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Assessment of Patient Safety Culture among Paramedical Personnel and Biomedical Equipment Technicians at General and District Hospitals

Mohammad Ogla Alanzi[1], Jamaan Mahdi Alharbi[2], Abdulaziz Abdulrahman Alfahid [3], Hamad Okla Alanazi[4], Abdulaziz Ahmad Alanezi[5], Abdailrhman Saad Aldhafeeri [6], Mashael Mohammed Alanazi[7], Hamed Ali Alenezi[8]

1-Biomedical specialist
2-Biomedical specialist
3-Biomedical specialist
4-Specialist-Sociology
5-Nurse
6-Emergency medical services
7-Nursing technician
8-Social worker

Abstract:
Background: Healthcare, being a high-risk industry, necessitates regular assessment of patient safety culture within healthcare organizations to address organizational cultural issues and explore their association with patient outcomes. This study aimed to assess the patient safety culture among paramedical health employees at general and district hospitals and identify factors influencing their perception of patient safety. **Methods:** A descriptive cross-sectional study was conducted at the general hospital and four district hospitals, involving 479 paramedical healthcare workers. The standardized Hospital Patient Safety scale (HSOPSC), comprising 12 safety culture dimensions, was utilized for assessment. **Results:** The mean total safety score varied based on participants' positions and work areas, with an overall patient safety score of 46.56%. None of the dimensions scored above 75%, with the highest mean composite scores observed for organizational learning and continuous improvement (65.36%) and teamwork within hospital units (63.09%). Communication openness had the lowest reported score at 17.9%. Females, participants in direct patient contact roles, and those with less than 10 years of work experience showed higher perceptions of safety dimensions. **Conclusion and Recommendations:** The overall patient safety level at public hospitals was found to be low, with none of the dimensions scoring above 75% and 7 out of 12 dimensions scoring below 50%. Continuous monitoring and updating of incident reporting methods are highly recommended, potentially through implementing a 24-hour accessible web-based incident reporting system.
Keywords: Patient safety, Barriers, Paramedical,

Introduction:

Patient safety (PS) in healthcare aims to minimize risks and prevent avoidable harm associated with patient care. The European Society for Quality in Health Care defines PS culture as a dynamic integration of individual and organizational behaviors, guided by shared beliefs and values, to continuously minimize patient harm resulting from care processes. Achieving harm prevention involves error prevention, learning

from errors, and active involvement of healthcare professionals, organizations, and patients. (Alshyyab et al., 2019)

Low- and middle-income countries (LMICs) face critical challenges in PS, with approximately 2.6 million deaths and 134 million adverse events occurring annually in hospitals worldwide. Effective PS requires expertise in human factors and systems management, as most preventable errors, such as investigation errors, medication errors, and nosocomial infections, stem from these areas. (Carayon & Wood, 2010)

A culture of safety in healthcare encompasses individual and organizational values, attitudes, perceptions, competencies, and behavior patterns that determine commitment to health and safety management. Understanding and addressing attitudes and behaviors related to PS are crucial for fostering a safety culture and achieving positive outcomes across organizational aspects. Clear policies, skilled healthcare professionals, strong leadership at all levels, updated data, and patient-centered care are essential for sustaining healthcare safety. (Weaver et al., 2013)

Assessing safety culture helps organizations identify areas needing improvement, strengths, weaknesses, and supports continuous quality management. In Arab countries, PS is a major concern for policymakers, requiring thorough analysis of contributing factors. (Dodek et al., 2012)

The nurse-to-patient ratio is lower than international standards, leading to a shortage of qualified staff who may lack a clear understanding of safety frameworks. This shortage, coupled with high workload in dynamic environments, increases potential safety hazards. This study, the first of its kind aims to assess PS culture among paramedical staff in general and district hospitals and identify factors influencing their perception of PS. (Colliers International, 2017)

Subjects and Methods:

Study Design and Setting:

A cross-sectional descriptive study was conducted

Study Participants:

The study included paramedical staff (nurses, pharmacists, and technicians) working full-time and having direct contact with patients in the selected hospitals. Participants with less than one month of experience and part-time workers were excluded. A total sample of 479 paramedical staff was randomly selected using a purposive sample technique, with 100 individuals selected from each hospital department (internal medicine and general surgery). The study achieved a high response rate of 95.8%.

Data Collection:

The Hospital Patient Safety scale (HSOPSC), developed by the Agency for Healthcare Research and Quality (AHRQ), was used to assess safety culture. This scale consists of 12 safety culture dimensions, including patient safety culture dimensions (seven units-level dimensions and three hospital-level dimensions) and two outcome dimensions, with a total of 42 items. Data collection included demographic information (age, gender, position, years of work experience, and work area) and patient safety culture dimensions. The HSOPSC questionnaire was administered in Arabic, following validation and reliability testing in Arabic-speaking hospital settings.

Data Analysis:

Domain scores were calculated based on positive responses in each domain, expressed as percentages. Composite scores were categorized as areas of strength (composite score >75%), areas with potential for improvement (composite score between 75% and 50%), and areas of weakness (composite score <50%). The patient safety grade was estimated from respondents' overall grading of their work area or unit. Statistical analysis was performed using SPSS version 21, presenting variables as numbers, percentages, means, and standard deviations. Student t-tests, ANOVA tests, and Pearson correlation were used for statistical comparisons, with a significance level set at $p \leq 0.05$.

Results

The study included 479 paramedical staff, distributed evenly across age groups between 25 and 54 years, as well as among genders. Among the participants, 64.3% were nurses, 12.3% were pharmacists, and 23.4% were technicians. About 52.4% of participants primarily worked in outpatient services, and 44% had 6–10 years of work experience. Most participants (69.9%) had direct contact with patients, and the reported number of events ranged from none to 20, with 44.3% reporting one to two events and 32.2% reporting three to four events in the last year.

The composite scores for the 12 dimensions of patient safety culture revealed that none of the dimensions scored above 75%. The highest mean composite score was for organizational learning-continuous improvement (65.36%), followed by teamwork within hospital units (63.09%). Other dimensions scoring above 50% included staffing work conditions (57.6%), supervisor/manager expectations and actions promoting safety (59.8%), management support for patient safety (59.5%), and handoffs and transitions (55.1%). Communication openness had the lowest reported score at 17.9%. The total patient safety score was 46.56%, with variations in mean total safety scores based on participants' positions, work areas, and specialties.

Females tended to have a more positive perception of safety dimensions compared to males, particularly in teamwork within hospital units, management support for patient safety, handoffs and transitions, and non-punitive response to errors. Participants with direct patient contact and nurses also showed a more positive perception of safety dimensions, overall perceptions of patient safety, communication openness, teamwork across units, and number of reported events compared to technicians and pharmacists. Additionally, participants with less than 10 years of work experience had a higher perception of most safety dimensions. Participants' perceptions of patient safety grade varied, with 41.3% perceiving it as excellent, 36.5% as poor, and 3.9% as failing.

Correlations between patient safety culture dimension scores were generally positive, with each dimension showing a significant positive correlation with others.

Table 1. Basic characteristics of paramedical participants at General Hospital and other selected district hospitals, 2018 (n = 479)

Category	Number	Percentage
Age in years		
< 25	55	11.5
25–34	114	23.8
35–44	113	23.6
45–54	139	29.0
≥ 55	58	21.1
Gender		
Male	237	49.5
Female	242	50.5
Job title		
Nurse	308	64.3
Technician	112	23.4
Pharmacist	59	12.3
Workplace		
Outpatients	251	52.4
Inpatients	62	12.9
Others	166	34.7
Years of work experience		
1–5 years	67	14.0
6–10 years	214	44.7
11–15 years	83	17.3

> 15 years	115	24.0
Direct contact with the patient		
Yes	335	69.9
No	144	30.1
Number of reported events in the last 12 months		
No reports	58	12.1
1–2 events	212	44.3
3–5 events reported	154	32.2
6–10 events reported	49	10.2
11–20 events reported	6	1.2

Table 2. Patient safety culture dimensions, , and other selected district hospitals,

Item	Mean percent positive score	Range
Teamwork within hospital units	63.09	35–100
Staff work conditions	57.6	40–70
Supervisor/manager expectations and actions promoting safety	59.81	35–90
Organizational learning-continuous improvement	65.36	33.3–100
Management support for patient safety	59.5	20–93.3
Overall perceptions of patient safety	48.34	16–72
Feedback and communication about errors	20.29	8.89–28.89
Communication openness	17.96	8.89–28.89
Frequency of events reported	30.48	20–80
Teamwork across units	46.54	25–85
No. of events	30.48	20–80
Handoffs and transitions	55.1	20–90
Non-punitive response to errors	34.74	20–86.6
Total patient safety score	46.56	34.8–59.8

Table 3. Mean scores of patient safety culture dimensions according to demographic characteristics

PSC dimensions	Gender	Direct contact with patients	Position	Length of work
	Male	Female	Yes	No
Teamwork within hospital units	60.48 ± 12.42	65.59 ± 12.43	63.18 (11.55)	62.81 (15.00)
Staffing	57.9 ± 6.4	57.3 ± 8.9	57.13 (6.4)	58.7 (8.3)
Supervisor/manager expectations and actions promoting safety	63.54 ± 9.3	56.16 ± 8.9	59.57 (9.4)	60.38 (10.79)
Organizational learning—continuous improvement	67.48 ± 17.51	63.28 ± 13.13	63.24 ± 14.35	70.3 ± 17.2
Management support for patient safety	56.09 ± 12.16	62.89 ± 18.83	58.45 ± 15.49	62.04 ± 17.63
Overall perceptions of patient safety	47.47 ± 11.13	49.19 ± 9.2	49.28 ± 9.45	46.17 ± 11.59

Feedback and communication about error	21.38 ± 4.7	19.24 ± 5.1	19.99 ± 4.68	21.01 ± 5.64
Communication openness	17.5 ± 4.2	18.4 ± 4.5	18.43 ± 4.27	16.89 ± 4.51
Teamwork across units	46.9 ± 9.9	46.18 ± 11.1	48.01 ± 10.51	43.08 ± 9.78
Handoffs and transitions	53.6 ± 14.7	56.6 ± 18.5	56.52 ± 15.1	51.80 ± 19.8
Nonpunitive response to errors	33.6 ± 10.5	36.01 ± 6.9	34.86 ± 8.4	34.63 ± 10.19
Number of events	30.9 ± 11.9	29.9 ± 9.4	31.64 ± 11.4	27.78 ± 8.7

Discussion

Patient safety is a critical component of healthcare quality, and assessing safety culture is vital for enhancing healthcare services and addressing organizational factors that contribute to adverse events.

The study by El-Shabrawy et al. found an overall mean score for positive perceptions of patient safety culture dimensions at 46.56%, which contrasts with studies in Beni Suef (39.3%) and Alexandria (69%). Compared to other Arab countries, their results were lower than those in Kuwait (69%), Lebanon (61.5%), Saudi Arabia (61%), and Palestine (54%). Globally, their findings were also lower than those in China (65%), Taiwan (64%), the USA (65%), and the Netherlands (52.2%), but higher than a study in Ethiopia (46%). These differences were explained in a study in Egypt as part of a WHO investigation in the Eastern Mediterranean region, which linked reduced positive perceptions of patient safety culture dimensions to a culture of blame. This low perception contributed to a decline in reported errors and increased rates of permanent disability and mortality. (El-Shabrawy et al., 2017)

While no domain in their study achieved a positive score above 75%, the highest scores were reported for organizational learning-continuous improvement (65.36%) and teamwork within hospital units (63.09%). Areas needing improvement included non-punitive response to error (34.7%), communication openness (17.9%), feedback and communication about error (20.3%), and number of events reported (30%). These findings align with previous research. (Mohamed et al., 2015)

Contrary to findings in Ethiopia where two-thirds of staff reported at least one adverse event in the previous year, approximately 44.3% of participants in their study reported one to two events. Nurses reported better overall patient safety scores compared to other paramedical personnel, with paramedics in internal medicine scoring higher than those in general surgery. Staffing showed negative correlations with all dimensions except organizational learning and feedback about errors. (Ghobashi & Elragehy, 2014)

The low score for "frequency of adverse events reported" (30.48%) may be due to a lack of reporting culture and the perception that errors reflect individual incompetence rather than opportunities for learning. Barriers to reporting included punitive systems, humiliation, and fear. (El-Jardali et al., 2010)

Their study's mean composite score for organizational learning-continuous improvement was 65.36%, lower than in a teaching hospital in Egypt (78.2%), but consistent with findings among Iranian nursing staff (67%) and hospital staff in Saudi Arabia (75.9%). Teamwork within hospital units scored relatively high (63.09%), indicating a preference for active collaboration within units. (Hamdan & Saleem, 2013)

Communication openness was notably low (17.9%), impacting the number of reported events. A study in Kuwait reported higher communication openness (45%). Communication openness positively influences the willingness to report safety incidents, highlighting the importance of supportive communication and reduced blame. (Chen & Li, 2010)

Gender differences were observed, with females showing higher perceptions of safety dimensions related to teamwork within hospital units, supervisor/manager expectations, and actions promoting safety. This contrasts with previous research in Egypt and Tunisia, which found no gender differences. The higher female-to-male ratio in their study may contribute to these variations. (Wagner et al., 2013)

Participants in direct contact with patients reported higher perceptions of overall patient safety, communication openness, teamwork across units, handoffs and transitions, and number of events. This aligns with findings in Kuwait. (Mekonnen et al., 2017)

In terms of participants' perceived patient safety grade, 41.3% rated it as excellent. This differs from a study in Saudi Arabia, where 60% rated overall patient safety as excellent or very good. These variations may reflect ongoing efforts to improve quality and safety through standards and accreditation schemes in developing countries. (Aboul-Fotouh et al., 2012)
Overall, the study by El-Shabrawy et al. highlights the need for targeted interventions to enhance patient safety culture, improve communication openness, encourage reporting, and foster collaborative teamwork within healthcare settings.

Conclusion

In conclusion, the study found low levels of patient safety across public hospitals, with no dimension scoring above 75% and many below 50%. Continuous monitoring and evaluation are recommended to improve patient safety culture, particularly emphasizing communication openness and error reporting. Addressing the culture of blame is crucial to encourage incident reporting among paramedics, requiring education and the establishment of anonymous incident reporting systems. The Ministry of Health should regularly assess safety culture, educate healthcare staff, and enhance health information infrastructure to support patient safety initiatives. Transitioning from traditional medical training to include patient safety skills is also advised.

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