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ASSESSING SAFETY MECHANISMS IN EMERGENCY MEDICAL SERVICES: A QUALITATIVE STUDY OF AMBULANCE OPERATIONS IN KARACHI

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ABSTRACT

Healthcare workers, particularly ambulance personnel, have become a global concern in areas of safety where many of the workers experience physical, verbal, and psychological violence in high stress environments. Ambulance services in Pakistan were operated at decentralised levels exposing the workers to various risks during emergency response operations. The aim of this research is to examine the safety protocols, communication practices, and risk assessment procedures of three major ambulance service providers in Karachi, Aman Foundation, Edhi Foundation and Jafferia Disaster Cell (JDC). The goal is to fill in safety measure gaps and proposing ways to improve ambulance workers' security. The research design used was qualitative where the researcher utilized 56 participants pulled from these organizations, who were ambulance drivers, medical technicians, and managers. The FGDs and IDIs data were detailed using thematic content analysis. The study of the findings shows, for example, that although Aman Foundation has adopted some advanced safety measures and communication protocols, Edhi and JDC have to work with limited resources and are at risk for their workers. Physical violence, verbal abuse, and road accidents are reported as key hazards on by Edhi and JDC, whose major concern is the lack of safety gear and training. The findings reinforce the need for standardised safety protocols, better equipment and better training. This also recommends the introduction of bulletproof ambulances, presence of dedicated road tracks, as well as greater collaboration with government agencies. The findings help achieve ambulance worker safety, which is consistent with worldwide efforts such as the Health Care in Danger project run by the International Red Cross.

Keywords: Safety Mechanisms, Emergency Medical Services, Ambulance Operations, Qualitative Study, Karachi

INTRODUCTION

Pressing current global issue is the safety and security of the healthcare workers, especially for those engaged in emergency services (Søvold et al., 2021; Murray et al., 2020). Ambulance workers and healthcare providers in particular are more exposed to all kinds of violence in the course of their duties (Cenk, 2019; Lawn et al., 2020). More than a third (38%) of healthcare workers in the United States have been victims of physical violence in their careers, or 8% to 38% of healthcare workers worldwide (Liu et al., 2019; Mento et al., 2020). This problem is particularly prevalent in high stress situations (e.g. disaster zones, conflict areas, or emergencies) where ambulance paramedics are likely to encounter aggressive behavior from patients, their attendants or bystanders (Branas et al., 2020).

Similar to Rescue 1122 in Punjab, ambulance services in Pakistan are not run under a centralized control system like in Pakistan but are aided by private service providers such as Edhi Foundation, Aman Foundation and among others Jafferia Disaster Cell (JDC). In most cases, these organizations are not standardized in terms of safety protocols, and they therefore leave workers exposed to physical, verbal, and even chemical hazards during emergency 'respond,' (Behie et al., 2020; Orloff, 2021). Consequently, the safety of the healthcare workers as well as the overall efficacy and reliability of emergency medical services are compromised (Barten et al., 2021; Troyer & Brady, 2020).

Ambulance worker risks are multifaceted (Granter et al., 2019; Wines et al., 2019). Mob violence, armed conflicts, chemical spills, and natural disasters are the examples that range from a lack of training, insufficient safety equipment, bad protocols of communication (Severin & Jacobson, 2020; Symons, 2019). For instance, local studies found that 81% of Karachi's healthcare workers had experienced verbal abuse, and 14.6% had been hit. Additionally, the lack of a standard approach to how to dispatch ambulances or how to assess risks in a field creates high risk for untoward events (McElhenie, 2020; Galeano, 2019).

Ambulance services in Pakistan have issues in terms of organization corroborated as they play a critical role in pre hospital care (Tran et al., 2019; Yousuf et al., 2021). Despite international studies focusing on the necessity to embrace enhanced safety mechanisms like in-vehicle monitoring along with automated communication systems (Ameen et al., 2020), local providers usually work with limited resources (Cichosz et al., 2020; Ahangar et al., 2021). For example, Aman foundation ambulances carry defibrillators and portable ventilators whereas Edhi and JDC ambulances carry oxygen cylinders and stretchers. Aman Foundation has implemented a set of detailed risk assessment and communication protocols which Edhi and JDC lack in.

This is the first of its kind research in Pakistan addressing the urgent need of developing comprehensive safety protocols for ambulance workers. This study explores three factors by examining existing safety measures, communication procedures, and risk management procedures across the main ambulance service provider organizations and then identifies the gaps and proposes recommendations for safer work practices. The findings can be incorporated in the broader endeavour to improve emergency medical services in line with larger projects such as the Health Care in Danger (HCID) project by the International Red Cross (Aeiliya's thesis). The final goal of this thesis is to create a safer workplace for ambulance workers so that they are protected both from themselves and the ability to get efficient emergency care.

METHODOLOGY

This study used exploratory qualitative research design to investigate the field safety and security mechanisms offered to ambulance workers in Karachi. The objective was to learn about experiences and perceptions of ambulance workers, emergency medical technicians, and managers with regard to workplace hazards and safety protocols. This research was conducted with three important ambulance service providers in Karachi: Jafferia Disaster Cell (JDC), Edhi Foundation and Aman Foundation, all of which are necessary parts of the city's emergency response system and this is done by charitable organizations. Ambulance drivers, emergency medical technicians, control room staff and managers of these organizations formed the study sample.

The participants were selected for the study through purposive sampling and only those who directly engaged in field operations were approached. In total, 50 participants participated in six Focus Group Discussions (FGDs) and six In Depth Interviews (IDIs). Saturation was reached data collection after five IDIs and four FGDs, however all planned induced sessions were conducted to comprehensively capture the participants' views.

For the data collection, FGDs and IDI were employed. Ambulance drivers, medical technicians, and field staff were interviewed in FGDs to understanding collective experience and what were the common safety concerns. In contrast, IDIs with managers and control room staff were conducted to better grasp on how the organization was performing in terms of its policies and safety protocols and how decisions and risk management were made. The study used FGDs and IDIs in February 2019, at the times convenient for the participants, thereby achieving high participation rates. They lasted between 30 minutes to one hour and were audio and video recorded for accuracy.

Both the FGDs and IDI relied on a structured interview guide which was pre tested prior to the commencement of data collection. Questions on the open ended questions ranged from existing safety measures, communication protocols, risk assessment procedures, hazard in the field encounter and recommended safety improvements. Thus a piloted interview guide in which participants belong to another organization (not included in the main study) was used to refine the tool by incorporating probes in order to strengthen clarity as well as comprehensiveness.

Transcription of verbatim FGDs and IDIs represented the data collected and translated in to English. Several stages of a thematic content analysis approach were used. The researchers then read the transcripts multiple times to familiarize themselves with the transcripts and to help them identify recurrent patterns. First, initial codes were generated inductively, and after initial review of a few transcripts, a deductive approach was adopted to fit into emerging themes. Based on the codes, two researchers coded the data independently and developed the broad themes. Discrepancies during the coding process were discussed in consensus with the supervisor and any discrepancies that were present were resolved. The credibility of the findings was strengthened with methodological triangulation between the findings derived from the FGDs and IDIs. The COREQ (Consolidated Criteria for Reporting Qualitative Research) was adhered to to guarantee rigor and transparency in the research process.

This study lasted for six months from February 2019 to July 2019 during which one month spanned the period of data collection in February 2019 for one month while the remaining five months were allotted for data analysis and report writing from March to July 2019. A comprehensive methodological approach enabled a thorough evaluation of the safety and security mechanisms available to ambulance workers in Karachi.

Ethical Considerations

The Institutional Review Board (IRB) and management of the participating organizations approved the work. All the participants were given information regarding the study objectives, details of the study and their right to withdraw without any consequence at any stage. Informed consent was secured from all the participants. Transcripts were excluded of identifiable information to maintain anonymity.

RESULTS

The results of this exploratory qualitative study revealed significant insights into the safety and security mechanisms employed by ambulance workers in Karachi. Data from 56 participants were analyzed, leading to the identification of seven broad themes. These include hazards faced by ambulance drivers, existing safety measures, communication protocols, risk assessment procedures, specific responses to hazardous situations, patient shifting protocols and monitoring mechanisms. Key findings are outlined below:

Hazards Faced by Ambulance Drivers

Participants reported facing physical violence, verbal abuse, road accidents, and psychological stress. Notably, ambulance workers were frequently targeted during mob violence and incidents involving armed conflict. High-speed driving under pressure and poor traffic conditions further exacerbated safety risks. One paramedic described the hostility faced during violent incidents: *"During riots, we are seen as part of the authorities rather than as neutral aid workers. People have thrown stones at us, and sometimes, they try to pull patients out of the ambulance." (Ambulance Driver 3)*

Verbal abuse from the public was also a common challenge for ambulance personnel. A driver shared his experience:

"People expect us to reach them instantly, but they don't realize the traffic situation. I have been cursed and threatened just because I was a few minutes late." (Ambulance Driver 1)

Table 1: Frequency of Hazard Reports in Ambulance Operations

Type of Hazard	Frequency of Reports
Physical violence	High
Verbal abuse	Very high
Road accidents	Moderate
Psychological stress	High

Existing Safety Measures

Aman Foundation reported to have relatively advanced safety protocols, including safety gear and emergency medical equipment, Moreover the ambulance workers from Aman foundation said that their ambulances were better equipped with essential equipment to ensure safety.

"It's just like a running hospital where we not only have facilities of primary care but also of secondary care in which there is cardiac monitor, defibrillator, pulse oximeter and glucometer. We also have reflector jackets, which, during fire incident one can use" (Manager 2, Ambulance 1)

Edhi and JDC workers reported that they lacked basic protective equipment. Training programs at Aman Foundation also encompassed communication skills and disaster management, unlike the limited training focused on basic life support provided at Edhi and JDC.

"*We have gloves and mask only. We use it in each patient and during hospitalization as well". (Ambulance driver 16)*

Table 2: Safety Gear and Training Programs Across Ambulance Organizations

Organization	Safety Gear	Training Programs
Aman Foundation	Advanced (gloves, jackets)	BLS, Disaster Management
Edhi Foundation	Basic (gloves, masks)	BLS only
JDC Foundation	Limited (masks, basic kits)	BLS only

Communication Protocols

Most of the communication at Aman is done by using specific communication codes. They said that command and control coordinates with law enforcement agencies (LEA), rangers and media to communicate and guide actions of field teams. Participants from Aman Foundation also said that in situations where they needed to make decisions on the basis of field situation, team leader was responsible to make such decisions.

"*When the call is given to command and control (CNC) the operator will process it according to Medical priority dispatch system (MPDS). Police 15 and rangers are immediately alerted so that the safety concern of staff on the ground can be addressed we not only mobilize our vehicles but also inform other agencies like EDHI, CHIPPA. We also try to inform fire brigade, Rangers and police if we can". (Manager 3, Ambulance 1)"*

In contrast, Edhi and JDC respondents said that primarily relied on wireless communication without standardized protocols for risk assessment or coordination with law enforcement.
"Our first priority is to reached to an emergency, pick up the injured patient and shifts him to the nearest hospital" (Ambulance Driver 4)

Table 3: Communication Tools and Risk Assessment Practices Across Ambulance Organizations

Organization	Communication Tools	Risk Assessment
Aman Foundation	Wireless, GPS trackers	Structured
Edhi Foundation	Wireless only	Limited
JDC Foundation	Wireless only	Limited

Risk Assessment Procedures
Risk assessment mechanisms were minimal at Edhi and JDC, with decisions often left to the discretion of field workers as they reported that
"*We don't care our self and vehicle at that time; we just try to shift the injured person to the hospital at any cost". (Ambulance Driver 3).*
However, Aman Foundation reported that they maintained structured protocols, emphasizing personal safety and thorough site evaluation before engagement.
"For us, the personal safety comes first. If the scene is secure then all team members are secure. If the scene is not secure, the staff is ordered not to move" (Ambulance worker 9)

Specific Responses to Hazardous Situations
Responses to high-risk scenarios, including bomb blasts, chemical spills, and mob violence, varied significantly. Aman workers stated that they adhered to established guidelines, as they have specified policy to maintain political, ethnic and sectarian neutrality
"*We have the routes for the rally, so we inform our plans to the decision managers so during the process we don't use the routes. We use alternate route." (Manager 2 Ambulance 1)*
while Edhi and JDC workers reported that they often relied on improvised measures, increasing their vulnerability.
"In risky situations like bomb blast or firing we perform our duties but we are advised to keep our self far away from this type of situation." (Ambulance driver 8)

Table 4: Response Strategies for Various Situations Across Ambulance Organizations

Type of Situation	Aman Foundation	Edhi/JDC
Bomb Blasts	Maintain distance, follow protocol	Ad hoc responses
Chemical Spills	Use protective gear, follow MPDS	Limited tools and training
Mob Violence	Alternate routes, coordination	Reactive measures only

Patient Shifting Protocols
Aman Foundation reported that they implemented systematic patient shifting protocols, ensuring timely communication with hospitals.
"When the call is given to command and control (CNC) the operator will process it according to Medical Priority and Dispatch System MPDS," (Manager 4).
Edhi and JDC claimed that they lack standardized procedures, focusing primarily on immediate first aid and transportation.

"Our command and control (CNC) is communicating with us and they ask about the patient's condition. Then we shift the patient to hospital and do not leave until the patient's condition is better" (Ambulance driver 19)

Monitoring Mechanisms

Aman Foundation also reported that they employed advanced monitoring systems, including speed warnings and feedback mechanisms through their control rooms which monitors them.

"We have quality departments, and we have a security department as well. Security department is linked with admin department; they have the visits, after every 3 months". (ambulance worker 21)

whereas, Edhi and JDC expressed that they relied solely on control room communication, lacking systematic evaluation of field performance. *Our control room gets every report, the attendant informs about the location and then control room forward us that location through wireless, that's how we communicate." (Ambulance Driver, 16)*

DISCUSSION

Results of this study point at the critical gaps and opportunities for ambulance safety and operational efficiency in Karachi. Occupational hazards, particularly safety hazards endangering the safety of ambulance workers, impede the quality of service delivery in emergency health care. In these situations, standards need to be standardized and improved to address safety protocols urgently.

Ambulance workers in Karachi experience high levels of physical violence, verbal abuse and psychological stress as with emergency healthcare worldwide. Studies in India and Turkey corroborate the findings, and equally high levels of work place violence against ambulance personnel are reported. In particular, the reactive nature of violence committed by patient attendants highlights the urgent necessity to implement specific measures to prevent the outbreak of these risks, including conflict resolution training and public awareness campaigns.

The fact that the safety measures between the three organizations which have been studied(Aman, Edhi & JDC) are so different is shocking. Aman Foundation's advanced protocols and safety gear are a good set of benchmarks, but Edhi and JDC ambulances lack even basic protective equipment and that represents the lack of a systemic neglect. This inequality highlights the importance of regulatory control so that ambulance services maintain a common safety standard.

The foundation for the safety and efficiency of ambulance operations is effective communication and risk assessment. Her best practices such as structured protocols, as well as the use of GPS trackers can significantly reduce response time and increase coordination. Edhi and JDC, however, use ad hoc approaches that show the dangers of poor planning and inadequate allocation of resources.

Psychological and financial support systems are necessary to keep up morale and resilience of the workforce. The lack of such mechanisms in Edhi is in contrast to what Aman and JDC offer. Further, the findings suggest a need for personal safety, advanced life support and disaster management training tailored to the work of ambulance workers as part of a program that prepares them for that role.

CONCLUSION

This study concludes with the urgency of establishing comprehensively siloed safety protocols and resource allocation to shield the ambulance workers in Karachi. The most striking difference in the findings was in safety measures, communication systems and training programs of the city's major ambulance service providers. Edhi and JDC ambulances struggle with systemic challenges including inadequate training, few or ad hoc risk assessment practices, few protections, and lack of proper protective gear, while Edhi's and JDC's protocols and equipment closely approximate Aman Foundation's advanced protocols and equipment.

It is clear that workplace violence (physical or verbal abuse, physical or mental pressure) has become a very prevalent phenomenon with the need to involve conflict resolution training and public awareness programmes to create a safer working environment. As GPS trackers and structured risk assessments continue to emerge as key elements of communication protocols, this will lead to enhanced communication protocols, which would in turn improve emergency response efficiency and reduce safety risks.

This study also discusses the need to develop supporting psychological and financial mechanisms for all ambulance workers regardless of their organization. Standards processes, fair resource distribution and working with government agencies are important steps towards protecting workers and improving service delivery.

This research enhances safety and operational effectiveness of ambulance services by filling relevant gaps and has actionable implications for improving emergency medical care across Pakistan.

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