health Professional Education in Patient Safety Survey (H-PEPSS) Instrument Among Dental Students in Riyadh, Saudi Arabia

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Aim: To investigate dental students' self-reported confidence in learning about various domains of patient safety during their clinical training years.

Methods: The Health Professional Education in Patient Safety Survey (H-PEPSS) was distributed to the fourth- and fifth-year undergraduate students, interns and postgraduate dental students. The survey explores how the seven domains of the Canadian Patient Safety Institute Safety Competencies Framework and wider cases of patient safety issues are presented in dental education, as well as participants' self-reported comfortability regarding revealing about patient safety issues. A comparison of the patient safety domains scores were assessed through learning scenarios (classroom and clinical), gender, level of study and type of institution.

Results: Out of 409 participants, 359 undergraduate dental students and 131 postgraduate dental students responded to the survey. Irrespective of the groups, all dental students were most confident regarding their learning aspects about skills pertaining to clinical safety and effective communication and least confident in learning related to managing safety risks. All the patient safety factors irrespective of the scenario, scored above 75% and thus interpreted as good competence. Statistically significant differences were reported among the genders in the classroom scenario for learning about communicating effectively with the patients regarding patient safety issues ($p < 0.05$). Male dental students, undergraduates and those in the private institution were significantly less confident about recognizing and reporting to immediate risks in the clinical scenario compared to their respective counterparts ($p < 0.05$).

Conclusion: Based on the results, the dental students are quite confident with regard to the learning aspects of clinical patient safety, nevertheless, their confidence in learning certain patient safety aspects warrants further improvement. This implies a need to address the impact of regular interventions, extra motivation and repeated mentoring in both the classroom and clinical scenarios on improving dental students' confidence about patient safety.

Keywords: patient safety, health care, clinical safety, dental students, postgraduates, questionnaire

Introduction

Patient safety is one of the most imperative steps to be undertaken in order to deliver high-quality dental care.¹ The likelihood of errors or mishaps continues to challenge health-care professionals. However, information on patient safety in dental literature is sparse. With the exception of a few pioneer studies,²⁻⁶ the dental profession has not been able to match the progress made by the medical counterparts towards developing patient safety initiatives. It is high time that dentistry commits to patient safety by thoroughly addressing events of adverse nature and errors from the very roots. As



a primary step of a dental patient safety initiative, the dental students during their clinical training period need to understand the fundamentals of patient safety and also “identify the threats to dental patient safety by detecting errors and causes of patient injury associated with the delivery of dental care”.^{5,7}

There is limited information about dental students’ perspective on patient safety in dentistry and this is the first study evaluating their collective opinions and views on improving or maintaining safe dental practices, which they are currently being taught in their classrooms and in the clinical scenarios. In the current dental curriculum, the fundamentals of patient safety are introduced from year 1 in 3 papers: introduction to dentistry, the concept of health informatics and human rights; in year 2 and 3, patient safety is reinforced with papers titled ethics in dentistry and ethics. In addition, patient safety is of paramount importance when the students are introduced to each clinical branch of dentistry in the subsequent years. Patient safety is given utmost priority with regard to infection control guidelines that are mandatory in every clinical setting.

Inadvertent errors are common in the dental field, but with the morbidity and mortality rates at a lower level compared to the medical and nursing environments and the advantage of averting errors may be determined by high employee and patient satisfaction, a reduction in practice costs, elevated practice status, and relatively less stress on dental professionals.⁸ By the time dental students graduate, they need to gain enough experience in treating patients during their training period and they must be able to achieve competency in performing complex series of hands-on practical tasks and this is in contrast to the medical students’ training.

Students being the “consumers” of dental education, have an important part in giving valuable feedback and viewpoints for curriculum improvement of the skill attaining environment.^{9–11} Therefore, in the course of training dental students to be skillful in dental clinical knowledge and expertise, the importance of patient safety cannot be ignored. Improving patient safety education in dental education is crucial in altering the culture of health-care organization as many adverse events can be alleviated early if the safety awareness is high in these future health-care professionals. Although general concepts of patient safety are incorporated within the dental education curriculum, the confidence aspect of dental students in learning about patient safety is still questionable. Administering the modified form of H-PEPSS survey instrument to a sample of fourth- and fifth-year dental students, interns and post graduate students in Saudi Arabia is the first attempt following its development and validation by a group of Canadian researchers.¹²

The aim of this study was to administer the H-PEPSS in all dental schools in Saudi Arabia having post graduate education, to investigate the self-perceptions of dental students exposed to clinical environment in the undergraduate education and postgraduate dental students regarding their patient safety competence during their dental education programs. The hypothesis tested was that the dental students were competent to handle issues regarding all aspects of patient safety.

Materials and Methods

This study was reviewed for ethical compliance and approved by the ethics committee of the College of Dentistry Research Center (CDRC registration number FR 0341) on 27th September, 2016 and was commenced with the understanding and prior informed consent of each participant according to the ethical principles outlined by the World Medical Association Declaration.¹³

Setting and Study Sample

All interns, fourth and fifth year undergraduate dental students who were exposed to clinical training and all postgraduate students at three dental schools located in Riyadh and Jeddah, Saudi Arabia were invited to complete a slightly modified form of the Health Professional Education in Patient Safety Survey (H-PEPSS). This study targeted those dental schools with post graduate studies enrollment, which are only three in the Kingdom of Saudi Arabia namely College of Dentistry, King Saud University, Riyadh; College of Dentistry, King Abdulaziz University, Jeddah; and Riyadh Colleges of Dentistry and Pharmacy. The former two dental schools are governmental, and the latter is a privately funded dental school, which had our targeted sample of officially registered fourth and fifth year undergraduate and post graduate dental students for the 2016 to 2017 academic year. Interns were also asked to participate in the study. The vice dean of student affairs of each of the three dental schools were given an invitation letter via email that contained concise information regarding the objective of the

study, the requisites for participation by those dental students with clinical experience at their respective institutions and the timetable for distribution to the students. However, out of an overall 600 questionnaires distributed, 490 students anonymously completed the study questionnaire in their classrooms prior to lectures. Students who did not wish to participate did so voluntarily, and there were some absentees in the class at the time of the survey. Student participation in the research was strictly confidential. The students were not requested any form of identification.

Data Collection Instrument

This survey utilized a validated and modified form of the H-PEPSS questionnaire from a Canadian study¹² in a paper-based format. The modified form of the H-PEPSS captures the confidence level of the dental students regarding their patient safety learning while they are doing their current training in the present tense. The participants were requested to answer each question separately for the classroom and the clinical scenarios.

The questionnaire was written in the English language and comprised of items on demographics and close-ended questions regarding patient safety. The questionnaire comprises items on the six domains pertaining to patient safety (16 items), clinical-level skills (4 items), wider cases of patient safety (7 items) and comfortability when revealing their concerns (3 items). The Likert scale ranged from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) and 5 (strongly agree) in order to score the items, including an "I don't know" option. Additional questions which were enquired were age, gender, current year of study and program of specialization (for postgraduate students only).

In order to detect any obstacles to its comprehension, the questionnaire was pretested in a pilot study of 50 (25 male and 25 female) fifth-year dental students from King Saud University. Minor alterations were made to incorporate the dental elements and some words were rephrased for better clarity of the questions, which was based on their analogous conceptual meanings.

Validity Verification of the Survey Instrument

The question stem used in the current study was slightly different from the original survey instrument and since it was not validated with dental students, Cronbach's alpha was used to estimate the internal consistency of the H-PEPSS.

Statistical Analysis

The data collected were entered manually into a Statistical Package for the Social Sciences database (IBM, SPSS V 20, IL, USA) and were analyzed using descriptive statistics with $p < 0.05$ set as the level of significance. Analysis of data focused on self-reported patient safety competencies in the classroom and clinical scenarios separately. Univariate statistics were used to assess the demographic data. In line with the initial validated tool, a mean score (\pm SD) for each of the patient safety domains was considered by averaging the items in each domain. More students completed questions relative to the classroom scenario than to the clinical scenario like which was speculated in the initial Canadian study. Unpaired *t*-test was used to evaluate the statistically significant differences between classroom and clinical scores. Based on the initial validated tool, domain scores (ranging 1 to 5) were also classified into agree/strongly agree (>3.5) and neutral/disagree (≤ 3.5), and the chi-square test was used to evaluate differences between the classroom and the clinical scenarios.

Interpretation of the Scores

The scoring system comprised a 6-point Likert scale which was scored on a 100% scale expanded as follows: I do not know = 0, strongly disagree = 20, disagree = 40, neutral = 60, agree = 80, and strongly agree = 100. The scores for each item in the 3 factors were averaged to determine the level of competencies for each factor. The scores were then interpreted as follows: $\leq 19.9\%$ very poor, 20% to 39.9% poor, 40% to 59.9% moderate, 60% to 79.9% good and $>80\%$ excellent for ease of identifying domains that needed interventions. A poor score ($\leq 39.9\%$) was interpreted as a below average competency in patient safety domains that require implementation of several radical changes. A moderate score of 40% to 59.9% indicated lack of confidence in learning about few patients' safety domains that may warrant improvement. The final two scores, presented as good and excellent ($\geq 60\%$), were recognised as being competent in most of the patient safety domains, however, may require further improvements in specific items.

Results

Characteristics of the Sample

The distribution of the sample is presented in Table 1 and reveals that, out of 409 participants, 359 undergraduate dental students and 131 postgraduate dental students responded to the survey instrument. In this study, the student body can be characterized as homogenous in terms of ethnicity, educational background, and other socio-cultural aspects given that all the dental students who participated were originally from the Arabian Peninsula. The mean age of the undergraduate dental students was 24.0 ± 1.5 years with a range of 20 to 31 years. The mean age of the postgraduate dental students was 29.0 ± 3.1 years with a range of 25 to 40 years. Approximately 56.1% ($n = 275$) of the respondents were male, and 43.9% ($n = 215$) were female, which was found to be significantly different ($p = 0.028$). The majority of undergraduate dental students were in the fifth year (46.2%, $n = 166$), whereas among the postgraduate students, the majority who participated were in the second year 36.4% ($n = 47$) of the dentistry program. The distribution of respondents across year of study, and program of specialization (postgraduate dental students only) are also given in Table 1.

Patient Safety Domains

Dental students were most confident regarding their learning aspects about skills pertaining to clinical safety and effective communication as shown in Table 2. They were least confident in what they were learning about safety risks management. Furthermore, there were no statistically significant differences in mean patient safety domain scores between the classroom and clinical scenarios. In terms of the proportion of dental students who were confident about what they were learning, a large majority of the dental students “agreed/strongly agreed” they were confident in what they were learning about all the various patient safety domains and the majority of them reported competent learning

Table 1 Demographic Characteristics of the Undergraduate Students Exposed to Clinical Training and Postgraduate Students

	Undergraduate Students (n=359)	Postgraduate Students (n=131)
Mean age (SD) in years	24.0 (1.5)	29.0 (3.1)
Gender n (%)		
Male	212 (59.1)	63 (48.1)
Female	147 (40.9)	68 (51.9)
Year of study# n (%)		
1	n/a	33 (25.6)
2	n/a	47 (36.4)
3	n/a	39 (30.2)
4	26 (7.2)	10 (7.8)
5	166 (46.2)	n/a
Interns	157 (43.7)	n/a
Specialty	n/a	
Endodontics		14 (10.7)
Prosthodontics		15 (11.5)
Oral medicine		2 (1.5)
Oral and Maxillofacial Surgery		10 (7.6)
Periodontics		13 (9.9)
Orthodontics		18 (13.7)
Dental Public Health		13 (9.9)
Paediatric dentistry		21 (16.0)
SBARD		12 (9.2)
Others		13 (9.9)

Notes: #Missing values. Others included Advanced general dentistry, Oral pathology, Aesthetic dentistry, Oral and Maxillofacial Radiology and missing values.

Abbreviations: SD, Standard deviation; n/a, not applicable; SBARD, Saudi Board in Advanced Restorative Dentistry Program.

Table 2 Classroom and Clinical Self-Reported Patient Safety Domain Scores for Dental Students (Reduced H-PEPSS Model) and the Cronbach's Alpha Values

Patient Safety Domains (PSD)	Scenario	n	Score (1–5) (Strongly Disagree) to 5 (Strongly Agree)			Agree/Strongly Agree		
			Mean	Std. Deviation	P-value	n	%	Cronbach's Alpha
PSD_1 Clinical safety skills (4 items) 1. Hand hygiene. 2. Infection control. 3. Safe medication practices including anaesthesia. 4. Safe clinical practice in general.	Class	470	4.2	0.7	0.886	395	87	0.875
	Clinical	324	4.2	0.8		266	86	0.870
PSD_2 Culture of safety (3 items) 5. The importance of having a questioning attitude and speaking up when you see things that may be unsafe. 6. The importance of a supportive environment that encourages patients and providers to speak up when they have safety concerns. 7. The nature of dental systems and system failures and their role in unpleasant events.	Class	473	4.1	0.8	0.750	359	84	0.811
	Clinical	321	4.1	0.8		240	83	0.799
PSD_3 Team work with other health professionals (3 items) 8. Managing conflicts with other health professionals. 9. Sharing authority, leadership, and decision-making. 10. Encouraging team members to speak up, question, challenge, promote and be accountable as appropriate to address safety issues.	Class	470	4.0	0.8	0.935	362	85	0.873
	Clinical	323	4.0	0.9		239	85	0.873
PSD_4 Communicating effectively (3 items) 11. Enhancing patient safety through clear and adequate communication with patients. 12. Improving patient safety through effective communication with other health care providers. 13. Effective verbal and nonverbal communication abilities to prevent unpleasant events.	Class	462	4.1	0.8	0.221	368	86	0.861
	Clinical	315	4.2	0.7		252	88	0.831
PSD_5 Managing safety risk (3 items) 14. Recognizing routine situations and settings in which safety problems may arise. 15. Identifying and applying safety solutions. 16. Anticipating and managing "high risk situations".	Class	458	3.9	0.8	0.547	335	83	0.881
	Clinical	312	4.0	0.9		222	83	0.858
PSD_6 Understanding human and environmental factors (2 items) 17. The role of human factors such as tiredness, capability that effect patient safety. 18. The role of environmental factors such as work flow, work place, resources, that effect patient safety.	Class	467	4.0	0.9	0.601	334	91	0.848
	Clinical	309	4.0	0.9		221	89	0.804
PSD_7 Recognise and respond to remove immediate risk (2 items) 19. Recognizing an unpleasant event. 20. Reducing harm by addressing immediate risks for patients and others involved in the dental clinic.	Class	462	4.0	0.8	0.982	335	88	0.798
	Clinical	314	4.0	0.8		219	85	0.734

Note: Statistics using unpaired t tests.**Abbreviation:** H-PEPSS, Health Professional Education in Patient Safety Survey.

about understanding human and environmental factors. Moreover, all seven patient safety factors confirmed acceptable internal consistency, with Cronbach's alpha exceeding the minimum standard of 0.7 as provided in Table 2.

Wider Cases of Safety and Comfortability When Revealing Their Concerns

Questions on wider cases of safety and comfortability when revealing their concerns about patient safety are given in Table 3. The majority of the dental students agreed "As a student, the possibility of what is "safe" for me to do in the clinical setting is very clear to me" (92.2% agree/strongly agree). In all areas pertaining to wider cases of patient safety, dental student agreement levels, that is, agree or strongly agree, were above 75%.

Table 3 also presents data on comfortability when revealing their concerns about patient safety issues. Similarly, 80.2% of dental students revealed that they could approach some colleague engaging in practices in an unsafe manner and 83% worry they will face disciplinary action if they perform a serious error. The majority of dental students (84%) agreed to the difficult situation they may face if they questioned the actions or decisions of those with more authoritative power.

Investigation of the Scores

The mean scores for each factor related to the seven patient safety domains are provided in Table 4. Among the factors, the highest mean score was obtained for the competency in "Recognizing and responding to remove immediate risks" in the clinical environment (84.7 ± 16.0 SD, interpreted as good) and again all the factors irrespective of the scenario, whether classroom or clinical, scored above 75% and thus interpreted as good competence.

The mean scores for each patient safety domains in classroom and clinical settings based on gender (male versus female), level of study (undergraduate versus postgraduate dental students) and type of institution (government versus

Table 3 Wider Cases of Patient Safety and Comfortability in Revealing Their Concerns About Patient Safety for Dental Students

Dental Students	Mean (SD) (Strongly Disagree) to 5 (Strongly Agree)	Agree/Strongly Agree n (%)
Wider cases of patient safety		
As a student, the possibility of what is "safe" for me to do in the clinical setting is very clear to me	4.3 (0.7)	428 (92.2)
There is consistency in how patient safety issues are dealt with by different preceptors in the clinical/simulation setting	4.0 (0.7)	381 (82.1)
I have sufficient opportunity to learn and interact with members of all dental specialties	4.1 (0.9)	354 (76.3)
I am gaining a solid understanding that reporting unpleasant events can lead to change and can reduce reoccurrence of events	4.0 (0.8)	355 (76.5)
Patient safety is well included into the overall program	4.1 (0.9)	377 (81.3)
Clinical aspects of patient safety (eg Hand hygiene, transferring patients, medication safety) are being well covered in our program	4.2 (0.9)	382 (82.3)
"Dental system" aspects of patient safety were well covered in our program (eg Aspects of the organization, management, or the work environment including policies, resources, communication and other procedures)	4.1 (0.9)	356 (76.7)
Comfortability in revealing their concerns about patient safety		
If I see some colleague engaging in unsafe care practice in the clinical setting, I feel safe to approach them	4.0 (0.9)	345 (80.2)
If I make a serious error, I worry that I will face disciplinary (corrective) action	4.0 (0.9)	357 (83.0)
It is difficult to question the decisions or actions of those with more authoritative power, even though they are the ones most responsible for the event	4.0 (0.9)	360 (83.7)

Table 4 A Summary of the Distribution of the Responses on the Level of Agreement for the Patient Safety Domains and the Mean Scores

Patient Safety Domains (PSD)		Distribution of the Score ^a			Mean Scores \pm SD ^b
		Good n (%)	Moderate n (%)	Poor n (%)	
PSD_1 Clinical safety skills (4 items)	Class	444 (92.7)	29 (6.1)	6 (1.3)	80.6 (16.5)
	Clinical	295 (91.3)	21 (6.5)	7 (2.2)	80.5 (17.3)
PSD_2 Culture of safety (3 items)	Class	453 (94.2)	24 (5.0)	4 (0.8)	81.1 (15.2)
	Clinical	304 (94.7)	13 (4.0)	4 (1.2)	81.4 (15.6)
PSD_3 Team work with other health professionals (3 items)	Class	446 (95.3)	16 (3.4)	6 (1.3)	82.6 (15.2)
	Clinical	300 (95.2)	13 (4.1)	2 (0.6)	84.0 (14.9)
PSD_4 Communicating effectively (3 items)	Class	435 (92.8)	25 (5.3)	9 (1.9)	78.7 (16.7)
	Clinical	286 (91.7)	21 (6.7)	5 (1.6)	79.5 (17.2)
PSD_5 Managing safety risk (3 items)	Class	436 (93.6)	20 (4.3)	10 (2.1)	79.3 (17.4)
	Clinical	290 (93.9)	15 (4.9)	4 (1.3)	80.0 (17.2)
PSD_6 Understanding human and environmental factors (2 items)	Class	437 (93.4)	25 (5.3)	6 (1.3)	79.0 (16.6)
	Clinical	292 (93.0)	20 (6.4)	2 (0.6)	79.0 (16.9)
PSD_7 Recognise and respond to remove immediate risk (2 items)	Class	437 (89.2)	25 (5.1)	28 (5.7)	75.5 (23.1)
	Clinical	292 (59.6)	20 (4.1)	178 (36.3)	84.7 (16.0)

Notes: ^aResponses were scored on a scale of 0 to 100% and categorised as poor ($\leq 39.9\%$), moderate (40–59.9%) and good ($\geq 60\%$). ^bMean \pm standard deviation (SD) of the 6-point Likert scale, ranging from 0 to 100.

Table 5 Comparison of the Individual Scores Between Each Classroom Patient Safety Domains Based on Gender, Level of Study and Type of Institution

Patient Safety Domains	Gender		p-value	Level of Study		p-value	Type of Institution		p-value
	Males Mean \pm SD	Females Mean \pm SD		UG Mean \pm SD	PG Mean \pm SD		Public Mean \pm SD	Private Mean \pm SD	
PSD_1	80.1 \pm 15.2	82.2 \pm 15.1	0.124	80.7 \pm 16.1	82.1 \pm 12.6	0.395	79.3 \pm 15.5	82.4 \pm 14.9	0.028
PSD_2	79.4 \pm 16.6	82.2 \pm 16.1	0.062	80.1 \pm 17.1	81.8 \pm 14.7	0.329	79.3 \pm 15.8	81.5 \pm 16.9	0.147
PSD_3	81.5 \pm 15.7	84.0 \pm 14.3	0.072	81.8 \pm 16.3	84.8 \pm 11.3	0.059	80.9 \pm 15.0	83.9 \pm 15.2	0.032
PSD_4	77.2 \pm 17.9	80.6 \pm 14.9	0.026	78.5 \pm 17.5	79.3 \pm 14.4	0.665	77.1 \pm 16.7	80.0 \pm 16.7	0.066
PSD_5	79.2 \pm 17.9	79.6 \pm 16.9	0.806	78.9 \pm 17.9	80.4 \pm 15.3	0.425	77.7 \pm 17.9	80.5 \pm 17.0	0.087
PSD_6	78.7 \pm 16.8	79.4 \pm 16.5	0.688	78.8 \pm 17.1	79.7 \pm 15.3	0.593	78.6 \pm 16.8	79.4 \pm 16.5	0.605
PSD_7	75.0 \pm 23.5	76.0 \pm 22.7	0.632	74.6 \pm 24.3	77.9 \pm 19.3	0.166	76.3 \pm 21.2	74.9 \pm 24.4	0.507

Note: Proportions tested using independent samples *t*-tests. Numbers in bold denotes to *p*-values < 0.05 , which are statistically significant.

Abbreviations: UG, Undergraduate students; PG, Post graduate students; SD, standard deviation.

private) are given in Table 5 and Table 6 respectively. Independent sample *t*-tests showed that the modified H-PEPSS revealed good discriminant validity given that the instrument was able to attain significant differences between the patient safety domains. There were significant differences between private and public institutions in the classroom scenario for skills pertaining to clinical safety and teamwork with other health professionals ($p < 0.05$). Statistically significant

Table 6 Comparison of the Individual Scores Between Each Clinical Patient Safety Domains Based on Gender, Level of Study and Type of Institution

Patient Safety Domains	Gender		p-value	Level of Study		p-value	Type of Institution		p-value
	Males Mean \pm SD	Females Mean \pm SD		UG Mean \pm SD	PG Mean \pm SD		Public Mean \pm SD	Private Mean \pm SD	
PSD_1	81.7 \pm 15.3	81.0 \pm 15.9	0.718	81.7 \pm 16.2	80.9 \pm 14.2	0.656	80.6 \pm 16.1	82.2 \pm 15.1	0.355
PSD_2	79.7 \pm 18.4	81.5 \pm 16.0	0.362	79.8 \pm 18.8	82.0 \pm 13.6	0.284	80.7 \pm 15.3	80.3 \pm 19.0	0.859
PSD_3	83.5 \pm 16.0	84.4 \pm 13.6	0.565	83.8 \pm 16.2	84.3 \pm 11.8	0.778	83.9 \pm 14.7	84.0 \pm 15.1	0.974
PSD_4	78.7 \pm 18.5	80.3 \pm 15.7	0.425	80.0 \pm 18.2	78.4 \pm 15.1	0.431	80.2 \pm 16.5	78.9 \pm 17.9	0.521
PSD_5	81.2 \pm 17.3	78.7 \pm 17.0	0.208	80.5 \pm 17.2	78.9 \pm 17.1	0.436	80.0 \pm 17.7	80.0 \pm 16.7	1.000
PSD_6	78.4 \pm 17.2	79.7 \pm 16.5	0.495	79.4 \pm 17.6	78.2 \pm 15.1	0.550	80.1 \pm 16.1	78.1 \pm 17.5	0.285
PSD_7	47.1 \pm 40.7	55.1 \pm 39.4	0.028	47.3 \pm 41.3	59.8 \pm 35.8	0.002	56.5 \pm 39.0	46.4 \pm 40.7	0.006

Notes: Proportions tested using t-tests. Numbers in bold denotes to p-values <0.05, which are statistically significant.

Abbreviations: UG, Undergraduate students; PG, Post graduate students; SD, standard deviation.

differences were reported among the genders in the classroom scenario for learning about communicating effectively with the patients regarding patient safety issues ($p < 0.05$). For learning in the clinical scenario, statistically significant differences of all the three variables analyzed were found in recognizing and responding to remove immediate risk ($p < 0.05$). Dental students from the public institutions had significantly lower scores for the domain of skills pertaining to clinical safety in the classroom scenario in comparison to dental students from the private institution. Moreover, students from the private institution reported more confidence about teamwork in the classroom scenario compared with those from the public institutions. Also, female dental students were significantly more confident about communicating effectively than male dental students in the classroom scenario. On the other hand, female dental students, postgraduates and those from the public dental schools were significantly more confident about what they were learning about recognizing and removing immediate risks in the clinical scenario compared with male dental students, undergraduates and those from the private dental school respectively.

Discussion

To the best of our knowledge, this is the first study to explore the educational aspect of patients' safety from the dental students' perspective and this study aimed at highlighting the much-needed awareness of patient safety in dental practice. Although the concepts regarding patient safety are generally merged within the dental curriculum, the level of dental students' confidence in learning about patient safety is still questionable.

In general, dental students in all program years were impressively confident in what they were learning about the clinical domains of patient safety, but they were relatively less confident about clinical safety skills, teamwork, effective communication and responding to adverse events. Thus, the hypothesis is partially accepted. The results of the current study demonstrate that dental students' self-reported confidence in learning about certain aspects of patient safety in the classroom scenario tended to be less for the males and those studying in the public institutions. Male dental students, undergraduates and those in the private institution were less confident about recognizing and responding to immediate risks in the clinical scenario compared to their respective counterparts. This could be explained by discrepancies between patient safety concepts taught in the classroom scenario and student experiences in the clinical scenario in both the private and public institutions. This trend in the data probably implies that, as the dental students devote more time in the clinical scenario, they will eventually gain greater awareness about the knowledge they were lacking. The difficulty the dental students faced about questioning the decisions or actions of those with more authoritative power and how they could not approach some colleague engaging in patient care in an unsafe manner implies the impact of the deep-rooted sociocultural background of the younger population in Saudi Arabia.

Furthermore, these findings provide areas for targeted interventions, particularly in the clinical scenario, to upgrade students' confidence in what they learn about patient safety during their dental clinical training programs.

Additionally, the great importance of hand hygiene and infection control has been widely advocated in the form of public posters and educational campaigns in all institutions and this might have influenced the confidence in these areas.^{14,15} When the wider cases of patient safety were taken into consideration, the majority of the dental students understood the possibilities of what can be safe in the clinical setting or scenario. Therefore, any adverse event which may occur might be linked to the system and they tend to focus on solving the inadvertent errors without serious consequences. Comfortability in revealing their concerns voluntarily about patient safety most often takes years of experience to develop. This may be attributed to the unwillingness of dental practitioners in general, to disclose incidences for fear of humiliation and disciplinary actions. It has been reported that a significant degree of iatrogenic harm arises not during treatment but through pre-procedural and post-procedural checks, which are potentially manageable.¹⁶ Moreover, it is a very common misconception that needs serious tailoring that dentistry involves non-life-threatening errors and therefore are insignificant and hence not important to report.

Given that the dental students, irrespective of their level of study, exhibited similar levels of confidence in learning about patient safety, with respect to the classroom and clinical scenario, these findings offer a stable baseline which can be used to evaluate changes in confidence in patient safety learning that may result from alterations to dental curricula. However, it should be borne in mind that results of this study may not directly reflect patient safety competencies within actual dental clinical practice, when the dental students eventually venture out on their own. The field would benefit from future dental research on similar concepts such as dental practitioners' patient safety knowledge and patient safety competence. Such endeavors would require other approaches of investigation that have not yet been widely explored in the dental literature and this can be adopted from the medical and nursing fields, who have increasingly explored patient safety concepts.¹⁷⁻²²

Several limitations of this study need to be addressed. Firstly, a lack of previously published research using protocols of similar nature makes comparison of all aspects of the results challenging. Because the study population only included dental students from Saudi Arabia, the findings obtained from these self-reported data can only be generalized within this population. It is possible that dental students from other geographical areas may respond differently to the survey instrument used in this study. The modified H-PEPSS being a survey in a questionnaire format, there might be some form of under-reporting bias. The cross-sectional study design and non-respondent bias may be considered as other drawbacks.

Conclusion

It is of paramount importance that oral health-care professionals attain a thorough understanding of patient safety concepts during their professional training period. From the results of this study, it can be concluded that dental students are quite confident in what they are learning about clinical aspects of patient safety, however, their confidence in learning about certain patient safety aspects warrants further improvement. This suggests a need to address the impact of the regular interventions, extra motivation and repeated mentoring in both the classroom and clinical scenarios on improving dental students' confidence in what they are learning about patient safety. Overall, the dental students rated the clinical training experience regarding patient safety as more positive than negative.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board at College of Dentistry, King Saud University (Registration No. FR 0341).

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Disclosure

The authors declare no conflict of interests in relation to this work.

References

1. Yamalik N. Patient safety and quality assurance and improvement. *Indian J Dent Res.* 2014;25(2):139–141. doi:10.4103/0970-9290.135898
2. Saksena A, Pemberton M, Shaw A, Dickson S, Ashley M. Preventing wrong tooth extraction: experience in development and implementation of an outpatient safety checklist. *Br Dent J.* 2014;217(7):357–362. doi:10.1038/sj.bdj.2014.860
3. Ramoni R, Walji MF, Tavares A, et al. Open wide: looking into the safety culture of dental school clinics. *J Dent Educ.* 2014;78(5):745–756. doi:10.1002/j.0022-0337.2014.78.5.tb05726.x
4. Kalenderian E, Walji MF, Tavares A, Ramoni RB. An adverse event trigger tool in dentistry: a new methodology for measuring harm in the dental office. *J Am Dent Assoc.* 2013;144(7):808–814. doi:10.14219/jada.archive.2013.0191
5. Ramoni RB, Walji MF, White J, et al. From good to better: toward a patient safety initiative in dentistry. *J Am Dent Assoc.* 2012;143(9):956–960. doi:10.14219/jada.archive.2012.0303
6. Pinsky HM, Taichman RS, Sarment DP. Adaptation of airline crew resource management principles to dentistry. *J Am Dent Assoc.* 2010;141(8):1010–1018. doi:10.14219/jada.archive.2010.0316
7. Buhrow SM, Buhrow JA. Integrating patient safety in the OMFS curriculum: survey of 4-year residency programs. *J Patient Saf.* 2016;12(4):197–203. doi:10.1097/PTS.0000000000000094
8. Leong P, Afrow J, Weber HP, Howell H. Attitudes toward patient safety standards in U.S. dental schools: a pilot study. *J Dent Educ.* 2008;72(4):431–437. doi:10.1002/j.0022-0337.2008.72.4.tb04508.x
9. Manogue M, Brown G. Managing the curriculum—for a change. *Eur J Dent Educ.* 2007;11(2):75–86. doi:10.1111/j.1600-0579.2007.00444.x
10. Crawford JM, Adami G, Johnson BR, et al. Curriculum restructuring at a North American dental school: rationale for change. *J Dent Educ.* 2007;71(4):524–531. doi:10.1002/j.0022-0337.2007.71.4.tb04305.x
11. Rossomando E. Biodontics: dental students as change agents for dental school curricula. *Comp Cont Educ Dent.* 2005;26(8):571–580.
12. Doyle P, VanDenKerkhof EG, Edge DS, Ginsburg L, Goldstein DH. Self-reported patient safety competence among Canadian medical students and postgraduate trainees: a cross-sectional survey. *BMJ Qual Saf.* 2015;24(2):135–141. doi:10.1136/bmjqs-2014-003142
13. World Medical Association. Declaration of Helsinki—ethical principles for medical research involving human subjects; 2015.
14. Farrington M. Infection control education: how to make an impact—tools for the job. *J Hosp Infect.* 2007;65(Suppl 2):128–132. doi:10.1016/S0195-6701(07)60029-2
15. Kohn WG, Harte JA, Malvitz DM, et al. Guidelines for infection control in dental health care settings—2003. *J Am Dent Assoc.* 2004;135(1):33–47. doi:10.14219/jada.archive.2004.0019
16. Thusu S, Panesar S, Bedi R. Patient safety in dentistry—state of play as revealed by a national database of errors. *Br Dent J.* 2012;213(3):E3. doi:10.1038/sj.bdj.2012.669
17. Ginsburg LR, Tregunno D, Norton PG, et al. Development and testing of an objective structured clinical exam (OSCE) to assess socio-cultural domains of patient safety competency. *BMJ Qual Saf.* 2014;24:188–194. doi:10.1136/bmjqs-2014-003277
18. Ginsburg LR, Tregunno D, Norton PG. Self-reported patient safety competence among new graduates in medicine, nursing and pharmacy. *BMJ Qual Saf.* 2012;22:147–154. doi:10.1136/bmjqs-2012-001308
19. Duhn L, Karp S, Oni O, Edge D, Ginsburg L, VanDenKerkhof E. Perspectives on patient safety among undergraduate nursing students. *J Nurs Educ.* 2012;51(9):526–531. doi:10.3928/01484834-20120706-04
20. Patey R, Flin R, Cuthbertson BH, et al. Patient safety: helping medical students understand error in healthcare. *BMJ Qual Saf.* 2007;16(4):256–259. doi:10.1136/qshc.2006.021014
21. Madigosky WS, Headrick LA, Nelson K, Cox KR, Anderson T. Changing and sustaining medical students' knowledge, skills, and attitudes about patient safety and medical fallibility. *Acad Med.* 2006;81(1):94–101. doi:10.1097/00001888-200601000-00022
22. Chen L, Huang F, Yuan X, Song J, Chen L. An assessment of the reliability and factorial validity of the Chinese version of the health professional education in patient safety survey (H-PEPSS). *Front Psychol.* 2019;10:2183. doi:10.3389/fpsyg.2019.02183

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