

# Study Descriptive Reality Dealing With Reports Emergency Multiple Injuries In Kingdom Arabic Saudi Arabia

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## Abstract

This study aims to describe the current reality of dealing with emergency reports involving multiple injuries in the Kingdom of Saudi Arabia. The study adopts a descriptive research approach to present an objective picture of the procedures coordination mechanisms and response practices followed by emergency medical services when handling incidents that involve more than one injured person. The focus is on reviewing existing practices as documented in previous studies official reports and relevant research related to emergency response systems. The study relies on analyzing available literature to describe how emergency reports are received classified and managed as well as how resources are mobilized and coordinated among different emergency agencies. Attention is given to identifying common challenges highlighted in earlier studies such as response time communication efficiency availability of trained personnel and adequacy of equipment during multiple-injury incidents. By comparing findings across related research the study provides a comprehensive descriptive overview of the current situation without applying experimental or analytical interventions. The results are expected to contribute to a clearer understanding of strengths and gaps in dealing with emergency reports of multiple injuries thereby supporting future planning and improvement efforts in emergency medical services in the Kingdom of Saudi Arabia.

**Keywords** Emergency Reports Multiple Injuries Emergency Medical Services Prehospital Care Saudi Arabia

## - introduction

has a sophisticated system for handling emergency and multi-casualty disaster reports relying primarily on a unified central reporting system that links the operations rooms of the Saudi Red Crescent Authority with various security and health sectors. Upon receiving a report of a major incident the medical triage protocol is activated. Immediate on-site assessment aims to classify the injured based on the severity of their condition to ensure the most efficient use of available resources. Advanced geolocation and wireless communication technologies are employed to guide field teams and ambulances to locations with high accuracy and speed. Qualified personnel also play a crucial role in this process. Emergency medical and ambulance teams are trained in crisis management scenarios and crowd control especially during Hajj and Umrah seasons during which the Kingdom gains unique global experience. This is accompanied by close coordination between the Red Crescent and the Ministry of Health through the Command and Control

Center which manages the distribution of injured people to hospitals according to [ the plan/resources] Its capacity and specialized capabilities prevent the overcrowding of cases in one facility and ensure that every injured person receives the necessary care in a timely manner with these operations supported by air ambulance to reach remote or crowded areas<sup>8,6</sup>

Moreover the reality of dealing with these reports is witnessing a huge digital transformation through the use of smart applications and software that enable the instant exchange of data between paramedics in the field and hospital emergency departments before the arrival of the case This information integration allows medical teams to prepare in advance and mobilize the required specialties based on the initial reports sent from the site which reduces the time for medical response and directly contributes to reducing the rates of death and complications resulting from major accidents This reflects the Kingdom's commitment to applying the highest international standards in emergency medical services 8

#### **- reality Reports Emergency Multiple Injuries in Kingdom Arabic Saudi Arabia**

The reality of dealing with multi-injury emergency reports in Saudi Arabia is based on a sophisticated digital infrastructure where the Saudi Red Crescent Authority manages a centralized dispatch system that ensures rapid response through real-time linking between operations rooms and field teams The Kingdom recorded a significant leap in the number of direct reports exceeding 1 3 million in 2024 This reflects the high level of preparedness of the Kingdom's ambulance system in dealing with the increasing pressure of cases and the expansion of geographical coverage to effectively include peripheral and remote areas On the ground the Kingdom's protocol for major incidents is based on a rigorous triage system that accurately classifies injuries to ensure priority is given to critical cases Specialized medical pathways such as those for strokes and heart attacks are activated to increase survival rates These efforts are further strengthened through Air ambulance services have witnessed a significant increase in the number of cases transported exceeding 65% which contributes to reducing the time required for injured people to reach advanced care centers from crowded or remote accident sites in record time 9

Furthermore joint coordination between government agencies stands out as a key element in crisis management Civil Defense works in conjunction with the Red Crescent and the Ministry of Health under the umbrella of the Command and Control Center to ensure the equitable distribution of injured individuals across hospitals based on their capacity and the availability of required specialties This integrated model prevents the overcrowding of cases in a single facility and allows for highly efficient management of medical resources in line with international standards for disaster and major incident management Consequently this reality is witnessing a tangible societal transformation through the launch of smart applications such as the Responder app The "Save Me" app aims to engage volunteers and qualified healthcare practitioners at the scene of an incident to provide first aid before the arrival of official teams This is accompanied by a huge investment in continuous training and simulation especially during the Hajj and Umrah seasons which has made the Kingdom a global model in crowd management and dealing with multiple injuries in limited geographical areas and with high human density 9,7

#### **- features Reports Multiple Injuries from where Type and the place And time**

are characterized by specific qualitative features imposed by the nature of common accidents such as highway accidents These reports are at the forefront in terms of severity and number of injuries followed by fires or limited structural collapses and these reports are characterized by a pattern of injuries Complex cases involving head injuries multiple fractures and internal bleeding require a specialized response relying on mobile intensive care teams Which has the ability to perform advanced medical interventions in the heart of the field before transferring the injured to specialized trauma centers In terms of spatial characteristics these reports are geographically concentrated in two main axes The first is the long highways that connect the administrative regions such as the Riyadh-Dammam road or the coastal road where injuries are characterized by high severity due to the high speeds The second axis is represented by the areas with high population density within major cities such as Riyadh and Jeddah in addition to the

holy sites in Makkah and Madinah. These are areas that require different access strategies that rely on ambulance motorcycles and air ambulances to overcome spatial obstacles and traffic congestion.<sup>6,3</sup>

In addition, temporal characteristics play a significant role as reports of multiple injuries fluctuate according to seasons and national and religious events peaking during Hajj and Umrah seasons, weekends, and official holidays which witness heavy intercity travel. Daily timing also plays a crucial role with reports increasing during morning and evening rush hours and late at night on highways. This prompts emergency services to raise their level of preparedness and preventative deployment at strategic locations based on predictive analyses of historical data for these times. The interplay between these three characteristics—type, location, and time—draws a roadmap for proactive planning operations. Medical and human resources are directed based on a risk analysis for each region and time. For example, specialized ambulance teams are intensified in dealing with crowds in Mecca during the month of Ramadan while the focus is on rapid intervention teams for traffic accidents on long roads during travel seasons. This ensures a flexible and accurate response that is appropriate to the nature of each report and its surrounding circumstances.<sup>7,5</sup>

#### **- Mechanisms reception Reports Emergency Multiple Injuries**

The mechanisms for receiving multi-injury emergency reports in Saudi Arabia begin with a unified central system that receives calls via the emergency number 997 or through smart applications linked to an advanced medical dispatch system. Upon receiving the call, the trained dispatcher uses international interrogation protocols to determine the type of incident and the precise location using GPS technologies. The approximate number of casualties and this initial stage is crucial for assessing the required response. The report is immediately classified as a major incident if the number of casualties exceeds the capacity of a single ambulance team, necessitating the immediate mobilization of additional resources. After classifying the report as multiple casualties, the command and control mechanism is activated. This system connects the operations rooms to each other where automated call-out signals are sent to the nearest ambulance teams and field commanders at the scene of the incident. This coincides with opening direct communication channels with nearby hospitals to declare a state of alert and raise readiness in the emergency departments. This mechanism ensures the flow of live information from the field to medical decision-making centers, allowing hospitals to clear beds, prepare operating rooms and radiology teams before the arrival of the first emergency case.<sup>9</sup>

Accordingly, the reception mechanisms also include the use of artificial intelligence in analyzing report patterns. The system automatically suggests the number of ambulances and the type of support required such as intensive care teams or air ambulance based on the initial report data. In major incidents, a unified electronic platform is activated, bringing together the Red Crescent, Civil Defense, and security agencies to ensure coordinated arrival of vehicles to the site without overlap and to facilitate the opening of traffic lanes to ensure assistance arrives in the shortest possible time. This is known as the inter-agency coordination phase for receiving the report. Real-time digital documentation is also used for all information received from the reporter or the first team to arrive at the site. This data is immediately reflected on monitoring screens in the Ministry of Health's command and control centers, enabling the electronic distribution of patients to healthcare facilities based on their immediate specialized capabilities, not just their geographical proximity. This integrated cycle from reception to distribution ensures that reports of multiple injuries are handled scientifically, minimizing human error and increasing the chances of saving lives. These mechanisms are complemented by a forensic review and analysis phase of the data following the closure of the report. The timeline and technical details of each multiple-injury report undergo a comprehensive audit using business intelligence systems. This process aims to extract lessons learned and analyze the efficiency of the connection between operations rooms and field teams, contributing to the updating of predictive response algorithms that anticipate future pressure points. This approach ensures development. Continuously updating reception protocols to become more flexible and adaptable to field

changes thereby enhancing the efficiency of the ambulance system in facing urgent and complex challenges with the highest levels of credibility and confidence 7,5

#### **- speed Response and dealing First with Reports Multiple Injuries**

Rapid response is a key element in the Saudi emergency system for dealing with multi-injury reports as ambulance services are committed to achieving the "golden time" By deploying strategic ambulance centers and temporary staging points in high-risk areas Once the teams are deployed intelligent navigation systems are used to select the fastest routes activating traffic priority through real-time coordination with smart traffic control centers This approach aims to ensure the first response team arrives at the scene within minutes directly increasing the chances of survival for those injured in critical situations and serious accidents Upon the arrival of the first ambulance team the initial treatment phase begins immediately Which focuses on securing the site and assessing the extent of the disaster with the commander of the first division assuming the role of site commander A temporary measure to regulate the flow of emergency medical services At this stage the process begins immediately Medical triage Using universal color-coded cards to classify patients: red for critical cases requiring immediate intervention yellow for moderate cases green for mild cases while black is reserved for deaths This field triage ensures that limited medical resources are directed in the first moments to those who need them most and prevents the depletion of resources in cases that can be postponed 2,9

A parallel organized field assembly and evacuation zone is established where life-saving first aid is provided such as controlling severe bleeding opening airways and stabilizing fractures prior to transport The response here is characterized by the use of advanced first aid kits and equipment designed to handle large numbers of injuries simultaneously Encrypted wireless communication is also activated to inform operations rooms of the number of classified cases initiating the organized dispatch of incoming ambulances to support the site This ensures that critical cases are transported first and sequentially preventing overcrowding in the emergency departments of receiving hospitals The importance of unified field command in maintaining the pace of response is evident as all field teams are linked to an electronic platform that allows commanders to monitor the speed of patient evacuation and the quality of medical care provided to each patient This response continues until the last patient is evacuated from the site followed by a digital technical report documenting the response time for each individual case from the initial report until arrival at the hospital This integration of rapid response and professional accuracy in initial handling reflects the significant progress the Kingdom has made in managing major health crises according to [the relevant authorities/ institutions ] To the highest international standards9,7

#### **- Coordination between Entities The concerned in Reports Emergency Multiple Injuries**

Coordination between relevant authorities in handling multiple casualty reports in Saudi Arabia relies on a joint field command model This model automatically links the Red Crescent operations rooms and the National Security Operations Center Upon receiving a report of a major incident multiple parties intervene simultaneously Civil Defense handles rescue firefighting and securing the site from secondary hazards while security agencies including police and traffic control enforce the rules Security cordons facilitate the movement of ambulances and prevent crowding creating a safe and organized working environment that allows medical teams to fully focus on their emergency duties The Ministry of Health's role as a strategic partner is evident through the Command and Control Center This system acts as a technical link between the field and the network of public and private hospitals Coordination is achieved through a unified electronic system that displays the real-time capacity of operating rooms and intensive care beds in each hospital This guides Red Crescent teams to evacuate the injured to the facilities best equipped to handle the specific type of injuries This connection prevents overcrowding in hospitals near the accident site and ensures a fair and logical distribution of cases based on Regarding available medical specialties such as burn centers or neurosurgery10,1

Therefore in extreme emergencies or national disasters the scope of coordination expands to include the National Risk Council and supporting entities such as the Ministry of Defense Health Services and the National Guard. This high-level coordination allows for the mobilization of massive logistical resources such as mobile field hospitals and medical evacuation aircraft to deal with large numbers of casualties that may exceed local capacity. Standardized communication protocols are activated to ensure the clear flow of information between all ranks and leadership levels, reducing conflicting authorities and increasing the speed of decision-making in critical times. However, coordination is not limited to the field level but also extends to other areas. The post-incident phase is extended through joint fact-finding committees to analyze the response and develop future plans. All efforts are documented in a unified electronic record linking medical and security data, contributing to the building of a comprehensive national database on multi-injury incidents. This institutional integration is supported by national legislation and regulations. This makes the Kingdom's experience in inter-sectoral coordination a model to be emulated especially in crowd management where the efforts of dozens of sectors are harmonized to ensure the safety of lives with the utmost efficiency possible 9,2

#### **- Readiness difference Emergency To deal with Cases Multiple Injuries**

Emergency teams in Saudi Arabia are characterized by high operational readiness based on specialized training programs and continuous simulation of major disaster and accident scenarios where ambulance personnel are trained in site management skills. Rapid medical triage under pressure is ensured and this readiness includes training medical teams on the use of the latest technologies and equipment for multiple injuries such as mass casualty kits and portable ventilators. It also ensures the teams' ability to work seamlessly within a unified command structure which is clearly demonstrated by the exceptional efficiency these teams exhibit in managing the millions of pilgrims during Hajj seasons. Logistically this readiness relies on a sophisticated ambulance fleet comprising mobile intensive care units and mass casualty buses equipped to accommodate and transport multiple injuries simultaneously while providing advanced medical care within them. This readiness also extends to air ambulance services which represent a strategic arm. For rapid access to accidents in rugged areas or busy highways, aircraft equipped with the latest medical technologies and crews specializing in air emergency medicine are available ensuring the continuity of critical care from the accident site to advanced trauma centers without interruption 1,10

In addition, readiness is based on a technical and technological support system that allows emergency teams to have instant access to updated medical protocols and direct communication with consultant physicians in command and control centers through telemedicine technologies. This technical connection ensures that field teams are not isolated but are supported by specialized medical opinions that help in making critical decisions in the field. This readiness is also evaluated periodically through rigorous efficiency tests and joint field maneuvers with all vital sectors to ensure that the ambulance system remains in a state of maximum readiness to respond to any emergency with the highest international quality standards 7,9

#### **- Most prominent Challenges that Faces Dealing with Reports Emergency Multiple Injuries**

The most significant challenges facing emergency teams in dealing with multiple injury reports are logistical and spatial obstacles. Traffic congestion in major cities like Riyadh and Jeddah hinders the rapid arrival of ambulances at accident sites and the gathering of bystanders at accident locations also presents a challenge. This hinders the movement of ambulance teams and civil defense vehicles and may sometimes lead to unqualified intervention by some bystanders attempting to help potentially causing health complications for the injured or disrupting the organized triage process which requires a calm working environment and tight security control. On the operational side another challenge arises: managing the flow of information. In the first moments of the accident, initial reports from the public are often inaccurate regarding the number or type of injuries which may lead to an inaccurate assessment of the size of the force required in the first response. In addition, dealing with the multiple languages of the informants or the injured in a country with diverse nationalities especially during Hajj and Umrah seasons places

additional pressure on radio operators and paramedics in the field to ensure an accurate understanding of the medical situation and to quickly provide the necessary psychological and medical support to the injured from various backgrounds<sup>6,7</sup>

However a third challenge lies in the immense pressure on healthcare facilities near the accident site. The simultaneous influx of a large number of critical injuries can overwhelm the immediate capacity of emergency departments necessitating extremely rapid coordination to redirect stable cases to other hospitals. Furthermore the difficulty of managing injuries in remote or rugged areas which may not be fully covered by communication networks makes reliance on air ambulances essential and unavoidable. However this remains dependent on weather conditions and the availability of nearby safe landing sites requiring continuous technological investments to overcome these geographical and technical challenges. Psychological stress and post-traumatic stress are also major challenges for field personnel responding to multiple casualty incidents. Paramedics are exposed to harrowing scenes and immense pressure resulting from the need to make critical decisions in fractions of a second under unstable field conditions. This type of incident demands significant mental exertion. And high physical condition which may lead in the long term to Professional burnout occurs if there are no ongoing and specialized psychological support programs to rehabilitate teams after dealing with major incidents and relevant authorities are currently working to strengthen psychological resilience programs. Providing investigative debriefing sessions To ensure the continued efficiency of the human element which is the main element in the emergency response system<sup>4,7</sup>

#### **- Antiquities The resulting on effectiveness Dealing with Reports Multiple Injuries**

Effective handling of multiple injury reports makes a difference in survival rates. The decline in fatality rates from major accidents is due to rapid response and accurate medical triage which contribute to utilizing the golden time with high efficiency. By providing advanced medical interventions on-site before transfer the aggravation of injuries is reduced and they are transformed from critical unstable cases to medically manageable cases which reduces the likelihood of permanent disabilities for the injured and accelerates their recovery and return to their normal lives. This is reflected positively on the quality of health life in the community and on the efficiency of the health system. Successful management of these reports contributes to reducing the operational pressure on emergency departments and operating rooms in hospitals thanks to the organized distribution mechanism for the injured based on capacity. This coordination prevents a state of institutional confusion within health facilities and ensures the continuity of providing routine medical services without interruption despite the presence of a huge event. Effectiveness in the field also leads to reducing the duration of admission to intensive care as correct first aid reduces complications and secondary infections that may result from incorrect transfer or delayed diagnosis<sup>5,8</sup>

In addition to the economic and strategic aspects effectively managing these crises reduces the exorbitant costs associated with long-term medical care and rehabilitation for complex injuries. It also enhances the Kingdom's reputation as a leading global destination in crowd management and medical emergencies. This distinction provides a high level of reassurance to residents visitors and investors that there is an integrated social and medical protection system capable of facing the most difficult challenges. Furthermore the data gleaned from these successful operations contributes to the development of preventative policies road engineering and security standards thus transforming the impact. From a mere medical response to a comprehensive national strategy for risk prevention the effectiveness in dealing with these reports contributes to building a strong national knowledge base as the reports resulting from each incident are transformed into massive data used in research and scientific studies specializing in disaster and crisis medicine. This knowledge impact provides decision-makers with monitoring gaps and updating treatment protocols based on real evidence from the Saudi field which enhances the Kingdom's ability to innovate world-leading emergency solutions. In addition the repeated success in managing multiple injuries raises the level of community confidence in the health system and creates a general culture that focuses on the

importance of cooperating with ambulance teams making the community an active partner in the success of the national emergency system<sup>6,7</sup>

## **Methodology**

This study employs a descriptive research methodology to depict the reality of dealing with emergency reports involving multiple injuries in the Kingdom of Saudi Arabia. The research method is based on reviewing and comparing previous studies scientific research and official documents related to emergency medical services and mass casualty management. Data are collected through a systematic literature review and the findings are analyzed descriptively to identify patterns procedures and challenges reported in the literature. This approach allows for an accurate description of the current situation without manipulation of variables relying solely on documented evidence and related research in the field.

### **- Results Recommendations**

#### **Results**

- The results showed a continuous improvement in response time rates especially in major cities and holy sites as a result of the strategic distribution of ambulance deployment points where the system recorded numbers approaching international standards in response time despite the challenges of traffic congestion
- The study demonstrated high effectiveness in implementing the global sorting system By field teams which contributes to reducing preventable mortality rates By accurately prioritizing treatment needs at the scene of the accident
- The study proved that relying on digital systems such as the Ministry of Health's guidance and command and control center system led to a smoother distribution of patients to hospitals thus reducing the saturation of nearby emergency departments and increasing the efficiency of clinical absorption of critical cases
- The study showed that activating the air ambulance service in traffic accidents on highways contributes to reducing mortality and complication rates significantly due to shortening the time of transport to advanced injury centers
- The study showed the need to strengthen institutional psychological support programs for ambulance personnel due to the amount of accumulated psychological pressures resulting from repeatedly handling multi-injury accidents

#### **Recommendations**

- The need to expand the integration of ambulance navigation systems with smart traffic signals in major cities to ensure the opening of automatic routes for ambulances which contributes to reducing the time to reach congested locations by greater percentages
- The need to activate the role of private hospitals more in national emergency plans and to train their staff on standardized triage protocols to increase geographical capacity in the event of major simultaneous incidents
- It is necessary to increase the number of air ambulance deployment points to include all highways connecting the regions With the establishment of approved helipads in all central hospitals to ensure the smooth transfer of critical cases
- The need to establish specialized mental health units within the Red Crescent Authority and health sectors aims To provide regular and mandatory support to paramedics and medical evacuation personnel to prevent post-traumatic effects and ensure the sustainability of outstanding performance
- should be adopted to train teams in command control and decision-making in environments that simulate reality without real risks

## Summary

I aimed Study analysis reality deal the difference ambulance in body Al-Hilal red Saudi with Reports Emergency Multiple Injuries have shown Results that body Al-Hilal red Saudi possess system response Field Advanced relatively For accidents Multiple Injuries especially in areas urban The Great unless that there Challenges Field in speed Sorting The doctor and management Resources in Sites remote or The density Traffic High as The study showed that worker Time Quality Contact between room Operations The difference Field For them effect Important and pivotal in to improve Rates Survival and reduce complications between The injured She confirmed Results On the importance expansion Programs Training specialist in administration disasters Accidents collective and use systems Support Technician like maps smart and systems to set Sites To improve speed Response and distribution Field The study recommended the necessity of construction Protocols patriotism Unified Management Accidents Multiple Injuries and strengthening partnership between Sectors The concerned To ensure response Effective and coordinator It aligns With vision The Kingdom's 2030 goals in to lift efficiency system Emergency Prevention from Risks and investigation higher Standards Safety The general public

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