

BMJ Open Quality Predictors and outcomes of patient safety culture: a cross-sectional comparative study

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ABSTRACT

Background Developing a safety culture in hospitals improves patient safety-related initiatives. Limited recent knowledge about patient safety culture (PSC) exists in the healthcare context.

Aims This study assessed nurses' reporting on the predictors and outcomes of PSC and the differences between the patient safety grades and the number of events reported across the components of PSC.

Methods A cross-sectional comparative research design was conducted. The Strengthening the Reporting of Observational Studies in Epidemiology (<https://www.strobe-statement.org/index.php?id=available-checklists>) guided the study. The researcher recruited a convenience sample of 300 registered nurses using the hospital survey on patient safety culture, with a response rate of 75%.

Results Nurses reported PSC to be 'moderate'. Areas of strength in PSC were non-punitive responses to errors and teamwork within units. Areas that needed improvements were the supervisor's/manager's expectations and actions in promoting safety and communication openness.

Some significant correlations were reported among PSC components. Significant differences in means were observed for patient safety grades in six out of the ten PSC components and one outcome item. Organisational learning/continuous improvement, hospital handoffs and transitions, years of experience in the current hospital, the supervisor's/manager's expectations and actions in promoting safety and gender predicted PSC. Of the outcomes, around half of the sample reported a 'very good' patient safety grade, and 'no events' or 'one to two events' only were reported, and nurses 'agreed' on the majority of items, which indicates a positive perception about the overall PSC in the hospitals. In addition, nurses 'most of the time' reported the events when they occurred. PSC components correlated significantly and moderately with PSC outcomes.

Conclusion and relevance to clinical practice PSC was moderate with an overall positive nurses' perceptions. PSC's strengths should be maintained, and areas of improvement should be prioritised and immediately tackled. Assessing PSC is the first step in improving hospitals' overall performance and quality of services, and improving patient safety practices is essential to improving PSC and clinical outcomes.

BACKGROUNDS

Patient safety culture (PSC) is a healthcare organisation's shared values, norms and beliefs that influence staff's behaviour and

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Although evidence is abundant on patient safety culture (PSC), recent international knowledge about PSC in healthcare settings is scanty.

WHAT THIS STUDY ADDS

⇒ This study is one of a few studies that tackle PSC predictors and outcomes together.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The results will help design interventions that initiate and sustain PSC in hospitals. These interventions include regular assessment and benchmarking of organisations. As most organisations are striving to be accredited, patient safety should be prioritised, managed and sustained, which, in turn, will result in many positive outcomes for the patients, nurses, and organisations.

actions. Patient safety begins with a safety culture.¹⁻⁵

Healthcare PSC studies are limited^{3,4,6-11}; few recent studies have addressed PSC in terms of predictors or outcomes, but not both.^{7,12-15}

Open communication, good information flow, shared perceptions of safety communication, organisational learning, top leadership commitment and non-punitive approaches to reporting incidents and errors are predictors of a positive PSC in healthcare organisations.^{5,16-18} Safety awareness, error reporting, gender and work experience also predict PSC.⁷ Staffing adequacy, hospital management support for patient safety, organisational learning/continuous improvement, job satisfaction and occupational factors predicted nurses' perceived patient safety.⁹

Purpose and significance of the study

PSC is key in nursing and healthcare. Unfortunately, despite abundant evidence on PSC,^{2,19-28} recent international knowledge about PSC in healthcare settings is scanty.^{1,4,6-14,29} There is limited recent evidence about the link between PSC predictors and outcomes,^{3,7} and it was the PSC

in the Arab world, but it was not about predictors and outcomes together.^{6 17 30–34} Taiwan conducted one post-COVID-19 PSC study. The COVID-19 group scored higher on working conditions in PSC. This improvement was more pronounced among managers and less pronounced among other hospital staff members post-COVID-19.⁸

Although a few published studies in Jordan were about safety³⁵ and PSC,^{36–39} none of these studies were about the predictors and outcomes of PSC. The current study is one of few in the Middle East^{3 5 7 16 30 34} that examines PSC predictors and outcomes together and is Jordan's first nursing study.^{22 24 32} Suliman surveyed Jordanian public hospitals using the hospital survey on patient safety culture (HSOPSC) to assess nurses' reporting of medication errors and patient falls, not the predictors and outcomes of PSC.³⁹ Nurses' perceptions of safety were studied in Jordan.³⁸ Safety culture dimensions got fewer positive responses than Agency for Healthcare Research and Quality (AHRQ) benchmarks.^{1 2} Current results will help design interventions to promote and sustain PSC in hospitals and support organisational safety culture.

This study examined predictors and outcomes of PSC. (1) What components (factors) of the hospital PSC in Jordan? (2) What areas of strength and areas require improvements in PSC in hospitals? (3) What are the relationships between the components of PSC in hospitals? (4) What are the differences between the patient safety grades and the number of events reported across the components of PSC? (5) What are the predictors of PSC in hospitals? (6) What are the outcomes of PSC in hospitals? (7) What are the relationships between the predictors and outcomes of patient safety in hospitals?

Patient safety begins with a PSC³¹; improved PSCs will improve care and patient outcomes, reducing medical errors and healthcare costs.¹⁴ Accurate PSC measurement requires specific culture components to improve patient safety in hospitals.

PSC across countries

Weak PSC contributes to adverse events; thus, a safety culture is essential.^{14 40} Most of the studies reviewed in their bibliometric analysis were conducted in organisational or healthcare settings. 'Safety Science' was the top safety culture journal.^{6 10 11 18 41–47} Information technology has improved patient safety in developed countries.⁴¹

In Sweden, HSOPSC was used to study PSC.² Its components with the highest scores were unit teamwork, open communication, the supervisor's/manager's expectations and actions in promoting safety, non-punitive responses to errors, and error feedback and communication.²⁹ In another study using the HSOPSC,² most hospitals in the Netherlands, the USA and Taiwan had high teamwork. All countries could improve handoffs and transitions. Americans were more optimistic about hospital safety than Dutch and Taiwanese respondents.²⁸ PSC was studied in four hospitals in Turkey using the Turkish version of HSOPSC.^{2 23} Teamwork and organisational learning/continuous improvement were the highest means. The

lowest means were non-punitive responses to errors and reporting frequency.²³ Healthcare systems across countries have different strengths and improvement areas.

Lebanon addressed PSC first among the Arab countries.^{5 16 17} Jordan has been a leader in quality assurance since 1992.^{48 49} Hospitals seeking international and national accreditation to promote safety efforts.³⁵ Jordan is new to PSC; the Health Care Accreditation Council was established in 2002 to build public and private human resources capacities in the accreditation process.^{48 49} We realised that it was the time to promote PSC and its initiatives, not just the accreditation process. A Jordanian study identified PSC from nurses' perspectives in primary healthcare centres using the Safety Attitudes Questionnaire; not in hospitals or using the HSOPSC.³⁷ The highest positive average response was for job satisfaction, while the lowest was for perceptions of management. In another Jordanian study, respondents rated unit teamwork most positively.³⁶ The supervisor's/manager's expectations and actions in promoting safety needed improvements, and overall safety perceptions were 42.0%.³⁶

A systematic review of PSC in the Arab countries found that non-punitive responses to errors need improvement.⁵⁰ It was good to see 'organisational learning/continuous improvement' and teamwork as areas of strength. Communication openness worried the Arab healthcare professionals.⁵⁰ Some PSC areas in Saudi Arabia (SA) have improved.^{16 31 34} However, non-punitive responses to errors and staffing were identified as needing change.^{16 30 34} The overall safety perceptions (38.7%), the supervisor's/manager's expectations and actions in promoting safety (32.9%), staffing (23.7%), hospital handoffs and transitions (19.6%) and non-punitive responses to errors (19.6%) were identified as PSC weaknesses in SA (15.8%),^{30–32 51} and all dimensions needed improvements.³⁰ PSC predictors included work hours and staff position.

Events were associated with open and honest communication, organisational learning/continuous improvement and cross-unit teamwork.¹⁸ Another study used the same questionnaire to compare worker and patient safety predictors.²⁴ Most patient safety dimensions were below the benchmark. Overall safety was low (46.0%), and 2/3 of staff reported an incident in the past year. Teamwork and organisational learning/continuous improvement had the highest PSC (72.0%), while staffing had the lowest (26.0%). Nurses scored higher than other healthcare professionals in patient safety.

PSC strengths include hospital management support for patient safety and organisational learning/continuous improvement. Teamwork across units, hospital handoffs, staffing and non-punitive responses to errors needed improvements.^{2 5 13 16 17 29 52} PSC components themselves were linked to outcomes.^{2 5 16 17 22}

Components (factors) of PSC

Attitudes, values, skills and behaviours to commit to patient safety management determine PSC in a health

Table 1 Characteristics of the sample and patient safety culture outcomes (N=300)

Characteristics	N*	%
Gender		
Male	116	38.8
Female	183	61.2
Age (years)		
<30	210	70.7
≥30 years	87	29.3
Marital status		
Single	159	53.2
Married	113	37.7
Divorced/separated	11	3.7
Widowed and others	16	5.4
Level of education		
Diploma level	41	14.1
Baccalaureate degree	232	79.7
Master's degree	18	6.2
Work area/unit where respondents spend most of their work time		
Wards	93	30.1
Units	122	40.6
Others	85	28.3
Experience in current hospital (years)		
<1 year	55	18.5
1–5 years	153	51.3
≥6 years	90	30.2
Experience in the current work area (years)		
<1 year	59	19.8
1–5 years	162	54.4
≥6 years	77	25.8
Number of years working in the current profession		
<1 year	50	16.7
1–5 years	159	53.0
≥6 years	91	30.3
Number of worked hours/week		
<40 hours	113	38.4
40–49 hours	149	50.7
≥50	33	10.9
The job involves direct contact with patients		
Yes	267	89.6
No	31	10.4
The overall mean of patient safety culture components was 3.40 (SD=0.36), and the overall mean of patient safety outcomes was 3.17 (SD=0.53).		
*Some totals did not equal 300 because of missing values.		

organisation.³¹ On the HSPSC, 1128 hospitals and 567 703 hospital staff were compared. The highest positive responses were on interunit teamwork (80.0%) and the supervisor's/manager's expectations and actions in promoting safety (75.0%), while the lowest positive responses were on non-punitive responses to errors (44.0%). Most respondents rated their work area or unit's patient safety as excellent (30%) or very good (45%), with no events in the past year.

The most important PSC components in a recent review were teamwork and organisational and behavioural learning.⁷ Safety awareness, staffing levels, gender and work experience were also important.² Azami-Aghdash *et al*¹⁹ reported that Iranian hospitals' overall safety score was 50.1%, indicating poor performance. Teamwork within hospital units scored highest (67.4%), while non-punitive responses to errors scored lowest (32.4%), consistent with AlReshidi *et al*.¹² In total, 41.0% of reviewers rated their hospitals' PSC performance as excellent/very good. In total, 53.0% of participants reported no adverse events in the past year.

In the Arab countries, SA was better than Lebanon on PSC teamwork across units, teamwork within units and the supervisor's/manager's expectations and actions in promoting safety and organisational learning. Other areas include organisational learning/continuous improvement, feedback, management support for patient safety, error communication, event reporting frequency, staffing, handoffs and transitions, and non-punitive responses to errors.^{5 12 16 17 31} SA did better on PSC components than Palestine, excluding staffing.^{31 33}

PSC predictors

Clinical factors and the presence of a contemporary control group are also factors.²⁵ Other predictors of PSC were communication, information between and across units, a shared vision of patient safety, a non-punitive approach to incident and error reporting, and management and leadership commitment. Age,⁶ work experience,^{7 16 23} baccalaureate degree and medical profession predicted PSC.¹⁶ Young, nurse or technical staff, day-night shift and long hospital experience predicted negative PSC perceptions.¹⁵ Using evidence-based practice, working in university-affiliated hospitals and prioritising patient safety predicted PSC in Jordanian hospitals.³⁵

The Arab PSC studies found that non-punitive error responses need improvements.⁵⁰ 'Organisational learning/continuous improvement' and 'unit teamwork' were satisfactory. Low communication openness worried the Arab healthcare professionals.⁵⁰ SA has made progress in some PSC areas.^{16 31 34} Non-punitive responses to errors and staffing were areas that required change.^{16 30 34} Overall safety perceptions (38.7%), the supervisor's/manager's expectations and actions in promoting safety (32.9%), staffing (23.7%), hospital handoffs and transitions (19.6%) and non-punitive error response (19.6%) were identified as PSC weaknesses in SA (15.8%).³⁰ Improvements were required in

**Table 2** Means, SD and distribution of components and responses of the hospital survey on the patient safety culture instrument (N=300)

Components and survey items	Mean (SD)	Negative responses	Neutral	Positive responses
		SD/D*	N	SA/A
		N (%)†	N (%)	N (%)
The supervisor's/manager's expectations and actions in promoting patient safety	2.93 (0.62)			
My supervisor/manager says a good word when they see a job done according to established patient safety procedures	3.27 (1.15)	75 (25.0)	74 (24.6)	151 (50.3)
My supervisor/manager seriously considers staff suggestions for improving patient safety	3.27 (1.16)	71 (23.6)	99 (33.0)	128 (42.6)
Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts (R)‡	2.97 (1.11)	115 (38.4)	75 (25.0)	109 (36.3)
My supervisor/manager overlooks patient safety problems that happen over and over (R)	2.27 (1.12)	200 (66.6)	54 (18.0)	45 (15.1)
Organisational learning/continuous improvement	3.66 (0.73)			
We are actively doing things to improve patient safety	3.94 (0.97)	27 (9.0)	43 (14.3)	229 (76.3)
The mistake has led to positive changes here	3.41 (1.16)	63 (21.0)	73 (24.3)	162 (54.0)
After we make changes to improve patient safety, we evaluate their effectiveness	3.60 (1.15)	49 (16.3)	66 (22.0)	182 (60.6)
Teamwork within units	3.89 (0.66)			
Staff support one another in this unit	3.97 (0.96)	29 (9.6)	15 (5.0)	256 (85.3)
When a lot of work needs to be done quickly, we work together as a team to get the work done	3.91 (0.92)	28 (9.3)	32 (10.7)	240 (80.0)
In this unit, people treat each other with respect	4.01 (0.84)	17 (5.6)	38 (12.6)	245 (81.6)
When members of this unit get really busy, other members of the same unit help out	3.53 (1.09)	55 (18.3)	55 (18.3)	190 (63.4)
Communication openness	3.08 (0.76)	Never/rarely	Sometimes	Mostly/always
Staff will freely speak up if they see something that may negatively affect patient care	3.33 (1.13)	67 (22.3)	98 (32.6)	135 (45.0)
Staff feel free to question the decisions or actions of those with more authority	3.01 (1.19)	100 (33.3)	99 (33.0)	101 (33.7)
Staff are afraid to ask questions when something does not feel right (R)	3.02 (1.18)	99 (33.0)	114 (38.0)	84 (28.0)
Feedback and communications about error	3.31 (0.87)	Never/rarely	Sometimes	Mostly/always
We are given feedback about changes put into place based on event reports	3.13 (1.42)	99 (33.0)	88 (29.3)	109 (36.3)
We are informed about errors that happen in this unit	3.50 (1.13)	61 (20.3)	80 (26.6)	159 (53.0)
In this unit, we discuss ways to prevent errors from happening again	3.22 (1.11)	77 (25.7)	100 (33.3)	123 (41.0)
Non-punitive response to the error	3.90 (0.87)			
The staff feel like their mistakes are held against them (R)	3.95 (1.06)	29 (9.6)	48 (16.0)	221 (73.7)
When an event is reported, it feels like the person is being written up, not the problem (R)	3.67 (1.27)	63 (21.0)	54 (18.0)	180 (60.0)
Staff worry that mistakes they make are kept in their personnel file (R)	4.15 (1.20)	27 (9.2)	32 (10.9)	228 (77.8)
Staffing	3.45 (10.88)			
We have enough staff to handle the workload	2.67 (1.32)	156 (52.1)	53 (17.7)	89 (29.8)
Staff in this unit work longer hours than is best for patient care (R)	3.70 (1.30)	58 (19.3)	61 (20.3)	177 (59.1)
We use agency/temporary staff that is best for patient care (R)	3.47 (2.53)	136 (45.3)	49 (16.3)	73 (24.3)
When the work is in 'crisis mode', we try to do too much, too quickly (R)	3.86 (1.08)	37 (12.3)	52 (17.3)	208 (69.5)
Hospital management support for patient safety	3.41 (0.70)			
Hospital management provides a work climate that promotes patient safety	3.52 (1.07)	59 (19.7)	53 (17.7)	187 (62.6)
The actions of hospital management show that patient safety is a top priority	3.62 (1.35)	58 (19.3)	56 (18.7)	182 (60.7)

Continued

Table 2 Continued

Components and survey items	Mean (SD)	Negative responses	Neutral	Positive responses
		SD/D* N (%)†	N (%)	SA/A N (%)
Hospital management seems interested in patient safety only after an adverse event happens (R)	3.10 (1.00)	118 (39.3)	49 (16.3)	130 (34.4)
Teamwork across hospital units	3.45 (0.68)			
There is good cooperation among hospital units that need to work together	3.62 (1.32)	56 (18.6)	66 (22.00)	171 (57.0)
Hospital units work well together to provide the best care for patients	3.65 (1.23)	48 (16.0)	75 (25.0)	171 (57.2)
Hospital units do not coordinate well with each other, and this might affect patient care (R)	3.07 (1.22)	106 (35.3)	73 (24.3)	120(40)
It is often not easy to work with staff from other hospital units (R)	3.43 (1.00)	72 (24.0)	52 (17.3)	173 (57.7)
Hospital handoffs and transitions	3.10 (1.01)			
Things 'fall between the cracks', that is, things might go uncontrolled and get lost (eg, medical records, medical treatment, patient information, and education, discharge criteria) when transferring patients from one unit to another (R)	3.00 (1.41)	122 (40.7)	74 (24.7)	99 (33.0)
Important patient care information is often lost during shift changes (R)	3.00 (1.50)	127 (42.4)	61 (20.4)	103 (34.3)
Problems often occur in the exchange of information across hospital units (R)	3.43 (1.27)	72 (24.0)	52 (17.3)	173 (57.7)
Shift changes are problematic for patients in this hospital (R)	2.98 (1.24)	119 (39.8)	63 (21.1)	116 (38.8)
The overall perception of safety	3.57 (0.68)			
It is just by chance that more serious mistakes do not happen around here (R)	3.28 (1.43)	93 (31.0)	69 (23.0)	132 (44.0)
Patient safety is never sacrificed to get more work done	4.10 (1.01)	21 (7.0)	37 (12.3)	240 (80.0)
We have patient safety problems in this unit (R)	3.32 (1.49)	96 (32.0)	66 (22.0)	129 (43.0)
Frequency of events reported	3.33 (1.14)	Never/rarely	Sometimes	Mostly/always
How often is this reported when a mistake is made but is caught and corrected, affecting the patient?	3.29 (1.31)	94 (31.3)	77 (25.6)	127 (42.3)
How often is this reported when a mistake is made but has no potential to harm the patient?	3.20 (1.33)	98 (32.6)	75 (25.0)	125 (41.6)
When a mistake is made that could harm the patient but does not, how often is this reported?	3.52 (1.22)	61 (20.3)	83 (27.6)	154 (51.3)

*%SD/D (combined strongly disagree and disagree), N (neutral), %SA/A (combined strongly agree and agree); otherwise, the scale label was listed above the variables.
 †Some totals did not equal 300 and in turn to 100% because of 'not applicable' or missing answer in some items.
 ‡Negatively worded items that were reverse coded.

all areas.³⁰ Working hours and staff position predicted PSC.³⁰

PSC and outcomes

PSC outcomes include staff's overall patient safety grade, willingness to report events, safety perceptions and the number of reported events.^{1 5 16 19 34 53 54} Patient outcomes correlate with safety culture.²⁶ Most studies focused on one hospital and period. Few studies found statistically significant correlations between PSC and nurse-sensitive patient outcomes.²¹ Studies linked hospital safety culture to mortality, complications, length of stay and readmissions.^{55–58}

METHODS

Design

A cross-sectional comparative study assessed PSC from Jordanian hospital nurses. The Strengthening the Reporting of Observational Studies in Epidemiology Statement Checklist of items⁵⁹ (see online supplemental file 1) guided the study. The HSOPSC² was used to collect the data. A descriptive study helps build baseline information regarding PSC.⁶⁰

Sampling and settings

The target population in the current study was all registered nurses (RNs) working in Jordanian hospitals in different settings. The accessible population included RNs who were working in the hospitals. Of 400 surveys

**Table 3** Correlations between patient safety culture components (N=300)

	Frequency of events reported (N=269)	The overall perceptions of safety (N=269)
	Pearson r	Pearson r
The supervisor's/manager's expectations and actions in promoting safety	0.183*	0.296*
Organisational learning/continuous improvement	0.301*	0.268*
Teamwork within hospital units	0.219*	0.076
Communication openness	0.173*	0.142†
Feedback and communication about errors	0.255*	0.091
Non-punitive response to errors	-0.113	0.133†
Staffing	0.063	0.189*
Hospital management support for patient safety	0.216*	0.063
Teamwork across hospital units	0.039	0.173*
Hospital handoffs and transitions	-0.102	0.272*

*Correlations are significant at the 0.01 level (two tailed).
†Correlations are significant at the 0.01 level (two tailed).

distributed, a convenience sample of 300 RNs was recruited from 2 governmental, 2 private and 2 teaching hospitals, with a response rate of 75.0%. The inclusion criteria included RNs with at least a 3-year diploma or 4-year baccalaureate with 1 year of experience. Exclusion criteria included practical nurses with diploma degrees because they have different job descriptions. Also, RNs with less than 1 year of experience were excluded to ensure that nurses were involved more in 'direct' patient care. According to Cohen's *s* power primer at a level of significant 0.05 and power 0.80, and linear regression test, the minimum sample size should be 107 participants.⁶¹

Data collection procedures

Preceded by a pilot study, the researcher collected the data over 2 months after obtaining the approval of the university's Institutional Review Board, where the author originally works. The consent form was granted by writing a statement in the invitation letter of the questionnaire as 'answering and returning your questionnaire is considered your consent form'. The anonymity of responses was assured by coding the questionnaires, and the confidentiality of nurses was maintained by sharing the overall results only with hospitals and nursing administrations.

The instrument: predictors and outcomes variables

The HSOPSC was used to collect data in the current study.² The HSOPSC consists of 42 items that measure 12 components of PSC. The survey measures 10 dimensions of culture about patient safety (independent variables): (1) the supervisor's/manager's expectations and actions in promoting patient safety; (2) organisational learning/continuous improvement. (3) teamwork within units; (4) communications openness; (5) feedback and communications about the error; (6) non-punitive response to errors; (7) staffing; (8) hospital management support for patient safety; (9) teamwork across hospital units;

(10) hospital handoffs and transitions. In addition, the HSOPSC measures four overall patient safety outcomes (dependent variables): (11) overall perceptions of safety and (12) frequency of events reported and their related items of the number of events reported; and the overall patient safety grade.

The overall reliability of the scale in the current study was 0.73. The low reliability of some items could refer to the nature of the healthcare system in Jordan. In addition, the sample was not big enough to locate the items on the variable and the diversity of responses.¹⁷

Demographic form

The sample's characteristics (independent variables) were gender, age, marital status, level of education, the area of work, experience in the current hospital and current areas of work as well as in the current profession, the number of worked hours/week, and whether involved in 'direct' patient care or not.

Statistical analyses

The Statistical Package for Social Sciences (SPSS) (V.25)⁶² was used to generate statistics at a significance level of 0.05. The demographics and the scores of the PSC dimensions were summarised using descriptive statistics. The HSOPSC includes positively and negatively worded items; thus, the negatively worded items were reverse scored. Frequency analyses were run to identify missing data (which were not replaced) and outliers. Items were scored using a five-point Likert scale reflecting the agreement rate on a five-point frequency scale (both including a neutral category). For each item, the mean score and the SD of the mean were calculated, and the percentage of responses of the items after collapsing the responses into three choices: disagree (1+2), neutral (3) and agree (4+5) and were presented using percentages.

Table 4 Comparison of means between patient safety grades and number of events reported with patient safety culture components scores (N=300)

	Patient safety grades			Events reported, n				
	Poor or failing	Acceptable	Excellent/ Very good	F, Sig*.	No event reports	1–5 event reports	>5 events reported	F, Sig*.
	Mean (SD)	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	Mean (SD)	
Supervisor's/manager's expectations and actions promoting safety	2.96 (0.72)	2.85 (0.64)	2.95 (0.60)	0.553, 0.576	2.96 (0.63)	2.92 (0.60)	2.79 (0.75)	0.617, 0.0540
Organisational learning—continuous improvement	3.63 (0.86)	3.42 (0.83)	3.73 (0.66)	3.61, 0.028 (c)	3.66 (0.77)	3.65 (0.69)	3.70 (0.70)	0.046, 0.955
Teamwork within hospital units	3.66 (0.82)	3.72 (0.67)	3.98 (0.60)	5.64, 0.004 (b)	3.86 (0.73)	3.88 (0.61)	4.08 (0.52)	0.831, 0.437
Communication openness	2.86 (0.84)	2.91 (0.78)	3.18 (0.73)	4.17, 0.016 (b)	3.04 (0.080)	3.19 (0.71)	2.70 (0.62)	3.50, 0.032 (a) (f)
Feedback and communication about errors	2.82 (0.82)	2.95 (0.77)	3.52 (0.82)	17.24, <0.001 (b, c)	3.23 (0.90)	3.43 (0.82)	3.17 (0.84)	1.93, 0.146
Non-punitive response to the error	4.06 (0.91)	3.95 (0.95)	3.85 (0.83)	0.963, 0.383	3.88 (0.74)	3.87 (0.97)	4.29 (0.91)	1.78, 0.170
Staffing	3.60 (1.15)	3.29 (0.93)	3.45 (0.79)	1.34, 0.263	3.44 (0.87)	3.41 (0.83)	3.79 (1.26)	1.39, 0.251
Hospital management support for patient safety	3.25 (0.80)	3.10 (0.66)	3.52 (0.66)	8.65, <0.001 (b, c)	3.44 (0.77)	3.37 (0.64)	3.41 (0.53)	0.336, 0.715
Teamwork across hospital units	3.55 (1.11)	3.40 (0.56)	3.44 (0.59)	0.611, 0.544	3.45 (0.69)	3.45 (0.69)	3.38 (0.58)	0.087, 0.916
Hospital handoffs and transitions	3.72 (0.97)	3.38 (0.86)	2.90 (0.99)	13.68, <0.001 (a>b)	2.96 (1.03)	3.22 (0.97)	3.23 (1.11)	2.24, 0.107

Patient safety grades: (a) The significant difference between 'poor or failing' and 'acceptable'. (b) The significant difference between 'poor or failing' and 'excellent/very good'. (c) The significant difference between 'acceptable' and 'excellent/very good'. (d) The significant difference between 'no events reported' and '1–5 events reported'. (e) The significant difference between 'no events reported' and '>5 events reported'. (f) The significant difference between '1–5 events reported' and '>5 events reported'.
*Tukey's post-test was performed, df=2.

The two components of frequency of events reported and overall perceptions of safety are two of the four PSC outcomes. The remaining two outcomes are the patient safety grade and the number of events reported. Pearson correlation examined the association between the frequency of events reported and overall perceptions of safety and the remaining 10 components at the bivariate level. An Analysis of Variance (ANOVA) *f* test with Tukey's post hoc test examined the differences between patient safety grades and the number of events reported across the 10 components.

Because the researcher has no idea which variable holds more weight in the regression model, the stepwise regression analysis was conducted to derive potential predictors of PSC.⁶⁰ The overall mean of PSC components and the outcomes were computed. The 10 components of PSC and the sample's demographics were considered independent variables, while the overall mean of the outcomes was considered the dependent variable.

RESULTS

Sample's demographics

Of 400 questionnaires, 300 eligible nurses were obtained using a response rate of 75.0%. The majority of nurses were females (183, 61.2%), aged less than 30 years (210, 70.7%), single (159, 53.2%), had a baccalaureate degree (232, 77.6%) and worked in units (122, 40.6%). They had 1–5 years of experience in the current hospital (153, 51.3%) and current area of work (162, 54.4%) as well as in the current profession (159, 53.0%), worked 40–49 hours/week (149, 50.7%) and were involved in direct patient care (267, 89.6%) (table 1). The overall mean of PSC components was 3.40 (SD=0.36), and the overall mean of patient safety outcomes was 3.17 (SD=0.53).

PSC components: determining areas of strength and areas requiring improvements according to PSC components

For the first and second research questions, areas of strength and others that required improvements were examined. The majority of items had negative responses. However, as evidenced through the PSC components, two

behaviours were closely related to patient safety: the non-punitive response to errors (mean=3.90, SD=0.87) and teamwork within units (mean=3.89, SD=0.66). Nurses were very positive about the non-punitive response to errors: the staff was not worried that mistakes they make are kept in their employees' files (228, 77.8% positive) or held against them (221, 73.7% positive), and when an event is reported, it feels like the problem is being written up, not the person (180, 60.0% positive). Nurses were very positive also about teamwork within units: staff support one another in the unit (256, 85.3% positive), people treat each other with respect (245, 81.6% positive), and when a lot of work needs to be performed quickly, they work together as a team to get the work done (240, 80.0% positive), and when members of the unit get busy, other members of the same unit help out (190, 63.4% positive) (table 2).

The areas that require improvements are to be read while considering the low positive percentage of responses. Areas that need improvements include dimensions of (1) the supervisor's/manager's expectations and actions in promoting patient safety (mean=2.93, SD=0.62); nurses reported that their supervisor/manager overlooks patient safety problems that happen repeatedly (45, 15.1% positive); whenever the supervisor/manager wants nurses to work faster, even if it means taking shortcuts, which builds up pressure (109, 36.3% positive), the supervisor/manager seriously considers staff suggestions for improving patient safety (128, 42.6% positive); and whenever supervisor/manager says good words when they see jobs done according to established patient safety procedures (151, 50.3% positive). (2) Communication openness (mean=3.08, SD=0.76); the staff reported that they freely speak up if they see something that may affect the patient care negatively (135, 45.0% positive). In addition, they reported that they feel free to question the decisions or actions of those with more authority (101, 33.7% positive) and are afraid to ask questions when something does not feel right (84, 28.0% positive). Additional areas of strength and those that require improvements are detailed in table 2.

Correlations between PSC components

For the third research question, correlation coefficients of the 10 components with the frequency of events reported and safety perceptions were presented in table 3. The strongest significant Pearson correlation was observed within the composite of frequency of events reported for organisational learning/continuous improvement ($r=0.301$). The weakest significant correlation was for communication openness ($r=0.173$). Interestingly, there is a weak correlation between the supervisor's/manager's expectations and actions in promoting patient safety and the reported frequency of events ($r=0.183$).

The strongest significant correlation was observed between the overall perceptions of safety and the supervisor's/manager's expectations and actions in promoting patient safety ($r=0.296$). The weakest significant

correlation was the non-punitive response to errors ($r=0.133$). It was interesting to observe a weak correlation between the overall perceptions of patient safety and communication openness ($r=0.142$) (table 3).

Comparisons of means between patient safety components and outcome variables

For the fourth research question, significantly different means for patient safety grades in six out of the ten PSC components were reported and presented in table 4. The highest means were observed for respondents who indicated excellent/very good patient safety grades except in hospital handoffs and transitions ($M=2.90$, $SD=0.99$) (with the highest means observed for respondents who indicated poor or failing ($M=3.72$, $SD=0.97$)). The outcome variable of the number of events reported was significantly associated only with communication openness ($F=3.50$, $df=2$, p value=0.032), with the highest means observed for respondents who reported one to five events ($M=3.19$, $SD=0.71$) (table 4).

Predictors of PSC

For the fifth research question, the results of the stepwise regression indicated that the organisational learning/continuous improvement, hospital handoffs and transitions, years of experience in the current hospital, supervisor's/manager's expectations and actions in promoting patient safety, and gender were predictors of PSC. These five predictors explained 18.5% of the variance of PSC ($F=14.60$, $df=1$; 294, p value ≤ 0.001).

Outcomes of PSC

The HSOPSC measures four overall patient safety outcomes: (1) the overall perceptions of safety, (2) the frequency of events reported, (3) the number of events reported and (4) the overall patient safety grade. For the sixth research question, approximately half of the nurses assigned their hospital a 'very good' patient safety grade (167, 55.8%) ($M=2.37$ (very good), $SD=0.93$). Approximately half of the nurses reported no events (149, 49.8%), approximately a third reported 1–2 events (76, 25.4%) ($M=1.95$ (1–2 events), $SD=1.24$). These items represent two of four patient safety outcomes, and the remaining two were the overall perceptions of safety ($M=3.57$ (agree), $SD=0.68$) and frequency of events reported ($M=3.33$ (most of the time), $SD=1.14$) (table 2).

Correlations of predictors and outcomes of PSC

For the seventh research question, the correlation between PSC's components' overall mean and outcomes' overall mean was significant and moderate ($r=0.374$) (p value=0.01). The highest correlations between the total score of PSC outcomes (dependent variable) and the 10 components of PSC and sample demographics (independent variables) were the organisational learning/continuous improvement ($r=0.338$) (p value=0.01), and the supervisor's/manager's expectations and actions in promoting safety ($r=0.270$) (p value=0.01).

DISCUSSION

PSC: areas of strength and areas of improvements

The sample's characteristics are consistent with Jordan's national nursing task force. On a 5-point Likert scale, the overall mean of PSC components was 3.40, and the overall mean of patient safety outcomes was 3.17. Both means indicate moderate nurses' perceptions of the PSC in Jordan, which is similar to that in the USA¹ and Ethiopia,²² yet is better than that of Al-Nawafleh *et al* in Jordan,³⁶ Alenezi *et al* in SA,³⁰ Azami-Aghdash *et al* in Iran,¹⁹ Ben Rejeb *et al* in Tunisia³² and Mekonnen *et al* in Ethiopia.²⁴ These results could be related to the accreditation initiatives in all hospitals in Jordan.

This study is the first published on assessing PSC predictors and outcomes in Jordan. Findings identified areas of strength (1) the non-punitive response to errors (consistent with Danielsson *et al*²⁹; inconsistent previous studies^{1 16 19 30 32 34 50}) and (2) teamwork within units (consistent with others^{1 2 7 16 24 29 30 36 53}). Teamwork is necessary for the effective coordination of multiple members of the team.^{7 24 50} In addition, the non-punitive response to the error is essential to early reporting and managing errors in a blame-free environment.¹⁸ By this, we use effective risk management in hospital settings.¹²

Areas that need improvements include (1) the supervisor's/manager's expectations and actions in promoting safety (consistent with some literature^{16 30 32 36 53} but inconsistent with others,^{1 2} and communication openness (consistent with previous studies^{16 18 30 32 50 53}). Thus, the supervisor/manager should be transformative and change agents and role models. Communication openness was the primary concern for PSC in the Arab countries⁵⁰; however, the PSC initiatives are still novel. Thus, the supervisor/manager should promote patient safety as a shared responsibility. The supervisors/managers should be visible and interact closely with their teams using open communication. Such communication should become a norm as it enhances the flow of information and organisational learning.^{5 16–18 52} Also, supervisors/managers should educate their staff; delegate to the team so they can identify and correct risks; provide adequate resources,^{20 32} and hire appropriate staffing to achieve patient safety.^{24 52} The PSC could be easily enforced by open communication, confidence in the efficacy of preventative measures, shared perceptions of the importance of safety, mutual trust^{52 53} and enough staffing.^{24 52}

Correlations between PSC components and outcomes

Significant correlations were found in the current study between the components of patient safety²² and outcomes.^{2 5 16 17} Higher scores on organisational learning/continuous improvement across units were reported in the present study, consistent with Galvão *et al*'s⁵³ findings. Components of patient safety were linked to the frequency of events reported and a higher likelihood of reporting a higher patient safety grade, which concurs with Ejajo *et al*'s results.²² In the current study, higher scores on the 'supervisor's/manager's

expectations and actions in promoting safety' (consistent with two studies^{1 53}) were linked to a greater likelihood of better perceptions of safety. However, these higher scores were still not related to reporting a patient safety grade. Consistent with the literature,^{12 17} while the higher scores in Lebanon were on 'teamwork across hospital units' and 'feedback and communication about the error', which is compatible with El-Jardali *et al*¹⁶ and Tear *et al*,¹⁸ and these were linked to the reported frequency of events, the current study reported higher scores on 'hospital handoffs and transitions'. These findings align with El-Jardali *et al*¹⁷ but contradict Wagner *et al*.²⁸ They found higher scores on 'hospital management support for patient safety', which were linked to a greater likelihood of better perceptions of safety and, most likely, a greater likelihood of reporting a higher patient safety grade (supported by El-Jardali *et al*¹⁶).

A weak correlation between the supervisor's/manager's expectations and actions in promoting safety and the frequency of events and a weak correlation between communication openness and overall perceptions of patient safety were reported in the present study. Those correlations pinpoint the need for supervisory safety communication practices as they play critical roles in shaping safety culture in hospital settings.^{1 18} However, this will not suddenly happen, nursing leaders should promote communication openness among the team.^{1 29 50}

Comparison of means between patient safety components and outcome variables

In the current study, six out of the ten PSC components in the present study were significantly different. The highest means were observed for respondents who indicated excellent/very good patient safety grades except in hospital handoffs and transitions. In comparison, El-Jardali *et al*¹⁶ reported that all the 10 components of PSC were different, with the highest mean scores reported for respondents who indicated excellent/very good patient safety grades.

Also, the highest means in the current study were found for respondents who indicated poor or failing. This mean score was consistent with their reporting the following in the composite itself: things might go uncontrolled and get lost when transferring patients from one unit to another, problems often happen during the exchange of information across and within hospital units, and shift changes are problematic for patients in this hospital, and important patient care information is often lost during shift changes. This result is consistent with AHRQ,¹ Top and Tekingündüz²⁷ and Wagner *et al*,²⁸ who reported handoffs and transitions as high potential areas for improvements.

The outcome of the number of events reported in the current study was significantly associated with communication openness, with the highest means observed for respondents reporting one to five events. On the other hand, El-Jardali *et al*¹⁶ reported the outcome of the number of events reported was significantly associated



with teamwork across hospital units, hospital management support for patient safety, feedback and communication about the error, hospital handoffs and transitions, and the highest means observed for respondents reporting one to five events. This result is consistent with current respondents' reporting of the non-punitive response to errors as the first-highest composite of PSC. Also, the current nurses reported that their mistakes were not held against them and that the report of any mistake was not kept in their files.

Predictors of PSC

Studies usually use demographics only as predictors; however, as the ten components are conducive to PSC, they were entered into the stepwise regression model. Results indicated that the organisational learning/continuous improvement (consistent with other studies^{7 27}), hospital handoffs and transitions (similar to El-Jardali *et al*^{16 23}) and years of experience in the current hospital (compatible with other studies^{7 16 23}), supervisor's/manager's expectations and actions in promoting safety (compatible with Top & Tekingündüz²⁷) and gender were predictors of PSC.⁷ Females with lengthier years of experience are expected to have better perceptions of PSC. Females are better in patient safety outcome variables of the overall perceptions of safety and frequency of events reporting.^{23 62} In addition, being a female with more years of experience at work may increase the awareness regarding safety practices undertaken in an institution.

Outcomes of PSC

A 'very good' patient safety grade and 'no events' or 'one to two events' were reported (similar to other studies^{1 19 24}). Moreover, nurses 'agreed' on the overall PSC and reported 'most of the time' the events that occurred (consistent with El-Jardali *et al*¹⁶), except that the frequency of events reported was slightly lower in the current study, similar to other research studies.^{1 24} Contrary to other research papers,^{19 24 30 32 36 53} the present findings revealed strengths in the safety culture at the Jordanian hospitals. However, reporting 'no events' or 'one to two events' in the current sample could identify the issue of under-reporting of errors,^{1 7 19 24 51} which is a common problem even in specialised units in developed countries.^{1 54}

Correlation of predictors and outcomes of PSC

The overall mean of components of PSC and the overall mean of PSC outcomes yielded a significant and moderate correlation ($r=0.374$) (similar to other studies^{16 17 22}). Also, the total score of PSC outcomes was correlated significantly and moderately with the organisational learning/continuous improvement and the supervisor's/manager's expectations and actions in promoting safety. For example, learning from mistakes led to positive outcomes (supported by El-Jardali *et al*^{16 17}). Also, supervisors/managers should consider their staff's suggestions

for improving patient safety, and they should not overlook patient safety problems.^{16 17}

STRENGTHS AND LIMITATIONS

This study offers baseline data about PSC in Jordan, mainly after significant work has been conducted on accreditation in almost all healthcare organisations. This study also validates the findings of previous studies. The study used the HSOPSC, the most commonly used tool to assess PSC in hospitals.

This study had a fair sample size; thus, results should be interpreted cautiously and without generalisation. The low Cronbach's alphas of the scale are of limitations; however, they are expected because of the items' diversity and the wide range of respondents,^{17 20} and the relatively fair sample. A Cronbach's alpha of 0.40 was reported in Turkey and 0.54 in Lebanon.^{17 20}

This study is cross-sectional; thus, longitudinal research is needed to determine the tangible improvements needed for creating and enduring positive safety culture and other clinical outcomes. Also, a comparative study based on types of hospitals and units vs wards may shed light on other different perspectives of PSC. Finally, there is a need to benchmark the hospitals in Jordan with similar ones in the region and the international ones.

PSC should be taught in the undergraduate and graduate, and continuing education courses.⁴³

RELEVANCE TO CLINICAL PRACTICE

Regular assessment of PSC is mandated by all healthcare organisations, especially the hospitals involved in accreditation programmes. Patient safety should be prioritised and linked closely to clinical outcomes.⁴⁴ Benchmarking the hospitals with similar ones, especially the international ones, will motivate all organisations to excel and achieve the best outcomes, particularly patient outcomes.

Areas of strength related to patient safety, especially the non-punitive work environments and teamwork within units, should be promoted and maintained. Areas that need improvements such as the supervisor's/manager's expectations and actions in promoting safety and communication openness should be targeted, overcome and transformed into opportunities. Organisational learning/continuous improvement initiatives and supervisor/manager actions promoting safety should be intensified and maintained.

Significant differences in PSC were reported; these differences point out other factors that hospitals and nursing leaders must consider when addressing patient safety in general and the PSC in particular, especially regarding the 'poor or failing hospital handoffs and transitions'. These are problematic issues that all professionals, not only nurses, should immediately intervene in.

SUMMARY AND CONCLUSION

PSC was moderate, as reported by nurses. Nurses ‘agree’ on most items related to their perceptions about the overall PSC, which indicates a positive perception. Moreover, they ‘most of the time’ reported the events or errors when they occurred. Areas of strength related to patient safety were the non-punitive response to errors and teamwork within units. Areas that needed improvements related to patient safety were the supervisor’s/manager’s expectations and actions in promoting safety and communication openness. Significant differences and predictors of PSC were reported.

Strengthening patient safety practices and culture is essential to improving hospitals’ overall performance and quality of services. Assessing PSC is the first step in identifying areas needed improvements; thus, practices that tackle safety should be prioritised to improve PSC and clinical outcomes.

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REFERENCES

- 1 Agency for Healthcare Research and Quality [AHRQ]. Quality and patient safety, 2019. Available: www.ahrq.gov/qual/patientsafetyculture/hospcult1.htm [Accessed 04 Dec 2021].
- 2 Agency for Healthcare Research and Quality [AHRQ]. Surveys on patient safety culture (SOPS) Hospital survey, 2004. Available: <https://www.ahrq.gov/sops/quality-patient-safety/patientsafetyculture/hospital/index.html> [Accessed 04 Dec 2021].
- 3 ALFadhlah T, Al Mudaf B, Alghanim HA, *et al*. Baseline assessment of patient safety culture in primary care centres in Kuwait: a national cross-sectional study. *BMC Health Serv Res* 2021;21:1172.
- 4 Carneiro AS, Dalmolin GdeL, Magnago TSBdeS, *et al*. Patient safety culture in critical and non-critical areas: a comparative study. *Rev Esc Enferm USP* 2021;55:e20210141.
- 5 El-Jardali F, Dimassi H, Jamal D, *et al*. Predictors and outcomes of patient safety culture in hospitals. *BMC Health Serv Res* 2011;11:45.
- 6 Antino M, Sanchez-Manzanares M, Ortega A. The hospital survey on patient safety culture in Mexican hospitals: assessment of psychometric properties. *Saf Sci* 2020;128:104706.
- 7 Azyabi A, Karwowski W, Davahli MR. Assessing patient safety culture in hospital settings. *Int J Environ Res Public Health* 2021;18:2466–66.
- 8 Chen HY, Lu L, Ko YM, *et al*. Post-pandemic patient safety culture: a case from a large metropolitan hospital group in Taiwan. *Int J Environ Res Public Health* 2021;18:4537.
- 9 Chirinos Muñoz MS, Orrego C, Montoya C, *et al*. Predictors of patient safety culture in hospitals in Venezuela: a cross-sectional study. *Medicine* 2021;100:e25316.
- 10 Noor Arzahan IS, Ismail Z, Yasin SM. Safety culture, safety climate, and safety performance in healthcare facilities: a systematic review. *Saf Sci* 2022;147:105624.
- 11 St.Pierre M, Grawe P, Bergstrom J, *et al*. 20 years after To Err Is Human: A bibliometric analysis of ‘the IOM report’s’ impact on research on patient safety. *Saf Sci* 2022;147:105593.
- 12 AlReshidi A, Farajat M, Ibrahim T, *et al*. Current status and predictors of patient safety culture in hospitals of Qassim region, Saudi Arabia. *Dr. Sulaiman Al Habib Medical Journal* 2020;2:76–82.
- 13 Lee SE, Dahinten VS. The enabling, enacting, and elaborating factors of safety culture associated with patient safety: a multilevel analysis. *Journal of Nursing Scholarship* 2020;52:544–52.
- 14 Lee SE, Quinn BL. Safety culture and patient safety outcomes in East Asia: a literature review. *West J Nurs Res* 2020;42:220–30.
- 15 Özcan TH, Kaya S, Teleş M. Evaluating patient safety culture at a private hospital. *Int J Healthc Manag* 2021;14:1161–70.
- 16 El-Jardali F, Sheikh F, Garcia NA, *et al*. Patient safety culture in a large teaching hospital in Riyadh: baseline assessment, comparative analysis and opportunities for improvement. *BMC Health Serv Res* 2014;14:122.
- 17 El-Jardali F, Jaafar M, Dimassi H, *et al*. The current state of patient safety culture in Lebanese hospitals: a study at baseline. *Int J Qual Health Care* 2010;22:386–95.
- 18 Tear MJ, Reader TW, Shorrock S, *et al*. Safety culture and power: interactions between perceptions of safety culture, organisational hierarchy, and national culture. *Saf Sci* 2020;121:550–61.
- 19 Azami-Aghdash S, Ebadifard Azar F, Rezapour A, *et al*. Patient safety culture in hospitals of Iran: a systematic review and meta-analysis. *Med J Islam Repub Iran* 2015;29:eCollection:251.
- 20 Bodur S, Filiz E. A survey on patient safety culture in primary healthcare services in turkey. *Int J Qual Health Care* 2009;21:348–55.
- 21 DiCuccio MH. The relationship between patient safety culture and patient outcomes: a systematic review. *J Patient Saf* 2015;11:135–42.
- 22 Ejajot, Arega A, Batebo B. Measuring the current patient safety culture in public general hospitals of southern nations Nationalities and peoples region (SNNPR), Ethiopia: perspective of health care workers. *J fam Med* 2017;4:1124.
- 23 ÜG G, Ö G, Sönmez MA. A survey of the patient safety culture of hospital nurses in turkey. *Collegian* 2016;23:225–32.
- 24 Mekonnen AB, McLachlan AJ, Brien J-anneE, *et al*. Hospital survey on patient safety culture in Ethiopian public hospitals: a cross-sectional study. *Saf Health* 2017;3:11.
- 25 Morello RT, Lowthian JA, Barker AL, *et al*. Strategies for improving patient safety culture in hospitals: a systematic review. *BMJ Qual Saf* 2013;22:11–18.
- 26 The Health Foundation. Does improving safety culture affect patient outcomes? 2011. Available: <https://www.health.org.uk/publications/does-improving-safety-culture-affect-patient-outcomes> [Accessed 04 Dec 2021].
- 27 Top M, Tekingündüz S. Patient safety culture in a Turkish public hospital: a study of nurses’ perceptions about patient safety. *Syst Pract Action Res* 2015;28:87–110.



- 28 Wagner C, Smits M, Sorra J, *et al.* Assessing patient safety culture in hospitals across countries. *Int J Qual Health Care* 2013;25:213–21.
- 29 Danielsson M, Nilsen P, Rutberg H, *et al.* A national study of patient safety culture in hospitals in Sweden. *J Patient Saf* 2019;15:328–33.
- 30 Alenezi A, Pandaan RPM, Almazan JU, *et al.* Clinical practitioners' perception of the dimensions of patient safety culture in a government hospital: A one-sample correlational survey. *J Clin Nurs* 2019;28:4496–503.
- 31 Alswat K, Abdalla RAM, Titi MA, *et al.* Improving patient safety culture in Saudi Arabia (2012–2015): Trending, improvement and benchmarking. *BMC Health Serv Res* 2017;17:516.
- 32 Ben Rejeb M, Chebil D, Merzougui L. Patient safety culture in a Tunisian teaching tertiary care hospital. *Archives of Nursing Practice and Care* 2017;3:077–83.
- 33 Hamdan M, Saleem Abed Alra'ooof. Assessment of patient safety culture in Palestinian public hospitals. *Int J Qual Health Care* 2013;25:167–75.
- 34 Hamadan M, Khraisat O, Eves C. Patient safety culture structures and outcomes: a sample from isolation units at Saudi Arabia. *Int J Nurs Sci* 2017;4:8–15.
- 35 AbuAIRub RF, Gharraibeh HF, Bashayreh AEI. The relationships between safety climate, teamwork, and intent to stay at work among Jordanian Hospital nurses. *Nurs Forum* 2012;47:65–75.
- 36 Al-Nawafleh A, Abu-Helalah MA, Hill V. Patient safety culture in Jordanian hospitals. *Health Sci J* 2016;10:5.
- 37 Khamaiseh A, Al-Twalbeh D, Al-Ajlouni K. Patient safety culture in Jordanian primary health-care centres as perceived by nurses: a cross-sectional study. *East Mediterr Health J* 2020;26:1242–50.
- 38 Suliman M, Aljezawi M, AlBashtawy M, *et al.* Exploring safety culture in Jordanian hospitals: a baseline study. *J Nurs Care Qual* 2017;32:E1–7.
- 39 Suliman M. Nurses' perceptions of patient safety culture in public hospitals in Jordan. Case Western Reserve University, 2015. Available: <https://etd.ohiolink.edu/> [Accessed 04 Dec 2021].
- 40 Han Y, Kim J-S, Seo Y. Cross-Sectional study on patient safety culture, patient safety competency, and adverse events. *West J Nurs Res* 2020;42:32–40.
- 41 Gluschkoff K, Kaihlanen A, Palojoki S, *et al.* Reporting of health information technology system-related patient safety incidents: the effects of organizational justice. *Saf Sci* 2021;144:105450.
- 42 Goncalves Filho AP, Waterson P. Maturity models and safety culture: a critical review. *Saf Sci* 2018;105:192–211.
- 43 Gong Y. Safety culture among Chinese undergraduates: a survey at a university. *Saf Sci* 2019;111:17–21.
- 44 Hu X, Casey T, Griffin M. You can have your cake and eat it too: embracing paradox of safety as source of progress in safety science. *Saf Sci* 2020;130:104824.
- 45 Kristianssen A-C, Andersson R, Belin Matts-Åke, *et al.* Swedish vision zero policies for safety – a comparative policy content analysis. *Saf Sci* 2018;103:260–9.
- 46 Li J, Goerlandt F, Reniers G. An overview of scientometric mapping for the safety science community: methods, tools, and framework. *Saf Sci* 2021;134:105093.
- 47 van Nunen K, Li J, Reniers G, *et al.* Bibliometric analysis of safety culture research. *Saf Sci* 2018;108:248–58.
- 48 World Health Organization [WHO]. Patient safety- global action on patient safety. Report by the director-general. Geneva Switzerland; 2019. https://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_26-en.pdf [Accessed 04 Dec 2021].
- 49 World Health Organization [WHO]. Patients for patient safety partnerships for safer health, 2013. Available: https://www.who.int/patientsafety/patients_for_patient/PFPS_brochure_2013.pdf?ua=1 [Accessed 04 Dec 2021].
- 50 Elmontsri M, Almashrafi A, Banarsee R, *et al.* Status of patient safety culture in Arab countries: a systematic review. *BMJ Open* 2017;7:e013487.
- 51 Aouicha W, Tili MA, Sahli J, *et al.* Exploring patient safety culture in emergency departments: a Tunisian perspective. *Int Emerg Nurs* 2021;54:100941.
- 52 Kuosmanen A, Tiihonen J, Repo-Tiihonen E, *et al.* Nurses' Views Highlight a Need for the Systematic Development of Patient Safety Culture in Forensic Psychiatry Nursing. *J Patient Saf* 2021;17:e228–33.
- 53 Galvão TF, Lopes MCC, Oliva CCC, *et al.* Patient safety culture in a university hospital. *Rev Lat Am Enfermagem* 2018;26:e3014.
- 54 Tili MA, Aouicha W, Sahli J, *et al.* A baseline assessment of patient safety culture and its associated factors from the perspective of critical care nurses: results from 10 hospitals. *Aust Crit Care* 2021;34:363–9.
- 55 Davenport DL, Henderson WG, Mosca CL, *et al.* Risk-Adjusted morbidity in teaching hospitals correlates with reported levels of communication and collaboration on surgical teams but not with scale measures of teamwork climate, safety climate, or working conditions. *J Am Coll Surg* 2007;205:778–84.
- 56 Haynes AB, Weiser TG, Berry WR, *et al.* Changes in safety attitude and relationship to decreased postoperative morbidity and mortality following implementation of a checklist-based surgical safety intervention. *Bmj-brit Med J* 2011;20:102–7.
- 57 Huang DT, Clermont G, Kong L, *et al.* Intensive care unit safety culture and outcomes: a US multicenter study. *International Journal for Quality in Health Care* 2010;22:151–61.
- 58 Hansen LO, Williams MV, Singer SJ. Perceptions of hospital safety climate and incidence of readmission. *Health Serv Res* 2011;46:596–616.
- 59 STROBE Group. STROBE Statement—Checklist of items that should be included in reports of cross-sectional studies, 2014. Available: <https://www.strobe-statement.org/index.php?id=available-checklists> [Accessed 08 Aug 2021].
- 60 Polit DF, Beck CT. *Nursing research: generating and assessing evidence for nursing practice*. 11th ed. Lippincott Williams and Wilkins, 2019.
- 61 Cohen J. A power primer. *Psychol Bull* 1992;112:155–9.
- 62 IBM Corp. IBM SPSS statistics for windows, version 25.0 2017.

<https://www.strobe-statement.org/index.php?id=available-checklists>

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Page		Item No	Recommendation
1-4	Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
	Introduction		
5-10	Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
5,6	Objectives	3	State specific objectives, including any prespecified hypotheses
	Methods		
10	Study design	4	Present key elements of study design early in the paper
11	Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
11	Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
11-12 and table 1	Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
11-13	Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
11 by the sampling technique and data collection steps and ethical consideration	Bias	9	Describe any efforts to address potential sources of bias
11	Study size	10	Explain how the study size was arrived at
11,12	Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
12,13	Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed
13: ANOVA			(d) If applicable, describe analytical methods taking account of sampling strategy
12			(e) Describe any sensitivity analyses
NA			
NA			
	Results		
11,13,14	Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
NA			
NA			
13-15	Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential

			confounders
Tables especially table 1			(b) Indicate number of participants with missing data for each variable of interest
Tables 1-4	Outcome data	15*	Report numbers of outcome events or summary measures
Tables 1-4	Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
NA			(b) Report category boundaries when continuous variables were categorized
NA			(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Tables 4	Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion			
13-21	Key results	18	Summarise key results with reference to study objectives
26-27	Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
22-26	Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
26-27	Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information			
NA	Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.