Road towards promoting patient safety practices among hospital pharmacists

Hospital-based baseline patient safety culture assessment cross-sectional survey

Khaled Al-Surimi, PhD, Ali Mohammed Alwabel, MSc, Amen Bawazir, PhD, Naila A. Shaheen, MD

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 Quality, a hard copy was distributed 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% confidence interval (1.543, 4.194), \( P = 0.0003 \).

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
1. Introduction

Patient safety is a fundamental aspect of a healthcare system. Patient safety was first highlighted during World Health Assembly in 2002. 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” 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.”

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.” 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.

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. Medication Error is the 8th leading cause of death in the United States of America (USA). According to the 2006 IOM report, there are approximately 1.5 million errors per 3 billion prescriptions per year, which accounts for 4 errors per 250 prescriptions per pharmacy per day. In Saudi Arabia, several studies have reported medication errors in different context. A study among in-patients had reported 7.1% (113/1580) prescribing errors. In a primary care set up, the prescription error was reported among 990 (18.7%) out of 5299 prescription. 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. However, the implementation of patient safety improvement depends upon a positive patient safety culture. According to the 2008, World Health Organization report, the key domains of a patient safety culture are open communication, and teamwork. International accreditation organizations, such as the Joint Commission International mandates, regular assessment of patient safety culture environment in a healthcare organization.

A recent systematic review conducted in 2017, concluded that there is an urgent need to promote a patient safety culture in Arab countries. Most of the studies conducted in Arab countries from 2008 to 2017 assessed the patient safety culture using the Hospital Survey on Patient Safety Culture (HSOPSC). 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, 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 formula for categorical data was used to estimate the sample size. A total of 384 participants were required for the statistical analysis. A priori study exploring the patient safety culture, reported a response rate (RR) of 60%. 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 Quality was used to assess the patient safety culture of the pharmacists. 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 (items = 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 quality.[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 calculated 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 40h/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 23.6% 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% confidence 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).
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 culture 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 responses to the various safety domains. The overall PRR (59%) for the patient counseling domain was low compared to a study reported in the USA.[31] The patient counseling 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 counseling domain was low compared to a study reported in the

| Characteristics | Overall | Government Hospitals | Military Hospitals | Private Hospitals |
|-----------------|---------|----------------------|--------------------|------------------|
| Male            | 182 (44.3) | 135 (46.7) | 14 (23.73) | 33 (52.38) |
| Female          | 229 (55.7) | 154 (53.29) | 45 (76.27) | 30 (47.62) |
| Age (yr)        |         |                     |                   |                  |
| 18 – 34         | 255 (62) | 166 (67.44) | 45 (76.27) | 44 (69.84) |
| 35 – 44         | 135 (33) | 106 (36.68) | 13 (22.03) | 16 (25.40) |
| 45 and over     | 21 (5) | 17 (5.88) | 1 (1.69) | 3 (4.78) |
| 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 |
| Doctorate degree | 4 (0.97) | 4 (1.38) |                  | 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) |
| 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) |
| 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) |
| 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 |         |                     |                   |                  |
| 40h or less /wk | 151 (36.7) | 97 (33.56) | 30 (50.85) | 24 (38.10) |
| More than 40h /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.

Table 1

Demographic and professional characteristics of the respondents (n = 411).
Table 2
Distribution of positive response rate (PRR) for survey items and composites across all pharmacists.

| Patient Safety Culture Dimensions | Responses | PRR n (%) |
|----------------------------------|-----------|-----------|
| Overall Perceptions of Patient Safety (Cronbach $\alpha=0.054$) | 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 $\alpha=0.454$) | 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. | 357 192 (50.98) |
| Teamwork (Cronbach $\alpha=0.491$) | 74.42 |
| A2. Staff treat each other with respect. | 389 314 (80.72) |
| A4. Staff in this pharmacy clearly understand their roles and responsibilities. | 389 273 (70.18) |
| A9. Staff who are new to this pharmacy receive adequate orientation. | 383 235 (61.36) |
| Staff Training and Skills (Cronbach $\alpha=0.560$) | 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 $\alpha=0.375$) | 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 Counselling (Cronbach $\alpha=0.674$) | 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 $\alpha=0.278$) | 25.55 |
| B3. Staff take adequate breaks during their shifts. | 361 28 (7.76) |
| B9. We feel rushed when processing prescriptions | 353 77 (21.81) |
| B12. We have enough staff to handle the workload. | 382 29 (7.59) |
| B16. Interruptions/distractions in this pharmacy (from phone calls, faxes, customers, etc.) make it difficult for staff to work accurately. | 354 229 (64.60) |
| Communication about Prescriptions across Shifts (Cronbach $\alpha=0.606$) | 62.77 |
| B4. We have clear expectations about exchanging important prescription information across shifts. | 358 231 (64.53) |
| B6. We have standard procedures for communicating prescription information across shifts. | 353 209 (59.21) |
| Communication about Mistakes (Cronbach $\alpha=0.612$) | 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. | 377 265 (68.77) |
| Response to Mistakes (Cronbach $\alpha=0.405$) | 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 $\alpha=0.451$) | 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 is it 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) |
A study conducted in 2006, reported the administrative leader as USA (94.5%). 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.

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

### 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) | .003** |
| 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) | 26 (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 (13.43) | .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 (12.46) | 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) | 26 (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) | 29 (39.77) | 12 (15.83) | .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** |
| B12. 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 (72.53) | 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 (8.56) | <.0001** |
| Staff feel like their mistakes are held against them | 77 (79.38) | 8 (8.29) | 12 (12.73) | .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%). The low PRR in patient counselling domain is of concern.
a key promoter of a safety culture in an organization. The current study indicates that the pharmacist fulfills 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. Leadership should encourage a culture of reporting errors to be able to learn from such errors. According to the IOM report, a ‘blame culture’ must be substituted to an improvement culture by removing errors.

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 implemented 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%). 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.

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.

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 team work, 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’ perspective would provide empirical evidence to inform policy-makers 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.

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### Table 5
Correlation between safety culture composites.

| Patient Safety 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 Counselling                       | 0.300*                             | 0.406*                                |
| Staffing, Work Pressure, and Pace         | 0.105*                             | 0.176*                                |
| Communication about Prescriptions         | 0.362*                             | 0.464*                                |
| Across Shifts                             |                                    |                                       |
| Communication about Mistakes              | 0.396*                             | 0.449*                                |
| Response to Mistakes                      | 0.387*                             | 0.423*                                |
| Organizational Learning-Continuous Improvement | 0.408*                           | 0.405*                                |

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

### Table 6
Predictors of patient safety grades.

| Patient Safety 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 (0.150–0.332) | <.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 –

* The patient safety culture dimensions’ GEE P-value is adjusted for confounders.
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.

Conceptualization: Khaled Al-Surimi, Ali Mohammed Alwabel.
Methodology: Khaled Al-Surimi, Ali Mohammed Alwabel, Amen Bawazir.
Project administration: Ali Mohammed Alwabel, Amen Bawazir.

Resources: Khaled Al-Surimi.
Supervision: Khaled Al-Surimi, Amen Bawazir.

Writing – original draft: Naila Shaheen.
Writing – review and editing: Khaled Al-Surimi, Naila Shaheen.

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