ORIGINAL RESEARCH

Shaping Safety: Unveiling the Dynamics of Incident Reporting and Safety Culture in Saudi Arabian Healthcare

Hind Alsahli[1], Ahmed M Al-Wathinani[2], Tariq A Althobaiti[3], Mohammed A Abahussain[2], Krzysztof Goniewicz ⓘ[4]

[1]Pharmaceutical Care Division, King Faisal Specialist Hospital and Research Center, Riyadh, 11211, Saudi Arabia; [2]Department of Emergency Medical Services, Prince Sultan bin Abdulaziz College for Emergency Medical Services, King Saud University, Riyadh, 11451, Saudi Arabia; [3]Department of Emergency Medicine, King Khalid University Hospital, King Saud University Medical City, King Saud University, Riyadh, Saudi Arabia; [4]Department of Security, Polish Air Force University, Deblin, 08-521, Poland

Correspondence: Ahmed M Al-Wathinani, Email ahmalotaibi@ksu.edu.sa

Background: Patient safety is a critical concern in healthcare systems worldwide. Understanding the interplay between safety culture and incident reporting behaviors among healthcare professionals is essential for improving patient outcomes.

Objective: To examine the perception of patient safety culture among healthcare professionals in Saudi Arabia and its impact on their attitudes toward incident reporting, considering variables such as level of care, ownership, and professional background.

Methods: A cross-sectional survey was distributed both online and onsite to 453 healthcare professionals, with 402 completing it. The survey assessed various dimensions of safety culture and incident reporting behaviors. Statistical analysis included correlation matrices, regression models, and comparative assessments across different types of hospital settings.

Results: The study revealed significant associations between perceived safety culture and incident reporting behaviors ($p < 0.01$). Specifically, management (B = 0.64, $p < 0.01$), working conditions (r = 0.51, $p < 0.01$), and job satisfaction (r = 0.52, $p < 0.01$) were identified as crucial for improvement. The study highlighted the importance of fostering a blame-free culture and establishing clear reporting guidelines to enhance reporting frequencies.

Conclusion: Enhancing the perception of patient safety within healthcare settings positively influences the likelihood of incident reporting. Strategic interventions aimed at improving safety culture could significantly advance patient care quality.

Keywords: patient safety, safety culture, incident reporting, healthcare professionals, Saudi Arabia, hospital management, cross-sectional survey

Introduction

Patient safety is not merely a fundamental principle of healthcare—it is its cornerstone. Defined by the Institute of Medicine (IOM) as "the prevention of harm to patients", the imperatives of patient safety have echoed globally since the seminal IOM report, "To Err is Human: Building a Safer Health System", was released in 1999. This report revealed that preventable medical errors resulted in between 44,000 and 98,000 deaths annually in American hospitals alone, spotlighting the critical need for transformative safety interventions.[1,2]

The World Health Organization (WHO) underscores that one in ten patients is harmed while receiving hospital care in high-income countries, with nearly half of these incidents deemed preventable In middle to low-income countries, the risk increases, affecting one in four patients.[3] Despite these alarming statistics, the actual incidence of Adverse Drug Events (ADEs) in Saudi Arabia remains largely undocumented. A 2016 study[4] spanning four hospitals noted an ADE rate of 6.1 per 100 admissions, predominantly in intensive care settings—a stark reminder of the ubiquity of medical errors and their dire need for addressal.[5]

Patient safety transcends the mere avoidance of errors. It involves a systematic orchestration of healthcare practices to minimize risk and harm, necessitating a robust safety culture as its foundation. Research indicates that elements such as burnout, depression, heavy workloads, and inadequate communication significantly undermine safety culture and, consequently, patient care.[6] Furthermore, studies within Saudi healthcare settings reveal a disturbing perception among nurses, with many viewing their safety climate as precarious at best, directly impacting error reporting and overall safety measures.[7–11]

A strong patient safety culture is essential in healthcare settings, influencing the willingness of healthcare providers to report errors and near misses. Safety culture encompasses shared values, attitudes, and behavioral norms related to patient safety. Key elements include management commitment to safety, open communication about errors, non-punitive responses to mistakes, and continuous learning and improvement.

Incident reporting is a critical aspect of patient safety, noted for its potential to transform healthcare culture and enhance safety outcomes. However, various barriers can hinder effective reporting, such as fear of retribution, blame culture, and lack of feedback on reported incidents.[12–17] Facilitators for reporting include strong leadership support, clear and simple reporting procedures, and a non-punitive approach to error reporting. Encouraging a culture of transparency and learning rather than blame can significantly improve reporting rates and overall patient safety.

In Saudi Arabia, patient safety culture varies across different healthcare settings. Studies indicate that healthcare professionals often perceive their safety climate as fragile, with significant gaps in communication and reporting practices.[18–21] For example, a survey of nurses in Saudi hospitals revealed that a significant proportion felt unsupported in their efforts to report errors, often due to fear of blame or lack of clear reporting procedures.[22]

Internationally, various interventions have proven successful in improving patient safety culture and incident reporting. For instance, the implementation of the Comprehensive Unit-based Safety Program (CUSP) in several hospitals across the United States has significantly reduced infection rates and improved safety outcomes.[23] Such programs emphasize teamwork, continuous learning, and robust communication channels, which could be adapted and implemented in Saudi Arabian healthcare settings to yield similar improvements.

In addition to cultural and procedural changes, the integration of health information technology, such as electronic health records (EHRs) and clinical decision support systems (CDSS), has been shown to enhance patient safety by reducing medication errors, improving clinical decision-making, and facilitating more efficient incident reporting.[24] These technologies can play a crucial role in supporting a safer healthcare environment by providing healthcare professionals with real-time data and decision support tools that can help identify and mitigate potential safety issues before they result in harm.

Healthcare providers play a pivotal role in fostering a culture of safety. Their attitudes toward incident reporting and safety practices are influenced by several factors, including workload, organizational support, and individual perceptions of safety culture. In Saudi Arabia, efforts to improve patient safety must consider the diverse backgrounds and experiences of healthcare professionals, ranging from physicians and nurses to pharmacists and administrative staff.[25,26]

This study seeks to rigorously examine how the perception of patient safety culture among healthcare professionals in Saudi Arabia influences their attitudes toward incident reporting and to explore variations across different levels of care, ownership types, and professional backgrounds. By identifying these dynamics, the research aims to provide actionable insights that could lead to significant enhancements in patient safety practices, making a compelling case for the global relevance of improving safety cultures within healthcare systems.

Materials and Methods
Study Design and Sample

This study employed a cross-sectional design to evaluate the perceptions of patient safety culture and attitudes toward incident reporting among healthcare professionals. Data collection occurred between June and August 2023, encompassing a diverse array of hospital settings including private hospitals, Ministry of Health (MOH) government hospitals, non-MOH government hospitals, and teaching hospitals across Saudi Arabia. The comprehensive coverage across different levels of care and ownership aimed to capture a broad spectrum of insights into the prevailing safety attitudes.

Participants and Sampling

Participants were recruited using a stratified sampling technique to ensure a representative distribution across various healthcare roles, including physicians, nurses, pharmacists, and administrative staff. The sampling process involved identifying and categorizing the healthcare settings and roles, followed by proportional random sampling within each stratum. The inclusion criteria specified currently practicing healthcare professionals who were fluent in English, the common operational language in these settings. Both online and onsite distribution methods were utilized to maximize participation rates and to accommodate the diverse schedules of healthcare providers. The sample size was estimated using a confidence interval approach, aiming for a 95% confidence level and a 5% margin of error. Based on the estimated population of healthcare professionals across the selected hospitals, a minimum sample size of 384 was calculated. To account for potential non-responses, the target sample size was increased by 20%, resulting in a final target of 461 participants.

Data Collection Instruments

Two primary instruments were employed for data collection:

Safety Attitudes Questionnaire (SAQ): Widely recognized for its efficacy in measuring safety climate, the SAQ was selected over the Hospital Survey on Patient Safety Culture (HSOPS) due to its concise format and comprehensive coverage of the necessary domains. The SAQ evaluates dimensions such as teamwork climate, safety climate, job satisfaction, perceptions of management, working conditions, and stress recognition.

The validity and reliability of the SAQ and RoCAES were ensured prior to their use in this study. The instruments were translated into Arabic following standard translation-back-translation procedures to maintain linguistic and conceptual equivalence. Content validity was assessed by a panel of experts in patient safety and healthcare management, while reliability was tested through a pilot study involving 30 healthcare professionals. The Cronbach's alpha values for the SAQ and RoCAES were 0.89 and 0.86, respectively, indicating high internal consistency.

Data Processing and Analysis

Data were Responses were collected, coded, and entered into the Statistical Package for the Social Sciences (SPSS) software, version 25.0, for analysis. Categorical variables were presented as absolute and relative frequencies (percentages). The relationships between categorical variables were analyzed using contingency tables to explore correlations between variables. Statistical significance was assessed through a variety of tests: ANOVA was used to identify significant differences among continuous variables for more than two groups. Kruskal–Wallis tests were employed for assessing nominal variables across multiple groups. Linear regression analysis was conducted to determine the relationship between safety attitudes and incident reporting frequencies. All P-values were two-tailed, with significance set at the 0.05 level, corresponding to a 95% confidence interval.

Ethical Considerations

The Institutional review board (IRB) approval was obtained from the King Saud University Research and Ethics Committee (Ref No: KSU-HE-23-609).

Results

Participant Demographics and Professional Characteristics

Total of 453 healthcare professionals participated in the survey, of which 402 completed it fully. The demographic and professional characteristics of the respondents are detailed in Table 1. The gender distribution was relatively balanced, with 50.5% males and 49.5% females. A significant majority of respondents were Saudi (66.4%), with the largest age group being 20–30 years (44.3%), followed closely by 31–40 years (40.3%). The primary professions represented were nurses (22.6%) and pharmacists (26.4%). Most respondents (38.3%) had between 1–5 years of experience, while 26.6% had 6–10 years. Geographically, 46.5% of participants worked in the central region of Saudi Arabia, and 34.6% were employed in governmental facilities, including both Ministry of Health (MOH) hospitals and primary centers. By hospital

Table 1 Demographic and Professional Profile of Healthcare Professionals

Variables		N	%
Gender	Male	203	50.5
	Female	199	49.5
Nationality	Non-Saudi	135	33.6
	Saudi	267	66.4
Age	Less than 20	4	1.0
	20–30	178	44.3
	31–40	162	40.3
	41–50	34	8.5
	More than 50	22	5.5
Profession	Nurse	91	22.6
	Pharmacist	106	26.4
	Physician	63	15.7
	Technician/Technologist	35	8.7
	Paramedic	52	12.9
	Resident	20	5.0
	Dentist	20	5.0
	Therapist	15	3.7
Experience	1–5	154	38.3
	6–10	107	26.6
	Less than a year	57	14.2
	More than 10	84	20.9
Working Region	Central (Riyadh region)	187	46.5
	Eastern (ash-Sharqiyah)	43	10.7
	Western (Makkah region)	66	16.4
	Southern (e.g: Najran, Jazan, Albaha.)	66	16.4
	Northern/north-western (e.g: Arar)	40	10.0
Type of hospital according to ownership	Governmental (MOH hospitals and primary centers)	139	34.6
	Governmental non-MOH (e.g: Security Force Hospital)	120	29.9
	Teaching university hospitals	51	12.7
	Private	92	22.9
Type of hospital according to level of care	Primary (less than 100 bed)	121	30.1
	Secondary (between 100–500)	132	32.8
	Tertiary (more than 500 bed)	149	37.1

size, tertiary care facilities (more than 500 beds) had the most respondents (37.1%), followed by secondary care facilities (32.8%) and primary care centers (30.1%).

Perception and Ranking of Key Organizational Domains in Healthcare Settings

This section of the study delves deep into the various organizational domains within different types of hospitals, aiming to understand and evaluate the perceptions and rankings related to patient safety and incident reporting. By examining these domains across hospital types categorized by ownership—Governmental (MOH) hospitals, Governmental non-MOH hospitals, Teaching university hospitals, and Private hospitals—we obtain valuable insights into how the structure and management styles of hospitals influence the safety attitudes and behaviors of healthcare professionals. The data from the Safety Attitudes Questionnaire (SAQ) revealed that teamwork climate and safety climate had the highest mean scores, indicating relatively strong perceptions in these areas across all hospital types. Conversely, stress recognition and job satisfaction had lower mean scores, highlighting areas that need improvement.

Table 2 provides detailed mean scores and standard deviations for each domain, offering a comparative view that highlights differences and pinpoints potential areas for enhancement in the safety culture across various settings.

The domains covered in the study include Safety Attitude, Teamwork Climate, Safety Climate, Job Satisfaction, Stress Recognition, Perception of Management, Working Conditions, Reporting of Clinical Adverse Events, Perceived Blame, Criteria for Identifying Events that Should Be Reported, Colleagues' Expectations, Benefits of Reporting, and Clarity of Reporting Procedures. Each of these areas is critical for building a comprehensive understanding of the workplace environment as they collectively contribute to the overall safety and efficiency of hospital operations.

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Safety Attitude, for example, reflects the general perception and prioritization of safety within the hospital, which is foundational for fostering a proactive safety culture. Teamwork Climate assesses the effectiveness of collaboration among staff, crucial for managing communication and reducing errors. Similarly, the Safety Climate provides a measure of the prevailing sentiments regarding safety practices and protocols, directly impacting how safety guidelines are followed and incidents are handled.

Further exploration of Job Satisfaction and Stress Recognition helps identify the underlying factors that can influence staff engagement and mental health, which are indirectly related to safety outcomes. Perception of Management and Working Conditions directly affects how empowered and supported staff feel in their roles, which in turn influences their willingness to report incidents and engage with safety initiatives.

The comprehensive analysis of these domains through Table 2 not only illuminates the current state of safety culture across hospital types but also serves as a crucial tool for healthcare administrators to identify strengths and areas for improvement in creating safer healthcare environments.

Correlation Matrix of Safety Attitude, Reporting Perceptions, and Clinical Adverse Event Factors

To elucidate the relationships between different components of safety culture and their influence on clinical adverse event reporting, a thorough correlation analysis was performed. The correlation matrix from the SAQ and RoCAES showed significant positive correlations between safety climate and incident reporting frequency, indicating that better safety perceptions are associated with higher reporting rates. Additionally, perceived blame was negatively correlated with reporting frequency, highlighting the detrimental effect of a blame culture on reporting behaviors. Table 3 showcases the interrelationships among various safety and reporting parameters within healthcare settings. This matrix is instrumental in identifying which aspects of safety culture are most strongly correlated with active reporting behaviors and positive overall safety attitudes.

Table 2 Perception and Ranking of Key Organizational Domains in Healthcare Settings

Domains	Type of hospital according to ownership							
	Governmental (MOH) hospitals		Governmental non-MOH		Teaching university hospitals		Private	
	Mean±SD	Mean Score %	Mean±SD	Mean Score %	Mean±SD	Mean Score %	Mean±SD	Mean Score %
Safety Attitude	3.72±0.64	74.43	3.78±0.52	75.55	3.63±0.61	72.67	3.68±0.61	73.65
Teamwork climate	3.87±0.64	77.51	3.85±0.56	76.92	3.74±0.65	74.71	3.79±0.65	75.83
Safety climate	3.72±0.67	74.41	3.81±0.59	76.19	3.50±0.75	70.05	3.70±0.66	73.99
Job satisfaction	3.76±0.91	75.17	3.75±0.88	74.97	3.5±0.99	70.04	3.58±0.94	71.57
Stress recognition	3.94±0.87	78.88	3.86±0.82	77.29	4.16±0.80	83.24	3.86±0.87	77.17
Perception of management	3.64±0.87	72.86	3.66±0.75	73.23	3.49±0.96	69.96	3.56±0.88	71.13
Working conditions	3.59±0.84	71.77	3.75±0.68	75.06	3.60±0.77	72.09	3.65±0.88	73.08
Reporting of Clinical Adverse Events Scale	3.47±0.73	69.38	3.33±0.66	66.69	3.41±0.66	68.24	3.51±0.61	70.18
Perceived blame	3.48±0.91	69.62	3.5±0.81	66.97	3.52±0.88	70.39	3.52±0.75	70.40
Perceived criteria for identifying events that should be reported	3.21±1.03	64.22	3.04±1.01	60.83	3.12±1.10	63.14	3.32±0.94	66.49
Perceptions of colleagues' expectations	3.23±1.02	64.65	2.96±0.96	59.25	3.13±0.95	62.68	3.40±0.87	68.04
Perceived benefits of reporting	4.27±0.68	85.32	4.2±0.68	83.94	4.24±0.72	84.84	3.99±0.72	79.86
Perceived clarity of reporting procedures	3.72±1.03	74.46	3.99±0.83	79.83	3.44±1.15	68.82	3.63±0.99	72.50

Table 3 Correlation Matrix of Safety Attitude, Reporting Perceptions, and Clinical Adverse Event Factors

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Teamwork climate	1	0.695**	0.561**	0.198**	0.658**	0.618**	0.803**	0.255**	0.368**	0.361**	0.226**	0.461**	0.452**
2. Safety climate	0.695**	1	0.566**	0.120*	0.651**	0.666**	0.829**	0.196**	0.364**	0.357**	0.209**	0.529**	0.436**
3. Job satisfaction	0.561**	0.566**	1	0.013	0.701**	0.618**	0.771**	0.006	0.137**	0.158**	0.286**	0.517**	0.219**
4. Stress recognition	0.198**	0.120*	0.013	1	0.126*	0.152**	0.283**	0.435**	0.313**	0.338**	0.235**	0.050	0.429**
5. Perception of management	0.658**	0.651**	0.701**	0.126*	1	0.733**	0.861**	0.217**	0.371**	0.391**	0.180**	0.544**	0.456**
6. Working conditions	0.618**	0.666**	0.618**	0.152**	0.733**	1	0.902**	0.276**	0.416**	0.457**	0.189**	0.496**	0.513**
7. Safety Attitude	0.803**	0.829**	0.771**	0.283**	0.861**	0.902**	1	0.292**	0.436**	0.460**	0.275**	0.585**	0.550**
8. Perceived blame	0.255**	0.196**	0.006	0.435**	0.217**	0.276**	0.292**	1	0.592**	0.578**	0.064	−0.009	0.781**
9. Perceived criteria for identifying events that should be reported	0.368**	0.364**	0.137**	0.313**	0.371**	0.416**	0.436**	0.592**	1	0.797**	−0.093	0.175**	0.893**
10. Perceptions of colleagues' expectations	0.361**	0.357**	0.158**	0.338**	0.391**	0.457**	0.460**	0.578**	0.797**	1	−0.019	0.202**	0.898**
11. Perceived benefits of reporting	0.226**	0.209**	0.286**	0.235**	0.180**	0.189**	0.275**	0.064	−0.093	−0.019	1	0.295**	0.150**
12. Perceived clarity of reporting procedures	0.461**	0.529**	0.517**	0.050	0.544**	0.496**	0.585**	−0.009	0.175**	0.202**	0.295**	1	0.309**
13. Reporting of Clinical Adverse Events Scale	0.452**	0.436**	0.219**	0.429**	0.456**	0.513**	0.550**	0.781**	0.893**	0.898**	0.150**	0.309**	1

Note: ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

Safety Attitude Based on Demographic and Professional Variables

In this section, we explore the relationship between safety attitudes and various demographic and professional variables among healthcare professionals. The analysis includes an examination of factors such as nationality, age, profession, type of hospital ownership, and level of care to understand how these elements may influence perceptions of safety within healthcare settings. The results indicated that younger healthcare professionals (20–30 years) reported significantly higher safety attitudes compared to older age groups, suggesting a generational difference in perceptions of safety culture. Nurses and pharmacists also showed higher safety attitude scores compared to other professions, reflecting their frontline involvement in patient care. Tables 4 and 5 provides a detailed overview of the mean scores, standard deviations, and p-values, offering insights into the statistical significance of the differences observed in safety attitudes across diverse groups.

This table highlights the variations in safety attitudes across different demographic and professional categories, illustrating how each group perceives safety within their work environment. Although variations in mean scores exist, they are not statistically significant ($p > 0.05$), suggesting that these differences do not substantively reject the null hypothesis for these variables. This observation indicates that while individual perceptions of safety may vary, they are consistently aligned across diverse groups, emphasizing the universal importance of fostering a strong safety culture in healthcare settings.

Reporting of Clinical Adverse Events Based on Demographic and Professional Variables

This section of the analysis examines how the reporting of clinical adverse events varies across different demographic and professional groups within healthcare settings. Table details the mean scores, standard deviations, and p-values, which provide insights into the statistical significance of differences in reporting behaviors among these groups.

The data reveal substantial variations in reporting behaviors across demographic categories and workplace settings. Notably, younger respondents and those employed in primary care settings reported clinical adverse events at higher rates, signaling potential variances in perceptions or experiences within patient safety culture. Statistically significant results among nurses and the youngest age group highlight specific areas where targeted interventions could effectively

Table 4 Safety Attitude Based on Demographic and Professional Variables

Variables	Safety Attitude	P-value
	Mean	Standard Deviation
Nationality	Non-Saudi	3.65
	Saudi	3.75
Age	Less than 20	4.09
	20–30	3.66
	31–40	3.70
	41–50	3.96
	More than 50	3.84
Profession	Nurse	3.67
	Pharmacist	3.75
	Physician	3.73
	Technician/Technologist	3.48
	Paramedic	3.88
	Resident	380
	Dentist	3.69
	Therapist	3.63
Type of hospital according to ownership	Governmental (MOH hospitals and primary centers)	3.72
	Governmental non-MOH	3.78
	Teaching university hospitals	3.63
	Private	3.68
Type of hospital according to level of care	Primary (less than 100 bed)	3.72
	Secondary (between 100–500)	3.72
	Tertiary (more than 500 bed)	3.71

Table 5 Reporting of Clinical Adverse Events Based on Demographic and Professional Variables

Variables	Reporting of clinical adverse events	P-value
	Mean	Standard Deviation
Nationality	Non-Saudi	3.36
	Saudi	3.47
Age	Less than 20	3.91
	20–30	3.44
	31–40	3.41
	41–50	3.60
	More than 50	3.10
Profession	Nurse	3.45
	Pharmacist	3.27
	Physician	3.29
	Technician/Technologist	3.52
	Paramedic	3.77
	Resident	3.27
	Dentist	3.65
	Therapist	3.57
Type of hospital according to ownership	Governmental (MOH hospitals and primary centers)	3.47
	Governmental non-MOH	3.33
	Teaching university hospitals	3.41
	Private	3.51
Type of hospital according to level of care	Primary (less than 100 bed)	3.62
	Secondary (between 100–500)	3.48
	Tertiary (more than 500 bed)	3.24

increase reporting rates and thereby enhance overall patient safety. This detailed analysis of reporting behaviors provides crucial insights that can help healthcare institutions identify focus areas for improvement, ensuring that efforts to bolster patient safety are as effective and informed as possible.

Linear Regression Model of Providers' Attitudes Towards Incident Reporting

The linear regression analysis was conducted to understand the relationship between the perception of patient safety and healthcare providers' attitudes towards incident reporting. The regression analysis showed that safety attitudes significantly predicted incident reporting behaviors (B = 0.64, p < 0.001), with an R-squared value of 0.571, indicating that 57.1% of the variance in reporting attitudes could be explained by safety attitudes. This strong predictive relationship underscores the importance of enhancing safety perceptions to improve reporting practices. Table 6 presents the regression coefficients, p-values, and the R-squared value, which quantifies the proportion of variance in reporting attitudes that can be explained by the variables included in the model.

The linear regression model analyzed the impact of patient safety perceptions on healthcare providers' attitudes towards incident reporting. The regression coefficient for patient safety (B = 0.64) demonstrates a strong and positive

Table 6 Linear Regression Model of Providers' Attitudes Towards Incident Reporting

Variable	Regression coefficients (B)	P-value	R2
Constant	1.40	0.00*	0.571
Patient Safety	0.64	0.00*	

Note: *P-value < 0.05.

effect on attitudes towards incident reporting. This finding suggests that improvements in the perception of patient safety are associated with more favorable attitudes towards reporting incidents. Enhancing perceived safety is therefore crucial for strengthening the overall safety culture within healthcare settings.

The model's R-squared value, 0.571, indicates that approximately 57.1% of the variance in reporting attitudes among healthcare providers can be explained by the included predictor of perceived patient safety. This significant proportion highlights the vital role that perceptions of safety play in influencing reporting behaviors among medical professionals.

The analysis underscores the critical importance of fostering a positive perception of patient safety. It is essential for motivating healthcare professionals to actively participate in incident reporting systems. Such participation is integral to ongoing improvements in patient care and the enhancement of safety protocols across healthcare facilities.

Adverse Event Experience and Reporting Intentions

To understand the extent of adverse event experiences among healthcare professionals and their consequent reporting behaviors, data was gathered and analyzed. The analysis of the Reporting of Clinical Adverse Event Scale (RoCAES) revealed that 60.9% of respondents had witnessed or been involved in an adverse event, with 67.8% reporting these events. Additionally, 45.5% indicated a high likelihood of reporting future incidents, although 27.1% remained neutral, suggesting areas for improvement in encouraging consistent reporting behaviors. Table 7: Adverse Event Experience and Reporting Intentions provides a breakdown of responses indicating the frequency of witnessing or being involved in adverse events, the propensity to report such events, and the likelihood of reporting future incidents.

A significant majority of the healthcare professionals surveyed, specifically 60.9%, reported having witnessed or been directly involved in an adverse event. This prevalence underscores the commonality of such occurrences within healthcare settings, highlighting the ongoing challenges in patient safety that institutions face.

Among those who have encountered adverse events, a substantial 67.8% took steps to officially report these incidents. This level of engagement with reporting systems indicates a relatively high degree of responsiveness and responsibility among healthcare workers towards enhancing safety protocols.

Responses regarding future reporting intentions revealed a positive inclination towards proactive behavior, with 45.5% of respondents indicating they are likely or very likely to report future adverse events. However, nearly 27.1% of participants remained neutral, which suggests there is room to improve confidence and commitment towards reporting. This ambivalence points to potential areas where healthcare institutions can focus to bolster reporting rates and foster a more robust culture of safety and transparency. These insights are vital for healthcare institutions that aim to refine their safety protocols and enhance reporting mechanisms. By understanding the factors that influence reporting behaviors,

Table 7 Adverse Event Experience and Reporting Intentions

Item	Response	N	%
Have you ever witnessed, or been involved in, an adverse event?	Yes	245	60.9
	No	157	39.1
Have you ever reported an adverse event	Yes	166	67.8
	No	79	32.2
	Not applicable	157	Not applicable
How likely are you to report an adverse event in the future?	Very unlikely	52	12.9
	Unlikely	58	14.4
	Neutral	109	27.1
	Likely	123	30.6
	Very likely	60	14.9

healthcare leaders can tailor interventions more effectively, ultimately fostering a culture that prioritizes safety and transparency. This proactive approach is essential for not only addressing incidents as they occur but also for preventing future adverse events through lessons learned and systemic improvements.

Discussion

This study aimed to elucidate the influences of perceived safety culture among healthcare professionals in Saudi Arabia on their attitudes towards incident reporting, with particular attention to variations by level of care, ownership, and professional background. Unlike prior research[27–29] that often concentrated on specific hospital areas such as ICUs or certain medical specialties, this study provides comprehensive baseline data intended to foster broader generalizations across the healthcare system in Saudi Arabia. The key findings demonstrate discernible differences in patient safety culture among hospitals, contingent on ownership, which may be shaped by factors ranging from financial constraints to patient volume.

Earlier research conducted in Riyadh in 2008[30] highlighted critical areas needing attention in governmental hospitals, such as handoff processes and communication openness, whereas private hospitals were urged to enhance staffing and adopt a non-punitive response to errors. Notably, error reporting frequency was higher in private settings compared to public ones, suggesting variances in organizational culture and management practices that could influence reporting behavior.

Our study extends these findings by conducting a comparative analysis across different hospital types, uncovering nuanced insights into organizational dynamics. For instance, governmental non-MOH hospitals generally displayed a slightly better safety attitude and teamwork climate, possibly due to different operational and administrative frameworks. Meanwhile, teaching university hospitals stood out for their stress recognition capabilities, emphasizing a robust understanding of the stressors affecting healthcare workers, yet they, along with private hospitals, need to enhance job satisfaction and management perceptions to cultivate a healthier workplace environment conducive to safety.

Interestingly, despite the higher error reporting rates in private hospitals, governmental non-MOH hospitals scored lowest in this regard. This discrepancy could be linked to the prevalent fear of blame, which aligns with findings from a 2013 study[17] associating error reporting with concerns over repercussions. Furthermore, clarity in reporting procedures and the types of events that should be reported were also identified as significant factors influencing reporting rates, underscoring the need for clear guidelines and a blame-free culture to foster a learning environment from incidents.

Internationally, the adoption of just cultures in various healthcare settings has demonstrated substantial improvements in safety reporting, serving both as a deterrent to safety incidents and a catalyst for proactive improvements. For example, the implementation of the Green Cross method in a Swedish hospital markedly enhanced the patient safety culture compared to other units.[31–37]

Despite these advancements, challenges persist, such as the impact of a diverse multicultural workforce on clinical safety, as noted in a 2012 Saudi Arabian study.[29] Our findings echo this complexity, showing that while Saudi nationals reported higher mean scores in safety attitudes compared to non-Saudis, the differences were not statistically significant, suggesting deeper underlying factors at play. This indicates the need for targeted interventions that address the specific cultural and operational contexts within Saudi hospitals.

Regarding professional demographics, our study found that nurses, paramedics, and dentists were more likely to report incidents, contrasting with physicians and pharmacists who reported less, highlighting distinct professional dynamics that could influence reporting practices. Notably, respondents aged between 41–50 years showed a higher inclination towards reporting, pinpointing an age group that might be more engaged or experienced in dealing with clinical adverse events.

Ultimately, the substantial variation in reporting behaviors, especially among younger healthcare workers and those in primary care settings who reported more frequently, indicates a pressing need for targeted interventions aimed at enhancing reporting rates. This could significantly improve patient safety by ensuring that adverse events are not only reported but also systematically analyzed to prevent future occurrences.

This discussion sheds light on the complex interplay of factors affecting incident reporting in healthcare settings in Saudi Arabia. By addressing these factors, healthcare leaders can better tailor interventions, promoting a safety culture that not only supports the existing reporting mechanisms but also embraces them as integral components of patient safety and care quality enhancement. The findings of this study correlate well with its objectives and contribute to the broader context of research on patient safety culture. The comparison with other studies, particularly those from the Middle East

and other regions, underscores the relevance and applicability of the results. For example, studies from countries like Qatar and UAE have similarly highlighted the impact of organizational culture and management practices on safety attitudes and reporting behaviors.[38] Despite contextual differences, the core principles of fostering a non-punitive, transparent, and supportive safety culture are universally applicable, suggesting that the findings of this study can inform patient safety initiatives in diverse healthcare settings.

Additionally, our findings highlight the critical role of continuous education and training in enhancing patient safety culture. Educational programs focused on patient safety can equip healthcare professionals with the knowledge and skills necessary to identify, report, and prevent adverse events. For example, simulation-based training has been shown to improve clinical skills and teamwork, thereby reducing the likelihood of errors.[39,40] Implementing regular training sessions and workshops on patient safety can help reinforce the importance of reporting and create a more open and supportive environment for discussing errors.

Moreover, the integration of advanced health information technologies, such as EHRs and CDSS, can play a significant role in improving patient safety. These technologies facilitate real-time access to patient data, enhance communication among healthcare providers, and provide decision support to prevent errors. Studies have shown that the use of EHRs and CDSS can reduce medication errors, improve compliance with clinical guidelines, and increase the accuracy of diagnosis and treatment.[41–45] Adopting these technologies in Saudi Arabian hospital.

Limitations

Despite the comprehensive nature and significant findings of this study, it is important to acknowledge several limitations that might have influenced the results. First, although the study encompassed a diverse array of healthcare settings across Saudi Arabia, the sample size—453 participants, with 402 completions—is relatively small given the scale and variability of healthcare professionals in the country. This limitation might restrict the generalizability of the findings across all regions and types of healthcare facilities within Saudi Arabia.

Second, the use of self-reported questionnaires introduces the potential for bias, as respondents may overestimate or underestimate their perceptions and behaviors related to safety culture and incident reporting. Self-reporting can also be influenced by the respondents' desire to present themselves or their organizations in a favorable light, potentially skewing the data.

Additionally, the mixed mode of survey distribution—online and onsite—might have affected the consistency of the responses. The variation in survey administration conditions could lead to differences in response behaviors, thereby affecting the data's reliability.

Lastly, the cross-sectional design of the study captures a snapshot in time and does not account for changes in perceptions or behaviors that might occur due to new safety protocols or changes in hospital management. Longitudinal studies would be required to understand trends over time and to draw more definitive conclusions about the cause and effect relationships between patient safety culture and incident reporting.

These limitations highlight the need for further research with a larger, more nationally representative sample, potentially incorporating more objective measures of safety culture and incident reporting to supplement self-reported data. This would help validate and extend the findings, providing a more robust framework for interventions aimed at improving patient safety and reporting behaviors in healthcare settings.

Conclusions

This study aimed to elucidate the influences of perceived safety culture among healthcare professionals in Saudi Arabia on their attitudes towards incident reporting, focusing on variations by level of care, ownership, and professional background. The findings highlight the significant role of safety culture in influencing incident reporting behaviors, underscoring the need for targeted interventions to improve patient safety practices. Our research reveals that management, working conditions, and job satisfaction are critical factors impacting safety culture and reporting behaviors. Improvements in these areas can create a more conducive environment for safety practices. Moreover, fostering a blame-free culture and establishing clear, accessible reporting guidelines are essential to encourage consistent and honest reporting of clinical adverse events. The positive associations between safety attitudes, teamwork climate, and incident reporting underscore the benefits of cultivating robust safety climates within healthcare institutions.

The study also identified significant variations in safety culture perceptions and reporting behaviors across different hospital types. Private hospitals showed higher error reporting frequencies, while governmental non-MOH hospitals scored lowest, likely due to fear of blame. Addressing these discrepancies through targeted interventions can ensure that safety incidents are reported and utilized effectively for learning and prevention.

The practical implications of these findings are multifaceted. Continuous education and training programs focused on patient safety are crucial. Implementing simulation-based training and regular workshops can enhance clinical skills, teamwork, and promote a non-punitive approach to error reporting. Integrating patient safety and quality improvement modules into medical and nursing curricula can instill a safety-first mindset from the outset of healthcare careers. Longitudinal studies are needed to track changes in safety culture and incident reporting behaviors over time, providing insights into the long-term effectiveness of interventions. Comparative studies between different regions and healthcare systems can help identify best practices and adapt successful strategies to the Saudi context.

Developing and enforcing national policies that mandate standardized reporting procedures and promote a blame-free culture is essential. These policies should include legal protections for healthcare professionals who report incidents and integrate patient safety culture metrics into hospital accreditation standards to ensure continuous monitoring and improvement. Hospital management must demonstrate a strong commitment to patient safety through visible actions and resource allocation. Leadership training on safety culture can help managers support their teams effectively. Implementing robust feedback mechanisms that provide healthcare professionals with timely information on reported incidents and actions taken can enhance trust and encourage more active participation in reporting systems.

In conclusion, by focusing on continuous education, technology integration, supportive policies, and strong management commitment, healthcare institutions can foster a culture that prioritizes safety and transparency. This comprehensive approach will address current challenges and pave the way for sustained improvements in patient safety, ultimately leading to higher quality care and better health outcomes for all patients.

Institutional Review Board Statement (Ethics)

This study strictly adhered to ethical considerations, with approval secured from the Institutional review Board (IRB) and Ethics Committee of King Saud University (Ref No: KSU-HE-23-609).

Data Sharing Statement

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

Informed Consent Statement

The information provided to participants included the study's purpose, the voluntary nature of their participation, and assurances of strict confidentiality and secure data storage. The survey was conducted anonymously, and all respondents consented to participate in the survey. Written consent was obtained from participants who completed the online questionnaire. It is important to note that all participants were 18 years of age or older, and thus, they were legally able to provide informed consent on their own behalf.

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Disclosure

The authors declare no conflicts of interest in this work.

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