

**ORIGINAL ARTICLE**

A multi-university assessment of patient safety competence during clinical training among baccalaureate nursing students: A cross-sectional study

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Abstract

Aims and objectives: To assess the perceived patient safety competence during clinical training of Saudi nursing students.

Background: Ensuring safety in healthcare settings requires improvements in the educational and clinical practice of professionals. Experts stressed that shared patient safety culture must be of primary importance; they also emphasised the resolute need for theoretically driven research approaches for patient safety competence in healthcare organisations and educational institutions.

Design: Descriptive, cross-sectional design.

Methods: This study was conducted in six government universities in Saudi Arabia. A sample of 829 nursing students was surveyed using the health professional education in patient safety survey. Descriptive and inferential statistics were used to analyse the data. The study adhered to the STROBE guideline for cross-sectional studies (See Supporting Information Appendix S1).

Results: The percentage of agreement on the items of the health professional education in patient safety survey ranged from 61.5%–76.5%. The dimension “understanding human and environmental factors” received the highest perceived competence, whereas the dimension “working in teams” received the lowest competence. Significant differences in students’ patient safety competence from different universities were reported. Male students perceived their competence in “working in teams” higher than the female students. Students in their internship year had significantly higher levels of competence in all the six dimensions of the health professional education in patient safety survey than students in the third- and fourth-year levels.

Conclusions: Saudi nursing students have positive perceptions towards their patient safety competencies. Significant differences were found in the patient safety competence of nursing students between universities, gender and year of study.

Relevance to clinical practice: The results provide valuable insights and guidance for improving the patient safety competence of nursing students. The findings can be used to guide the creation of policies and interventions that may ensure the

continuous development of patient safety competence of nursing students as they navigate the clinical area.

KEYWORDS

clinical training, nursing education, nursing students, patient safety, patient safety competence, Saudi Arabia

1 | INTRODUCTION

Nurses are the front line of care and the largest group of health-care providers which made them prominent to guarantee patient safety (Institute of Medicine, 2011). Patient safety reduces errors; hence, nursing organisations were mounting competencies which integrates such nursing management skill in the curricula (American Association of Colleges of Nursing, 2008; World Health Organization [WHO], 2009). The WHO (2014) supported such intercession whereby education in nursing and other healthcare courses must involve patient safety. Thus, the students in nursing colleges must gain understanding and acquire patient safety competence as this promotes patients' recovery, prevents unwanted circumstances and has been a global concern among healthcare and academic organisations (Colet et al., 2015). The development and integration of patient safety as a specialised discipline assisted healthcare professionals, managers, organisations, institutions, governments and consumers worldwide. Individuals in the healthcare organisations, such nurses and nursing students, are recommended to be familiar with patient safety including its concepts and applications (Langari, Tella, Smith, & Turunen, 2017; WHO, 2014).

The Ministry of Health in Saudi Arabia prioritised the development of healthcare system in the country, including the development of competent and safe healthcare workers (Fielden, 2012). The demand for qualified Saudi nurses has become a challenge for nursing institutions in the country because of the national policy of Saudisation of the workforce (Alboliteeh, Magarey, & Wiechula, 2017; Al-Dossary, 2018). This policy in the Middle Eastern context implies the rapid promotion of the skills improvement of Saudi Arabian nationals as registered nurses (Fielden, 2012). These nurses should be competent in their ability to perform safe care services in a given situation on the basis of nursing care standards. Patient safety competence in the context of undergraduate nursing education and learning must include the three aspects of knowledge, skills and attitudes; these aspects should be prioritised (Mansour, 2015). This approach prepares nursing students for healthcare working environments that require high levels of quality and safety of care (Safadi, Jaradeh, Bandak, & Froelicher, 2010).

1.1 | Background of the study

Ensuring safety in healthcare settings requires improvements in the educational and clinical practice of professionals (Alquwez et al., 2018; Colet et al., 2018; Stevanin et al., 2015). Patient safety was

What does this paper contribute to the wider global clinical community?

- Training hospitals should foster an organisational culture that allows students to be active participants in promoting patient safety in the clinical areas.
- The nursing education and training hospitals should work together to plan and implement interventions that can improve the teamwork and communication of students with healthcare workers in hospitals.
- The differences on patient safety competence of students from different universities reported in this study may prompt the creation of a uniform patient safety curricular content based on international standards that can be adapted by all nursing schools.

defined by WHO (2014, p. 3) as "the absence of preventable harm to a patient during the process of health care." A concept analysis conducted by Kim, Lyder, McNeese-Smith, Leach, and Needleman (2015, p. 2,497) presented that the most common defining attributes of patient safety in the literature are as follows: "prevention of medical errors and avoidable adverse events, protection of patients from harm or injury and collaborative efforts by individual healthcare providers and a strong, well integrated healthcare system." Ensuring safety in healthcare settings requires improvements in both the academic trainings and clinical practice of professionals (Ammouri, Tailakh, Muliira, Geethakrishnan, & Al Kindi, 2015; Stevanin et al., 2015). Experts stressed that shared patient safety culture must be of primary importance. Moreover, experts emphasised the need for theoretically driven research approaches for patient safety competence in healthcare organisations and academic institutions (Colet et al., 2015; Hickner, Smith, Yount, & Sorra, 2015). Thus, exploring the concept of patient safety must be initiated among individuals in undergraduate nursing programmes (Colet et al., 2015).

According to Colet et al. (2015), patient safety is a determining factor of quality care which must be highlighted in the competency development of students and staff either in the academic or in healthcare organisations. David, Alati, Ware, and Kinner (2013) explained that patient safety should be reflected when promoting overall quality of healthcare services. In the healthcare organisation, the development of effective interventions should promote examination on the adverse events and worthwhile learning experiences

of the staff (Zegers, Hesselink, Geense, Vincent, & Wollersheim, 2016). The presence of multifaceted factors in the healthcare organisation can be addressed through clinical training of both the students and the professionals to emphasise their roles and responsibilities in promoting safety (David et al., 2013). Clinical trainings help ensure their satisfactory performance in delivering safe and effective care. Many instructive initiatives were recently undertaken in different methods to ensure acquisition of patient safety competence (Lee, Jang, & Park, 2016; Wong, 2014). According to Dauphine (2012), the learning experiences to patient safety help enhance the level of skills and knowledge of the individuals which will improve the patient safety strategies and implementations.

The Joint Commission mandated all accredited hospital nursing units to implement the components of a culture of safety. The mandate addressed the healthcare work environment, which is often characterised as chaotic with inadequate or inappropriate communication and conflict that hinder the culture of safety initiatives. The mandate of the new Joint Commission has been in effect for 10 years, but only a few studies examined the influence of safety culture and educational interventions among nursing staff and students. Thus, current nursing scholars are challenged to assess the perspectives of nursing student on patient safety competence to prevent adverse events and harm on patients. A culture of safety must be encouraged. Such a culture changes the social context from an untrusting and blaming approach to a trusting and nonblaming one. This culture encourages healthcare staff to share information about safety issues and the measures that can be adopted to promote a safer healthcare environment (The Joint Commission, 2017).

1.2 | Aim

This study assessed the perceived patient safety competence during clinical training of Saudi baccalaureate nursing students in six universities.

2 | METHOD

The study adhered to the STROBE guideline for cross-sectional studies (See Supporting Information Appendix S1). This descriptive, cross-sectional, multi-university study was part of a larger study conducted in six universities that operate under the Ministry of Education in Saudi Arabia. Three of the universities (Universities A, B and C) are located in the west region of the country, two universities (Universities D and E) are located in the central region, and one university (University F) is situated in the northern region. The Baccalaureate in Nursing (BSN) programme of the six universities is a four-year programme (with classroom and clinical courses). Students under this programme should undergo an additional year of clinical internship before they can apply for nursing registration. The inclusion criteria for this study were (a) BSN students in any of the six universities, (b) with Saudi nationality and (c) third, fourth, and fifth (internship year) full-time students. Freshman and sophomore

students were excluded due to their nonexposure to clinical settings. Students of any of the researchers were excluded. A total of 1,191 nursing students met the inclusion criteria. The sample size was calculated using the SurveyMonkey® sample size calculator (<https://www.surveymonkey.com/mp/sample-size-calculator/>). The computation yielded 291 required samples at 95% confidence level and 5% margin of error. To ensure adequate sample size, all the students who met the inclusion criteria were invited but only 1,072 agreed to participate. Of the 1,072 distributed questionnaires, 838 were retrieved; however, nine were excluded due to substantial missing data. Hence, 829 were included in the analysis giving a 77.3% response rate (Alshammari et al., 2018).

The demographic characteristics of the respondents were reported in Alshammari et al. (2018). The mean age of the students was 22.26 years ($SD = 2.69$). The majority of the students were females (69.5%). The highest proportion of the sample was from University F (30.6%), whereas the lowest was from University B (7.6%). 36.4%, 34.0% and 29.6% of respondents were registered in the third, fourth and internship years of the BSN programme, respectively.

2.1 | Study variables

The main study variable measured in this study was the students' perceived patient safety competence. Six dimensions of patient safety were measured to identify the students' perceived patient safety competence. The dimensions were (a) working in teams with other health professionals, (b) communicating effectively, (c) managing safety risks, (d) understanding human and environmental factors that influence patient safety, (e) recognising and responding to adverse events and (f) culture of safety. The demographic characteristics of the respondents were also measured.

2.2 | Instrument

A demographic sheet designed by the researchers was attached to the survey to collect data on the respondents' university, age, gender and year of study.

The Health Professional Education in Patient Safety Survey (H-PEPSS) by Ginsburg, Castel, Tregunno, and Norton (2012) was adapted to collect data on the perceived patient safety competence of BSN students. This tool measures the self-reported patient safety competence of health professionals and was developed to reflect six socio-cultural areas fundamental to patient safety. These six areas are "working in teams with other health professionals, communicating effectively, managing safety risks, understanding human and environmental factors that influence patient safety, recognising and responding to adverse events, and culture of safety." These areas are framed from a number of key patient safety competency frameworks developed by different international professional bodies and the WHO (Walton et al., 2011). The tool was also designed to measure competence in the classroom and clinical settings. Only the scale for clinical settings was used in this study. The scale is rated using a five-point Likert-type scale (1 = strongly disagree to 5 = strongly

agree). The mean for each dimension is calculated to obtain a dimension score. A high mean signifies better patient safety competence. The H-PEPSS is a valid and reliable tool, with Cronbach's alpha that ranges from 0.81–0.85 for the six dimensions (Ginsburg, Castel et al., 2012). This tool was used in this study after obtaining permission from the copyright holder via email (L. Ginsburg, personal communication, May 31, 2017).

The Arabic version of the tool, which was culturally adapted for Saudi nursing students by Colet et al. (2015), was used in the present study. The Arabic version was presented to a five-member panel of experts who specialise in patient safety and quality improvement to evaluate the content validity of the tool. The panel was tasked to assess the relevance of the items of the scale by responding from 1 (not relevant)–4 (highly relevant) (Polit & Beck, 2006). The item-level content validity indexes of the 20 items were 1. The scale-level content validity index using averaging method was also 1. Hence, the Arabic version has acceptable content validity (Polit & Beck, 2006). The Arabic version was pilot-tested on 126 nursing students who were not part of the study. The students were enrolled in a nursing programme at a university located in the Riyadh region. Convenience sampling was utilised for sample selection following the same inclusion criteria and procedure. The tool was re-administered two weeks after the first data gathering to allow the computation of stability reliability by calculating the intra-class correlation coefficient (ICC) of the two-week test-retest scores. The Cronbach's alpha of the tool was 0.74, whereas the computed ICC was 0.80; these figures imply acceptable internal consistency (Nunnally & Bernstein, 1994) and reliable stability (Vincent, 1999).

2.3 | Ethical consideration and data collection

This study was part of a protocol that was reviewed and approved by the Institutional Review Board of King Saud University, College of Medicine (Project No. E-17-2559). Permission to conduct the study was sought from each university. During the recruitment phase done one month before the data collection schedule, adequate information about the study (i.e., significance of the study, voluntary participation, benefits and risks of participation and expected participation of the respondents) was explicitly explained to prospective participants. The privacy of students was ascertained throughout the research process. Students who agreed to participate were asked to sign an informed consent to signify their voluntary participation. Data collection was performed from October 2017–January 2018. After the recruitment phase, the researchers coordinated with the instructors of the students to allow them to devote 15–20 min at the end of their lectures. The instructors were asked to leave the classroom during data collection to prevent undue influence. Information about the study was reinforced before distributing the questionnaires to the students. The students were asked not to indicate their names in the survey and return it to the researchers after answering. The researchers visited the nursing interns in their training hospitals during breaks to distribute the questionnaires. Similar information about the study and the process of data collection were observed.

The questionnaires were kept in a locked cabinet in the office of the researchers until the data collection period was over.

To address nonresponse bias and selection bias, the researchers invited all the students who met the inclusion criteria. This led to a higher number of samples than the required sample size for the study. The use of a valid and reliable tool that measures the students' perceptions of patient safety competence addressed the potential effect of information bias in this study.

2.4 | Statistical analysis

First, the researchers entered the data from each university in Microsoft excel to determine missing data. Missing data were treated in two ways: (a) Cases with substantial missing data were excluded in the analyses, and (b) cases that do not have substantial missing data were handled using common-point imputation. Second, the data were entered in SPSS version 22.0. Descriptive statistics (i.e., frequency count, percentage, mean and standard deviation) were calculated for the demographic profiles of respondents. Means and standard deviations were calculated for the patient safety competence of respondents. *t* Tests, one-way analyses of variance with Tukey HSD test and Pearson's product-moment correlations were computed to examine the association between demographic profile and patient safety competence. Partial eta-square and Cohen's *d* were also computed for effect size (0.20 = small, 0.50 = medium, 0.80 = large). *p*-values <0.05 were considered significant.

3 | RESULTS

3.1 | Patient safety competence during clinical training

Table 1 reflects the reported patient safety competence of respondents during clinical training. The majority of the respondents agreed or strongly agreed to all the items in the H-PEPSS. The percentage of agreement ranged from 61.5%–76.5%. The mean of items ranged from 3.83 (*SD* = 1.01)–4.09 (*SD* = 0.87, 0.93). The item “the role of environmental factors such as work flow, ergonomics, resources, that effect patient safety” (*M* = 4.09, *SD* = 0.93) and the item “the importance of having a questioning attitude and speaking up when you see things that may be unsafe” (*M* = 4.09, *SD* = 0.87) received the highest mean. The item “encouraging team members to speak up, question, challenge, advocate and be accountable as appropriate to address safety issues” received the lowest mean (*M* = 3.83, *SD* = 1.01). In terms of the dimensions of H-PEPSS, the dimension “understanding human and environmental factors” received the highest mean (*M* = 4.05, *SD* = 0.83), followed by “safety culture” (*M* = 4.03, *SD* = 0.77), “recognising and responding to adverse events” (*M* = 3.98, *SD* = 0.85), “communicating effectively” (*M* = 3.95, *SD* = 0.86) and “managing safety risks” (*M* = 3.95, *SD* = 0.85). The dimension of “working in teams” received the lowest mean (*M* = 3.89, *SD* = 0.88).

TABLE 1 Percentage of respondents agreeing with each H-PEPSS item (n = 829)

Dimension	Item: "I feel confident in what I learned about..."	Mean	SD	Strongly Agree/Agree	
				n	%
Working in teams with other health professionals	1. Managing inter-professional conflict;	3.91	1.03	573	69.1
	2. Sharing authority, leadership and decision-making;	3.92	1.05	565	68.2
	3. Encouraging team members to speak up, question, challenge, advocate and be accountable as appropriate to address safety issues;	3.83	1.01	510	61.5
Communicating effectively	4. Enhancing patient safety through clear and consistent communication with patients;	4.08	0.93	596	71.9
	5. Enhancing patient safety through effective communication with other health care providers;	3.86	1.08	528	63.7
	6. Effective verbal and nonverbal communication abilities to prevent adverse events;	3.92	0.98	563	67.9
Managing safety risks	7. Recognising routine situations in which safety problems may arise;	3.90	1.01	531	64.1
	8. Identifying and implementing safety solutions;	3.99	0.99	575	69.4
	9. Anticipating and managing high-risk situations;	3.96	0.97	558	67.3
Understanding human and environmental factors	10. The role of human factors, such as fatigue, that effect patient safety;	4.00	0.93	574	69.2
	11. The role of environmental factors such as work flow, ergonomics, resources, that effect patient safety;	4.09	0.93	609	73.5
Recognise, respond to immediate risks	12. Recognising an adverse event or close call;	3.89	1.03	545	65.7
	13. Reducing harm by addressing immediate risk for patients and others involved;	4.07	0.90	608	73.3
	14. The importance of having a questioning attitude and speaking up when you see things that may be unsafe;	4.09	0.87	634	76.5
Safety culture	15. The importance of supportive environment that encourages patients and providers to speak up when they have safety concerns;	3.94	0.92	555	66.9
	16. The nature of system (e.g., aspects of the organisation, management or the work environment including policies, resources, communication and other processes)and system failures and their role in adverse events	4.07	0.94	583	70.3

TABLE 2 Comparison of the self-reported patient safety competence between universities ($n = 829$)

Dimensions	University	Mean	SD	F	p	η^2	95% CI	
							Lower	Upper
Working in teams	University A	3.59	1.00	9.24	<0.001***	0.05	3.39	3.79
	University B	3.72	0.76				3.53	3.9
	University C	3.79	1.00				3.63	3.95
	University D	4.18	0.61				4.07	4.28
	University E	3.68	0.93				3.51	3.85
	University F	4.03	0.81				3.93	4.13
Communicating effectively	University A	3.78	1.07	10.79	<0.001***	0.06	3.56	4.00
	University B	3.67	0.85				3.46	3.88
	University C	3.97	0.91				3.82	4.11
	University D	3.64	0.82				3.51	3.78
	University E	4.08	0.72				3.95	4.22
	University F	4.19	0.72				4.10	4.27
Managing safety risks	University A	3.77	1.00	3.89	0.002**	0.02	3.56	3.97
	University B	3.67	0.84				3.46	3.88
	University C	3.94	0.95				3.78	4.09
	University D	3.91	0.68				3.80	4.03
	University E	3.99	0.90				3.83	4.16
	University F	4.09	0.75				4.00	4.18
Understanding human and environmental factors	University A	3.81	1.00	6.57	<0.001***	0.04	3.61	4.02
	University B	3.65	0.83				3.44	3.86
	University C	4.04	0.89				3.90	4.18
	University D	4.25	0.60				4.15	4.34
	University E	4.09	0.95				3.91	4.26
	University F	4.11	0.72				4.02	4.20
Recognising and responding to adverse events	University A	3.76	1.02	6.12	<0.001***	0.04	3.55	3.96
	University B	3.63	0.79				3.44	3.83
	University C	4.06	0.87				3.92	4.20
	University D	3.92	0.77				3.79	4.05
	University E	3.95	0.95				3.78	4.12
	University F	4.15	0.72				4.06	4.24
Safety culture	University A	3.70	1.03	9.52	<0.001***	0.05	3.48	3.91
	University B	3.61	0.79				3.41	3.81
	University C	4.11	0.82				3.97	4.24
	University D	4.08	0.62				3.98	4.18
	University E	4.15	0.73				4.02	4.28
	University F	4.13	0.64				4.05	4.21

Significant at 0.01 level. *significant at 0.001 level.

3.2 | Comparison of patient safety competence of students in terms of demographic characteristics

As indicated in Table 2, significant differences in reporting of patient safety competence from different universities were present in all categories of patient safety dimensions, with no one university consistently showing higher scores in all of these dimensions. However, the computed effect size in each dimension was very small (<0.20).

In terms of gender, male students reported significantly higher competence in the dimension of “working in teams” than female students ($t = -5.44$, $p < 0.001$, $d = 0.39$; see Table 3). The comparison on “recognising and responding to adverse events” between genders achieved a borderline significance ($t = -1.96$, $p = 0.05$, $d = 0.13$), with males reporting higher competence than females.

The comparison between years of study is indicated in Table 4. Significant differences were revealed on student competence on the

TABLE 3 Comparison of the self-reported patient safety competence between genders ($n = 829$)

Dimensions	Gender	Mean	SD	t	p	95% CI	
						Lower	Upper
Working in teams	Female	3.79	0.92	-5.44	<0.001***	-0.44	-0.21
	Male	4.11	0.73				
Communicating effectively	Female	3.94	0.87	-0.75	0.457	-0.17	0.08
	Male	3.98	0.82				
Managing safety risks	Female	3.93	0.87	-1.17	0.234	-0.20	0.05
	Male	4.00	0.78				
Understanding human and environmental factors	Female	4.02	0.86	-1.30	0.194	-0.20	0.04
	Male	4.10	0.74				
Recognising and responding to adverse events	Female	3.95	0.89	-1.96	0.050	-0.23	0.00
	Male	4.06	0.74				
Safety culture	Female	4.02	0.80	-0.85	0.394	-0.16	0.06
	Male	4.07	0.70				

***Significant at 0.001 level.

six H-PEPPS dimensions. The Tukey HSD tests revealed that nursing students in their internship year had significantly higher levels of competence in all the six dimensions of the H-PEPPS than students in the third- and fourth-year levels. The effect size for each dimension was very small (<0.20).

4 | DISCUSSION

This study investigated the perceived patient safety competence during clinical training of nursing students in six universities in Saudi Arabia. This study also showed the associations among the

TABLE 4 Comparison of the self-reported patient safety competence between year of study ($n = 829$)

Dimensions	Year of study	Mean	SD	F	p	η^2	95% CI	
							Lower	Upper
Working in teams	3rd-year	3.70	0.89	37.38	<0.001***	0.08	3.60	3.80
	4th-year	3.75	0.89				3.65	3.85
	Internship year	4.27	0.70				4.19	4.36
Communicating effectively	3rd-year	3.80	0.86	16.16	<0.001***	0.04	3.71	3.90
	4th-year	3.89	0.86				3.79	3.99
	Internship year	4.20	0.80				4.10	4.30
Managing safety risks	3rd-year	3.79	0.89	23.94	<0.001***	0.06	3.69	3.89
	4th-year	3.85	0.83				3.75	3.95
	Internship year	4.25	0.73				4.16	4.34
Understanding human and environmental factors	3rd-year	3.88	0.86	17.49	<0.001***	0.04	3.78	3.98
	4th-year	4.01	0.81				3.92	4.11
	Internship year	4.29	0.75				4.20	4.39
Recognising and responding to adverse events	3rd-year	3.80	0.89	17.78	<0.001***	0.04	3.70	3.90
	4th-year	3.96	0.78				3.87	4.05
	Internship year	4.23	0.82				4.12	4.33
Safety culture	3rd-year	3.85	0.84	27.51	<0.001***	0.06	3.75	3.94
	4th-year	3.98	0.74				3.90	4.07
	Internship year	4.31	0.62				4.24	4.39

***Significant at 0.001 level.

self-reported patient safety competence with the demographic characteristics of nursing students.

The findings highlighted the self-reported patient safety competence of students. Findings revealed moderate patient safety competencies; these competencies are higher in previous study conducted among Saudi nursing students (Colet et al., 2015), Canadian nurses, medical doctors and pharmacists (Ginsburg, Tregunno, & Norton, 2012), but slightly lower than the overall self-reported patient safety competence of Korean nurses (Hwang, 2015). The pursuit for patient safety in healthcare facilities has become increasingly widespread in Saudi Arabia; this development is attributed to the recommendation of the Agency for Healthcare Research and Quality (AHRQ), which is monitored every two or three years (Famolaro et al., 2016). This recommendation was also emphasised in the accreditation standards of Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI), which recommended patient safety culture assessment on yearly basis (National Hospital Standards, 2015). This development could be the reason that most nursing students received patient safety competencies during their formal education at university level. Thus, patient safety content should be improved in clinical training programmes and nursing curricula.

Results revealed that teamwork with other healthcare teams was rated lowest among the six socio-cultural patient safety competencies; this result is consistent with previous findings in Canada (Ginsburg, Tregunno et al., 2012), Finland, the UK (Tella et al., 2015), Ireland (O'Connor et al., 2016) and Korea (Hwang, 2015). This evidence suggests that inter-professional collaboration is a weakness in current healthcare settings. However, careful consideration is recommended when interpreting the findings of previous literature because all respondents were nurses and other healthcare professionals and not nursing students. Different types of respondents represent discrepancies in individual beliefs entrenched within the learning culture. Therefore, further studies are needed in this area. Nevertheless, findings further stress the need to foster teamwork competency towards healthcare professionals, which could adapt teamwork training programmes across professional disciplines.

This study revealed that the perceived patient safety competency dimension (teamwork) of students varied significantly according to universities, gender and year level. However, the computed effect sizes on the comparisons showed very small to small effects. These findings may indicate that while the differences were statistically significant, the differences between groups may not be practically significant. Results related to patient safety are significantly associated with different educational institutions (Gehring et al., 2013; Hoffmann et al., 2013). This means that complexities of educational institutions may have different pedagogies in teaching, which lead to different learning outcomes. However, factors and teaching approaches that impacts patient safety dimensions were not discussed in the study. Understanding the factors and teaching approaches may improve the patient safety perception and competence of students.

Male nursing students have better teamwork perception than female students. This result negates the findings in a previous study,

which described that female students had better patient safety competence than male students (Colet et al., 2015). Results also refute an earlier study by Wilhelmsson, Ponzer, Dahlgren, Timpka, and Faresjö (2011), which found that women are inclined to work in groups, whereas men choose to work alone, and women demonstrated lower confidence about their abilities. Thus, women are more confident in the skills of their potential partners. The analysis of Hansson, Foldevi, and Mattsson (2010) showed that women overwhelm men in several caring professions from altruistic societies to nursing field, both of which bestowed cooperation with or without financial incentives. However, these previous findings should be interpreted with caution because more than half of the respondents were female. The present finding may also be explained by the culture on gender differences in the KSA, where males are more socially dominant than females (Cruz & Bashtawi, 2016).

Nursing interns had better perceptions of patient safety competence than third- and fourth-year nursing students. This finding is consistent with Aboumatar et al. (2012) and Jansma, Wagner, Kate, and Bijnen (2011), who reported that the higher the year level of students, the more competent they are in patient safety. A higher year level means additional learning opportunities that are appropriate to the study concepts of patient safety, which further contribute to an increased confidence level in patient safety practices (Aboumatar et al., 2012). Intern students have more experience in clinical practice, which substantiates higher confidence level in patient safety practices. Another study negated this finding (Tella et al., 2015). A previous study discovered that a significant stressful experience is manifested as students enter their internship year; this outcome might affect their confidence level towards patient safety and how they perceive teamwork, communication and safety culture in clinical settings (Duhn et al., 2012). Hence, further studies should be conducted to explore the influence of year of study on the patient safety competence of nursing students.

The present study found that the other five socio-cultural areas, namely, communicating effectively, managing safety risks, understanding human and environmental factors, recognising and responding to adverse events and safety culture, were determined by different educational institutions and year level of education. This result confirms the finding in other contemporary literature that educational institution and educational level play a vital role in developing patient safety competence (Doyle, VanDenKerkhof, Edge, Ginsburg, & Goldstein, 2015). This finding might be linked to the educational system of Saudi Arabia, which is constantly preparing its future nurses to become competent in patient safety care services; this goal remains a focal point of the country's healthcare policies (Alboliteeh et al., 2017). For instance, the country is offering two nursing educational programme, namely, nursing bridging programme (diploma to BSN) and a university baccalaureate nursing programme (four-academic years and a one-year internship; Al Mutair & Redwan, 2016). Each educational programme may provide education on the quality and safety of nursing care. The majority of the members of nursing workforce are expatriates (Cruz, 2017). Each cultural background may possess different teaching

style and learning strategies that might affect student's engagement and learning during clinical training. Furthermore, different educational systems provide varying academic experience, financial resources and educational facilities. Each educational system is also affiliated with different training hospitals that range from secondary hospitals to state-of-the-art tertiary hospitals (Almalki, FitzGerald, & Clark, 2011). Different training hospital levels offer different health equipment resources, health policy measures and nurses with myriad skills. These resources may affect the training of nursing students. These nursing programmes, educational system institution and differences in healthcare settings may affect the performance of students, which may result in different student learning outcomes. Therefore, nurse educators should understand the varied needs of students arising from these differences and adjust their patient safety teaching styles to support the learning process of students.

These findings further support the idea of international accreditation organisations that require assessment of patient safety competence in all clinical healthcare settings in the country (Alswat et al., 2017). This accreditation system evaluates different aspects of patient safety culture and can help hospitals better understand factors, such as teamwork among health professionals, communication, safety management culture, risk assessment staffing and response to error (Alswat et al., 2017). In responding to these national accreditation requirements, hospitals should restructure their work to promote patient safety competence. Academic institutions should comply with the rules and clinical guidelines of patient safety. Notably, students may have more limited expertise in participating in patient safety initiatives than other healthcare professionals (Leach, Hofmeyer, & Bobridge, 2016). Therefore, the patient safety competencies of students should be strengthened in the undergraduate healthcare curricula to build a strong safety culture.

4.1 | Limitations of the study

Some limitations should be acknowledged and considered when utilising the findings of this study. First, the data used in this study were self-reported, which may have introduced a degree of social desirability bias. The self-reported confidence level of patient safety may be high, but it also shows the lack of awareness of students. Second, cross-sectional design was used in this study. Further research (interventional studies) may improve the patient safety competencies of students over time. These interventions might include standardisation of patient safety care process in measuring the clinical patient safety of students. Third, this study used a convenience sample, which limits the generalisability of the results.

5 | CONCLUSIONS

Nursing students should be competent in performing patient safety based on the quality standards of nursing care. This study was

conducted to determine the perceived patient safety competence of nursing students during clinical training. Saudi nursing students have positive perception towards patient safety competencies. The perceived patient safety competency dimension (teamwork) of students is associated with the academic institution, gender and year level. Male students have better teamwork perception than female students, whereas nursing interns have better patient safety competence than third- and fourth-year students. Differences were revealed in other five socio-cultural areas (communicating effectively, managing safety risks, understanding human and environmental factors, recognising and responding to adverse events and safety culture) between educational institutions and educational level. However, the findings revealed that the differences were not practically significant. Nevertheless, the results provide valuable insights and guidance for improving the patient safety competence of nursing students.

5.1 | Relevance to clinical practice

This investigation highlighted the patient safety competence perception of nursing students during their clinical training. Nursing students should possess high levels of competence in patient safety during clinical rotations. Their exposure to the clinical environment and other healthcare workers, as well as their direct contact with patients during their clinical training, poses threats to the safety of patients if their patient safety competence is sub-optimal. This study provides a baseline data aimed at improving patient safety quality during the clinical training of nursing students. The findings of the study can be used to guide the creation of policies and interventions that may ensure the continuous development of patient safety competence of nursing interns as they navigate the clinical area. The findings revealed good levels of patient safety competence among nursing students, but several aspects of patient safety still needs improvement. For example, the findings showed that students perceived working in teams and communicating effectively as their poorest patient safety dimension. Hence, nursing education and training hospitals should work together to plan and implement interventions that can improve the teamwork and communication of students with healthcare workers in hospitals. Various approaches in improving teamwork and communication can also be adapted, such as Team Strategies and Tools to Enhance Performance and patient safety curriculum, which targets the four core teamwork competencies, namely, communication, leading teams, situation monitoring and mutual support (Bhatt & Swick, 2017). Training hospitals should foster an organisational culture that allows students to be active participants in promoting patient safety in the clinical areas. Furthermore, the differences in patient safety competence of nursing students from different universities call for a unified and stronger patient safety content in the nursing curriculum. This approach will address the poor competence of students in the third and fourth compared with the students in the internship year.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

Conception or design of the work: NA, JPC, Farhan A and JA; the acquisition of data: NA, JPC, Farhan A, EMF, JA, HA, Fatmah A and HMMT; analysis and interpretation of data: NA and JPC; drafting the work: NA, JPC, Farhan A, JA, RBT and JPBS; revising it critically for important intellectual content: All Authors; final approval of the version to be published: All Authors.

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REFERENCES

- Aboumatar, H. J., Thompson, D., Wu, A., Dawson, P., Colbert, J., Marsteller, J., ... Pronovost, P. (2012). Development and evaluation of a 3-day patient safety curriculum to advance knowledge, self-efficacy and system thinking among medical students. *BMJ Quality and Safety*, 21(5), 416–422. <https://doi.org/10.1136/bmjqs-2011-000463>
- Al Mutair, A., & Redwan, F. (2016). Undergraduate Saudi nursing students attitudes towards nursing profession. *Journal of Nursing & Care*, 5(1), 1–5. <https://doi.org/10.4172/2167-1168.1000329>
- Alboliteeh, M., Magarey, J., & Wiechula, R. (2017). The profile of Saudi nursing workforce: A cross-sectional study. *Nursing Research and Practice*, 2017(2017), 1710686. <https://doi.org/10.1155/2017/1710686>
- Al-Dossary, R. N. (2018). The Saudi Arabian 2030 vision and the nursing profession: The way forward. *International Nursing Review*, 65(4), 484–490. <https://doi.org/10.1111/inr.12458>
- Almalki, M., FitzGerald, G., & Clark, M. (2011). The nursing profession in Saudi Arabia: An overview. *International Nursing Review*, 58(3), 304–311. <https://doi.org/10.1111/j.1466-7657.2011.00890.x>
- Alquwez, N., Cruz, J. P., Almoghairi, A. M., Al-otaibi, R. S., Almutairi, K. O., Alicante, J. G., & Colet, P. C. (2018). Nurses' perceptions of patient safety culture in three hospitals in Saudi Arabia. *Journal of Nursing Scholarship*, 50(4), 422–431. <https://doi.org/10.1111/jnu.12394>
- Alshammari, F., Cruz, J. P., Alquwez, N., Almazan, J., Alsolami, F., Tork, H., ... Felemban, E. M. (2018). Compliance with standard precautions during clinical training of nursing students in Saudi Arabia: A multi-university study. *The Journal of Infection in Developing Countries*, 12(11), 937–945. <https://doi.org/10.3855/jidc.10821>
- Alsawat, K., Abdalla, R. A. M., Titi, M. A., Bakash, M., Mehmood, F., Zubairi, B., ... El-Jardali, F. (2017). Improving patient safety culture in Saudi Arabia (2012–2015): Trending, improvement and benchmarking. *BMC Health Services Research*, 17(1), 516. <https://doi.org/10.1186/s12913-017-2461-3>
- American Association of Colleges of Nursing (2008). *The essentials of baccalaureate education for professional nursing practice*. Washington, DC: American Association Colleges of Nursing.
- Ammouri, A. A., Tailakh, A. K., Muliira, J. K., Geethakrishnan, R., & Al Kindi, S. N. (2015). Patient safety culture among nurses. *International Nursing Review*, 62(1), 102–110. <https://doi.org/10.1111/inr.12159>
- Bhatt, J., & Swick, M. (2017, March 15). Focusing on teamwork and communication to improve patient safety. Retrieved from <https://www.aha.org/news/blog/2017-03-15-focusing-teamwork-and-communication-improve-patient-safety> on May 2, 2018.
- Colet, P. C., Cruz, J. P., Cacho, G., Al-Qubeilat, H., Soriano, S. S., & Cruz, C. P. (2018). Perceived infection prevention climate and its predictors among nurses in Saudi Arabia. *Journal of Nursing Scholarship*, 50(2), 134–142. <https://doi.org/10.1111/jnu.12360>
- Colet, P. C., Cruz, J. P., Cruz, C. P., Al-otaibi, J., Qubeilat, H., & Alquwez, N. (2015). Patient safety competence of nursing students in Saudi Arabia: A self-reported survey. *International Journal of Health Sciences*, 9(4), 418–426. <https://doi.org/10.12816/0031231>
- Cruz, J. P. (2017). Quality of life and its influence on clinical competence among nurses: A self-reported study. *Journal of Clinical Nursing*, 26(3–4), 388–399. <https://doi.org/10.1111/jocn.13402>
- Cruz, J. P., & Bashtawi, M. A. (2016). Predictors of hand hygiene practice among Saudi nursing students: A cross-sectional self-reported study. *Journal of Infection and Public Health*, 9(4), 485–493. <https://doi.org/10.1016/j.jiph.2015.11.010>
- Dauphine, W. D. (2012). Educators must consider patient outcomes when assessing the impact of clinical training. *Medical Education*, 46(1), 13–20. <https://doi.org/10.1111/j.1365-2923.2011.04144.x>
- David, M. C., Alati, R., Ware, R. S., & Kinner, S. A. (2013). Attrition in a longitudinal study with hard-to-reach participants was reduced by ongoing contact. *Journal of Clinical Epidemiology*, 66(5), 575–581. <https://doi.org/10.1016/j.jclinepi.2012.12.002>
- Doyle, P., VanDenKerkhof, E. G., Edge, D. S., Ginsburg, L., & Goldstein, D. H. (2015). Self-reported patient safety competence among Canadian medical students and postgraduate trainees: A cross-sectional survey. *BMJ Quality and Safety*, 24(2), 135–141. <https://doi.org/10.1136/bmjqs-2014-003142>
- Duhn, L., Karp, S., Oni, O., Edge, D., Ginsburg, L., & VanDenKerkhof, E. (2012). Perspectives on patient safety among undergraduate nursing students. *Journal of Nursing Education*, 51(9), 526–531. <https://doi.org/10.3928/01484834-20120706-04>
- Famolaro, T., Yount, N. D., Burns, W., Flashner, E., Liu, H., & Sorra, J. (2016). Hospital Survey on Patient Safety Culture. User Comparative Database Report. Rockville: Agency for Healthcare Research and Quality. Retrieved from <https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/patientsafetyculture/hospital/2014/hsops14pt1.pdf>
- Fielden, J. M. (2012). Managing the transition of Saudi new graduate nurses into clinical practice in the Kingdom of Saudi Arabia. *Journal of Nursing Management*, 20, 28–37. <https://doi.org/10.1111/j.1365-2834.2011.01348.x>
- Gehring, K., Schwappach, D. L., Battaglia, M., Buff, R., Huber, F., Sauter, P., & Wieser, M. (2013). Safety climate and its association with office type and team involvement in primary care. *International Journal for Quality in Health Care*, 25(4), 394–402. <https://doi.org/10.1093/intqhc/mzt036>
- Ginsburg, L., Castel, E., Tregunno, D., & Norton, P. G. (2012). The H-PEPSS: An instrument to measure health professionals' perceptions of patient safety competence at entry into practice. *BMJ Quality and Safety*, 21(8), 676–684.
- Ginsburg, L. R., Tregunno, D., & Norton, P. G. (2012). Self-reported patient safety competence among new graduates in medicine, nursing and pharmacy. *BMJ Quality and Safety*, 22(2), 147–154. <https://doi.org/10.1136/bmjqs-2012-001308>

- Hansson, A., Foldevi, M., & Mattsson, B. (2010). Medical students' attitudes toward collaboration between doctors and nurses—a comparison between two Swedish universities. *Journal of Interprofessional Care*, 24(3), 242–250. <https://doi.org/10.3109/13561820903163439>
- Hickner, J., Smith, S. A., Yount, N., & Sorra, J. (2015). Differing perceptions of safety culture across job roles in the ambulatory setting: Analysis of the AHRQ Medical Office Survey on Patient Safety Culture. *BMJ Quality and Safety*, 25(8), 588–594. <https://doi.org/10.1136/bmjqs-2014-003914>
- Hoffmann, B., Miessner, C., Albay, Z., Schröber, J., Weppler, K., Gerlach, F. M., & Güthlin, C. (2013). Impact of individual and team features of patient safety climate: A survey in family practices. *The Annals of Family Medicine*, 11(4), 355–362. <https://doi.org/10.1370/afm.1500>
- Hwang, J. I. (2015). What are hospital nurses' strengths and weaknesses in patient safety competence? Findings from three Korean hospitals. *International Journal for Quality in Health Care*, 27(3), 232–238. <https://doi.org/10.1093/intqhc/mzv027>
- Institute of Medicine (2011). *The future of nursing: leading change, advancing health*. Washington, DC: National Academic Press.
- Jansma, J. D., Wagner, C., ten Kate, R. W., & Bijnen, A. B. (2011). Effects on incident reporting after educating residents in patient safety: A controlled study. *BMC Health Services Research*, 11(1), 335. <https://doi.org/10.1186/1472-6963-11-335>
- Kim, L., Lyder, C. H., McNeese-Smith, D., Leach, L. S., & Needleman, J. (2015). Defining attributes of patient safety through a concept analysis. *Journal of Advanced Nursing*, 71(11), 2490–2503. <https://doi.org/10.1111/jan.12715>
- Langari, M. N. M., Tella, S., Smith, N. J., & Turunen, H. (2017). Self-assessment of patient safety competence: a questionnaire survey of final year British and Finnish pre-registration nursing students. *International Journal of Caring Sciences*, 10, 1212–1223.
- Leach, M. J., Hofmeyer, A., & Bobridge, A. (2016). The impact of research education on student nurse attitude, skill and uptake of evidence-based practice: A descriptive longitudinal survey. *Journal of Clinical Nursing*, 25(1–2), 194–203. <https://doi.org/10.1111/jocn.13103>
- Lee, N. J., Jang, H., & Park, S. Y. (2016). Patient safety education and baccalaureate nursing students' patient safety competency: A cross-sectional study. *Nursing and Health Sciences*, 18(2), 163–171. <https://doi.org/10.1111/nhs.12237>
- Mansour, M. (2015). Factor analysis of nursing students' perception of patient safety education. *Nurse Education Today*, 35(1), 32–37. <https://doi.org/10.1016/j.nedt.2014.04.020>
- National Hospital Standards (2015). Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) 2015. Retrieved from <https://portal.cbahi.gov.sa/english/accreditation-programs/hospital-accreditation-program>
- Nunnally, J., & Bernstein, I. (1994). *Psychometric theory*. New York: McGraw-Hill.
- O'Connor, P., O'dea, A., Lydon, S., Offiah, G., Scott, J., Flannery, A., ... Byrne, D. (2016). A mixed-methods study of the causes and impact of poor teamwork between junior doctors and nurses. *International Journal for Quality in Health Care*, 28(3), 339–345. <https://doi.org/10.1093/intqhc/mzw036>
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing and Health*, 29(5), 489–497. <https://doi.org/10.1002/nur.20147>
- Safadi, R., Jaradeh, M., Bandak, A., & Froelicher, E. (2010). Competence assessment of nursing graduates of Jordanian universities. *Nursing & Health Sciences*, 12(2), 147–154. <https://doi.org/10.1111/j.1442-2018.2009.00507.x>
- Stevanin, S., Bressan, V., Bulfone, G., Zanini, A., Dante, A., & Palese, A. (2015). Knowledge and competence with patient safety as perceived by nursing students: The findings of a cross-sectional study. *Nurse Education Today*, 35(8), 926–934. <https://doi.org/10.1016/j.nedt.2015.04.002>
- Tella, S., Smith, N. J., Partanen, P., Jamookeeah, D., Lamidi, M. L., & Turunen, H. (2015). Learning to ensure patient safety in clinical settings: Comparing Finnish and British nursing students' perceptions. *Journal of Clinical Nursing*, 24(19–20), 2954–2964. <https://doi.org/10.1111/jocn.12914>
- The Joint Commission (2017). The essential role of leadership in developing a safety culture. *Sentinel Event Alert*, 57, 1–8.
- Vincent, W. J. (1999). *Statistics in kinesiology*. Champaign, IL: Human Kinetic.
- Walton, M., Woodward, H., Van Staalduijn, S., Lemer, C., Greaves, F., Noble, D., ... Barraclough, B. (2011). Republished paper: The WHO patient safety curriculum guide for medical schools. *Postgraduate Medical Journal*, 87(1026), 317–321.
- Wilhelmsson, M., Ponzer, S., Dahlgren, L. O., Timpka, T., & Faresjö, T. (2011). Are female students in general and nursing students more ready for teamwork and interprofessional collaboration in healthcare? *BMC Medical Education*, 11(1), 15. <https://doi.org/10.1186/1472-6920-11-15>
- Wong, B. M. (2014). How health professions education can advance patient safety and quality improvement. *Healthcare Quarterly*, 17, 31–35. <https://doi.org/10.12927/hcq.2014.23953>
- World Health Organization (WHO) (2009). Gold Standards for the Initial Education of Professional Nurses and Midwives, Geneva. Retrieved from http://www.who.int/hrh/nursing_midwifery/hrh_global_standards_education.pdf
- World Health Organization (2014). What is Patient Safety? Retrieved from <http://www.who.int/patientsafety/about/en/index.html> on December 19, 2018.
- Zegers, M., Hesselink, G., Geense, W., Vincent, C., & Wollersheim, H. (2016). Evidence-based interventions to reduce adverse events in hospitals: A systematic review of systematic reviews. *British Medical Journal Open*, 6(9), e012555. <https://doi.org/10.1136/bmjopen-2016-012555>

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