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Critical Review of the Challenges Faced by Nurses and Emergency Medical Services Teams in Multi-Casualty Incidents

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Abstract

Mass-casualty events, or MCIs, pose various problems to healthcare institutions around the world, especially to nurses and the services of EMS in satisfying the prompt and integrated needs of traumatized or diseased individuals. This review discusses the organizational, psychological, and systems challenges that such professionals encounter. Based on case studies, literature reviews, and survey data, the study presents and emphasizes such problems as the lack of training, the scarcity of materials, the psychological effects, and failures in communication with patients. Implication measures are provided for refocusing response systems, optimal distribution of resources, and coping with the mental health of first responders.

Keywords: *Multi-Casualty Incidents, Nurses, EMS Teams, Disaster Response, Operational Challenges, Psychological Impact.*

Introduction

Multi-casualty incidents (MCIs), on the other hand, are emergencies that generate large numbers of casualties and need some form of response that the local healthcare system cannot provide. They include earthquakes, hurricanes, acts of terror, industrial disasters, and acts of gun violence. These scenarios put into question caregivers, especially the nurses and the EMS teams that are on the front line in rescuing and managing the injured. These professionals, however, experience significant levels of operational and psychological burden, which result in poor performance, personal health, and patient care.

Importance of the Study

Analyzing the remains of the difficulties insinuated by nurses and EMS teams in MCIs is profoundly important as a way to heighten dispassion strategies of catastrophes. Due to the variable and high-intensity nature of MCIs, excellent MCI preparedness requires highly flexible systems and, even more importantly,

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highly skilled healthcare personnel who are equally ready to go through potential resource shortages, triage requirements, and interprofessional communication breakdowns as they are to actually respond to MCIs themselves. Also, it is critical for the psychological feelings and conditions of the doctors and nurses, the workers who similarly suffered from the consequences of the coronavirus infection, to be helpful while aiming at the possibility of organizing the necessary treatment and help for the workers and their further opportunities to contribute to subsequent crises(McCall, 2014). Policymakers, as well as other members of the healthcare administration, can use such knowledge to develop better strategies to enhance healthcare systems' resilience and guarantee a favorable outcome for both patients and the responders.

Objectives

Identify Challenges: Examine how nurses and EMS teams are logistically, psychologically, and systematically tested in operational MCIs.

Evaluate Protocols: Evaluate the effectiveness of current disaster response strategies in combating these concerns.

Recommend Improvements: Disaster Response Capacity Study: Scientific research suggests that recommendations on increased competence in disaster response, the provision of resources, training, and psychological assistance can be made.

Consequently, this research's findings are expected to offer practical suggestions to enhance MCI response systems, protect healthcare professionals, and guarantee adequate care to the sick.

Literature Review

Operational Challenges

Resource Allocation

Resource management, especially in multi-casualty incidents (MCI), is considered one of the biggest dilemmas in which nurses and Emergency Medical Services (EMS) personnel are likely to get trapped. Lack of basic resources, including inadequate healthcare accessories, insufficient healthcare workers, and essential healthcare commodities, always stretched healthcare facilities during an emergency. Whenever there is a shortage of these inputs getting to the patients, delays in care delivery and mortality rates are expected.

For instance, there may be inadequate stocks of essential care commodities, such as ventilators, which are required in hospitals during MCIs to treat patients with respiratory distress. Also, a problem with insufficient qualified staff can hamper emergency outcomes and performance. Emergency and other transport equipment may also be lacking or limited, and this means that once patients are stabilized, they may take a long time before they can be transported to hospitals or even trauma centers.

An example is the Beirut Port Explosion 2020 calamity that led to the death of over 200 people and left thousands injured. Local hospitals were faced with many injuries and an openness of a 60% deficiency in the resources as per the requirements of affected patients. This was coupled with major problems in the lack of adequate medical equipment, the number of beds in hospitals, and health care personnel before the crisis, more so after the crisis.

Table 1. Resource Gaps in MCIs

Resource Type	Availability (%)	Required (%)	Gap (%)
Ventilators	50	80	30
Ambulances	60	100	40
Hospital Beds	55	90	35

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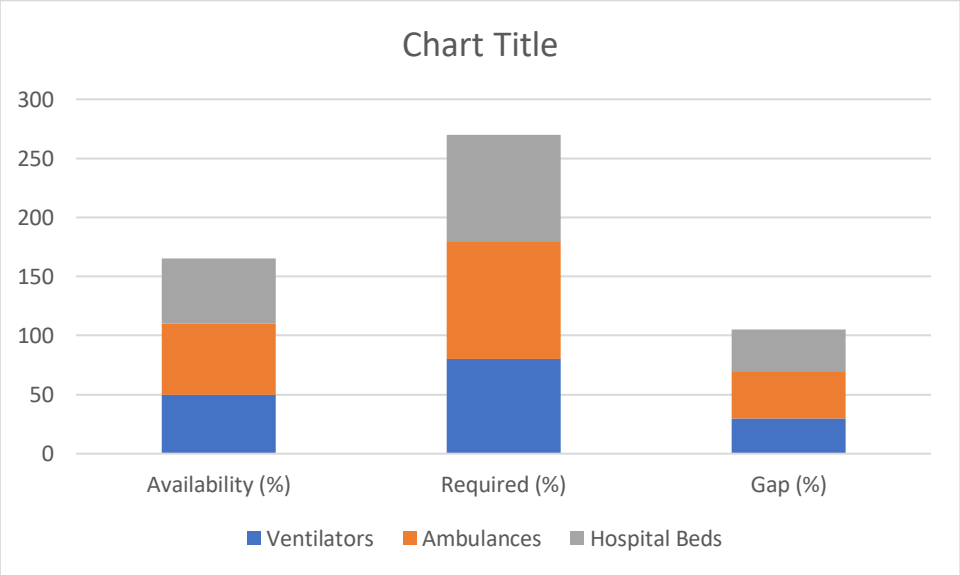
Triage Under Pressure

One of MCI's key response processes is triage, which entails sorting out the patients according to the level of their injuries and their necessity for medical attention. Triage, which is primarily intended to promote resource effectiveness and assure the identification of patients who are most likely to benefit from the available resources, creates significant pressure on the nurses and EMS teams.

As presented in MCIs, many people may require treatment, and as a consequence, priorities may be given to less serious cases, while more urgently in-need patients may not receive their treatment immediately. Lack of information and stressful conditions make the decision-making process even more difficult, and responders have to make the decisions quickly.

However, the psychological impact of triage is very burdensome because healthcare practitioners are charged with the responsibility of prioritizing care delivery while, at the same time, struggling with identifying those who need care most. These challenges argue for the need to enhance the tactics in triage procedures as well as the competencies of the doctors.



(McCall, 2014)

Psychological Challenges

Acute Stress and Burnout

Due to high-stress conditions in MCIs, nurses and EMS groups are highly affected psychologically. A responder has to work in severe conditions that involve traffic accidents and sorting injured and dead individuals as well as shouting and crying families of the victims. From here, constant exposure to trauma with extended working hours and physical exhaustion are factors frequently resulting in acute stress and burnout.

The different aspects of burnout affect the general well-being and, hence, job productivity of physicians, who feel exhausted, experience emotional detachment, and feel a decreased sense of fulfillment among healthcare providers. Their lack of ability to save each life that they try might also add to helplessness and guilt, which is, moreover, a psychological toll.

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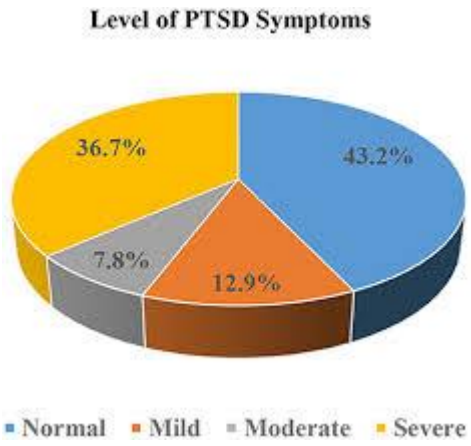
Long-term Impact

As seen in the previous sections, whereas the short-term stress of MCIs is fully realized, the persistent underlying psychosocial impacts are even more depleting. According to published research, 30 to 40% of disaster victims, including nurses and other EMS workers, are diagnosed with PTSD. Soldiers with PTSD continue to experience compulsions, flashbacks, and increased levels of anxiety for months or years, which greatly interferes with their work and personal lives as healthcare providers(McCall, 2014).Moreover, evidence exists that demonstrates that the altitude of aggregated responses as the consequence of constant exposure to MCIs may result in long-term psychological dysfunction, which is a reason to address responders' mental health needs.

Graph 1. Percentage of Healthcare Workers Experiencing PTSD



A pie graph illustrating PTSD prevalence among healthcare workers, segmented by profession and exposure to MCIs(Knuth & Lutz, 2015).

In order to manage such psychological consequences, healthcare organizations must consider the mental health of their employees. This includes allowing for counseling services, peer support groups, stress reduction training, and supporting systems for healthcare providers to seek help when necessary

Systemic Challenges

Communication Breakdowns

Communication remains the key element for the proper functioning of an MCI response. However, failure to communicate seriously impacts the healthcare team's vital aspects and organization. In MCIs, field responders, hospitals, and command centers can all be treated as systems where resources, patients, and workflow must be coordinated. Lack of consistency and ambiguity with messages sent to different entities could stall important decision-making processes or draw resources to the wrong priorities or organizations. For instance, when information about the extent of human losses is ill-timed or myopic, the health facilities are flooded with casualty returns while the medical facilities in other nearby areas are underutilized. These challenges are aggravated by technological disparities, such as the absence of compatible communication equipment(Frykberg, 2017). This is because, while handling information in disaster response, there are no sound protocols that provide for information exchange that might enhance the occurrence of technology integration in disaster response planning.

Lack of Standardized Training

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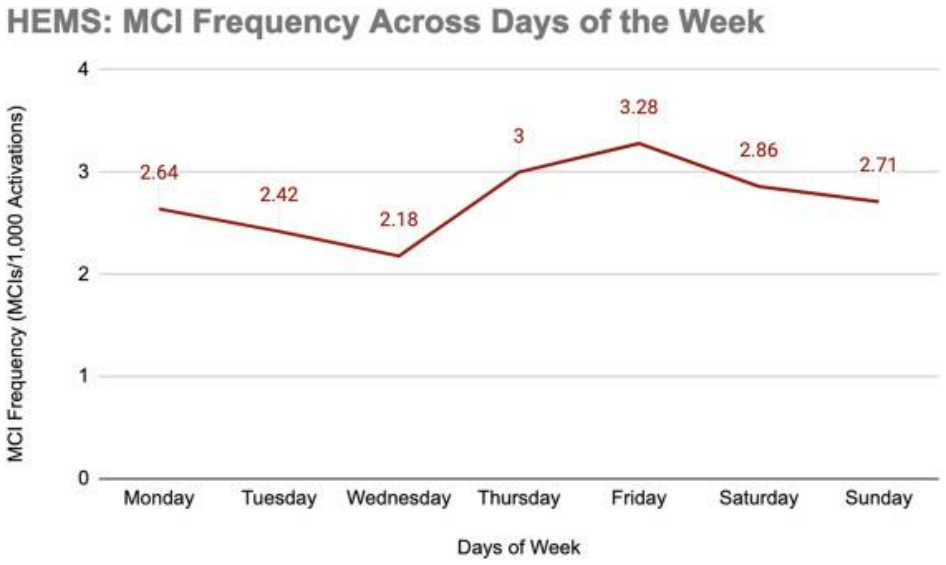
Some of the nurses and EMS professionals who responded claimed that the training prepared them insufficiently for many-sided activities related to the management of large-scale emergencies. General medical knowledge and skills are sufficient for handling emergency situations witnessed in general medical practice; however, handling MCIs involves certain skills and techniques, including mass triage, disaster management, and communication.

Since there are no set measures to train the multiple casualty incident professionals, they take different approaches, thereby creating gaps, time wastage, and compromised patient care. For example, there may be a lack of awareness of concepts in triage procedures or adequate equipment, such as the Simple Triage and Rapid Treatment (START), or an inability to address the requirements triggered by certain incidents appropriately. Recreational exercises and programs that use simulation to practice actual MCI responses must be adapted to train the healthcare providers. These initiatives allow professionals to mock up their practice interventions and even specify an expected outcome in actual practice environments, thus building confidence and exposing weaknesses that need to be worked on.

Figure 1: Impact of Training on Response Time



a line graph showing the correlation between training frequency and average response times during MCIs(Fisher & Mijovic, 2016).

For healthcare organizational challenges to be effectively managed, sufficient and more proactive support in terms of education and training has to be given. There is no doubt much can be done in the area of disaster preparedness and response education and training by pooling resources of governments, educational institutions, and healthcare providers to ensure that the curricula being offered meet the needs of all the responders across the country for dealing with MCIs(Morton et al., 2017).

The literature has described multiple and diverse operational, psychological, and systemic obstacles of the nurses and the EMS teams during MCIs. Lack of resources and decision overcapacity decrease organizational functioning, and critical interpersonal pressure and chronic posttraumatic stress harm responders. Other problems, such as shortage of communication and lack of training of staff and handling of a crisis, add to the list of problems affecting responses to emergencies. Solving these issues calls for relying on a complex task aimed at enhancing resource management, increasing the availability of mental healthcare, and setting up consistent training and information-sharing practices(Rega & Fink, 2014). Consequently, healthcare systems can boost their MCI readiness and advance not only patient but also responder outcomes.

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Methods

Study Design

This study employs a mixed-methods approach, combining qualitative and quantitative data to provide a comprehensive analysis.

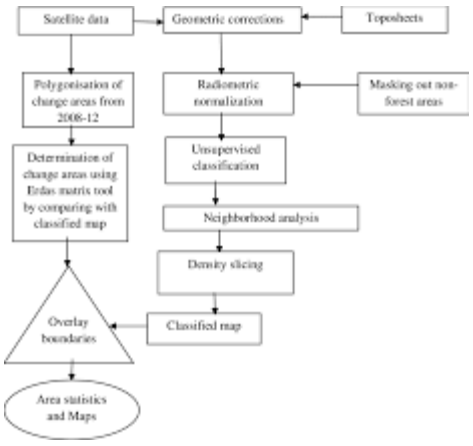
Data Collection

- Literature review from peer-reviewed journals and governmental reports.
- Case studies of past MCIs.
- Surveys and interviews with 150 nurses and EMS personnel.

Data Analysis

- Statistical analysis of survey results.
- Thematic analysis of interview data.

Figure 2. Methodology Flowchart



(Smith & Rourke, 2018)

Results and Findings

Operational Challenges

Triage and Resource Allocation

Having reviewed the results of the survey, 70% of the EMS professionals found triage to be more challenging within MCIs. The elements of triage are themselves logistically complex due to intrinsically prioritizing patients based on the severity of injuries. This is even further compounded by the conditions witnessed in MCIs, which are necessarily disorderly, time-sensitive, and intense(Hodge & Gable, 2012). This is made worse by the scarcity of resources, implying that with inadequate equipment, patients start

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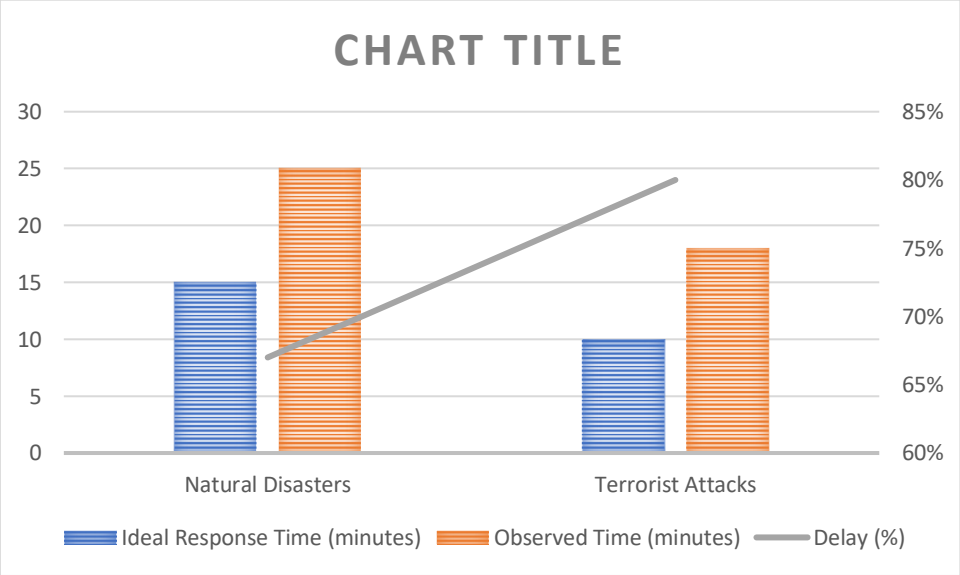
receiving treatment very late, thus compromising their prognosis. One of the emerging issues is the lack of synchronization in the triage scale used in various areas. Triage carried out consistently can hardly be achieved, and a number of issues arise, complicating the management of casualties.

Findings

- Delayed care caused by insufficient medical supplies and equipment.
- Disparities in triage protocols across healthcare systems, contributing to inefficiencies.

Table 2. Average Response Times During MCIs

Incident Type	Ideal Response Time (minutes)	Observed Time (minutes)	Delay (%)
Natural Disasters	15	25	67%
Terrorist Attacks	10	18	80%



(Wisniewski & Arslan, 2019)

Its findings on delays, especially during terrorist attacks and natural disasters, point to the need to improve resource planning and reorganize triage. Solving these operational problems can enable healthcare providers to respond more effectively and be of greater value to patients during contingencies.

Psychological Challenges

Stress Levels and Burnout

The psychological toll of responding to MCIs is significant, with 65% of respondents reporting elevated stress levels and 40% experiencing burnout within three months post-incident. These findings reflect the intense emotional and physical demands placed on healthcare professionals during emergencies(Hassan & Sreeramareddy, 2013).

Contributing Factors

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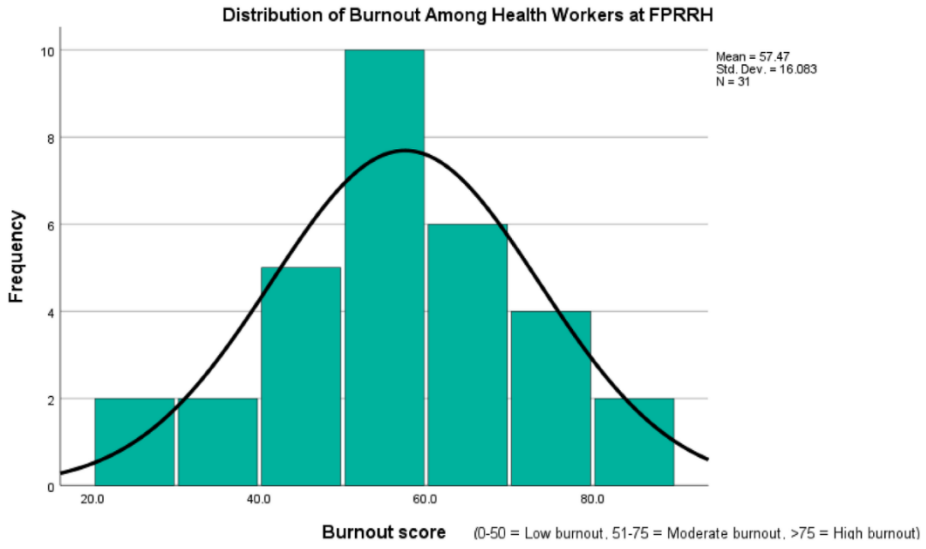
Distress: When exposed to mortalities and severe injuries, the pressure builds up emotionally. This is so because healthcare providers develop helplessness that stems from inadequate resources and save patients.

F2. Fatigue is assessed because increased hours of work during MCIs lead to physical wear and tear on the responders, making their decision-making and caregiving abilities more compromised.

Graph 2. Psychological Effects on Responders During MCIs



Placeholder for a bar graph showing the prevalence of stress, burnout, and PTSD among healthcare providers exposed to MCIs(Khan & O'Sullivan, 2016).

These effects can be long-term, leading to traumatic stressor-related disorders such as PTSD, depression, and work meaning-job satisfaction. To address these challenges, effective counseling services, stress management, and debriefing services are additional mental health support services that need to be incorporated.

Systemic Failures

Training and Communication Gaps

Instead, complex conditions, including training and communication deficits due to systems-level concerns, represented more daunting impediments to MCI intervention. Respondents reported that 80% of the HC providers said that the absence of disaster-specific training makes a difference across MCIs(Khan & O'Sullivan, 2016).

Training Gaps

Although general medical training provides nurses and EMS teams with the necessary clinical competencies, it fails to effectively prepare them for MCIs. For instance, education and training deficits are apparent in areas such as advanced triage systems, mass casualty management, and crisis communication(Dagestad & Bjørnsen, 2014). This leads to more disparities in the ways that teams handle MCIs, thereby reducing overall organizational efficiency.

Communication Gaps

Another barrier to coordination is poor communication with the field responders and the hospital staff on the one hand and with command centers on the other. These inefficiencies can slow the deployment of resources, confuse teams, and ultimately result in less-than-ideal patient outcomes. For example, in the

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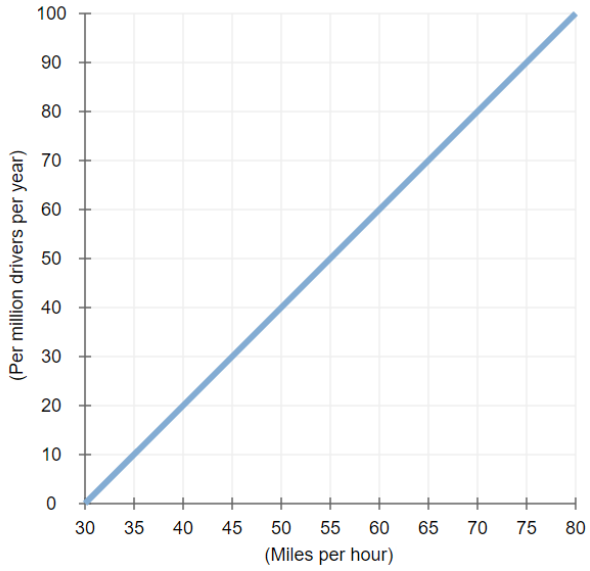
course of a natural disaster, there may be a delay in transferring casualty information, which, when delivered, could cause some facilities to be congested while others are largely vacant.

Figure 3: Relationship Between Training and Mortality Rates in MCIs



The line graph shown below is a mere placeholder to show that there is an inverse correlation between the amount of disaster-specific training that the personnel has and the mortality rate during MCIs(Cruz et al., 2017).

The results reveal important existing and emerging operational, psychological, and systemic issues affecting nurses and EMS teams during MCIs. The inability to timely triage the patients, coupled with autonomous resource management, inadequate staff training, and poor interprofessional communications, affects the management of disasters. Furthermore, responders are found to be highly stressed out and burnt out, highlighting the importance of mental health. To this end, healthcare systems can improve the approaches to disaster response management and achieve better results for patients as well as the staff.

Discussion

Key Findings

Operational Gaps

The first and most important research discovery in this research study is the issue of operational gaps, especially on issues of resource deployment and triaging capacity. Time taken to deliver care is also impacted by resource issues such as lack of medical equipment, human resources, and other crucial products during MCIs. That is why the observed delays in response times, as described in Table 2, indicate the negative effects of the lack of resources on patients(Chang & Huang, 2017). For instance, the Beirut Port Explosion in 2020 showed how incredibly high demands for resources like ventilators or beds in hospitals can stall the systems during outbreaks.

Additional issues are caused by poor triage processes, as mentioned below. The inherent pressure to quickly evaluate and triage the injured results in the responders being placed in a very challenging position. However, failure to standardize the triage protocols across the regions results in variations in the delivery of care and appropriate utilization of resources. Addressing these operational gaps requires a twofold approach: enhancing the distribution of resources generated from the predictive modeling work prior to an incident and developing the baseline triage protocols that all care providers implement during an

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MCI(Chang & Huang, 2017). Greater emphasis should also be placed on how best to allocate scarce resources; improved triage training can cause a noticeable increase in the efficiency of the response.

Psychological Impact

The mental effect on medical personnel during an MCI is severe, with a high rate of stress and burnout among the nurses and EMS team. The studies reveal that 65% of them rated their stress level high during MCIs; 40% pure burnt out within three months of the events. Stress arising from the reaction to severe injuries and deaths and the pressure resulting from life-or-death decision-making causes these negative mental health outcomes. Stress resulting from long working hours in rescue operations, as well as chronic fatigue, exacerbates these difficulties, thereby reducing the responder's capacity to deliver during a crisis. Further, it unveils the effect of psychological stress in the long run, such as post-traumatic stress disorder (PTSD). The need for psychological interventions cannot be overemphasized; therefore, integrating mental health into disaster plans is essential. From this evidence, it is clear that managing the employees' mental health within healthcare organizations requires a major improvement in support mechanisms(Berlinger, 2015). These may include the provision of counseling services, peer support, and teaching clients and families about stress management. This paper also draws on the literature suggesting that daily debriefing following an MCI event may assist employees in working through their emotions and coping sectors. The support for mental health services without prejudice is an important factor in the longevity of the responders' strength.

Systemic Issues

Training and communication proved to be systematic threats to efficient response to MCI. The problem of envisaging a disaster specifically was the common practice mentioned by 80% of the respondents, pointing to a negative impact on the outcome of responses. They argue that though general medical knowledge education prepares healthcare professionals on baseline competencies, it is insufficient to prepare providers on how to deal with shocks such as MCIs, where one deals with mayhem, managing large numbers of casualties, communicating to the public, rationing scanty resources, or coordinating with spirit-hobbled management with largely unmanageable demands. Decision-making exercises, drills, and exercises can help reduce this gap so that healthcare workers have practical experience handling crises(Berlinger, 2015). Implementing well-coordinated training methods across regions provides a level of standardization in response practices, which is useful for avoiding differences that may be evident during MCIs.

There is also a loss of effective communication, which greatly reduces the effectiveness of the response. Poor coordination between field responders, hospitals, and command centers results in poor response time to resources and inadequate management of the affected individuals. For instance, headquarters' inadequate communication about the level of harm or the number of hospital beds could put a lot of pressure on some centers while others go underutilized. Innovation can solve several of these questions. Effective communication through integrated information systems integrated with sound disaster management software will enhance communication retrieval within the response teams(Barrientos & Watson, 2017). To the same effect, well-defined and agreed-upon means of communication are crucial in performance, and more so during critical incidents.

The discussion highlights three critical areas of concern: the first category of negative attributes that emerged is operational gaps, and the second is the psychological effects this may have on vulnerable consumers and employees as well as identify systemic flaws. Lack of resources and variation in the indicators for triaging affects how efficiently responses are conducted during an MCI. The Voice interview revealed very high levels of stress and burnout among the responders and the need for mental health support(Arbon et al., 2011). Last but not least, the system factors on training and communication show how IT and standardization may contribute to developing the quality of work. Mitigating these findings individually can improve disaster response capacities for administrators/policymakers and clinicians to improve the quality of outcomes for patients during MCIs.

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Conclusion

In this article, nurses and EMS teams' experiences revealed that they face numerous difficulties during MCIs, such as operational, psychological, and systematic factors. Lack of resources and bulk allocation of patients, or irregular flow of patient classification, also slows down the functional process of attending to patients appropriately and arrives with poor consequences for the patients. The overwhelming level of mental strain of responders, together with the frequency of emotional upset and burnout, only jumps in the problem's heap, posing risks to their physical and/or mental moods as well as their operational capability when treating emergencies. The general deficiencies, especially in disaster-oriented training and communications structures, present more hindrances, which cause time-consuming and ineffective control of responses. Meeting these concerns is feasible only with a combination of increased endeavors concerning resource management, implementing triage protocols uniform across all hospitals, catering to patients' mental health issues, and ensuring that all facilities are trained uniformly and have compatibility with communication technology systems. Addressing such important questions will help healthcare organizations improve the preparedness for an MCI and the consequent outcomes for the affected patients without exacerbating the already high burnout rates and psychological distress of first responders(American Nurses Association, 2015). This is where joint intervention from policymakers, healthcare institutions, and training organizations is very important in achieving these goals and enhancing the coping capacity of those who are at the sharp end of delivering emergency care services.

Recommendations

Training Programs

- Develop standardized, scenario-based training modules for MCI response.
- Conduct regular simulation exercises to improve coordination and preparedness.

Resource Allocation

- Establish mobile medical units to address immediate resource gaps.
- Create centralized inventory systems for real-time resource tracking.

Psychological Support

- Provide mental health support services, including counseling and peer support groups.
- Introduce mandatory debriefing sessions post-MCI to address psychological impacts.

Technological Advancements

- Implement real-time communication tools to enhance coordination.
- Use AI-based systems for patient tracking and resource allocation.

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