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Road towards promoting patient safety practices among hospital pharmacists
Hospital-based baseline patient safety culture assessment cross-sectional survey

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Abstract

Patient safety is a fundamental aspect of a healthcare system. The aim of this study was to assess the perception and determinants of the patient safety culture of pharmacists in hospitals, in Riyadh, Saudi Arabia.

A survey was conducted with pharmacists in the pharmacies of governmental, /military and private hospitals in Riyadh, Saudi Arabia. The pharmacy survey on patient safety culture questionnaire developed by Agency for Healthcare Research and Qualtity, a hard copy was distriuted to the pharmacists. The positive response rate (RR) was calculated and compared across hospitals using a chi-square test. The predictors of patient safety grades were identified using the generalized estimating equation. The data was analyzed using SAS.

A total of 538 questionnaires were distributed, of which 411 responded (RR 76.4%). Of the participants, 229 (56%) were females. The majority 255 (62%) were in the 18 to 34 years age range, and 361 (88%) had a bachelor's degree. The majority of the sample 376 (92%) was a pharmacist. The Positive RR (PRR) ranged between (25.6%–74%). The highest PRR was observed in teamwork (74.4%), followed by 'staff, training and skills' (68%), and 'organizational learning continuous improvement' (66%). The lowest PRR was observed in 'staffing, work pressure, and pace' (25.5%). Comparing the PPR of the various healthcare sectors, the governmental hospitals scored the highest in all patient safety domains. Generalized Estimating Equation analysis showed that with increase in scores of all patient safety culture domains increased the likelihood of reporting a better patient safety grade, whereas respondents' demographic characteristics had no effect except the working experience years 6 years and above had odds of poor reporting of the patient safety grade (odds ratio = 2.54, 95% confience interval (1.543, 4.194), (P = .0003).

The grades achieved in the various domains of patient safety culture by pharmacists in Riyadh are below the expected standard. The highest scores were achieved in teamwork, with the lowest scores in staffing, work pressure and pace. Overall, pharmacists in government hospital settings have a better perception of patient safety than their peers in other settings. These results provide the baseline evidence for developing future interventional studies aiming at improving patient safety culture in hospital pharmacy settings.

Abbreviations: HSOPSC = Hospital Survey on Patient Safety Culture, IOM = Institute of Medicine, ME = Medication Error, PRR = positive response rate, PSOPSC = Pharmacy Survey on Patient Safety Culture, RR = response rate, USA = United States of America.

Keywords: patient safety culture, pharmacy, Saudi Arabia

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1. Introduction

Patient safety is a fundamental aspect of a healthcare system. Patient safety was first highlighted during World Health Assembly in 2002.[1] Several definitions of patient safety have been published. According to the Institute of Medicine (IOM), patient safety is defined as "the prevention of harm to patients"[2] and the definition of the World Health Organization is "Patient safety is the absence of preventable harm to a patient during the process of healthcare and reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum."[1]

The Study Groups on Human Factors defined patient safety culture as "the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management."[3] The focus of patient safety activities is to prevent errors, and to learn from correcting errors, with the aim of building a safety culture among healthcare providers and patients.[2]

The patient safety culture of pharmacists is a fundamental aspect in improving patient safety care and preventing medication errors. A Medications Error is an event that can be prevented, for example preventing the inappropriate use of medicines or harm to the patient through the prescribing, dispensing, management or control of drugs.[4] Medication Error is the 8th leading cause of death in the United States of America (USA).[5,6] According to the 2006 IOM report, there are approximately 51.5 million errors per 3 billion prescriptions per year, which accounts 4 errors per 250 prescriptions per pharmacy per day.[7] In Saudi Arabia, several studies had reported medication errors in different context [8–14]. A study among in-patients had reported 7.1% (113/1580) prescribing errors.[15] In a primary care set up, the prescription error was reported among 990 (18.7%) out of 5299 prescription. [11]

In recent years, there has been a growing recognition within the healthcare to improve patient safety by making sufficient resources available for quality improvement and safety teams.[16] However, the implementation of patient safety improvement depends upon a positive patient safety culture.[17] According to the 2008, World Health Organization report, the key domains of a patient safety culture are open communication, and teamwork.[18] International accreditation organizations, such as the Joint Commission International mandates, regular assessment of patient safety culture environment in a healthcare organization.[19]

A recent systematic review conducted in 2017, concluded that there is an urgent need to promote a patient safety culture in Arab countries.[20] Most of the studies conducted in Arab countries from 2008 to 2018 assessed the patient safety culture [21–25] using the Hospital Survey on Patient Safety Culture (HSOPSC).[20,25,26] There is a growing recognition of the importance of establishing a culture of patient safety in pharmacies to improve patient safety and quality of care. Thus, the aim of this study was to assess the domains of a patient safety culture of pharmacists in different hospitals, to compare the patient safety domains of the different hospitals, to explore the association between the safety culture domains and a positive safety perception of pharmacists, and to identify the determinant factors of a positive safety culture in pharmacists in Riyadh, Saudi Arabia.

2. Material and methods

2.1. Study design, setting and participants

A cross-sectional study was conducted in pharmacies of different hospitals in Riyadh, Saudi Arabia during 2017. The pharmacies were selected from the government (including specialized clinics, academic/teaching hospitals), military and private hospitals. A pharmacy is defined as a single pharmacy site regardless of multiple locations.

The study participants were selected from the government, military and private hospitals pharmacies. Based on the Health Statistical Year Book for 2011 of the Ministry of Health, the total number of pharmacists in Riyadh was 1162, [27] which includes all pharmacists working at tertiary referral hospitals in inpatient or outpatient pharmacies. All the pharmacists working in day, evening and night shifts and designated as pharmacy managers, technicians, or clinical pharmacists were included in the study. The technicians and pharmacists not in active clinical practice were excluded.

Ethical approval was obtained from the Institutional Review Board of King Abdullah International Medical Research Center (RC/385/14). All participants were adequately informed of the aims, methods, and risks of the study as well as voluntary participation and confidentiality of the responses at the introduction of the survey. The responses were anonymous and participants' confidentiality was maintained.

2.2. Sample size and sampling technique

Cochran's (1977) formula for categorical data was used to estimate the sample size.[28] A total of 384 participants were required for the statistical analysis. A prior study exploring the patient safety culture, reported a response rate (RR) of 60%.[29] The sample was increased by 154 participants due to the expected 40% non-response rate, and the final estimated sample size was 538 participants. A proportional number of pharmacists were chosen from each pharmacy to ensure the required sample size.

A multi-stage sampling was used. The government (including specialized clinics, academic/teaching hospitals), military and private hospitals were selected using simple random sampling. A list of pharmacists was obtained from each pharmacy, and a random sampling of pharmacists was selected from each pharmacy.

2.3. Data collection instrument

The Pharmacy Survey on Patient Safety Culture (PSOPSC), developed by the Agency for Healthcare Research and Qualtity was used to assess the patient safety culture of the pharmacists.[30] The questionnaire include 36 items with 11 domains: communication about mistakes (items=3), communication about prescriptions across shifts (items=3), communication openness (items=3), organizational learning–continuous improvement (items=3), overall perceptions of patient safety (items=3), patient counseling (items=3), physical space and environment (items=3), response to mistakes (iems=4), staff training and skills (items=4), staffing, work pressure and pace (items=4), and teamwork (items=3). In addition to the domains, the questionnaire included 3 items exploring the frequency of documenting different types of mistakes, and 3 items about the participants' background characteristics, an overall rating question and a section for open-ended comment. Minor amendments to the 3 background questions were made, excluding pharmacy technicians and students from the pharmacy position question as per the exclusion criteria. Four questions were added to determine the gender, age, level of education and type of hospital. In total the questionnaire was composed of 48

items. Hard copy questionnaires were distributed in person. The questionnaires were collected back on the spot after completion. Questionnaires were excluded from the analysis if found to be completely blank or missing responses to PSOPSC.

2.4. Computing positive RR (PRR)

The item responses were re-coded using the user instruction guide published by the agency for healthcare research and qualtity[30] Responses (Strongly Disagree/Disagree or Never/Rarely) were re-coded as Negative, (Neither Agree nor Disagree or Sometimes) as Neutral, and (Strongly Agree/Agree) as Positive. Responses "Doesn't know or don't apply" were excluded from the survey items during analysis. The Positive RR (PRR) was calcualted as stipulated in the PSOPSC user guide. [30] Negatively worded items (C3, C8, B9 and B16) were reversed while computing the PRR. To estimate the *percent positive*, the count of percent positive per composite was divided by the total number of responses for that composite. *Composite items scores* were computed by the summation of the items within the composite divided by the total number of responses in that composite with non-missing values. The *Number of events* is the summation of documenting mistakes divided by the total number of responses.

2.5. Identifying areas of strength and areas requiring improvement

The PSOPSC domains were examined to determine areas of strength as well as the ones requiring improvement. When the PRR found below 50%, it has been considered as area requiring improvement.

2.6. Statistical analysis

Categorical variables, gender, age, educational level, position in pharmacy, job title, work experience in pharmacy, and working hours per week, were reported in frequency tables and percentages. A Chi-square/ fisher exact test was used to compare the results of the patient safety domains of the various hospitals. The results were considered significant at an alpha less than 0.05. The Cronbach alpha was used to estimate the internal consistency of the domains and a Pearson correlation was used to analyze the association between domains and overall patient safety/number of events reported. The association between covariates (age categories, gender, working hours, title, education, years of experience, and safety culture domains) and overall patient safety grade (poor, fair, good, very good, excellent) was estimated using the Generalized Estimating Equation with a cumulative logit function. Results are reported as odds ratio, 95%CI and corresponding *P*-values. Areas were considered to require an improvement for which the PRR scored less than 50%. Statistical analyses were done using SAS version 9.4 (SAS Institute, Cary, NC).

3. Results

3.1. Participants' characteristics and assessment outcomes

Of the 538 questionnaires distributed, 411 were completed (RR 76.4%). Just more than half of the participants 229 (56%) were females, and the majority 255 (62%) was in the 18–34 years age range. The highest proportion was pharmacists 376 (92%), and 361 (88%) had a bachelor degree. The majority of the participants 249 (60%) worked at an inpatient pharmacy, 155 (38%) reported 6 or more years working experience, and 260 (64%) worked duration more than 40 h/wk. The gender, age, level of education, job title, years of experience, and working hours per week were significantly different across the hospitals (Table 1).

The pharmacists' perception about patient safety culture in the pharmacy is displayed in Table 2. The PRR ranged from 25.6% to 74%. The highest PRR was observed in teamwork (74.4%), followed by 'staff, training and skills' (68%), and 'organizational learning continuous improvement' (66%). The domains 'physical space and environment', 'communication openness', and 'response to mistakes' scored 55%. The lowest PRR was observed in 'staffing, work pressure, and pace' (25.5%) (Table 2). The overall perception was assessed by 3 items. Half of the pharmacists reported that the pharmacy places more emphasis on sales than on patient safety (n=178, 50%), and the pharmacy is good in preventing mistakes (n=198, 54.4%). A strong focus on the patient safety was reported by 268 (72%), (Table 2). The proportions of reported documentation most of the time/always was 63% for the item 'when the mistake reaches the patient and could cause harm but does not' (Table 3).

3.2. Safety culture assessment in the different hospitals

There were statistically significant differences identified in the different hospitals' safety culture domains: overall perceptions of patient safety (C3 [*P*=.0003],C6 [*P*=.048],C9 [*P*=.003]), physical space and environment (A1 and A5 [*P*= <.0001], teamwork (A4 [*P*=.018], A9 [*P*=.004]), training and skills (A3 [*P*=.002], A6 [*P*=.01], A8 [*P*=<.0001], patient counselling (B2 [*P*=.003], B7 [*P*=.01], B11 [*P*=.008]), staffing, work pressure, and pace (B3 [*P*=.029], B9 [*P*=.003], B12 [*P*=.006], communication about prescription across shifts (B4 [*P*=.0004], B14 [*P*=.037], communication about mistakes (B8 [*P*=<.0001], B13 [*P*=.004], B15 [*P*=.001], response to mistakes (C7 [*P*=<.0001], and organizational learning–continuous improvement (C5 [*P* =.01],C10 [*P*=.008]) (Table 4).

3.3. Correlation between patient safety culture domains

All domains were significantly correlated with overall patient safety and the number of events reported with a varying degree of strength. A moderate correlation (r=0.498, *P*=<.0001) was observed for domain organizational learning-continuous improvement and number of events. Overall safety perception was moderately correlated with physical space and environment (r=0.425, *P*=<.0001), staff training and skills (r=0.465, *P*=<.0001), communication about prescription across shifts (r=0.464, *P*=<.0001), response to mistakes (r=0.423, *P*= <.0001) and organizational learning- continuous improvement (r=0.495, *P*=<.0001) (Table 5).

3.4. Predictors of patient safety grades

With increase in scores of all patient safety culture domains increased the likelihood of reporting a better patient safety grade (*P*=<.0001). Only 1 factor, 6 or more years working experience had odds of poor reporting of the patient safety grade (odds ratio=2.54, 95% confence interval (1.54, 4.19). The sample's gender, level of education, job title, and number of working hours per week were not the significant predictors of reporting better patient safety grades (Table 6).

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Table 1

Demographic and professional characteristics of the respondents (n=411).

Characteristics	Overall n (%) n = 63	Government Hospitals n (%) n = 289	Military Hospitals n (%) n = 59	Private Hospitals n (%) n = 411	P-value
Male	182 (44.3)	135 (46.71)	14 (23.73)	33 (52.38)	.002**
Female	229 (55.7)	154 (53.29)	45 (76.27)	30 (47.62)	
Age (yr)					
18 – 34	255 (62)	166 (57.44)	45 (76.27)	44 (69.84)	
35 – 44	135 (33)	106 (36.68)	13 (22.03)	16 (25.40)	.047*
45 and over	21 (5)	17 (5.88)	1 (1.69)	3 (4.76)	
Education level					
Bachelor's degree	361 (87.8)	242 (83.74)	56 (94.92)	63 (100)	
Master degree	46 (11.2)	43 (14.88)	3 (5.08)	0	.0005*
Doctorate degree	4 (0.97)	4 (1.38)	0	0	
Position in pharmacy					
Inpatient Pharmacy	249 (60.58)	186 (64.36)	30 (50.85)	33 (52.38)	
Outpatient Pharmacy	162 (39.41)	103 (35.64)	29 (49.15)	30 (47.62)	.055**
Job title					
Pharmacist manager	10 (2.4)	8 (2.77)	2 (3.39)	0	
Pharmacist	376 (91.5)	269 (93.08)	44 (74.58)	63 (100)	<.0001*
Pharmacy resident	14 (3.4)	12 (4.15)	2 (3.39)	0	
Clinical pharmacist	11 (2.7)	0	11 (18.64)	0	
Work experience in pharmacy					
< 3 yr	139 (33.8)	97 (33.56)	13 (22.03)	29 (46.03)	.0015**
3 to 6 yr	117 (28.5)	71 (24.57)	26 (44.07)	20 (31.75)	
6 years or more	155 (37.8)	121 (41.87)	20 (33.90)	14 (22.22)	
Working h per wk					
40 h or less /wk	151 (36.7)	97 (33.56)	30 (50.85)	24 (38.10)	.041**
More than 40 h /wk	260 (63.3)	192 (66.44)	29 (49.15)	39 (61.90)	

* P-value is based on fisher exact test.
** P-value is based on chi-square test.
Significant P-values are bold.

4. Discussion

The patient safety culture of pharmacists is a fundamental aspect of improving patient safety care. This is a large-scale study assessing the perception of pharmacists related to the patient safety culture in different hospitals in Saudi Arabia. The RR 76.4% was comparable to a study conducted in the Kaiser Permanente Colorado pharmacy department,[31] however, the RR was lower than as reported in studies conducted in Malaysia and Kuwait (93%-99%). [26,32] The tools used in patient safety climate assessment have considerable heterogeneity making the comparison between studies difficult.[33] For comparison, we have selected studies reporting results based on the PSOPSC.

The results of the current study indicated different PRR responses to the various safety domains. The overall PRR (59%) of the current study was lower than studies reported in China (71%), [34] Malaysia (67%), [32] USA (70.6%), [31] and Kuwait (83.8%).[26] The PRR varied in studies using the PSOPSC conducted from 2014 to 2018.[26,31,34] The range of the PRR in the current study was 25% to 74% compared to 50% to 80% reported in China [34] and 27.1% to 97.6% in Kuwait.[26] In the current study, teamwork had the highest PRR (74%), support for the results is found in a study conducted in Kuwait with the composite teamwork reported as the highest 96.8%.[26]

The importance of teamwork in safety culture is highlighted regardless of the tool used.[35,36] The literature indicates teamwork is frequently reported the highest, suggesting that teamwork is a universally accepted phenomenon in patient safety culture.[32,35,36] In contrast, the highest PRR domains reported in China was staff training and skills (88%),[31] and

patient counseling (94.5%) in the USA. [31] In the current study staffing, work pressure and pace had the lowest PRR (25%), similar results were reported in China (50%),[34] Malaysia (46.2%),[32] USA (44.7%),[31], and Kuwait (49.7%).[26] Low staffing and high workload has been reported as a common factor of medication dispensing errors.[15] A study has reported that medication error is more likely to occur with only 1 pharmacist on duty compared to 2 pharmacists.[37] A positive culture is associated with lower rates of adverse events.[38] This domain includes factors/items such as 'enough staff to handle the workload,' 'staff do not feel rushed,' 'staff can take breaks,' and 'work cannot be completed accurately due to distractions.'

In Saudi Arabia, these factors were influenced by the limited number of pharmacists. According to the Health Statistical Year Book for 2011 of the Ministry of Health, the ratio of pharmacists in Saudi Arabia is 0.66 pharmacists per 10,000 of the population (1 pharmacist for 14,958 people). However, in most countries belonging to the Organization for Economic Co-operation and Development (OECD), the rate of pharmacists is between 6 to 10 pharmacists per 10,000 of the population (1 pharmacist for 1,316 people),[39] supporting the statement that lack of staff may have an effect on patient safety.

The domains that scored a PRR less than (50%) are considered areas that require improvement.[40]

Patient counselling domain improves patient's medication adherence, and is considered as a foundation of pharmacy practice.[41] In the current study the PRR (59%) for the patient counselling domain was low compared to a study reported in the

Table 2

Distribution of positive response rate (PRR) for survey items and composites across all pharmacists.

Patient Safety Culture Dimensions	Responses n	PRR n (%)
Overall Perceptions of Patient Safety (Cronbach α=0.054)		59.13
C3.This pharmacy places more emphasis on sales than on patient safety.	352	178 (50.57)
C6.This pharmacy is good in preventing mistakes.	364	198 (54.40)
C9.The way we do things in this pharmacy reflects a strong focus on patient safety.	370	268 (72.43)
Physical Space and Environment (Cronbach α=0.454)		55.72
A1.This pharmacy is well organized.	390	268 (68.72)
A5.This pharmacy is free of clutter.	356	169 (47.47)
A7.The physical layout of this pharmacy supports good workflow.	357	182 (50.98)
Teamwork (Cronbach α=0.491)		74.42
A2.Staff treat each other with respect.	389	314 (80.72)
A4.Staff in this pharmacy clearly understand their roles and responsibilities.	375	262 (69.87)
A9.Staff work together as an effective team.	372	248 (66.67)
Staff Training and Skills (Cronbach α=0.560)		68.1
A3.Technicians in this pharmacy receive the training they need to do their jobs.	381	294 (77.17)
A6.Staff in this pharmacy have the skills they need to do their jobs well.	389	273 (70.18)
A8.Staff who are new to this pharmacy receive adequate orientation.	383	235 (61.36)
A10.Staff get enough training from this pharmacy.	386	246 (63.73)
Communication Openness (Cronbach α=0.375)		55.14
B1.Staff ideas and suggestions are valued in this pharmacy.	339	92 (27.14)
B5.Staff feel comfortable asking questions when they are unsure about something.	387	288 (74.42)
B10.It is easy for staff to speak up to their supervisor/manager about patient safety concerns in this pharmacy.	368	235 (63.86)
Patient Counseling (Cronbach α=0.674)		59.31
B2.We encourage patients to talk to pharmacists about their medications.	346	202 (58.38)
B7.Our pharmacists spend enough time talking to patients about how to use their medications.	346	185 (53.47)
B11.Our pharmacists tell patients important information about their new prescriptions.	354	234 (66.10)
Staffing, Work Pressure, and Pace (Cronbach α=0.278)		25.55
B3.Staff take adequate breaks during their shifts.		65.05
B9.We feel rushed when processing prescriptions	361	28 (7.76)
B12.We have enough staff to handle the workload	353	77 (21.81)
B16.Interruptions/distractions in this pharmacy (from phone calls, faxes, customers, etc.) make it difficult for staff to work accurately.	382	29 (7.59)
Communication about Prescriptions across Shifts (Cronbach α=0.605)		62.77
B4.We have clear expectations about exchanging important prescription information across shifts.	354	229 (64.69)
B6.We have standard procedures for communicating prescription information across shifts.	358	231 (64.53)
B14.The status of problematic prescriptions is well communicated across shifts.	353	209 (59.21)
Communication about Mistakes (Cronbach α=0.612)		62.39
B8.Staff in this pharmacy discuss mistakes.	364	226 (62.09)
B13.When patient safety issues occur in this pharmacy, staff discuss them.	369	210 (56.91)
B15.In this pharmacy, we talk about ways to prevent mistakes from happening again.	377	257 (68.17)
Response to Mistakes (Cronbach α=0.405)		54.2
C1.Staff are treated fairly when they make mistakes	354	207 (58.47)
C4.This pharmacy helps staff learn from their mistakes rather than punishing them	378	244 (64.55)
C7.We look at staff actions and the way we do things to understand why mistakes happen in this pharmacy	378	251 (66.40)
C8.Staff feel like their mistakes are held against them	354	97 (27.40)
Organizational Learning–Continuous Improvement (Cronbach α=0.451)		66.24
C2.When a mistake happens, we try to figure out what problems in the work process led to the mistake.	376	267 (71.01)
C5.When the same mistake keeps happening, we change the way we do things.	364	236 (64.84)
C10.Mistakes have led to positive changes in this pharmacy	369	232 (62.87)

Table 3

Distribution of events reported by the pharmacists (n=411).

In this pharmacy, how often are the following types of mistakes documented?	Never/Rarely n (%)	Sometimes n (%)	Most of the times/always n (%)
D1.When a mistake reaches the patient and could cause harm but does not, how often it is documented?	47 (12.98)	84 (23.20)	231 (63.81)
D2. When a mistake reaches the patient but has no potential to harm the patient, how often is it documented?	63 (17.55)	87 (24.23)	209 (58.22)
D3. When a mistake that could have harmed the patient is corrected BEFORE the medication leaves the pharmacy, how often is it documented?	122 (34.46)	79 (22.32)	153 (43.22)

Table 4

Comparison of safety culture dimensions items' positive responses across hospitals.

Patient Safety Culture Dimensions	Government Hospitals % PRR	Military Hospitals % PRR	Private Hospitals % PRR	P-value
Overall Perceptions of Patient Safety				
C3.This pharmacy places more emphasis on sales than on patient safety.	132 (74.16)	14 (7.87)	32 (17.98)	.0003*
C6.This pharmacy is good in preventing mistakes.	148 (74.75)	24 (12.12)	26 (13.13)	.048**
C9.The way we do things in this pharmacy reflects a strong focus on patient safety.	192 (71.64)	35 (13.06)	41 (15.30)	.003**
Physical Space and Environment				
A1.This pharmacy is well organized.	205 (76.49)	33 (12.31)	30 (11.19)	<.0001**
A5.This pharmacy is free of clutter.	133 (52.16)	28 (47.46)	8 (19.05)	<.0001**
A7.The physical layout of this pharmacy supports good workflow.	130 (71.43)	28 (15.38)	24 (13.19)	.125**
Teamwork				
A2.Staff treat each other with respect.	227 (72.29)	42 (13.38)	45 (14.33)	.465**
A4. Staff in this pharmacy clearly understand their roles and responsibilities.	198 (75.57)	37 (14.12)	27 (10.31)	.018**
A9. Staff work together as an effective team.	190 (76.61)	35 (14.11)	23 (9.27)	.004**
Staff Training and Skills				
A3.Technicians in this pharmacy receive the training they need to do their jobs.	202 (68.71)	36 (12.24)	56 (19.05)	.002**
A6.Staff in this pharmacy have the skills they need to do their jobs well.	198 (72.53)	34 (12.45)	41 (15.02)	.01**
A8.Staff who are new to this pharmacy receive adequate orientation.	159 (67.66)	27 (11.49)	49 (20.85)	<.0001**
A10.Staff get enough training from this pharmacy.	179 (72.76)	28 (11.38)	39 (15.85)	.057
Communication Openness				
B1.Staff ideas and suggestions are valued in this pharmacy.	71 (77.17)	18 (19.57)	3 (3.26)	.003**
B5.Staff feel comfortable asking questions when they are unsure about something.	203 (70.49)	40 (13.89)	45 (15.63)	.584*
B10.It is easy for staff to speak up to their supervisor/manager about patient safety concerns in this pharmacy.	177 (75.32)	29 (12.34)	29 (12.34)	.064**
Patient Counseling				
B2.We encourage patients to talk to pharmacists about their medications.	139 (68.81)	24 (11.88)	39 (19.31)	.003**
B7.Our pharmacists spend enough time talking to patients about how to use their medications.	128 (69.19)	22 (11.89)	35 (18.92)	.01**
B11.Our pharmacists tell patients important information about their new prescriptions	172 (73.50)	27 (11.54)	35 (14.96)	.008*
Staffing, Work Pressure, and Pace				
B3.Staff take adequate breaks during their shifts	177 (73.14)	31 (12.81)	34 (14.05)	.029**
B9.We feel rushed when processing prescriptions	14 (50)	3 (10.71)	11 (39.29)	.003*
B12.We have enough staff to handle the workload	45 (58.44)	20 (25.97)	12 (15.58)	.006**
B16.Interruptions/distractions in this pharmacy (from phone calls, faxes, customers, etc.) make it difficult for staff to work accurately.	21 (72.41)	2 (6.90)	6 (20.69)	.129*
Communication about Prescriptions Across Shifts				
B4.We have clear expectations about exchanging important prescription information across shifts.	177 (77.29)	29 (12.66)	23 (10.04)	.0004**
B6.We have standard procedures for communicating prescription information across shifts.	166 (71.86)	33 (14.29)	32 (13.85)	.081*
B14.The status of problematic prescriptions is well communicated across shifts.	155 (74.16)	27 (12.92)	27 (12.92)	.037*
Communication about Mistakes				
B8.Staff in this pharmacy discuss mistakes.	205 (76.49)	33 (12.31)	30 (11.19)	<.0001**
B13.When patient safety issues occur in this pharmacy, staff discuss them.	161 (76.67)	24 (11.43)	25 (11.90)	.004**
B15.In this pharmacy, we talk about ways to prevent mistakes from happening again.	195 (75.88)	27 (10.51)	35 (13.62)	.001**
Response to Mistakes				
C1.Staff are treated fairly when they make mistakes	149 (71.98)	34 (16.43)	24 (11.59)	.056**
C4.This pharmacy helps staff learn from their mistakes rather than punishing them	177 (72.54)	33 (13.52)	34 (13.93)	.568**
C7.We look at staff actions and the way we do things to understand why mistakes happen in this pharmacy	194 (77.29)	33 (13.15)	24 (9.56)	<.0001**
Staff feel like their mistakes are held against them	77 (79.38)	8 (8.25)	12 (12.37)	.137**
Organizational Learning–Continuous Improvement				
C2.When a mistake happens, we try to figure out what problems in the work process led to the mistake.	189 (70.79)	43 (16.10)	35 (13.11)	.496**
C5.When the same mistake keeps happening, we change the way we do things.	175 (74.15)	31 (13.14)	30 (12.71)	.01**
C10.Mistakes have led to positive changes in this pharmacy	179 (77.16)	26 (11.21)	27 (11.64)	.008**

P-values are based on.

* fisher exact test.

** chi-square test.

Significant P-values are bold.

USA (94.5%).[31] The low PRR in patient counselling domain is of concern.

In the current study, just more than half of the sample (53%) indicated that they spent enough time counselling patients in terms of using their medication. The study showed the importance of training (68%) for pharmacists, and the majority (77%) indicated that they receive the training they required. A possible explanation may be the availability of the Saudi Commission for Health Specialties training (131) programs in Riyadh. According to the Statistic Reports of continuing medical education and Program Accreditation, more than 72 continuing medical education courses are available for pharmacists.[42]

Leadership is a key element for teams to function positively.[43] A study conducted in 2006, reported the administrative leader as

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Table 5

Correlation between safety culture composites.

Patient Safety Culture Dimensions	Number of Events Reported Pearson r	Overall Perception of Safety Pearson r
Physical Space and Environment	0.245*	0.425*
Teamwork	0.198*	0.307*
Staff Training and Skills	0.393*	0.465*
Communication Openness	0.260*	0.393*
Patient Counseling	0.300*	0.406*
Staffing, Work Pressure, and Pace	0.105*	0.176*
Communication about Prescriptions Across Shifts	0.362*	0.464*
Communication about Mistakes	0.396*	0.449*
Response to Mistakes	0.387*	0.423*
Organizational Learning–Continuous Improvement	0.498*	0.495*

* Correlation is significant at the <0.05 level (2-tailed).

Table 6

Predictors of patient safety grades.

*Patient Safety Culture Dimensions	OR (95% CI)	P-value
Physical space and environment	0.191 (0.138–0.263)	<.0001
Teamwork	0.575 (0.445–0.743)	<.0001
Training and skills	0.248 (0.174–0.355)	<.0001
Communication openness	0.183 (0.126–0.266)	<.0001
Patient counselling	0.224 (0.156–0.323)	<.0001
Staffing, work pressure and pace	0.403 (0.255–0.637)	.0001
Communication about prescriptions across shifts	0.237 (0.166–0.339)	<.0001
Communication about mistakes	0.312 (0.222–0.437)	<.0001
Response to mistakes	0.308 (0.206–0.461)	<.0001
Organizational learning-continuous improvement	0.227 (0.155–0.332)	<.0001
Overall perception of patient safety	0.165 (0.110–0.245)	<.0001
Gender		
Female	1.114 (0.774–1.603)	.559
Male	1	–
Age		
18–34 yr	2.075 (0.882–4.881)	.094
35–44 yr	0.699 (0.299–1.631)	.408
45 years and above	1	–
Working experience duration		
Less than 3 yr	1	–
3 yr to less than 6 yr	1.439 (0.883–2.345)	.143
6 yr and above	2.544 (1.543–4.194)	.0003
Number of hours per wk		
Less than 40	1	–
More than 40	0.761 (0.524–1.104)	.151
Job title		
Pharmacist	0.705 (0.221–2.241)	.553
Pharmacy resident	0.500 (0.108–2.314)	.375
Pharmacy manager	1	–
Level of Education		
Bachelor degree	0.677 (0.133–3.448)	.638
Master degree	0.704 (0.128–3.868))	.686
Doctorate degree	1	–

Patient safety grades; (i) poor (ii) fair, (iii) good, (iv) very good (v) excellent.
The model is based on Generalized Estimating Equation with a cumulative logit function.
* The patient safety culture dimensions' GEE P-value is adjusted for confounders.

a key promoter of a safety culture in an organization.[44] The current study indicates that the pharmacist fulfils a leadership role in terms of the pharmacists' understanding of their roles and responsibilities and treating each other with respect. A review, has reported only patient safety studies conducted in the Arab world using, HSOPSC. HSOPSC, stated that the patient safety culture in Arab countries must be changed from a blame culture.[20] Leadership should encourage a culture of reporting errors to able to learn from such errors.[45] According to the IOM report, a 'blame culture' must be substituted to an improvement culture by removing errors.[46]

The current study demonstrated that the PRR vary significantly in different hospitals with the government hospitals scoring the highest grades. The reason may be that government hospitals implemenetd Health Information Technology using medication barcodes to reduce adverse drug events, ensuring the correct medication and dose are dispensed, and decreasing the rate of all potential adverse drug events by (63%).[47] Pharmacists in military hospitals should promote the value of discussing errors with staff, and develop interventions to provide consistent instructions in terms of communication concerns. A prior study showed that there was significant difference in patient safety culture according to types of hospitals showing patient safety culture in public hospitals is much better than in private hospitals in the developing county context.[48]

In the current study, all domains of the patient safety culture were predictors of an increased patient safety grade similar to what was reported earlier. However, the tool used (HSOPSC) was different than the tools in the current study.[24]

4.1. Limitations

Our study has some limitations. The survey did not take into account the participants' personal experience of medication adverse events, and its relation to the safety culture environment perception. Though participants did not report any concern about filling the survey, however, they might have faced the difficulty in survey responses.

5. Conclusion

Patient safety culture is a multifaceted phenomenon. Our results indicate that the grades achieved for the domains of the patient safety culture by pharmacists in Riyadh are below the expected

standard. The highest grades were scored for teamwork, and the lowest for staffing, work pressure and pace. Overall, pharmacists in government hospital settings have a more positive perception of patient safety than their peers in other settings. Gender did not influence the perception of patient safety. The results highlighted areas of improvement to improve the overall patient safety culture in pharmacies.

The study findings on patient safety culture from pharmacists' perceptive would provide empirical evidence to inform policymakers and hospitals managers in developing evidence-based policy and quality improvement initiatives aiming at improving quality and safety related to medication errors. This would require involving pharmacists as well as related stakeholders in promoting the patient safety culture in hospitals that would empower the safety of the working environment and avoid blame culture.

Healthcare systems have defined safety culture and developed models to improve the deficiencies in the process. Further research is needed to identify interventions required for improving patient safety culture in the pharmacy.

Author contributions

KA: designed the study, reviewed results, and the manuscript. AMA: drafted study proposal, data acquisition, and reviewed the manuscript. AB: designed the study, reviewed results, and the manuscript. NAS: conducted the statistical analysis, reviewed the results, developed results tables and drafted the manuscript. All authors have read and approved the final manuscript.

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