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# ASSESSMENT OF PREHOSPITAL EMERGENCY TRANSPORT SERVICES IN MANAGING RESPIRATORY COMPLICATIONS AND INFECTION CONTROL STRATEGIES AMONG ROAD TRAFFIC ACCIDENT VICTIMS IN DISTRICT KOHAT

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## Abstract

Background: Road traffic accidents (RTAs) are a major public health problem globally . It is characterized by high mortality and disability rates . Improvement of prehospital emergency transport service quality is essential to improve patient outcome through early respiratory management and prevention of infection during transport of patients. Limited evidence is available in Pakistan especially in District Kohat regarding the effectiveness of these services and infection control practices followed by the rescue personnel. Objective: This study was conducted to evaluate the prehospital emergency transport services in management of

respiratory complications and infection control strategies among road traffic accident victims in District Kohat. Methods: A descriptive cross sectional study was carried out on 52 rescue squad personnel including Emergency Medical Technicians (EMTs), paramedics, rescue workers and ambulance drivers working in District Kohat. Data were collected using a structured questionnaire that included demographic information, airway management practices, initial patient assessment, infection prevention and control measures, hand hygiene practices, and challenges faced during emergency transport. The collected data was analyzed with the help of Statistical Package for the Social Sciences (SPSS) and presented in the form of frequencies and percentage. Results: The sample included 52 rescue personnel from different professional categories, with the EMTs, paramedics, rescue workers and drivers being almost equally represented. The nasopharyngeal airway was the most commonly reported airway intervention and was used by 50% of participants. Most rescue personnel in the initial assessment of trauma patients identified bleeding control as the first priority. Concerning infection prevention, around half of the participants said that they had partial knowledge of the measures of blood-borne infection transmission, such as hepatitis and HIV/AIDS. The majority of participants also reported practicing hand hygiene only sometimes, indicating inconsistent compliance with standard infection prevention guidelines. The most frequent problem affecting prehospital emergency care was ineffective communication between rescue teams and healthcare centers. Conclusion: Findings suggest that the rescue personnel of District Kohat have basic knowledge and practical skills in the management of respiratory emergency, especially in airway management and bleeding control. But there are still major gaps in infection prevention knowledge, hand hygiene practices and communication systems. Improvement of staff training, upgrading of ambulance equipment, availability of PPE, promotion of strict infection control practices and improvement of communication between emergency services and hospitals may improve the quality of prehospital emergency transport services and contribute to better outcomes of road traffic accident victims.

**Keywords:** Road Traffic Accidents, Prehospital Emergency Transportation Services, Emergency Medical Services, Respiratory Complications, Infection Prevention and Control, Airway Management, Hand Hygiene, Rescue Personnel, District Kohat, Pakistan.

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## Introduction

Road traffic accidents (RTAs) are among the leading causes of death, disability, and economic loss worldwide, making them one of the most significant public health challenges of the twenty-first century. According to the World Health Organization (WHO, 2023), approximately 1.19 million people die annually due to road traffic crashes, while 20–50 million people sustain non-fatal injuries, many of which result in temporary or permanent disability. Furthermore, road traffic injuries are the leading cause of death among individuals aged 5–29 years, and approximately 92% of global road traffic fatalities occur in low- and middle-income countries, despite these countries having only about 60% of the world's registered vehicles (World Health Organization [WHO], 2023).

Road traffic injuries impose substantial social and economic burdens on individuals, families, and healthcare systems. Beyond mortality, injuries contribute to prolonged hospitalization, permanent disability, reduced quality of life, productivity losses, and increased healthcare expenditure. The WHO estimates that road traffic crashes cost most countries nearly 3% of their Gross Domestic Product (GDP) every year, demonstrating their considerable economic impact on national development (WHO, 2023).

The period immediately following a road traffic accident, commonly referred to as the prehospital phase, is considered the most critical stage in trauma management. This phase begins at the scene of injury and continues until the patient reaches a healthcare facility capable of providing definitive treatment. During this period, emergency medical personnel perform rapid patient assessment, stabilize life-threatening conditions, initiate emergency interventions, and ensure safe transportation to an appropriate hospital. Timely prehospital care has been shown to reduce preventable deaths, minimize secondary injuries, and improve overall patient outcomes by providing early airway management, oxygen therapy, hemorrhage control, spinal immobilization, and rapid transport (WHO, 2023). Prehospital Emergency Medical Services (EMS) constitute an essential component of every healthcare system because they provide the first professional medical contact for seriously injured.

patients. Modern ambulance services are expected to deliver more than transportation alone; they should provide comprehensive emergency assessment, stabilization,

continuous monitoring, and communication with receiving hospitals. The concept of the "golden hour" emphasizes that prompt intervention within the first hour after injury substantially improves survival and reduces complications among trauma victims. Consequently, the effectiveness of EMS depends on trained personnel, properly equipped ambulances, standardized treatment protocols, efficient dispatch systems, and coordinated referral networks (WHO, 2023).

Among the various injuries sustained during road traffic accidents, respiratory complications are among the most common and immediately life-threatening conditions encountered during prehospital care. Trauma involving the head, face, neck, chest, or upper airway can rapidly compromise ventilation and oxygenation. Patients may present with airway obstruction caused by facial fractures, bleeding, aspiration, or soft tissue swelling. Likewise, blunt or penetrating chest trauma may lead to rib fractures, pulmonary contusions, pneumothorax, hemothorax, flail chest, or tension pneumothorax, all of which significantly impair respiratory function. Failure to recognize and manage these conditions promptly may result in hypoxia, respiratory failure, cardiac arrest, multiple organ dysfunction, and death (American College of Surgeons, 2023).

The effectiveness of respiratory management during ambulance transport depends on several factors, including the availability of trained emergency medical technicians (EMTs), paramedics, functional medical equipment, and standardized trauma protocols. Ambulances should be equipped with oxygen cylinders, suction machines, pulse oximeters, bag-valve-mask devices, airway adjuncts, cervical collars, and patient monitoring systems to manage respiratory emergencies effectively. However, emergency medical services in many developing countries continue to face challenges such as shortages of trained personnel, inadequate ambulance equipment, delayed response times, limited financial resources, and inconsistent implementation of evidence-based clinical guidelines. These limitations reduce the quality of prehospital care and increase the risk of preventable complications before hospital arrival. Research conducted in Pakistan has similarly identified deficiencies in ambulance preparedness, equipment availability, and prehospital trauma management, emphasizing the need to strengthen emergency transport systems (Razzak et al., 2013).

In addition to respiratory management, infection prevention and control (IPC) has become an essential component of prehospital emergency care. Trauma patients frequently present with open wounds, fractures, burns, and significant blood loss, exposing both patients and healthcare workers to infectious microorganisms. Ambulances transport multiple patients daily, and contaminated medical equipment, stretchers, environmental surfaces, and reusable devices may facilitate cross-transmission of healthcare-associated infections if proper infection control measures are not implemented. Therefore, standard precautions including hand hygiene, the appropriate use of personal protective equipment (PPE), environmental cleaning and disinfection, safe disposal of contaminated waste, and sterilization of reusable equipment are fundamental to ensuring safe patient transport and protecting both patients and emergency medical personnel (WHO, 2024).

Common challenges (Razzak et al., 2013). The emergency transport systems, mostly in resource-limited districts like Karak, can greatly improve the outcomes of cardiac and respiratory emergencies following RTAs. Representatives and health administrators must prioritize improvements in EMS delivery to reduce preventable deaths and complications during the critical pre-hospital phase. (NU et al., 2025)

The results show that severe injuries, delayed pre-hospital care, and emergency system constraints are significant factors in patient fatality. It may be possible to lower the number of fatalities among victims of traffic accidents by bolstering emergency response systems, enhancing pre-hospital treatment, and guaranteeing sufficient hospital resources. (NU et al., 2025). In Khyber Pakhtunkhwa (KP), road traffic accidents represent a significant public health concern because of increasing traffic volume, mountainous terrain, and long travel distances between accident sites and healthcare facilities. Districts located along major highways frequently receive trauma patients with severe injuries requiring immediate respiratory support and rapid transportation to tertiary care hospitals. However, access to advanced prehospital emergency services remains inconsistent across the province, particularly in rural and semi-urban areas. Studies have reported that many ambulances lack advanced airway management equipment, continuous patient monitoring systems, and adequately trained emergency

personnel, limiting their ability to provide comprehensive prehospital trauma care (Razzak et al., 2013).

## AIMS AND OBJECTIVES

- To assess the Prehospital Emergency Transport Services in Road Traffic Accident Victims in District Kohat.
- To evaluate and Manage Respiratory Complications and infection control strategies among Road Traffic Accident Victims in District Kohat.

## RESEARCH METHODOLOGY

### Study Design

This study will employ a descriptive cross-sectional research design supplemented by a retrospective medical record review component. A cross-sectional design is appropriate for this study as it permits the simultaneous assessment of multiple variables related to prehospital service structure, process, and outcomes at a single point in time. The retrospective component will enable analysis of documented clinical outcomes for RTA victims.

### Study Area / Setting

The study will be conducted in District Kohat, Khyber Pakhtunkhwa, Pakistan. Primary data collection sites will include:

- Rescue 1122 District Kohat headquarters and operational stations

### Target Population

The target population for this study will include:

- Prehospital emergency providers (Rescue 1122 personnel, ambulance drivers, paramedics, first aid technicians, EMT) operating in District Kohat.
- Rescue 1122 supervisors and management personnel (for key informant interviews)

### Sample Size

The sample size for the survey component will be calculated using the formula for estimating a proportion in a finite population:

$$n = Z^2 \times P \times (1-P) / e^2$$

Where: Z = 1.96 (95% confidence level), P = 0.50 (assumed proportion, maximizing sample size), e = 0.08 (8% margin of error). This yields an estimated n = 52 participants.

Adjustments for a finite population and anticipated 15% non-response rate will be applied, yielding a final target sample of approximately 52participants.

### Sampling Technique

A combination of sampling techniques will be employed:

- Purposive sampling: Selection of key informants (Rescue 1122 management, senior emergency physicians) based on their expertise and role.
- Census sampling: All Rescue 1122 operational personnel in District Kohat will be included due to the relatively small and finite nature of this population.
- Convenience sampling: Emergency department healthcare providers will be recruited on the basis of availability and willingness during data collection periods.
- Total enumeration: All relevant medical records meeting inclusion criteria during the specified 12-month period will be included.

Inclusion and Exclusion Criteria

### Inclusion Criteria

- Rescue 1122 personnel and other prehospital providers actively working in District Kohat at the time of data collection.
- Both Male and Female at any age.
- Medical records of RTA victims presenting with documented respiratory complications to study hospitals during the specified period
- Participants providing informed written consent

### Exclusion Criteria

- Medical records with incomplete data on prehospital care or clinical outcomes
- Participants who decline to provide informed consent

### Data Collection Methods

Data will be collected using the following methods:

- Structured self-administered questionnaires for prehospital providers and ED healthcare workers.
- Standardized equipment inventory and condition checklists for ambulances and emergency vehicles.
- Retrospective review of emergency department records, ambulance run sheets, and hospital admission records.

- Semi-structured key informant interviews with Rescue 1122 supervisors and senior emergency technologists.
- Direct observational assessment of ambulance equipment using a validated checklist.

**Ethical Consideration**

**a)** Informed Consent:

Participants should get clear, maybe not too complex information about the study, its purpose and possible benefits, along with their right to step back or withdraw at any time. The consent paperwork, well, needs to be phrased in a language that people can actually understand, and it should also calmly cover any questions or concerns that show up.

**b)** Confidentiality and Privacy

Ethical approval will be sought from the institutional ethics committee. Patient confidentiality will be respected by making the data anonymous, like removing any traceable details. No personal identifiers will be collected at all, so privacy stays protected throughout.

**Data Collection Procedure**

Before starting the data collection process, ethical approval will be obtained from the Institutional Review Board of Kohat University of Science and Technology and also from the relevant ethics committees of the participating healthcare facilities. At the same time, administrative permissions will be arranged from hospital administrators and the heads of departments, so there is no interruption later.

**Data Analysis Procedure**

The data will be analyzed by using the Statistical Package for the Social Sciences, IBM SPSS Statistics, Version 29. For the descriptive part, the variables will be shown as frequencies and percentages, plus mean, standard deviation (SD) and median. For testing differences between independent and dependent variables, we will run

**Regression Analysis and Correlation**

**Results:**

This chapter represents the findings of research study in the same sequence as the sections of questionnaire. A total of 52 participants were approached for research data

collection. For every item, the number and percentage of respondents selecting each response option are presented separately. percentage of profession, age, experience, training, types of respiratory complications and infection control strategies are mentioned separately in specific tables and figures.

### *4.1 Distribution on the basis of professional*

A total of 52 rescue squad personnels participated in this study. EMT, rescue worker ,driver and paramedics participated in this research study. Almost each category was in same proportion as shown in following table No 4.1

**Distribution by Profession**

| Frequency | | | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | EMT | 13 | 25.0 | 25.0 | 25.0 |
| | rescue worker | 13 | 25.0 | 25.0 | 50.0 |
| | Driver | 13 | 25.0 | 25.0 | 75.0 |
| | Paramedic | 13 | 25.0 | 25.0 | 100.0 |
| | Total | 52 | 100.0 | 100.0 | |

**Distribution on the basis of experience**

A total of 52 rescue squad personnels participated in this study. EMT, rescue worker, driver and paramedics participated in this research study. Almost 4-6 years experience was noticed in greater proportion (38%) as shown in following table No 4.2.

**Table 4.2 Experience**

| Frequency | | | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 1-3 years | 19 | 36.5 | 36.5 | 36.5 |
| | 4-6 years | 20 | 38.5 | 38.5 | 75.0 |
| | more than 10 years | 13 | 25.0 | 25.0 | 100.0 |
| | Total | 52 | 100.0 | 100.0 | |

**Distribution on the basis of airway management**

EMT, rescue worker, driver and paramedics participated in this research study. Almost nasopharyngeal airway management was noticed in greater proportion (50%) as shown in following table No 4.3.

### Airway Management

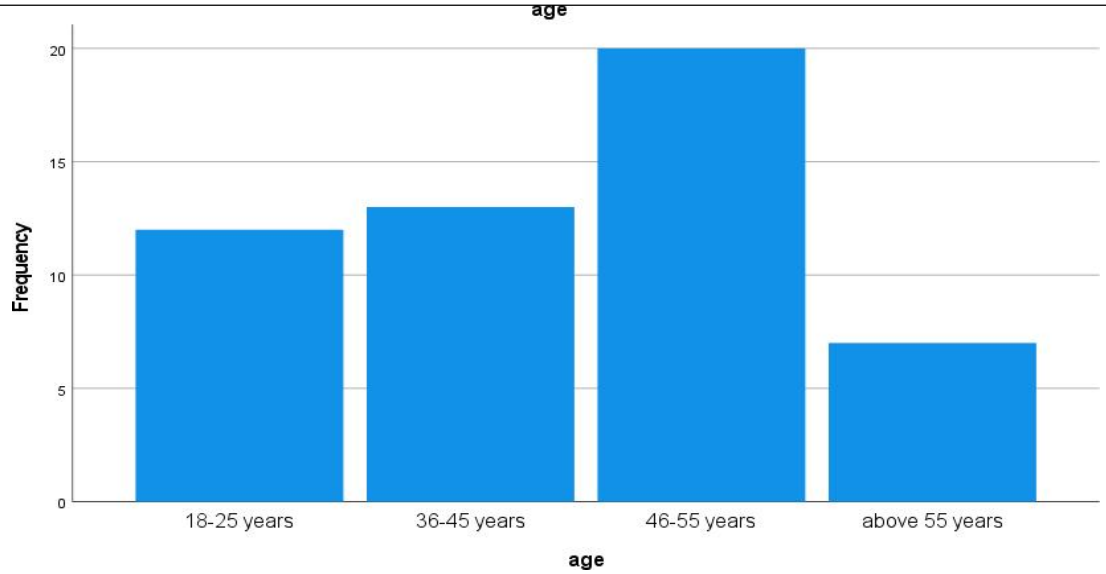
| Frequency | | | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | oropharyngeal airway | 13 | 25.0 | 25.0 | 25.0 |
| | nasopharyngeal airway | 26 | 50.0 | 50.0 | 75.0 |
| | surgical airway | 13 | 25.0 | 25.0 | 100.0 |
| | Total | 52 | 100.0 | 100.0 | |

### Distribution on the basis of challenges

According to the following table of challenges, poor communication was noticed in greater proportion (50%) as shown in following table No 4.4.

Table 4.4: *Challenges*

| Frequency | | | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | delay in reaching the scene | 7 | 13.5 | 13.5 | 13.5 |
| | poor communication | 26 | 50.0 | 50.0 | 63.5 |
| | skill gap | 19 | 36.5 | 36.5 | 100.0 |
| | Total | 52 | 100.0 | 100.0 | |




This figure shows frequency of age distribution of rescue squad which have participated in our research. According to the graph mostly rescue squad members were aged from 46-55 and then 36-45.

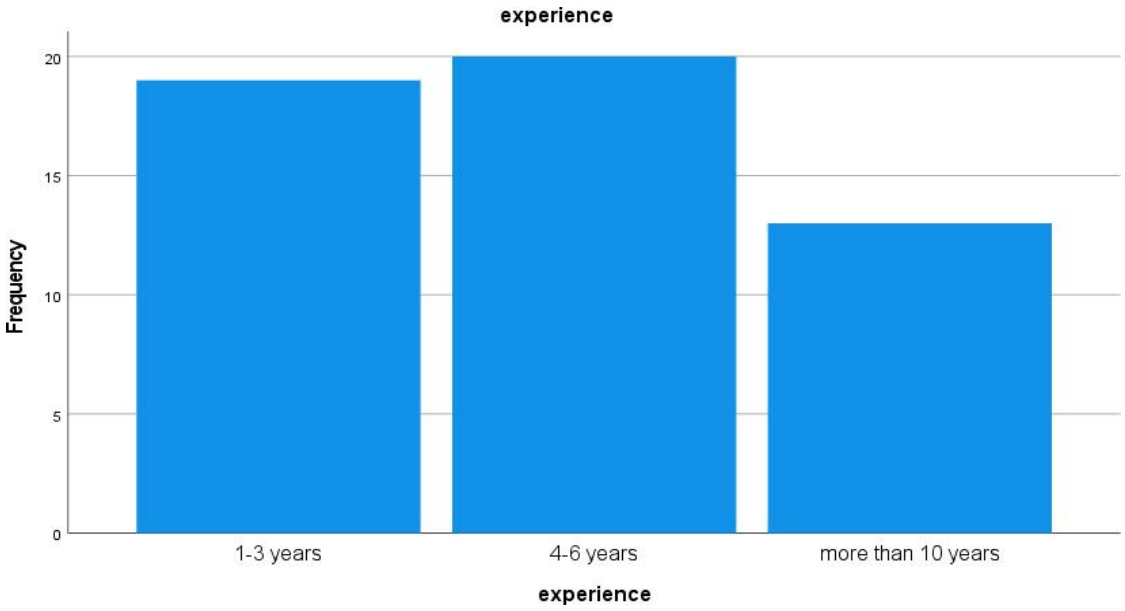
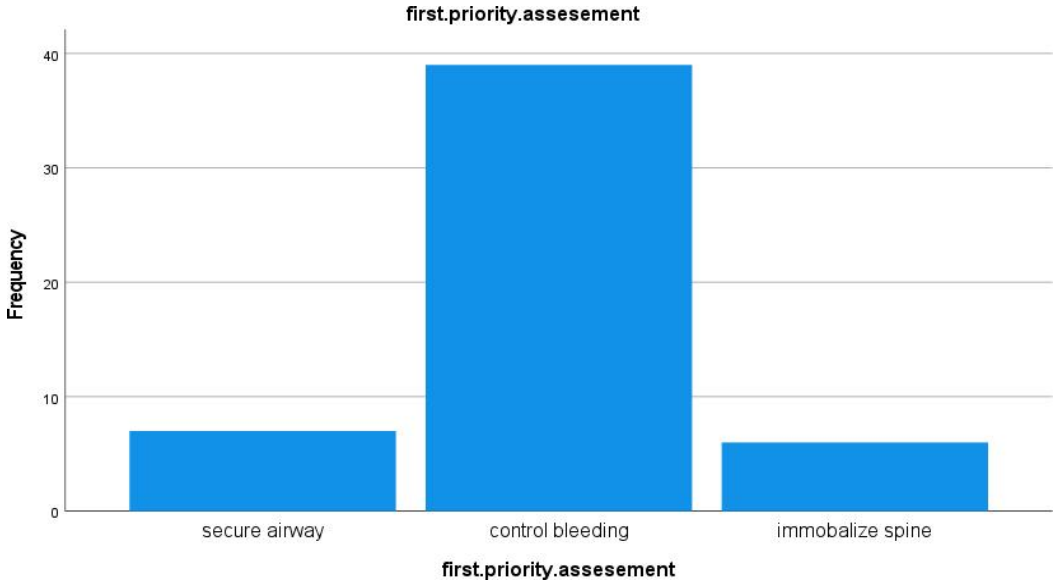



Figure is showing experience of rescue squad who were participated in this research. It is cleared from the graph that squad having experience 4-6 years in field were reported On greater scale and then 1-3 years and so on.




This figure shows frequency of first priority assesement to patients from rescue squad which have participated in our research. According to the graph mostly rescue squad members were giving priority to control bleeding.

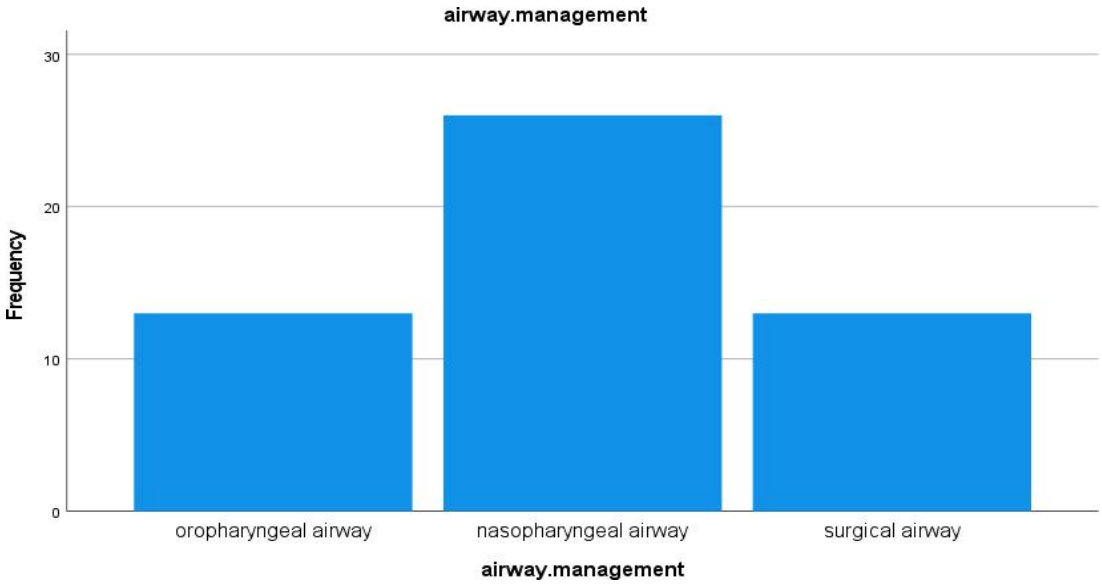
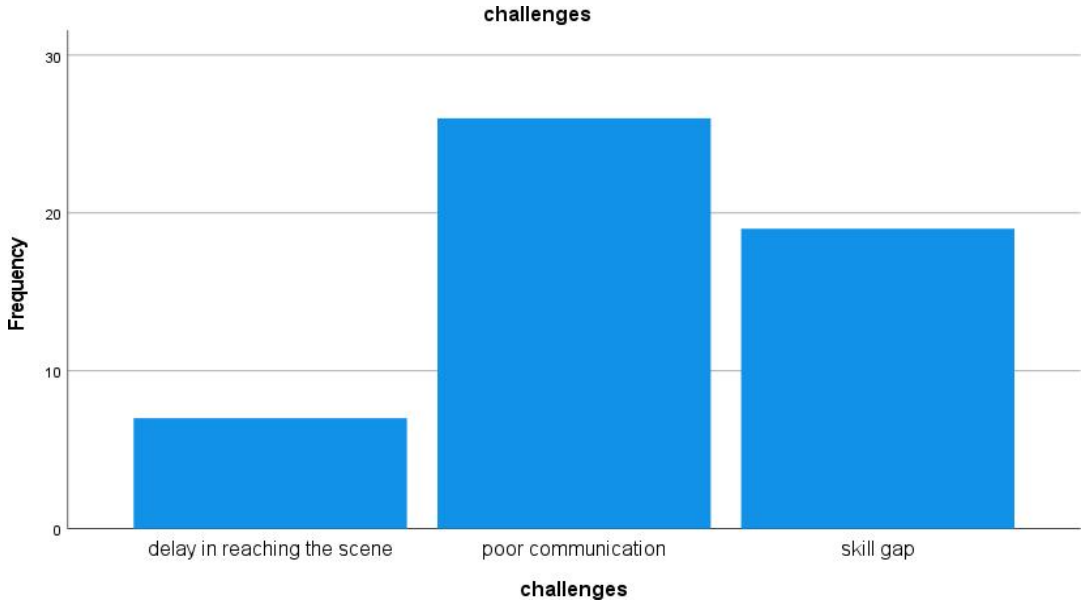



Figure is showing response for airway management from the rescue squad who were participated in this research. It is cleared from the graph that squad were mostly managing nasopharyngeal airway as per our research.




This figure shows frequency of challenges to rescue squad which have participated in our research. According to the graph mostly rescue squad members were claiming poor communication as a greatest challenge

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## Discussion

A total of 52 rescue squad personnels participated in this study. EMT, rescue worker ,driver and paramedics participated in this research study. Almost each category was in same proportion. EMT, rescue worker, driver and paramedics participated in this research study. Almost nasopharyngeal airway management was noticed in greater proportion (50%) as shown in table No 4.3.

Frequency of first priority assessment to patients from rescue squad were also accessed which have participated in our research. According to the graph mostly rescue squad members were giving priority to control bleeding . Figure is showing response for airway management from the rescue squad who were participated in this research. It is cleared from the graph that squad were mostly managing nasopharyngeal airway as per our research. Proportion of of AIDS and hepatitis control management skill from rescue staff have been traced Which have participated in our research. According to the graph half staff was partially aware from AIDS and hepatitis control management. Our research also shows frequency hand hygiene practices for rescue staff which have participated in our research. According to the graph mostly rescue staff were following hand hygiene sometimes only.

Research findings also shows frequency of challenges to rescue squad. According to the graph mostly rescue squad members were claiming poor communication as a greatest challenge. This study evaluated how prehospital emergency transport services helped victims of traffic accidents in District Kohat manage respiratory issues and infection control techniques. Emergency Medical Technicians (EMTs), paramedics, rescue workers, and ambulance drivers were among the 52 rescue squad members that took part in the study. The participation of different professional categories provided a broad understanding of current prehospital emergency practices and the challenges faced by rescue teams during patient transport.

The results demonstrated that nearly every professional category had comparable representation. The interdisciplinary structure of emergency medical services, where each team member has a distinct role in patient care, is reflected in this balanced participation. Delivering prompt and secure prehospital care requires efficient coordination between EMTs, paramedics, rescue personnel, and drivers. The World

Health Organization has documented similar findings by the World Health Organization (WHO, 2023), which claims that coordinated coordination among emergency medical professionals enhances patient stabilization and lowers avoidable transportation-related deaths.

The study's conclusions are significant because they offer local proof of the advantages and disadvantages of prehospital emergency transport services. The findings can help legislators, emergency service groups, and healthcare managers create focused plans to enhance communication systems, infection control procedures, airway management, and emergency response in general. Improving these areas will result in better clinical outcomes, safer patient transport, and lower fatality rates among victims of traffic accidents.

## Conclusion

Road traffic accidents are a significant public health issue and remain a heavy burden on individuals, families and health systems. The period from the scene of the accident to the hospital is often the most critical phase of patient care, especially when respiratory complications develop in the victim. Rapid prehospital emergency transport services save lives through early assessment, airway management, oxygen administration, vital sign monitoring and safe transportation of patients to an appropriate health care facility.

During transport, respiratory issues include respiratory failure, pneumothorax, chest traumas, and airway blockage need to be treated very away. Emergency medical personnel's clinical expertise, access to necessary equipment, compliance with treatment guidelines, and efficient communication with recipient hospitals all affect the quality of care they deliver. These life-threatening situations can be handled more effectively and patient outcomes can be enhanced by well-equipped ambulances manned by qualified emergency personnel.

Another crucial component of prehospital emergency care is infection prevention and control. Both patients and healthcare personnel can lower their risk of infection by practicing good hand hygiene, wearing personal protection equipment correctly, cleaning and disinfecting ambulances on a regular basis, and managing medical waste safely. Upholding these procedures during patient transfer enhances the general standard of care and makes emergency services safer.

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Prehospital emergency transport services in Pakistan, and especially in District Kohat, still have to deal with a number of issues, such as scarce resources, a lack of qualified staff, erratic emergency equipment availability, and differences in infection control procedures. These restrictions may cause treatment delays and lower the efficacy of emergency care for victims of traffic accidents. Despite these obstacles, improving ambulance services can greatly increase patient safety and survival through greater training, upgraded equipment, standardized clinical procedures, and frequent monitoring.

It is anticipated that this study will yield important data regarding the state of prehospital emergency transport services in District Kohat. In terms of managing respiratory problems and infection control during patient transport, it will assist in identifying current strengths and areas that need development. The results can help policymakers, emergency service providers, and healthcare administrators plan evidence-based strategies to enhance emergency medical services. In general, lowering avoidable deaths and complications among victims of traffic accidents depends on enhancing prehospital emergency transport services. Better trauma care and better health outcomes for the residents of District Kohat will result from investments in trained emergency staff, state-of-the-art ambulance equipment, efficient infection control procedures, and coordinated emergency response systems.

## Recommendation

The following suggestions are made in light of the study's findings to enhance prehospital emergency transport services in District Kohat for the management of respiratory problems and infection control among victims of traffic accidents..

### 1. *Strengthen Training of Rescue Personnel*

To increase the knowledge and practical abilities of EMTs, paramedics, rescue personnel, and ambulance drivers in airway management, respiratory emergency care, bleeding control, and infection prevention, regular training programs should be set up. Staff members should regularly participate in simulation-based training and refresher courses to stay current on emergency care protocols.

**2.** ***Improve Infection Prevention and Control Practices***

Organizations that provide emergency medical services should make sure that infection prevention and control procedures are strictly followed. Continuous training on hand hygiene, proper use of personal protective equipment (PPE), safe disposal of medical waste, and avoidance of blood-borne illnesses like HIV, hepatitis B, and hepatitis C should be provided to rescue personnel. Ambulances should always have enough PPE and disinfectants on hand.

**3.** ***Equip Ambulances with Essential Emergency Equipment***

Emergency equipment such as oxygen cylinders, suction machines, bag-valve masks, pulse oximeters, airway adjuncts, cervical collars, and first-aid supplies should be installed in every ambulance and kept in good working order. To guarantee preparedness for emergencies, ambulance equipment should undergo routine maintenance and inspection.

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