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Patient safety culture in a tertiary care hospital in Makkah, Saudi Arabia, a cross-sectional study

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Abstract

Background Patient safety remains an area of global concern, and patient safety culture among healthcare staff is one of its most important determinants. Saudi Arabia is investing much effort in enhancing patient safety. Assessment of patient safety culture is enlightening about the impact of such efforts and invaluable in informing policy makers about future directions. This study aimed to assess patient safety culture in King Abdullah Medical City (KAMC), a tertiary referral center in Makkah, Saudi Arabia.

Methods In this cross-sectional study the Hospital Survey on Patient Safety Culture (HSOPSC) version 2.0 was distributed electronically to all staff of KAMC. The HSOPSC version 2.0 Data Entry and Analysis Tool was used to compare results obtained from KAMC to those obtained from global data. Additional analyses were performed on SPSS to explore the presence of associations between responses and participant characteristics.

Results A total of 350 participants completed the questionnaire, 58.6% of whom were nurses. A comparison of the composite measure of all 10 domains of the HSOPSC showed 62% positive responses at KAMC versus 70% in the global database. This difference was statistically significant, with a chi-square of 10.64 and a p value of 0.001. The percentages of positive responses from the KAMC data exceeded those from the global data in the “Organizational learning and continuous improvement” and the “Communication about error” domains ($p=0.002$ and 0.003 , respectively).

Conclusion Although safety culture seems to score lower at KAMC than globally, accelerated improvement in the future is expected based on improvement trends in the literature and the national efforts focused on patient safety.

Keywords Patient safety, Hospital Survey on Patient Safety Culture, HSOPSC, Error reporting, Healthcare teamwork, Makkah, Saudi Arabia

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Introduction

“To Err is Human: Building a Safer Health System” was the title of a review published in 2000 by the Institute of Medicine (US) Committee on Quality of Health Care in America (QHCA) [1]. In the following twenty years and more, relentless efforts were made by the US and several global authorities to contain medical errors through evolving approaches [2, 3]. However, the most recent report from the WHO (World Health Organization) showed that “approximately 1 in every 10 patients is harmed in healthcare and more than 3 million deaths occur annually due to unsafe care” [4].

The perception of patient safety by healthcare workers, as a core concept and an aim in healthcare service delivery, is central to the actual improvement of patient safety [5–7]. Positive and strong patient safety cultures are known to have a significant impact on patient safety in terms of reducing the number of adverse events reported in a healthcare organization [8].

Previous literature points to variability in patient safety culture globally, even within geographically related regions. A study by Granel-Giménez et al., in 2022, showed differences in patient safety culture among countries in Europe [9]. In another study by Kang et al., in 2021, heterogeneity of patient safety culture was reported among South Asian countries [10]. Some studies have shown variability among different hospitals even in the same country. This variability also characterizes patient safety culture in the Arab countries as shown in a systematic review by Elmontsri et al., with a potential for improvement that can reflect on healthcare [11]. An organizational and multidisciplinary approach is essential for making a change [12]. Improvement requires understanding the status of each country and region, including details of patient safety culture domains [13]. Saudi Arabia has been investing greatly in improving healthcare quality in general and patient safety in particular [14]. Several studies have focused on patient safety culture in different regions of Saudi Arabia, yet little work has been done in the Makkah region, an area with its own peculiarity and diversity, being the site of Muslim pilgrimage. It is thus such an important unmet need to assess the status of patient safety culture on the ground in such a region that has great national as well as international importance, being a hub for visitors from all over the globe. Because health-related needs of those visitors might arise during their visits, the topic of patient safety culture in Makkah hospitals qualifies as one of international and not just national interest.

Methods

Study aim

The aim of this study was to assess patient safety culture in a tertiary care center representative of Makkah hospitals, King Abdullah Medical City (KAMC), and to present the analysis in comparison to the global data from the database of the Agency of Healthcare Research and Quality (AHRQ).

Study design and study population

This was a cross-sectional study that used the Hospital Survey on Patient Safety Culture (HSOPSC) version 2.0 [15]. The survey was distributed at KAMC from July to October, 2023. All healthcare professionals working during the survey period were invited to participate, without exclusions.

Survey on patient safety culture

The HSOPSC version 2.0 was used. The HSOPSC is a 40-item survey with 12 composites, or dimensions, for measuring perceptions about patient safety culture [16]:

- Thirty-two survey items, grouped into 10 composite measures that are groupings of two or more survey items that assess the same areas of patient safety culture.
- Eight single-item measures:
 - One survey item asking how many patient safety events the respondent has reported
 - One survey item asking respondents to provide an overall rating of patient safety for their unit/work area
 - Six survey items on respondent background characteristics (staff position, unit/work) area, hospital tenure, unit/work area tenure, work hours, interaction with patients)

Most of the survey items use 5-point agreement scales (“Strongly disagree” to “Strongly agree”) or frequency scales (“Never” to “Always”) and include a “Does not apply or Don’t know” response option.

The survey was administered in the English language with no translation or adaptation. Some staff positions and units/work areas had different names from those listed in the original survey. For example, the term “Licensed Vocational Nurse” is not used at KAMC and so this option was not used in the survey. Modifications were made so that the names could better match the names and titles used within the surveyed hospital; these modifications are acceptable according to the

AHRQ Hospital Survey on Patient Safety Culture Version 2.0: User's Guide [17].

Sample size determination

The sample size was estimated according to the guidelines set by the AHRQ [16]. The sample size was based on three assumptions: simple random sampling, the assumed response rate, and a confidence interval of $\pm 5\%$. At KAMC, with 594 health care providers, a minimum of 250 responses would be needed. Assuming a response rate of 30%, based on previous experience in similar settings, it was necessary to invite all healthcare workers in the hospital and use reminders until the minimum number of needed responses was reached.

Data management and statistical analysis

The questionnaire items were entered on a Google Form. The survey link was distributed through the professional emails of all the KAMC staff. To maximize responses, hard copies of the questionnaire were also distributed by the researchers who cautioned the respondents not to take it if they had answered electronically. The SOPS Hospital Survey 2.0 Data Entry and Analysis Tool was obtained from the AHRQ and was used to create tables and graphs. The data were also extracted by The Statistical Package for Social Sciences (SPSS, IBM Inc., Version 21.0) for further analysis. Recoding: Responses to negative statements were recoded as follows: 1=5, 2=4, 4=2, and 5=1. The responses coded as "4" or "5" (Strongly agree OR Agree for a positive statement and Disagree and Strongly disagree for a negative statement) were grouped together and represented the total positive response to that item. The percentage of positive responses for each item was calculated as the percentage of valid responses: $[(\text{Total positive responses} \times 100) / \text{Total valid (non-missing) responses}]$. The score for each composite measure was calculated as the arithmetic mean of the individual percentages of positive responses for the items in that composite measure. For comparison of percentages of positive responses among hospital or healthcare job categories, the chi-square (X^2) test was used. For each patient safety domain, the average of the Likert scale responses was determined by summing the responses and dividing them by the number of questions within each domain. Then, the average scores were summed to determine the overall patient safety culture score. This ensured that all domains would have equal weights regardless of the number of questions each one contained. Further analyses on item and composite measure medians or mean values of actual Likert responses were carried out for exploratory purposes. For such purposes, data were recoded to compare the following responses: clinical versus nonclinical staff, those with management

positions versus others, nurses versus all other respondents, those with five or fewer years of work experience versus those with more than five years of experience and those who work 40 h or less per week versus those who work more than 40 h per week. Such comparisons were made by using the independent "t test" for normally distributed data and by the Mann–Whitney U test for data that were not normally distributed. All comparisons were made at a 2-sided alpha value of 0.05.

Ethics approval and consent to participate

- This study adheres to the Declaration of Helsinki. Ethical approval for this study was obtained from the Institutional Review Board (IRB) of King Abdullah Medical City, Makkah; IRB number: 23-1126 KReSP. KAMC IRB is registered at the National BioMedical Ethics Committee, King Abdulaziz City for Science and Technology on 14-07-1433 (Registration no. H-02-K-001) and is following the GCP-ICH regulations (OHRP Registration no. IORG0011096).
- Confidentiality: The survey was made confidential and not anonymous, so it was possible to link the responses to the respondent's email. This approach was used to avoid duplication of responses and to provide more validity. To respect confidentiality, the survey database was anonymized after deduplication of responses and before transfer to the data analyst.
- Consent: A signed consent was not required in this study because the actual participation by the invitee was considered as an implied consent to participate. This was explained in the study protocol and was accepted by the IRB, based on the "Regulations of the Law of Ethics of Research on Living creatures" published by the Saudi National Committee of Biomedical Ethics. The regulations allow waiving of the documentation of informed consent if it reveals the research participant identity [18].

Results

Description of participant characteristics

A total of 350 participants completed the questionnaire and almost all the responses were valid. Because the questionnaire was distributed to all hospital staff (594 members) this constituted a response rate of 59%. At the time of conducting the comparative analysis with the global data from the AHRQ, 186,615 responses were available in the AHRQ database. These responses were compared with those obtained from the KAMC staff. Table 1 shows the characteristics of the KAMC study participants in terms of specialty. A total of 205 nurses from different ranks and specialties completed the questionnaire. These nurses constituted 58.6% of the total sample, while nurses

Table 1 Respondent characteristics

Participant description	N	%
Nursing Advanced Practice Nurse (NP, CRNA, CNC CNM)	38	10.9
Patient Care Aide, Hospital Aid, Nursing Assistant	9	2.6
Registered Nurse (RN)	158	45.1
Medical Physician Assistant	0	0.0
Resident, Intern	17	4.9
Physician, Attending, Hospitalist	52	14.9
Other Clinical Position Dietitian	0	0.0
Pharmacist, Pharmacy Technician	2	0.6
Physical, Occupational, or Speech Therapist	5	1.4
Psychologist	0	0.0
Respiratory Therapist	18	5.1
Social Worker	2	0.6
Technologist, Technician (EKG, Lab, Radiology)	26	7.4
Department Managers/Supervisor, Manager, Department Manager		
Senior Leaders Clinical Leader, Administrator, Director	5	1.4
Senior Leader, Executive, C-Suite	1	0.3
Support Facilities	2	0.6
Food Services	0	0.0
Other	15	4.3

in global data constituted 44.3%, and that difference was statistically significant ($X^2 = 28.87, p < 0.001$). With regard to the working area, 128 (36.6%) of the KAMC sample worked directly with patients. This difference was also statistically significant compared to the global data, in which 27.7% of the participants worked directly with patients ($X^2 = 15.16, p < 0.001$).

Comparisons of the total score of each patient safety domain

Figure 1 shows a comparison of the 10 domains of patient safety culture between the KAMC data and the global data, as well as a comparison of the overall composite of those domains. The percentages of positive responses obtained from the global data were greater than those from the KAMC data for all but three patient safety domains. In descending order, the differences in the percentages of positive responses were greatest for “Staffing and work pace”, “Reporting patient safety events” and “Supervisor, leader support”, with differences ranging between 14 and 17%. The largest difference of 17% was noted in the domain of “staffing and work pace”. Positive responses in the “Teamwork”, “Communication”, “Hands-off and information exchange”, and “Response to error” domains were in the range of 7% to 9% higher for

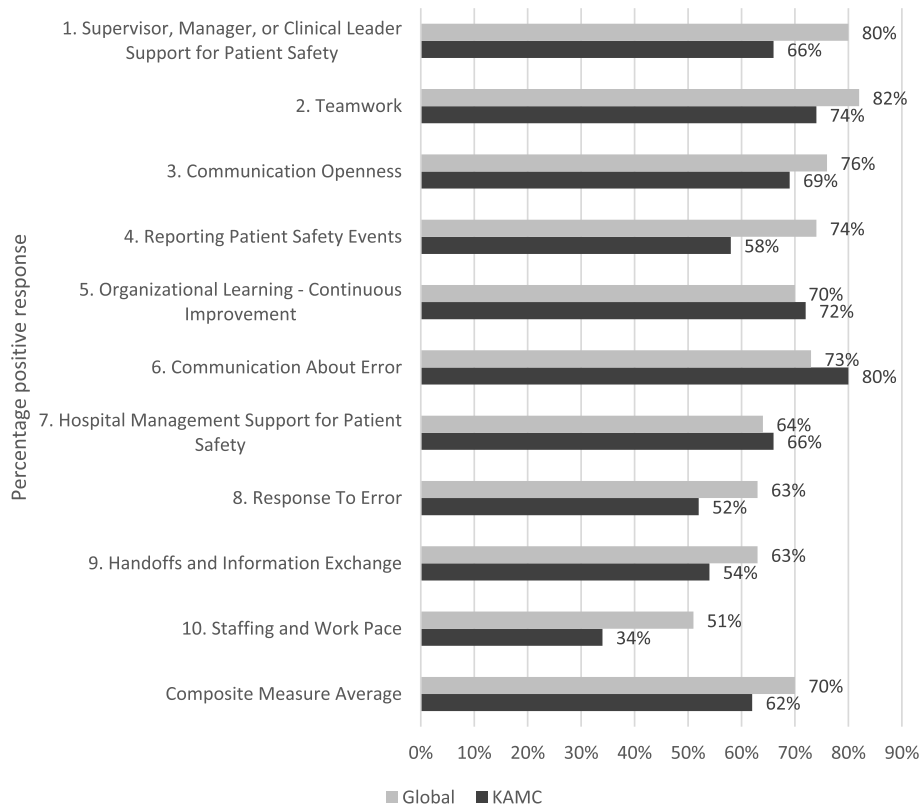


Fig. 1 Comparative results for patient safety culture composite measures

global data. The percentages of positive responses from the KAMC data exceeded those from the global data in the domains of “Organizational learning and continuous improvement”, “Communication about error”, and “Hospital management support for patient safety”. The difference in the latter domain was slight (2%) and was not statistically significant, but the differences in the other two domains were significant, with p values of 0.002 and 0.003 for the first and second domains, respectively. A comparison of the composite measures of all 10 domains revealed 62% positive responses at KAMC versus 70% in the global database. This difference was statistically significant, with a chi-square of 10.64 and a p value of 0.001.

Comparison of individual items within patient safety culture domains

Figure 2 (a to j) shows a comparison of individual items within each of the ten patient safety culture domains. Within the “Supervisor support” domain, the greatest difference between the databases was noted in the item concerning “Work in busy times and making shortcuts”. Within the “Teamwork” domain, the greatest difference was found in the item relating to “Disrespectful behavior by those working in the unit”. The difference in the “Communication openness” domain appears to be driven by “Staff fearing to ask questions”, while in the case of the “Reporting patient safety” domain, a greater difference is noted in “Reporting mistakes that reach patients without causing harm”. In the “Continuous learning” domain, KAMC exceeded global percentages of positive responses in areas pertaining to error review and evaluation, while in the case of “Communication about error”, KAMC exceeded global positive responses for all items. “Hospital management support” did well at KAMC on two out of three items. This was contrary to the case of “Response to error”, for which three out of four items had lower positive responses at KAMC. The “Hand-off and information exchange” domain points to more hand-over communication problems at KAMC. Additionally, KAMC respondents scored worse than the global responders on all items related to work pace and staffing.

Number of reported events and overall patient safety rating

Figure 3 shows the comparison between the KAMC and the global database regarding the number of reported events on the Likert scale. To simplify the statistical comparison, the responses on the Likert scale were grouped into two categories (no reporting and any number of reports). At KAMC those responding “none” were 196 (56.5%), and 102,638 out of 188,481 (54.5%) in the global data gave the same answer. This difference was not

statistically significant, with a chi-square of 0.57 and a p value of 0.448.

Figure 4 shows a comparison of the Likert scale results for the participants’ ratings of their unit work area on “patient safety”. Visual comparison shows a fairly comparable distribution of ratings in the two databases. Formal statistical comparison was performed by grouping “Excellent” and “Very good” responses in a single category and the other three in another. At KAMC, 252 (72%) reported patient safety to be excellent or very good. In the global database, 123,166 out of 184,749 (66.7%) reported that patient safety in their work area was excellent or very good. This difference was statistically significant, with a chi-square of 4.47 and a p value of 0.034.

Comparison of responses among groups of respondents at KAMC

Most comparisons of composite domain averages did not reveal significant differences except for the average score for “hospital management”, which was significantly greater for nonmanagers than for managers (mean \pm SD of 3.5 ± 0.6 and 3.3 ± 0.6 , respectively, $p = 0.045$). Additionally, clinical workers scored significantly higher than non-clinicians on the same composite domain (mean \pm SD of 3.5 ± 0.6 and 3.2 ± 0.5 , respectively, $p = 0.001$).

Discussion

To our knowledge, this is the first study comparing responses from a large tertiary center in Makkah on the internationally recognized HSOPSC questionnaire, to those from global data in the US QHCA database. A number of previous studies, however, have attempted to assess patient safety culture in other regions and settings in Saudi Arabia. Examples include a study performed in 2022, by Alrasheadi et. al. to explore patient safety culture using the HSOPSC questionnaire among nurses in medical and surgical wards in four hospitals in Qassim [19]. Before that, in 2010, Alahmadi had published an evaluation of patient safety culture based on the HSOPSC questionnaire distributed in sixteen hospitals in Riyadh [20].

With slightly fewer than 190,000 responses in the global database, along with an adequate local sample of 350 from KAMC, this study had enough power to compare the KAMC data to the global data on individual patient safety domains. This provided a chance to pinpoint areas where the greatest efforts should be put for improvements and areas that can provide an optimistic view. Although the overall patient safety culture rating at KAMC was significantly lower than that obtained from the US QHCA, a closer look at the results obtained from the present research can provide a positive and promising image. The analysis of the current study showed that KAMC, in fact, performed better on the “Organizational

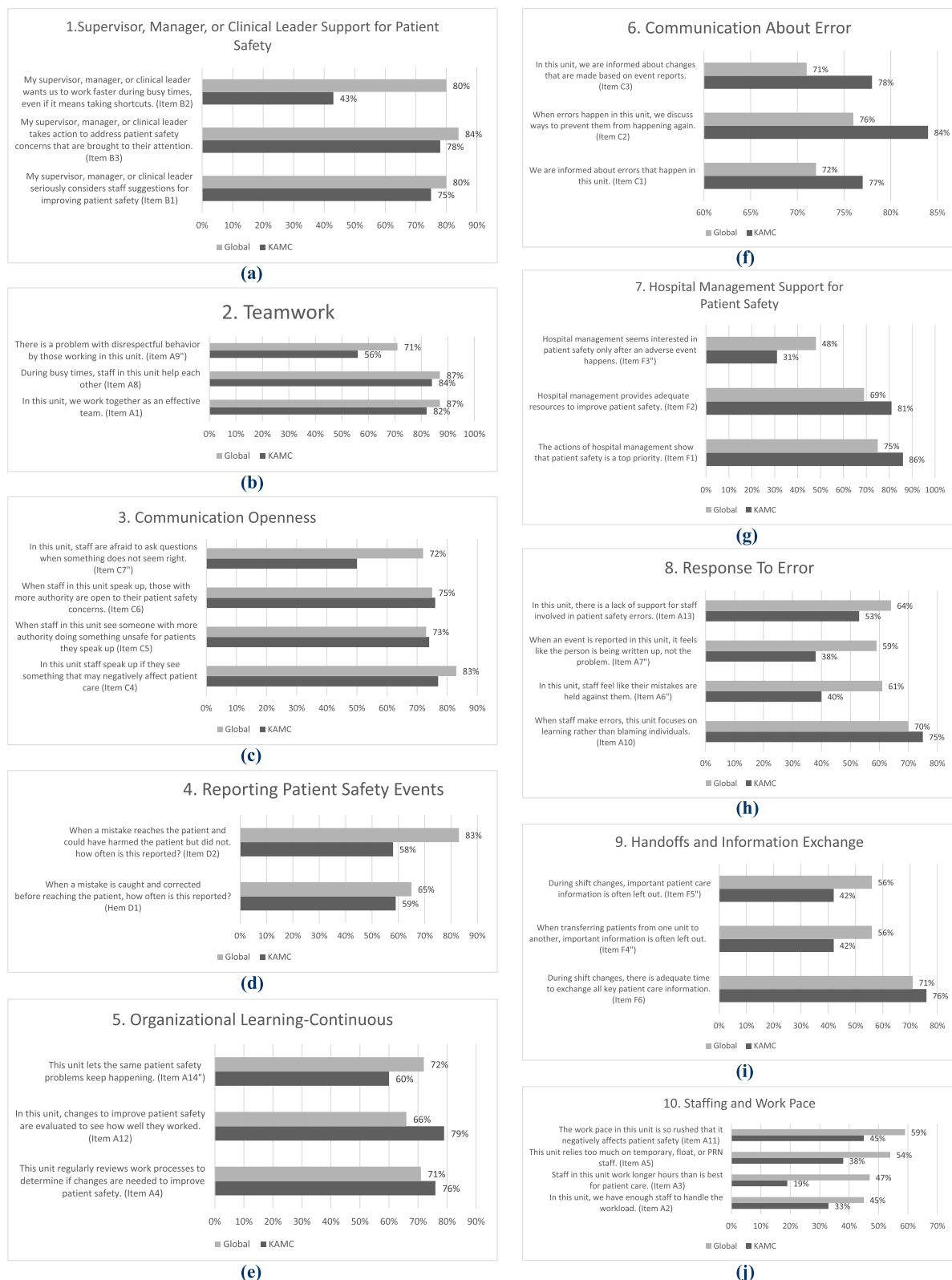


Fig. 2 a-j Comparison of individual items within each of the ten patient safety culture domains

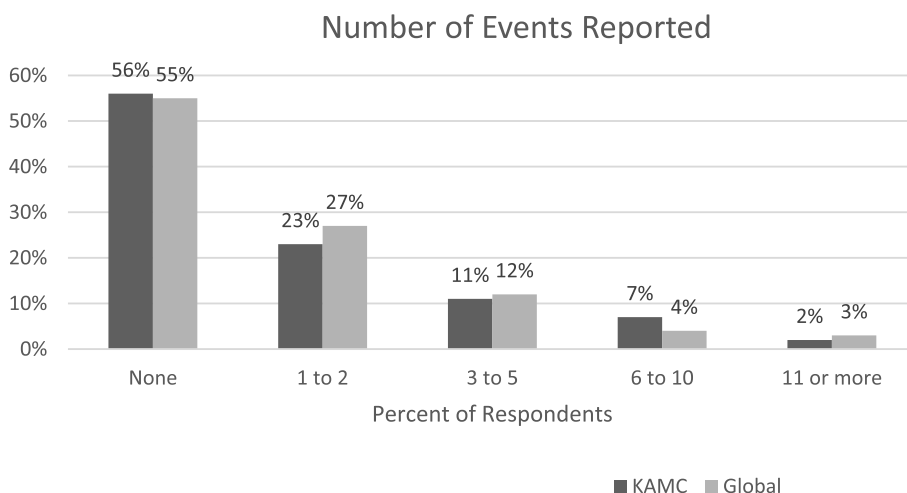


Fig. 3 Comparison of the number of events reported between the two datasets

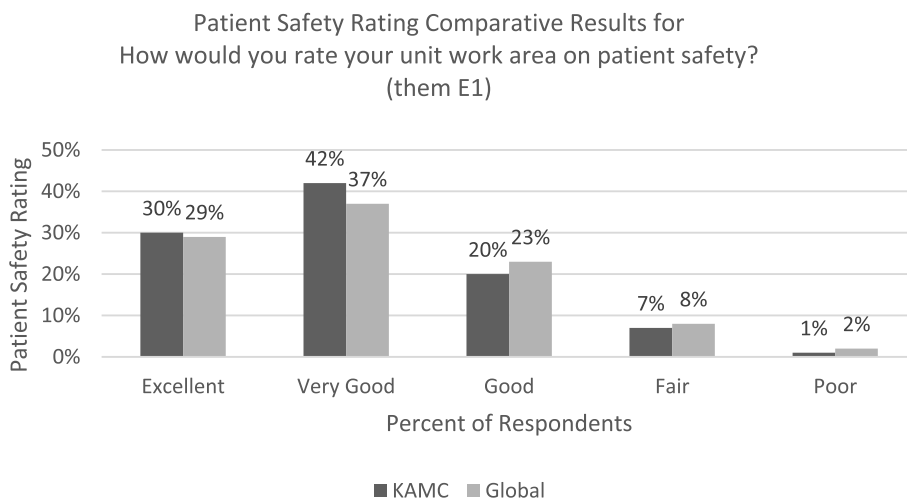


Fig. 4 Patient safety rating comparison between the two datasets

learning and continuous improvement”, “Communication about error”, and “Hospital management support for patient safety” domains. Two of these domains, the first and the last, have great promise for accelerated improvement in the near future. The domain of “Staffing and work pace”, which scored lowest in comparison to global data, is a domain that can be easily rectified if adequate recruitment and staffing measures are instituted [21].

Differences from the results obtained globally can also stem from differences in the sample structure. Compared to the global sample, the sample in the current study had a significantly greater proportion of nursing staff. Among other members of healthcare teams, nurses might be the most knowledgeable and skillful regarding patient safety, based on their patient-centered education and direct

work with patients [22, 23]. Compared to the global database, this study also revealed a significantly greater proportion of those working directly with patients. We assume that this would make results more authentic and responses more of a reflection of the real-world situation.

Teamwork has been recognized as one of the important determinants of patient safety, given the current complexity of healthcare processes [24]. The current study showed that teamwork scores were lower for KAMC than for global data. Makkah can be considered a cosmopolitan place, and pilgrims and healthcare workers alike come from all over the globe. It is not surprising that effective communication can sometimes pose a challenge, not only due to language barriers but also perhaps due to cultural differences. Bearing that in mind, positive

scores of over 80% on teamwork questions should be viewed as an achievement.

In terms of the actual error reporting behavior, this study revealed no significant difference between the KAMC and the global data. This is the fruit of several years of work on healthcare quality in tertiary care institutions in the KSA (Kingdom of Saudi Arabia), for which KAMC stands as a representative. Healthcare quality and patient safety in Saudi Arabia has a long journey that was led and directed by its National Accreditation Program for Healthcare Organizations (NAHCO) and the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI).

An interesting finding in the current study came from the analysis of the participants' reports about patient safety in their work units. Seventy-two (72%) healthcare workers at KAMC gave a "Very good to Excellent" rating for patient safety in their work units, in contrast to the value of 66.7% obtained from global data. In the study conducted in Qassim by Alrasheadi et al., 69% of the nurses who responded to the questionnaire rated patient safety in their hospital as "Excellent" or "Very good" [19]. Although the latter value was slightly lower than that at KAMC, it still exceeded the globally reported response. This similarity in the figures obtained from the KSA reassures the reader about the validity of the results. However, the percentage of staff reporting "zero adverse incidents" at KAMC was greater than that reported at Qassim, with values of 56% and 50%, respectively. This might also be because the Qassim study sample consisted exclusively of nurses. In the study conducted in 2010, by Alahmadi, in Riyadh, 59% of participants reported an overall positive perception of patient safety [20]. A study performed by Alswat et al., also in Riyadh, but in a period from 2012–2015 in a medical city, on approximately 2600 employees, showed an overall positive patient safety rating of 67% [25]. Interestingly, Alswat et al. reported a 56% "zero error reporting", similar to the figure obtained in the present study. A lower patient safety perception was shown in central Saudi Arabia by Alquwez et al., who reported an overall percentage of positive responses of 49% from a survey distributed in 2016 [26]. Their sample came from three government-owned general hospitals. Differences in values from those of other studies, including the current study, might be due to differences in the settings or the time periods. The increase in the percentage of positive responses seen in successive studies should not be overlooked, and it might be optimistically viewed as an improvement in patient safety culture in Saudi Arabia, in general.

Factors that are known to promote error reporting include good teamwork, providing time for efficient reporting and the presence of mutual respect among

staff, thus minimizing blame and punitive mindsets [27–29]. In Saudi Arabia, the management support of patient safety, which caused a blame culture, was identified in an analysis performed by Alaska and Alkutb [30] to be one of the barriers to developing a strong patient safety culture. They noted an absence of improvement in the reporting of safety events, an observation that can be noted from the current results, in which the percentage of events reported was like that obtained in Riyadh in 2015 [25]. The staffing domain scored lowest in the analysis by Alaska and Alkutb [30], a finding that was also noted in the current study.

In the current study, there were generally no significant differences among the different subgroups of participants regarding the composite scores of the safety domains. In a study conducted in Riyadh by Alsulami et al., significant differences in patient safety perception were shown based on participant age and educational level [31]. Such differences were not demonstrated in the current study.

A possible limitation of the current study is that it was conducted in a single tertiary/quaternary care center, and thus, the results do not reflect the overall status of the primary and secondary levels of care in the KSA. KAMC has been established as an exemplary healthcare institution in the busy Makkah region of Saudi Arabia. Staff selection and healthcare quality implementation receive great attention from the higher administration at such institutions in general [11], including KAMC. The current results might thus be reasonably generalizable to the comparable levels of care. Yet, it is worthwhile to point out the diversity of participants in the current study, including doctors, nurses, and other types of healthcare workers. It can thus be reasonably assumed that the views of study participants adequately reflect reality on the ground.

Healthcare improvement in Saudi Arabia over the past decades can be noted by comparing some indicators such as life expectancy, which increased from 64 years in 1964 to 75 years in 2015 [32]. A more accelerated improvement in healthcare and hence, in patient safety culture, is expected with the healthcare transformation being currently implemented as a part of the Saudi Vision 2030 [33]. This transformation aims at managing healthcare at a cluster level, focusing on the delivery of value-based healthcare services [34].

Conclusion

By having a good sample size and a formal comparison to the QHCA database, this study provides a reasonably clear view of patient safety culture in the KSA and how it might be compared to global data. Because it utilizes a well-validated questionnaire and a trustworthy analysis toolkit, this study provides estimates that can adequately

inform national KSA policy makers about the current stance of patient safety culture in the KSA. Detailed analysis of patient safety culture domains provides information about areas of strength and opportunities for improvement. The use of valid data and results make this study a benchmark for future evaluations and for patient safety culture evaluations in other regions and levels of healthcare in the KSA.

Abbreviations

AHRQ	Agency of Healthcare Research and Quality
CBAHI	Central Board for Accreditation of Healthcare Institutions
HSOPSC	Hospital Survey on Patient Safety Culture
IRB	Institutional Review Board
KAMC	King Abdullah Medical City
KSA	Kingdom of Saudi Arabia
NAHCO	National Accreditation Program for Healthcare Organizations
QHCA	Quality of health care in America
SOPS	Survey on Patient Safety Culture
SPSS	Statistical Package of Social Sciences
US	United States
WHO	World Health Organization

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Not applicable.

Authors' contributions

F.G. initiated the idea, supervised planning and data collection, managed approvals, and participated in manuscript writing. A.S.A. performed data collection and participated in manuscript writing. M.K.A. performed data collection and participated in manuscript writing. A.A.A. performed data collection and participated in manuscript writing. M.K.A. performed data collection and participated in manuscript writing. H.A. performed data collection and participated in manuscript writing. S.A.E. performed statistical planning and analysis and participated in manuscript writing. S.F.A. coordinated and performed data collection and participated in manuscript writing. All authors revised the final manuscript.

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Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Institutional Review Board of King Abdullah Medical City, Makkah; IRB number: 23-1126 KReSP. Information about the study was provided to participants at the questionnaire's introduction, indicating the purpose of the study, how the data would be used, that participation was voluntary and that confidentiality would be respected. Consent: A signed consent was not required in this study because the actual participation by the invitee was considered as an implied consent to participate. This was explained in the study protocol and was accepted by the IRB, based on the "Regulations of the Law of Ethics of Research on Living creatures" published by the Saudi National Committee of Biomedical Ethics. The regulations allow waiving of the documentation of informed consent if it reveals the research participant identity [18].

Consent for publication

This was not applicable because the study did not contain individual person data.

Competing interests

The authors declare no competing interests.

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