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Health Security Staff And Their Role In Protecting Medical Teams During Mass Casualty Events A Systematic Inquiry

Shahad Ayidh Alotaibi[1], Bayan Abdullah Alqahtani[2], Amani Jameel Boshnaq[3], Fidaa Abdulmonem Alzarmah[4], Raniyah Hameed Alhuzali[5], Kholoud Musaad Alharbi[6], Esraa Ismail Felemban[7], Mohammed Abdulwahab Alghamdi[8], Alaa Abdulaziz Alsaadi[9], Areej Abdullaziz Alqahtani[10]

[1]Health Care security Ajyad Hospital , Makkah Health Cluster.
[2,3,4,6,7,8,9,]Health Care Security Ajyad Emergency Hospital, Makkah Health Cluster.
[5]Health Care security Al-Sharaiea Al-Ulya Health Center, Makkah Health Cluster.
[10]Health Care Security Hera General Hospital, Makkah Health Cluster.

Abstract

Background: Mass casualty events (MCEs) due to natural disasters, pandemics, industrial incidents, and mass violence, challenge and strain our healthcare systems. In the context of these types of environments, medical teams rapidly triage and intervene to save lives and allocate resources - often in uncontrolled and unsafe scenarios. Although clinical preparedness has received substantial attention, the safety of healthcare workers is an important but largely neglected factor of the emergency response.

Study Objectives: The primary aim of this systematic review is to systematically and critically review and synthesize the current evidence regarding the roles, responsibilities, and effectiveness of health security staff in protecting medical teams during mass casualty events through a lens that is specific to the healthcare system within Saudi Arabia.

Materials and Methods: This is a narrative based review study and uses exploratory research design where the data is gathered from various sources on the basis of pre decieded criteria of inclusion and exclusion. PRISMA is used to segregate and screen the collected studies. The results are presented in theoretical and chronological manner to give the clear picture of point in question.

Results: The consequences suggest health security personnel are a valuable contributor to operational safety, triage coordination, and psychological protection - operationalizing an interface of clinical preparedness however there seemingly still remains confusion and ambiguity about training, preparedness and integration health security personnel as a distinct front-line responder in institutions.

Keywords: Health security staff, Mass casualty events, Medical team protection, Emergency preparedness, Hospital disaster response, Saudi Arabia healthcare.

Introduction

Background and Introduction

The extent toa which a national healthcare system is sustained for function during times of acute stress, such as a Mass Casualty Event (MCE), is intricately linked to the operational security and physical safety of clinical workers. Healthcare workers (HCWs) are now conceived of internationally as exposed to an ever-increasing breadth of risks; including risks from infectious disease outbreaks, risks from acts of violence against oneself personally and/or through the systemic moral hazard of messy work from civil emergencies. **[1], [2]**

Therefore, coherent plans for protecting and securing the workforce when it is incomprehensible to do so, is not an ethical obligation but a strategic priority in ensuring continuity and effectiveness of

essential health service delivery in emergencies. **[3]** Health security personnel are the basic tier of security for the continuity of operation and thriving of the health workers, as health system functionality depends on the overall integrity of its attendant health works.

The urgency of the obligation is strengthened within the Kingdom of Saudi Arabia (KSA), given that the national duty has prioritized strategic engagement with public health and strengthen national health systems with evidence based on best practices. The effectiveness and security capacity of security personnel are essential factors influencing staff engagement and sustainability within a health organization. **[4]** Thus, their role in this is vital to their functioning with efficacy and stability and the performance of the national health sector.

Saudi Arabia's geographic and strategic location requires a highly robust, dual vulnerabilities profile, emergency preparedness posture. This context supports an "all-hazard" posture focused on common operational systemic demands common to information, resource and communication management, regardless of the hazard incident. The annual Hajj pilgrimage is the world's largest regular mass gathering and serves as an ever-present, high-stakes operational stress testing of the Saudi health and security system. **[5], [6]** Millions of global pilgrims of distinct backgrounds move into a constrained geographic area to create significant crowd density, logistical complications and operational risk not only to health, but for stampede crush injuries, and major communicable disease outbreaks.

The historical impact of catastrophes like the 2015 Mina stampede resulting more than 2,000 lost lives adds to the reality of health and communication risks. The cyclical nature of the event adds an obligation to security to continually enhance their operating protocols to refine indicator-based surveillance systems, and support innovation in operational preparedness to limit disease globalization and transmission to secure the region’s health security. **[7]**

The Kingdom of Saudi Arabia is also susceptible to sudden-onset domestic hazards. These hazards can comprise natural events (e.g., flooding, storms, earthquakes) and human-made incidents (e.g., fires, structural collapses, transportation accidents / collisions). **[8], [9]** In 2009, severe flooding events experienced in Jeddah raised questions within the Ministry of Health (MOH) and other government authorities about hospital preparedness across the Kingdom. Planning hospitals and health facilities around these eventualities is important from both the strategy and economic perspective. **[3]**
While safety is critical, there is consideration that there should be some degree of financial modeling to underwrite proactive planning, specialized education, readiness supplies, and preparation education, rather than simply to fund client costs for direct patient care. **[17], [2]** Such a lack suggests that in order for security personnel to perform protective security functions during MCEs, their function needs to be financially modeled as a critical investment in resilient systems and business continuity rather than just a cost of doing business.

Even with these demands, literature regarding health security staff in Saudi Arabia is inconsistent. Some studies have considered emergency medical services, hospital preparedness for MCEs, and aspects of disaster risk reduction, but comprehensive studies of the duties and efficacy of health security staff responsible for protecting medical teams in MCEs remain scarce. **[10]** The research gap is demonstratively concerning given the increased occurrence of complex emergencies and the enhanced understanding of healthcare worker safety that continues to be increasingly viewed as a determinant of health system resilience. **[12], [17]** This systematic review intends to synthesize the evidence examining the role of health security staff in protecting medical teams during mass casualty events with a specific focus on Saudi Arabia. The literature review will examine only national and international studies to find best practices, training gaps, policy frameworks, and operational issues from a Saudi perspective.

Research Gaps

The existing literature is primarily concerned with emergency medical services or disaster preparedness generally and does not cover the roles, training, and effectiveness of health security personnel. Moreover, there is minimal information available on how health security staff operate during a mass casualty incident (MCI) in the Saudi context, especially to the north, west, or east of the larger cities, e.g., Riyadh and Jeddah. Importantly, health security staff in Saudi Arabia are often not included in formal emergencies drills and simulation exercises, which can lead to disorganized responses regarding

mass casualty events. There is also scarce literature regarding inter-agency coordination of health security, civil defense, and medical teams in response to MCIs.

Objective of Study

The primary aim of this systematic review is to systematically and critically review and synthesize the current evidence regarding the roles, responsibilities, and effectiveness of health security staff in protecting medical teams during mass casualty events through a lens that is specific to the healthcare system within Saudi Arabia.

Research Methodology

Research Design

Present study is based on the pillars of exploratory research design and presents the narrative review of the studies conducted on the role of health security staff during the occurrence of Mass Casualty. There are proven historical events where mass casualties have occurred, like Hajj stampede, flood, road accidents, sand storms, pandemic, etc. in various parts of Saudi Arabia. Medical staff has to reach at such places along with the medical security staff and control the situation. Researcher has considered the previous studies conducted in this regard and tried to assess the previous arrangements, current scenario and future prospects of the same. Most of the studies were of Saudi origin, a few foreign studies were consulted in the process to reach the understanding of global prospects. Most of the studies were considered from the period of 2015 to 2024.

Population: The population of the study was the total number of studies based on the role of health security staff during the occurrence of Mass Casualty. Most of the studies considered in this review study were based in Saudi Arabia or at the most MEA region. Researcher had touched around 137 studies, carrying appropriate keyword, at the stage of final screening some of the studies were not included in the final assessment.

Inclusion and Exclusion criteria

Inclusion

- National or global studies focused on Saudi Arabia.
- Studies based on the role role of health security staff during the occurrence of Mass Casualty.
- Mostly review articles, reports from government and private agencies and white papers.
- Studies published or presented in English or Arabic will be included.
- Studies published between 2015 to 2024 will be included

Exclusion

- Studies not related to Saudi Arabia or MEA will be excluded
- Studies that have not included the role of health security staff during the occurrence of Mass Casualty.
- Any type of editorials, general opinions, non-peer reviewed articles will be excluded.
- Studies in other languages (without translation) will be excluded.
- Studies published before 2015 will be excluded.

Sources of Data and Keywords

Researcher has touched a number of sources for the collection of data. Some of the relevant sources are mentioned here:

- PubMed
- Cochrane Library
- ClinicalTrials.gov

- EMBASE
- Saudi Medical Journal
- King Saud University Repository

Keywords for the study were decided in advance and only those studies were touched that have the following keywords using boolian operators (AND, OR):

“Health security staff”, “Mass casualty events”, “Medical team protection”, “Emergency preparedness”, “Hospital disaster response”, “Saudi Arabia healthcare”, “Healthcare resilience”, “Hospital security personnel”, “Inter-agency coordination”.

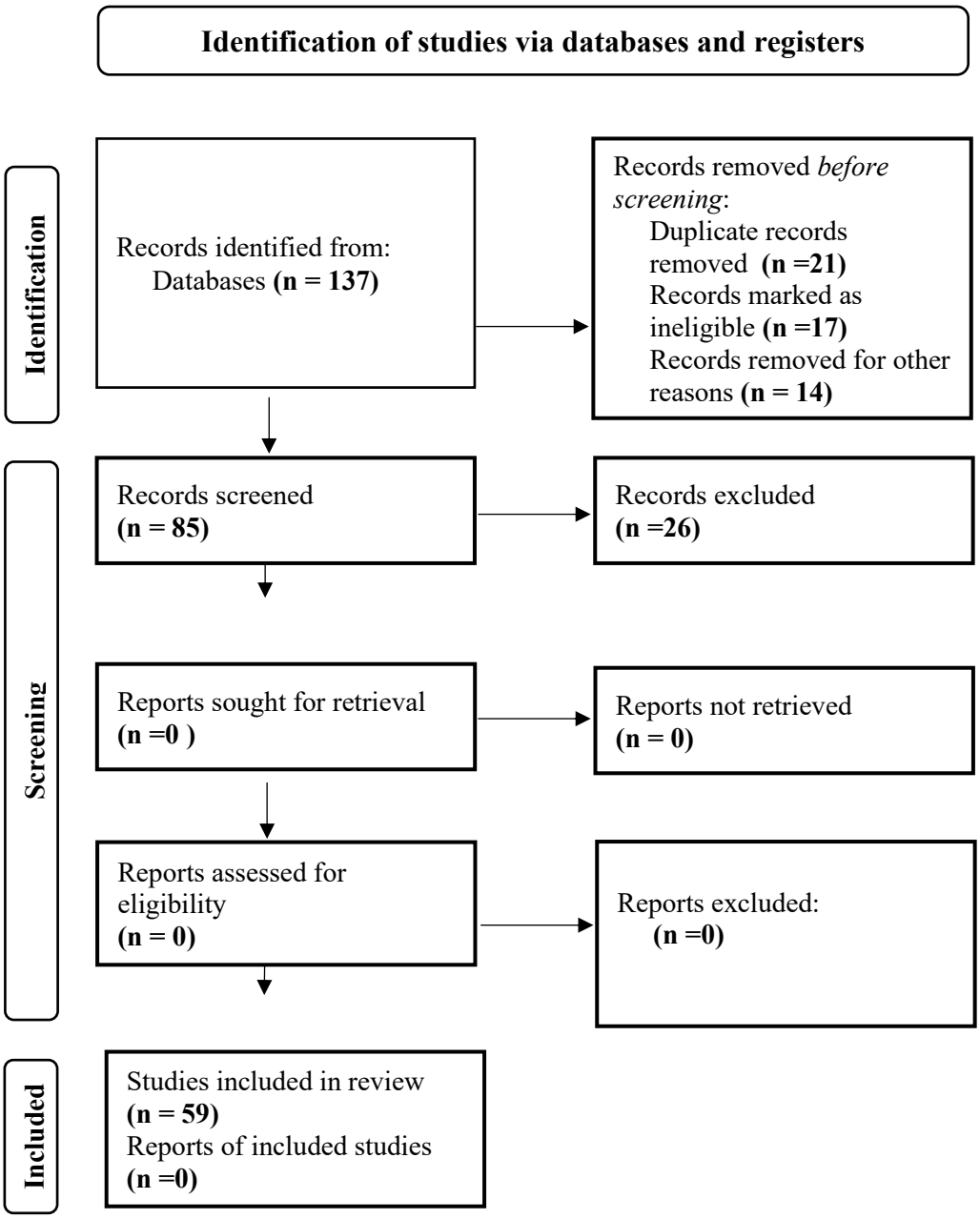
Information Extraction

Researcher had prepared a format for recording the relevant information, main heading include, design of study and location, demographics of the respondents and number, specific measures of outcome, like significance of trained staff in health security, role of health security staff during MCE, etc.

Results

A total of 137 research studies and nil reports were identified, all of them were based on the role of health security staff during the occurrence of MCE in Saudi Arabia. Out of these identified studies, 21 were removed because of duplication of records, references and location and 17 studies were marked as ineligible, as not including the concept of MCE or health security staff and 14 for some other unavoidable conditions. Further 85 records were saved for screening, then in the screening process 26 records were further removed on the basis of exclusion criteria stated above. Total studies finalized for review were 59. No reports were included in the study.

A pilot study conducted in 2024 at a government hospital in Riyadh reviewed the effectiveness of external disaster simulations utilizing standardized patients and MAC-SIM cards. **[13]** Fifty-eight (67%) of the patients were triaged in less than 5 minutes, demonstrating an efficient emergency department (ED) response time. Ninety-five (95%) of critical patients were placed into the ICU within 2.5 hours, demonstrating good surge capacity. **[14], [15]** Experienced paramedics outperformed nurses in the exercise simulation scenarios, indicating a potential need to specifically prepare, train and provide experience to those tasked with a response to a mass casualty (MC) incident or disaster.



Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71
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A 2024 article reported on various hospitals in Saudi Arabia and discussed the value of bringing medical security personnel with the integrated command role of other non-clinical roles (i.e., social workers and medical administration) during an emergency response. **[16]** The study findings recognized that Health security staff were utilized to control the perimeter, manage aggression and determine safe zones for the clinicians and medical team to work. **[11], [8]** One of the recommendations was to develop protocols that direct the coordination of medical and non-medical staff, which to enhance the institutional resilience during mass casualty incidents.

The World Health Organization's Mass Casualty Management (MCM) framework emphasizes the need to coordinate security efforts through emergency units to ensure a secure environment for staff and

patients. **[17], [18]** Train logistics and administration personnel with health security personnel on triaging patients, resuscitation, and resource allocation. Hence, the focus was put on operation efficiency and safety as what the MCM framework identifies as foundational pillars for mass casualty preparedness. **[9]** Support for these assertions indicates that health security personnel who are trained properly significantly enhance the safety of medical teams and allow medical teams to flow effectively through the operational response process during MCE. **[20]** Hospitals in Saudi Arabia that engaged in functional drills and interdisciplinary planning were more prepared and could respond more quickly in an MCE than hospitals that did not. It is clear that national training standards need to be created, especially for peripheral hospitals, and health security need to be integrated into a national emergency operating plan as part of Vision 2030. **[14], [9]**

Discussion

Threats to Medical Teams in Occurance of MCE

Protection of medical personnel requires prevention of two distinct but interrelated categories of threat--chronic, high-stress threats and acute, large-scale catastrophic threats.

Workplace Violence

Workplace Violence (WPV), which includes verbal abuse, threats, harassment, and physical assault, is a widespread, multifaceted problem that is most noticeable in Emergency Departments (ED). During Mass Casualty Incidents (MCI), the volume of patients and relatives arrives at the ED at a rapid pace, further exacerbating this chronic threat. Studies have been conducted in KSA showing that WPV is prevalent. The ED is designated as a high risk environment that operates around the clock with a higher degree of associated stress **[21]** and, in Abha, for example, 57.5% of healthcare workers responded affirmatively to WPV regardless of setting. In the ED setting, it has been reported that up to 48% of physicians and nurses had experienced WPV in the previous 12 months. **[22]** Risk factors to WPV are commonplace to the ED environment, as staff routinely are limited during certain shifts, patient volumes are excessive, and patients, along with visitors, often have unrealistic expectations of being seen or treated immediately. **[20], [22]** The Ministry of Health has successfully intervened in this area, implementing new regulations and penalties specifically targeting workplace violence. This regulatory reinforcement has yielded measurable positive results, with one study showing a dramatic reduction in violence prevalence among staff, from 78.6% before the regulations to approximately 20% afterward. This provides strong empirical evidence that policy enforcement and empowered security personnel are highly effective protective measures. **[23]**

Operational Risks in External Mass Casualty Incidents

The Ministry of Health has taken impactful actions in this area, implementing regulations and sanctions to manage workplace violence. These activities produced positive measurable outcomes, and one study reported that violence prevalence among staff decreased systematically prior to regulatory support from 78.6% to nearly 20%. This is compelling evidence that policy with enforcement as well as authority of safety staff, elevating their position was beneficial. **[17]**

Mass gatherings (like Hajj) involving some risk and potential violence, or stampedes, or potential chemical or bio-terrorism attacks. The level of security and security support as part of crowd management and controls again further reduced risk of stampedes. Coalition security staff are a critical aspect of physical health and having access control in a situation like simulated building collapse when every attempt is made to protect the medical staff in triage and treatment. **[12], [9]**

Roles of Health Security Staff

Health security staff perform specific functions that are both systematic and critical: physical intervention, logistical assurance, and information sharing, all essential to the continuity of medical practice. The dominant custodial responsibility of security staff is the physical protection of HCWs, particularly in emotionally charged, high-volume settings. **[7], [8]** A key capability for health security staff is having specialized security expertise, in addition to providing access to skills in de-escalation and conflict resolution practices. With this knowledge, security personnel actively reduce the rate of workplace violence (WPV) and, in doing, enhance the physical and psychological safety of the medical

practice. During an MCE surge, staff must ensure continuity of the treatment area. FSOs support this function by securing appropriate perimeter and access control, identifying, and establishing authority of access. This protective responsibility shields the clinical role from the tumultuous external environment, ensuring a safe treatment space for the future patients while preventing future patients from compromising critical care or stealing vitals. **[23]**

Protective services staff and safety officers will inspect safety equipment, verify emergency procedures, and conduct a risk analysis. **[22], [15]** This includes essential preparedness actions that may include utility control in responding to an emergency service interruption. By keeping the essential infrastructure operational, such as power for their life support equipment, protective services staff are able to provide medical units with a safe and functioning platform to deliver high-acuity patient care. **[24]** In responding to infrastructure emergencies external to the medical center or other disruption as compared to internal emergencies at the medical center, protective services staff are choreographed in an equally functional role for directing the flow of the traffic control access point in an emergency and rapidly moving people. Providing this organized traffic control reduces secondary risks, and access emergency response unit vehicles will be achieved rapidly and without obstruction, and patient movement through triage processes can be rapidly organized as part of necessary steps to keep chaos from spreading further. **[25]**

Issues and Concerns

Although the policies are appropriate and sound, the medical team protections during MCEs will not be reached with the operational gaps we will unfold, both in planning and education competencies. **[13]** The systemic challenge to health system resilience and health care sustainability in Saudi Arabia identified was "coordination and integration" across the workforce. Coordination and integration of teams across the workforce varies. Collaboration and teamwork occurs in single units, but this "teamwork" consistently requires "to improve" when we discuss "teamwork across hospital units and with multidisciplinary teams (MDT)." These operational gaps in preparedness exist and are the interface between clinical responders and security staff on the frontline and in some cases, directly relevant to operational preparedness and community safety burden. **[17], [18]** Health care systems do not provide an operational preparedness strategy for MCI so their brand of operational preparedness may limited is because there is a "limited number of disaster drills" (simulation training/staff and service use of services will be service specific, context dependent and maybe disproportionate) and local standardized patient simulation training or testing in hospitals locally. Such limitations in the health systems are there are policy limitations and funding limitations as well. **[26]** Lastly, there are no local literature on hospital preparedness specific to Saudi Arabia so there is no scope to evidence based policy. **[27]**

Conclusion

This systematic review underscores the significant position that health security personnel play in the protection of medical teams during times of mass casualty incidents, particularly in the multifaceted context of Saudi Arabia's changing healthcare system. The consequences suggest health security personnel are a valuable contributor to operational safety, triage coordination, and psychological protection - operationalizing an interface of clinical preparedness however there seemingly still remains confusion and ambiguity about training, preparedness and integration health security personnel as a distinct front-line responder in institutions. To maximize effectiveness, the following constraints remain: unpreparedness, rural unpreparedness, lack of coordination and standardization and lack of appropriate training. The future roles of health security should be better mapped and documented as part of an education competency framework and incorporated into Interdisciplinary drills, and into policy reform as part of the goals of Vision 2030, with consideration to achieve healthcare resilience and ensure the safety of front-line responders in future disaster incidents.

Scope of Future Study

Based on the findings and gaps identified in this system review, future research should develop and extend understanding of health security staff’s role in protecting medical teams, during mass casualty incidents in Saudi Arabia. Future research should seek to develop a competency model for health security staff that is standardized and designed and validated specifically for the health care

environment and cultural settings of Saudi Arabia. Future studies should then utilize longitudinal studies to assess the effectiveness of collaborative simulation exercises involving health security staff, the medical team, and civil defense.

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