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STANDARDS OF QUALITY, OCCUPATIONAL HEALTH, AND SAFETY IN AMBULANCE WORK

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Abstract:

Background: *The demand for Saudi Red Crescent Authority's ambulance services in Najran region is anticipated to continue increasing in demand due to the current ongoing rapid growth of population within the city. This has increased interest in the occupational health of emergency medical service workers at the branch since it directly affects their ability to respond to emergency services needs accordingly and deliver quality and safe services.*

Aim: *To identify the impact of quality standards on paramedics' physical and mental health and provide recommendations for improving work quality and ensuring worker safety.*

Methodology: *Using a cross-sectional descriptive approach, the study collected data through a structured questionnaire distributed to 200 personnel at the Najran branch of the Saudi Red Crescent Authority, with 134 valid responses analyzed using SPSS to assess correlations and regression relationships.*

Results: *Regression analysis of the data collected revealed that quality and safety standards significantly predicted reduced physical illness ($R^2 = 0.096$, $p = 0.023$ and $p = 0.044$) and accidents ($R^2 = 0.126$, $p = 0.043$ and $p = 0.014$), but had no significant impact on reducing physical injuries ($R^2 = 0.012$, $p > 0.05$). These measures also had weak explanatory power with no significant impacts on stress or anxiety ($R^2 = 0.038$, $p = 0.973$).*

Conclusion: *While safety measures effectively mitigate physical health risks for emergency medical service providers, comprehensive mental health interventions are necessary to address the holistic well-being of ambulance workers in high-stress environments.*

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INTRODUCTION: **Background**

The provision of emergency medical care and the transportation of patients to healthcare facilities, such as hospitals and clinics, are vital components of modern healthcare systems. Ambulances play a critical role in reducing fatalities and alleviating pain and distress of victims or patients during medical emergencies. In the Kingdom of Saudi Arabia (KSA) In Saudi Arabia, emergency ambulance services are primarily provided by the Saudi Red Crescent Authority (SRCA). It began in 1934 as Saudi Red Crescent Association but was rebranded to its current name in 2008. Today, the organization operates a system that includes over 400 stations, thousands of ambulances, and trained paramedics (Khattab et al., 2019). SRCA is funded and supported by the Saudi government under Vision 2030 initiatives, charitable donations, private organizations through collaboration and international aid partnerships (Khattab et al., 2019). Demand for its services has been increasing across the nation due to the rising number of medical emergencies. A recent survey found that in 2022, about 14.6 million individuals in KSA visited emergency rooms (ER), with a total number of cases from Riyadh, Jazan, Qaseem, Ha'il, and Medinah accounting for a third of these incidences (Saleh, 2024).

The Najran region (the study's focus region) had about six hundred thousand cases. Although these incidents are lower compared to a region like Riyadh, which had double the number of cases, it is projected to grow significantly in the coming years due to two significant factors. First is the rapid growth and expansion of Najran city, with a rate of about 225% within the last 4 decades. Notably, the Najran region had a population of about 665,031 people in 2019, of which 454,035 live within the city (Kamh et al., 2024). This indicates that about 68.27% of the population within this region lives in Najran City, and considering the congestion of the city and associated traffic, the demand for ambulance services is expected to be higher. It will increase due to transport-related accidents (Kamh et al., 2024). The second reason is the increasing number of people with chronic conditions and chronic disease comorbidities such as diabetes mellitus, hypertension, stroke, and heart disease within Saudi Arabia due to lifestyle changes, unhealthy dietary habits, lack of physical activity, and the rising prevalence of obesity especially in urban areas like Najran city (Alenazi et al., 2024).

Due to the growing demand for ambulance services, there is a significant emphasis on enhancing their quality and ensuring the safety of both patients and healthcare providers. Emergency Medical Services (EMS) are classified as safety-critical organizations, similar to entities like chemical and nuclear facilities, military operations, and hospital trauma centers (Venesoja et al., 2021). Quality and safety standards in ambulatory services encompass structured frameworks designed to ensure the safe, efficient, and effective delivery of care outside inpatient settings (Montano et al., 2016). They mitigate systemic errors by improving process adherence and enhance patient and provider safety in ambulatory care environments which prevent medication errors, facilitate proper communication during the transition from ambulance care to hospital setting care, and fostering a safety culture that encourages reporting and addressing potential hazards.

However, even with these standards, EMS personnel still experience a higher risk of injury than other emergency responders (Hallihan et al., 2019). For instance, a recent study reported that career injury rate among Najran EMS workers is about 37.6% which is high considering the participant had adequate training, high awareness to safety and strictly adhered to safety protocols (Awini et al., 2023) . Interestingly, emergency responders operating at the back of an ambulance face significant health risks as research shows that they along with patients experience higher rates of injuries and fatalities compared to the average driving population (Hallihan et al., 2019). It is estimated that up to 40% of patients in primary and ambulatory care settings experience harm, with as much as 80% (ranging from 23.6% to 85%) of these incidents being preventable (World Health Organization (WHO), 2023). This elevated risk of injuries among both patients and EMS providers makes safety culture a critical area of quality improvement focus, and thus, exploring this topic is one of the critical priorities in scholarly research in recent years (Awini et al., 2023; Hallihan et al., 2019; Khattab et al., 2019; Venesoja et al., 2021).

Research Problem and Question

The Saudi Red Crescent (SRC) Najran branch has been important for its significant role in emergency medical services, notably increasing CPR success rates from 4.74% in 2022 to 13.74% in 2023 and effectively activating heart attack and stroke pathways while coordinating with the Ministry of Health to improve patient care. However, understanding how these services can be improved is essential, given the rising demand for EMS within the region. As identified, ambulance work environments are inherently high-risk, influenced chiefly by quality and safety standards. Significantly, the well-being of ambulance service providers directly influences patient safety, as fatigued, stressed, or poorly trained

personnel may experience diminished decision-making, slower response times, and increased likelihood of errors in patient assessment, communication, or treatment, all of which can compromise the quality of care and potentially lead to adverse events during transport and intervention (Fisher et al., 2015). However, despite proof from scholarly literature that quality and safety standards improve patient and EMS providers' safety by improving the latter's competency, it is not known how these standards specifically affect the health, well-being, and occupational safety of ambulance workers at the SRC Najran branch. Understanding this is essential because their well-being directly impacts patient care, response efficiency, and the overall effectiveness of emergency medical services.

Study Objectives

a) To identify the impact of quality standards on EMS workers' physical and mental health.

b) To provide recommendations for improving work quality and ensuring worker safety.

Research Hypotheses

a) There is a positive relationship between quality and safety standards in ambulance work and the better mental health of paramedics.

b) There is a negative relationship between quality and safety standards in ambulance work and the rates of physical injuries and occupational diseases among paramedics.

c) Quality and safety standards in ambulance work significantly contribute to the overall occupational health and safety of paramedics.

Literature Review

Safety Culture and Its Impact

According to Venesoja et al. (2021), safety culture has multiple definitions depending on the workplace setting and is often synonymously used with safety climate. WHO defines safety culture as the outcome of individuals' and groups' competencies, values, perceptions, attitudes, and behavioral patterns, determining the commitment to and the effectiveness and approach of an organization's health and safety management (Venesoja et al., 2021). Skokan et al. (2020) identified that safety culture constitutes organizational learning, staff training, patient care tracking, communication about errors, and office processes/standardization (quality and safety standards). This was echoed in a systematic review by Noor Arzahan et al. (2022), which found that safety culture in healthcare is made up of management commitment, worker participation, communication, safety training, and error reporting, while safety climate dimensions are leadership commitment, safety awareness, safety communication, and safety resources.

A cross-sectional study by Lu et al. (2022) conducted in Taipei City Hospital Taiwan involving more than 3000 full-time staff (response rate: 59.46%) found that higher patient safety culture scores significantly reduced burnout levels ($\beta = -0.74$, $p < 0.001$) and positively impacted work-life balance ($\beta = 0.44$, $p < 0.001$), with structural equation modeling confirming the robustness of these relationships across demographic and job categories ($\Delta CFI \leq 0.01$, $\Delta TLI \leq 0.02$). Hesgrove et al. (2024), in another quantitative study conducted in the USA using a sample of healthcare providers and staff, found that teamwork, staffing levels, and protection from workplace hazards influenced patient safety culture and workplace safety culture scores. Further quantitative studies by Santa et al. (2018) using a sample of medical doctors, nurses and midwives, ambulance or paramedic staff, pharmacologists and other allied health professionals holding either frontline position or managerial positions in various hospitals within Saudi Arabia found that Quality and safety culture (QSC) fosters open communication, encourage error reporting and learning, reduce adverse events and inefficiencies, improve patient and staff welfare, and promote a focus on system improvements rather than individual blame, all of which contribute to enhanced overall healthcare quality and safety.

Quality and Safety Standards and Safety Culture

A quantitative study by Ladewski & Al-Bayati (2019) involving participants working in different work environments in manufacturing, transportation, communications, electric, gas, and sanitary services, retail trade, finance, insurance, real estate, services, and public administration found that quality and safety standards such as protocols of leadership in managing quality and safety, communication and cooperation, workforce management, process management, continuous improvement, client focus, and client satisfaction impacted organizational leadership, interdepartmental collaboration, employee engagement, error prevention, ongoing enhancements, and the alignment with both employee safety and customer satisfaction. In a healthcare setting, a qualitative study by Rakic et al. (2018), using a population of private healthcare providers within

Srpska, Bosnia and Herzegovina, demonstrated that quality and safety standards enable the enforcement of a safety culture. Specifically, risk management, infection control, fire protection, occupational safety, medical waste management, equipment sterilization, hand hygiene, and adverse event reporting positively impacted patient safety, staff safety, and environmental protection.

Correlation of Psychological Well-Being of Employee and Safety Culture

Studies on safety culture and employee well-being mainly treat safety culture as the dependent factor influenced by the latter. A negative correlation has been reported between the two variables in multiple recent cross-sectional studies, for instance (Chen et al., 2019) in Taiwan, Sani et al. (2024) in Nigeria, and Suptitz Carneiro et al. (2021) in Brazil. These findings were also confirmed by a recent systematic review by Zabin et al. (2023) of 7 cross-sectional quantitative studies (3 conducted in Iran and each of the rest conducted in China, Orman, turkey, and Germany) focusing mainly on the nurse population. Specifically, the review found that increased factors like burnout, fatigue, and workload could lead to decreased attention to safety protocols, leading to higher chances of errors and adverse events.

However, a few of the available literature that treats well-being as the dependent factor of safety culture has found a positive relationship. For instance, a cross-sectional study by Dawa et al. (2024) using a sample of nurses from an Egyptian hospital found a significant negative correlation ($r = -0.141$, $p = 0.02$) between staff nurses' awareness of patient safety culture and their job stress, indicating that higher awareness of patient safety culture is associated with lower job stress, with job stress negatively affecting perceptions of safety culture ($R = -0.198$, $p = 0.02$). A cross-sectional study by Majrabi (2022) using a sample of Saudi Arabian nurses found that a poor safety climate and lack of effective teamwork negatively affected emotional exhaustion, depersonalization, and personal accomplishment. They concluded that a strong safety culture in healthcare promotes employee well-being by addressing threats to safety and minimizing burnout, which can undermine resilience and affect care quality.

Equally, according to a review by Finn et al. (2024) of 42 studies (that used either qualitative or quantitative methodologies) primarily conducted in Western countries (such as the USA, UK, Canada, and Australia) except one from China, one from Iran and another from Jordan further found that safety interventions improved stress recognition, enhanced job satisfaction, improved working condition and reduced emotional exhaustion, burnout, and turnover. These positive employee outcomes were achieved in a safety culture since it leads to a supportive work environment and leadership that promotes better communication and teamwork within healthcare settings (Finn et al., 2024).

Gap

Most existing literature on the impact of safety culture (e.g., Chen et al., 2019; Sani et al., 2024; Suptitz Carneiro et al., 2021) treats safety culture as a dependent variable of staff well-being. In this context, the research has evaluated the impact of employees' well-being on safety culture. Other studies have examined the effect of safety culture on patient outcomes and organizational performance (e.g., Lu et al., 2022; Santa et al., 2018). A few of the only existing literature that has treated safety culture as the independent variable and the well-being of the employees as its dependent variable have focused on healthcare providers in general (e.g., Dawa et al., 2024; Majrabi, 2022) and none on paramedics or EMS providers. Moreover, in Saudi Arabia, the only recently existing study on the culture of safety and well-being of healthcare providers was conducted by Al-Maaitah et al. (2020), which lacks specificity on EMS providers. This is the specific gap that this study intended to address.

Theoretical Framework

We used safety culture theory to develop a theoretical framework for this research. According to the model safety culture concept embodies a forward-thinking approach to enhancing workplace safety and represents how individuals perceive and act concerning safety (Cooper, 2018). It postulates that enhancing occupational safety should involve prioritizing individuals' values, beliefs, and attitudes instead of solely focusing on tangible situational and behavioral factors. The theory further proposes that safety culture is made up of six main constructs: 1) management/supervision (visible safety leadership where leaders prioritize safety, allocate resources, and model safe behaviors), 2) safety systems (formalized strategies and processes designed to control health, safety, and environmental aspects within the organization), 3) risk Management (appraisal, assessment, and control of risks to prevent incidents through systematic identification and mitigation of potential hazards), 4) work pressure (balancing safety with productivity to ensure operational demands do not compromise safety standards, 5) competence (ensuring all employees possess the necessary

knowledge, skills, and abilities to perform their duties safely through comprehensive training programs) and 6) procedures and rules (codified guidelines that govern safe behaviors and operational practices, helping to standardize safety practices and ensure consistency) (Cooper, 2018). We derived four major items to assess our independent variables (quality and safety standards), namely safety equipment adequacy, established safety protocols, regular safety training, and safety checks and audits. Dependent variables for the study are physical health (measured using the outcomes of physical injuries and work-related illnesses) and mental health (examined using work-related stress, anxiety, burnout, and distress).

METHODOLOGY:

Type of Research

A cross-sectional descriptive approach was adopted as we aimed to collect data at a single point in time to test how safety measures impact both the physical and mental well-being of paramedics. Notably, due to resource constraints, this methodology was appropriate as it enabled us to assess the existing relationship between quality and safety standards and the occupational health of ambulance workers without the need for an extended data collection period.

Data Collection Tools

A structured questionnaire consisting of three sections was used to gather the data (Appendix A). Section 1 is composed of demographic questions on participants' gender, age group, role in the ambulance service, and years of experience working in ambulance services. Section 2 was made up of 4 questions rated on a five-point Likert scale and they specifically measured participants' perceptions of safety equipment adequacy, established safety protocols, regular safety training, and the frequency of safety checks and audits. The last section comprised 7 questions which were rated also on a five-point Likert scale and evaluated participant experiences with physical injuries, work-related illnesses, management of work-related stress, reduction of anxiety during emergencies, prevention of burnout, and mental protection from emotional distress. The questionnaire was developed by the researcher based on the theoretical framework and literature review.

Research Sample

The target population for this research comprised all field staff working at the Najran branch of the Saudi Red Crescent Authority. A convenience sampling technique was utilized to select study participants. Ambulance workers often work irregular hours, including night shifts and weekends, making it challenging to implement more stringent sampling methods such as random sampling. Our chosen sampling technique helped us select available field staff (paramedics, drivers, medical technicians, and supervisors) for participation to ensure we attained a manageable sample size within the constraints of the study's timeline and resources. We distributed the questionnaire to 200 personnel working at the Najran branch out of which we received back 160 filled questionnaires. However, 26 of them were excluded from the analysis as they were incomplete or partially filled. Therefore, the total sample size of our study was 134 responders.

Data Analysis

Data analysis was done with the help of Statistical Package for the Social Sciences (SPSS). Descriptive statistical analysis was done to summarize the demographic characteristics of the sample and the distribution of responses related to quality and safety standards. Pearson correlation coefficients were performed to assess the strength and direction of the associations between quality and safety standards and both mental and physical health outcomes. Finally, we conducted multiple regression analyses to determine the predictive power of quality and safety standards on overall occupational health and safety.

Ethical Considerations

The principal investigator of this study sought ethical approval from Saudi Arabia's Red Crescent Authority (SRCA)'s institutional review board (IRB) (H-01-R-110). A written informed consent to participate in this research was obtained from all participants. Survey responses were anonymized by removing personal identifiers and assigning unique codes to each participant. The researcher also ensured that the responses were safely stored and accessible only to authorized personnel.

RESULTS:

Demographic Characteristics

	Characteristics	Number	Percentage
Gender	Male	133	99.3%
	Female	1	0.7%
Age	18-24	0	0%
	25-34	5	3.7%
	35-44	59	44.3%
	45-54	67	50%
	55+	3	2%
Roles	Paramedic	8	0.06%
	Driver	2	0.01%
	Medical Technician	120	90.%
	Supervisor	4	0.03%
Experience	0-1 years	0	0%
	2-5 years	0	0%
	6-10 years	7	5%
	11-15 years	40	30%
	more than 15 years	87	65%

99.3% were males, while 0.7% were females. Most of them fell within the age group 45-54 years (50%), and 44.3%, 3.7%, and 2% were aged between 35-44 years, 25-34 years, and 55+ years, respectively. 90% of the participants were medical technicians, 0.06% were paramedics, 0.01% were drivers, and 0.03% were supervisors. In terms of experience, 65% had more than 15 years of experience, 30% had 11-15 years, 5% had 6-10 years, and 0% had 0-1 years or 2-5 years of experience.

Correlation Analysis Results

The Pearson correlation analysis reveals several significant relationships between various workplace safety and stress-related factors (Appendix B). First, the Safety Equipment Adequacy was positively correlated with Established Safety Protocols ($r = 0.300$, $p < 0.001$) and Regular Safety Audits ($r = 0.187$, $p = 0.031$), suggesting that better safety equipment is associated with more formal safety protocols and audits. Regular Safety Training also showed positive but weaker correlations with Established Safety Protocols ($r = 0.215$, $p = 0.013$) and Regular Safety Audits ($r = 0.149$, $p = 0.086$). Interestingly, Reduced Physical Injuries had no significant correlation with any safety practices except Manage Stress Effectively ($r = 0.304$, $p < 0.001$), which is strongly linked to Reduced Stress and Anxiety Levels ($r = 0.206$, $p = 0.017$), indicating that effective stress management may reduce both stress and physical injuries.

A significant negative correlation was found between Safety Equipment Adequacy and Reduced Physical Illnesses ($r = -0.247$, $p = 0.004$), and between Regular Safety Audits and Reduced Physical Accidents ($r = -0.269$, $p = 0.002$), suggesting that better safety equipment and audits may help in reducing physical issues. However, Reduced Emotional Burnout had a positive relationship with Reduced Emotional Distress ($r = 0.274$, $p = 0.001$), suggesting that managing burnout may contribute to emotional well-being.

Regression Analysis Results

Physical Health

The regression analysis investigating the impact of quality and safety standards on physical well-being reveals mixed results across different physical health outcomes (Appendix C). For Reduced Physical Injuries, the model indicates very weak explanatory power, with an R-squared value of 0.012, suggesting that the safety measures (Safety Equipment Adequacy, Established Safety Protocol, Regular Safety Training, and Regular Safety Audits) collectively account for only 1.2% of the variance in physical injuries. None of the safety variables were statistically significant predictors of reduced physical injuries, as all p-values were above the threshold of 0.05, indicating no meaningful relationship.

In contrast, for Reduced Physical Illnesses, the regression model showed a better fit with an R-squared value of 0.096, explaining approximately 9.6% of the variance in physical illnesses. Significant

negative associations were found between Safety Equipment Adequacy (B = -0.271, p = 0.023) and Regular Safety Audits (B = -0.241, p = 0.044), suggesting that higher safety equipment adequacy and more frequent safety audits are associated with a reduction in physical illness. Finally, for Reduced Physical Accidents, the model performed the best, with an R-squared value of 0.126, explaining 12.6% of the variance in physical accidents. Both Safety Equipment Adequacy (B = -0.216, p = 0.043) and Regular Safety Audits (B = -0.264, p = 0.014) were significant predictors, indicating that better safety equipment and more frequent audits are associated with fewer physical accidents.

Mental Health

The regression analysis of the impact of quality and safety standards on mental health outcomes revealed varying results across different measures of mental well-being (Appendix D). In terms of Managing Stress Effectively, the model exhibited a very weak explanatory power, with an R-squared value of 0.038, indicating that the safety measures (Safety Equipment Adequacy, Established Safety Protocol, Regular Safety Training, and Regular Safety Audits) explained only 3.8% of the variance in the ability to manage stress. None of the safety variables were statistically significant predictors, with p-values above the 0.05 threshold for all predictors. This suggests that the quality and safety measures did not have a significant impact on participants' stress management abilities. For Reduced Stress and Anxiety Levels, the model also showed a very weak fit, with an R-squared value of 0.004 and a p-value of 0.973 for the ANOVA test, indicating that the safety measures did not explain the variance in reduced stress and anxiety. None of the safety variables were significant, as all the p-values for the individual coefficients exceeded 0.05, with Safety Equipment Adequacy, Established Safety Protocol, Regular Safety Training, and Regular Safety Audits all showing no meaningful impact on stress and anxiety reduction.

Regarding Reduced Emotional Burnout, the model had a slightly better fit with an R-squared value of 0.044. While none of the predictors were statistically significant at the 0.05 level, the Regular Safety Training variable showed a marginally significant trend (p = 0.087). However, the overall lack of significant findings suggests that safety standards had little effect on emotional burnout reduction. Finally, for Reduced Emotional Distress, the results were similar to the other mental health outcomes, with an R-squared value of 0.022 and no significant predictors. Safety Equipment Adequacy showed a negative association with emotional distress (B = -0.138), but the p-value of 0.125 indicates that it was not statistically significant.

DISCUSSION:

Effective implementation of comprehensive safety measures and the consistent use of personal protective equipment (PPE) is essential in reducing workplace injuries and occupational diseases as well as enhancing overall health, safety, and environmental (HSE) outcomes by mitigating risks associated with operational hazards (Benson et al., 2023). In this study, both the correlation and regression analyses found that Safety Equipment Adequacy and Regular Safety Audits were significantly associated with reduced physical illnesses and accidents. The reason for this as identified in studies by Afework et al. (2024) is that employees with adequate training on and access to safety equipment have a higher likelihood of taking safety precautions. However, we found that safety measures had little impact on reducing physical injuries as they accounted for only 1.2% of the variance. Though the rationale for these findings is not clear from this study, studies conducted in the recent past have attributed such results to employees' non-compliance behaviors. For instance, Umugwaneza et al. (2019) found that while most participants (individuals working in steel manufacturing companies) recognized the occupational health and safety hazards in their workplace, they often neglected to wear personal protective equipment (PPE). Similarly, in a study by Atasoy et al. (2024) involving participants working in construction, it was found that they inconsistently utilized PPE as they felt they were uncomfortable to wear and slowed their pace when working.

Additionally, findings found a positive correlation between managing stress effectively and reduced stress, anxiety, and emotional burnout associated with reduced emotional distress. However, a weak relationship was identified between safety measures and mental health. Based on regression analysis safety equipment adequacy variable had a negative association with emotional distress, though this relationship was not statistically significant. Overall, none of the safety variables significantly predicted reduced stress, anxiety, or emotional burnout. This is in contrast with the current literature on safety culture which positively associates safety and quality measures with better mental health outcomes for employees (Atanackovic et al., 2024; Hesgrove et al., 2024; Rozaq, 2022). However, it is worth noting that this study only examined one aspect of safety culture (quality and safety standards). According to Juba

(2024), workplace safety encompasses comprehensive health and wellness programs integrated into the organizational structure through strong leadership support and a supportive culture, active employee participation and ownership, effective communication and training on safety protocols and stress management, ergonomic workplace design, flexible work arrangements to balance personal and professional responsibilities, access to mental health resources such as counseling and resilience training, continuous evaluation and feedback mechanisms to tailor initiatives to diverse employee needs, and the promotion of a psychologically safe environment where employees feel valued, empowered, and motivated to engage and perform optimally. Thus, it might be that one aspect was not perceived by the participants of our study to have such a significant impact on improving their mental health outcomes, especially considering the first-paced nature of ambulatory work, its intensity, and the risks associated with it.

The positive association between safety equipment adequacy and regular safety audits with reduced physical illnesses and accidents underscores the critical importance of investing in high-quality safety infrastructure and consistent monitoring practices. For EMS providers operating in high-risk environments, such as Najran with its rapidly expanding population and increasing incidence of chronic diseases, ensuring that paramedics are equipped with the necessary tools and that safety protocols are regularly reviewed and updated can substantially enhance their physical well-being and operational efficiency. However, the minimal impact of these safety measures on mental health suggests that while physical safety is being addressed, mental health support systems are either insufficient or inadequately integrated into the current safety culture. The results underscore the need for EMS organizations should consider implementing comprehensive mental health programs, including counseling services, stress management workshops, and resilience training, to complement the physical safety measures. This would assist in ensuring the creation of a more inclusive safety culture that targets improving overall mental and physical employee well-being which will ultimately lead to a more sustainable and effective emergency medical service workforce.
However, insights from this study are limited by its cross-sectional quantitative design, as data was captured at a single point in time, which prevents the observation of changes and developments in quality and safety standards and their impact on the physical and mental health of paramedics over time. Additionally, the use of a convenience sampling method and the focus on a single branch SRCA ay limit the generalizability of the findings to other regions or EMS settings within Saudi Arabia. Moreover, reliance on self-reported data introduces the potential for response bias, as participants might underreport or overreport their experiences and perceptions. Future investigations need to examine why safety measures at SRCA were not associated with a significant reduction in physical injuries by employees. It should especially explore behavioral aspects such as compliance with safety protocols to improve to inform more accurate interventions. Secondly, given the weak relationship between quality and safety standards and mental health outcomes, future studies should examine additional elements of safety culture that may influence mental well-being. Qualitative research approaches, especially using longitudinal design could provide deeper insights into these areas as it would allow for an in-depth understanding of EMS providers' personal experiences, perceptions, and challenges related to safety practices and mental health that quantitative methods may not fully capture.

CONCLUSION:

Occupational health among EMS staff influence their capacity to deliver quality and safe care services to patients. This cross sectional study examined the influence of quality and safety standards on the physical and mental health of ambulance service workers at the SRCA. Findings showed that while adequate safety equipment and regular safety audits were significantly associated with reductions in physical illnesses and accidents among EMS providers, these safety measures had little to no significant impact on mental health outcomes such as stress, anxiety, and emotional burnout. It was recommended that future efforts should explore the underlying factors undermining effectiveness of safety measures in reducing physical injuries and additional elements needed to address the mental well-being of EMS providers.

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