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REVIEW ON DISASTER PREPAREDNESS AND MANAGEMENT IN HOSPITALS OF NEPAL

Hom Prasad Adhikari[1*], Kuldeep Singh[2], Arjun Kumar Thapa[3], Nishchal Devkota[4], Kabita Khanal [5], Manita Bartaula,[6]

[1*,2]Om Sterling Global University, Hisar, Haryana, India
[3]School of Development & Social Engineering, Pokhara University, Nepal
[4,5,6] National Open College, Sanepa, Lalitpur, Nepal

**Corresponding Author: Dr. Hom Prasad Adhikari, PhD Scholar (Management-Health Care) Om Sterling Global University, Hisar. Email: hommgt211@osgu.ac.in, Phone: ORCID Id: https://orcid.org/0009-0001-8679-837X*

Abstract

Introduction: Disasters can overwhelm community resources and response capabilities, necessitating external support. Effective disaster preparedness is crucial for healthcare professionals. Robust disaster management strategies, as emphasized by the Sendai Framework, enhance hospital readiness. Nepal's 2015 earthquake and COVID-19 highlighted the need for improved emergency management, leading to the establishment of Health Emergency Operation Centers (HEOC) and a network of hospitals. However, ongoing challenges like resource shortages and coordination issues highlight the need for enhanced disaster preparedness.

Materials and Method: A comprehensive literature review was conducted to address gaps in Nepal's emergency and disaster preparedness research. Using search strategies across databases, the review aimed to map significant ideas and evidence in a complex and under-researched topic. The review focused on articles published from 2019 to 2024 to evaluate the effectiveness of current strategies and identify areas for improvement in Nepal's disaster preparedness and response systems.

Results: Prior disasters and emergencies exposed Nepal's healthcare system's weaknesses, including worker hesitancy, resource shortages, and logistical inefficiencies. Challenges like delayed case detection and inadequate surveillance worsened the crisis. Despite the presence of Hospital Emergency Operation Center (HEOC), Hospital Emergency Incident Command System (HEICS) & satellite hospitals, the gaps regarding disaster emergencies still persisted. The study found major gaps in emergency plans, including poor infrastructure and communication systems.

Conclusion: The pandemic has highlighted the need for a comprehensive approach to address gaps in healthcare. This includes improving hospital preparedness, establishing surge capacity plans, and enhancing community engagement. Effective disaster management requires developing emergency plans, robust communication systems, and addressing human resources and logistics deficiencies.

Key Words: Disaster, Disaster Management, Disaster Preparedness, Nepal, Preparedness

INTRODUCTION

A disaster is a rapid and significant natural or artificial event that necessitates external support, overwhelming the response capability or resources of a community. Disaster preparedness involves proactive measures and plans implemented by individuals, communities, and organizations to minimize the impact of such events, whether natural or artificial.[1] Given the unpredictable and sometimes large scale of disasters, they may require unconventional and complex procedural responses. Therefore, emphasizing the importance of having an emergency preparedness plan in place before a major disaster occurs is crucial.[2]

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Effective disaster preparedness is critical for all healthcare professionals, including hospital pharmacists. Gaps in preparedness can worsen the impact of unexpected disasters, prompting governments and guidelines to actively encourage hospitals to improve their readiness.[3] Hospital disaster preparation involves implementing systems, processes, and actions ahead of major disasters to enhance the hospital's capacity and readiness for emergencies and catastrophes. Establishing a hospital disaster management strategy is the initial and essential step in effectively managing a crisis and minimizing casualties, as mandated by the international Sendai Framework for disaster risk reduction.[4] Natural disasters have significantly impacted public health in South Asia, Southeast Asia, and Africa since 2000, increasing mortality and morbidity rates. These disasters have long-term implications on education, nutrition, and health, aggravated pre-existing health conditions, especially in underprivileged populations. A cycle of poverty and ill health persists in low-income nations due to inadequate healthcare support. The complex health issues arising from disasters extend beyond immediate death to include long-term effects on social security, nutrition, and mental health. [5]

Nepal's geographical diversity, ranging from the high Himalayas to the plains, renders it highly susceptible to both seismic and hydro meteorological hazards, making it a high-risk country for natural disasters. The 2015 earthquake alone resulted in 8,969 fatalities, 22,302 injuries, and the destruction of over 400 health facilities, with more than 700 partially damaged, underscoring the need for a robust health response. [6,7] Additionally, Nepal has faced significant health crises, including the COVID-19 pandemic, cholera outbreaks, and rising dengue cases. Historical data from 1971 to 2015 reveals that disasters in Nepal have led to over 40,000 fatalities and impacted millions, highlighting the persistent challenges posed by natural hazards and public health emergencies.[7] To improve emergency management, Nepal has established Health Emergency Operation Center (HEOC) and a network of hub satellite hospitals. The HEOC, created in 2014, serves as the Ministry of Health and Population's secretariat during public health emergencies. Provincial HEOCs across all seven provinces act as command hubs for provincial governments, coordinate with health partners, and maintain critical data repositories for effective decision-making during emergencies.[8] The HEOC initially focused on communicating with affected districts to assess health needs, and the Ministry of Health promptly declared free treatment for all injured individuals, demonstrating commitment to the health crisis.[9]

The Global Outbreak Alert and Response Network (GOARN), launched by WHO in 2000, aims to improve global epidemic preparedness and response capabilities. With over 300 partner institutions, including government agencies, universities, and NGOs, GOARN mobilizes resources for international disease outbreak responses. In Nepal, four key GOARN partners, including the National Public Health Laboratory (NPHL), Health Emergency Operation Center(HEOC), Sukraraj Tropical and Infectious Disease Hospital (STIDH), and Central Department of Microbiology(CDMI) at Tribhuvan University, are working to strengthen outbreak response mechanisms.[10] The Health Emergency Disaster Management Unit (HEDMU) and Health Emergency Operation Centre (HEOC) collaborated with the National Emergency Operation Centre (NEOC) and the National Disaster Risk Reduction and Management Authority (NRDRRMA) to improve disaster preparedness and response in the health sector at national and subnational levels.[6]

Nepal's healthcare system faced a significant shortage of intensive and resources due to the surge in COVID-19 positivity, straining hospitals and compromising care for both COVID-19 and non-COVID-19 patients. The federalization of the Ministry of Public Health further complicated the crisis, reducing its credibility.[11] The 2015 Nepal Earthquake also stunned health facilities, limiting routine care and rehabilitation services. Global recommendations emphasize the need for early rehabilitation interventions and sustained psychosocial support for patients with long-term disabilities post-disaster. Step-Down Facilities (SDF) have been proposed to bridge the gap between hub hospitals and communities, ensuring a standardized approach to emergency health management and facilitating

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transition care for individuals with injuries and disabilities. An inpatient facility that serves as a temporary medical unit for medically stable patients in preparation for their release into the community is known as a Step-Down Facility (SDF).[6]

Methodology

In order to provide stakeholders who might not have the capacity to perform such assessments themselves with a summary of the findings, examine the approach used to map important ideas and evidence in a complicated topic that has not been thoroughly researched.[11] Similarly, we are examining the various articles on emergency and disaster preparedness, which will help us identify the current gap, and we are examining the government of Nepal's current program and strategy.

Table 1: Search Strategies

Search Strategies	PubMed	Reserach4Life
Hospital Disaster Preparedness AND Nepal	13	107
Hospital Emergency preparedness AND Nepal	40	127
Hospital AND emergency preparedness AND Nepal	40	127
Emergency preparedness AND Hospital AND Nepal	40	127
Hospital Preparedness AND Kathmandu	_	56
Hospital disaster preparedness AND Nepal	19	107
Emergency AND Disaster Preparedness AND Nepal	13	224

The search strategies for hospital and emergency preparedness in Nepal yield varying results depending on the specificity and database used. Using the search term "Hospital Disaster Preparedness AND Nepal" on PubMed returned 13 results, while Research4Life provided 107 results. The search terms "Hospital Emergency Preparedness AND Nepal" and "Hospital AND Emergency Preparedness AND Nepal" and Emergency preparedness and hospital AND Nepal produced 40 results on PubMed databases. Whereas in Research4LIfe produced 127 in all the terms. For more localized information, searching "Hospital Preparedness AND Kathmandu" on Research4Life returned 56 results, while "Hospital Disaster Preparedness AND Nepal" produced 19 results on PubMed and 107 on Research4Life. Finally, the search term "Emergency AND Disaster Preparedness AND Nepal" gave 13 results on PubMed and 224 on Research4Life. In order to refine the findings further for the searching strategies, we looked at the outcomes by year, taking data from 2019 to 2024. However, total of 33 references were cited which were aligned with our purpose of the study among the studies filtered from the database (Table 1).

Challenges

The COVID-19 pandemic in Nepal has led to significant challenges in health interventions and management. Healthcare workers fear disease transmission, leading to hesitancy in providing care. A scarcity of human resources and logistical support at entry points exacerbated workload and hindered management efforts. The absence of comprehensive guidance and operational plans resulted in delayed detection of positive cases. Inadequate community surveillance and response mechanisms further hampered virus control. Budget constraints and a shortage of skilled Risk Communication and Community Engagement (RCCE) professionals affected communication strategies and public trust. Coordination issues between government tiers and human resource management further complicated the response.[11]

In 2072 BS, the Ministry of Health and Population introduced an emergency management system, forming a public-private and community-based hub and satellite hospital network. The Health Emergency Operations Center (HEOC) is crucial for implementing the Hospital Incident Command

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System (HICS) for health preparedness and response to epidemics and disasters. However, updating hospital disaster preparedness plans through the Health Systems Improvement plus (HIS+) application faces challenges due to a lack of specific plans and a well-defined incident command system. Standardized referral mechanisms are needed for patient management and collaboration. The province also faces a shortage of A and B grade ambulances, affecting efforts to reduce untimely deaths. Hub hospitals need to train and orient satellite hospital staff to enhance service quality. Continuous online staff availability and reimbursement for mobile data during emergencies are essential for effective ambulance service coordination. The Emergency Medical Deployment Team (EMDT) is crucial for triaging patients during emergencies, coordinating with the Rapid Response Team (RRT), and establishing referral mechanisms.[12]

Hospital Disaster Preparedness and Response Plan (HDPRP)

Authorities should assess current hospital preparedness and identify gaps to enhance surge capacity preparedness. Marcozzi et al. developed a medical surge preparedness index, Toerper et al. proposed a web-based simulation tool, and Mills, Helm and Wang developed an optimization model for early disposition scenarios, facilitating proactive planning and emergency preparedness.[13] Comprehensive planning, including Emergency Operation Plans (EOPs), Standard Operating Procedures (SOPs), and disaster management protocols is crucial for achieving desired preparedness levels.[2] This encompasses integrating roles, communication strategies, and resource mapping, as highlighted in the Hospital Disaster Preparedness and Response Plan (HDPRP), which includes disaster phases.[4] Hospitals should regularly update Emergency Operations Plans (EOPs), assess risks, establish Incident Command Systems, maintain critical infrastructure, and collaborate with external partners to improve response capabilities. Continuous evaluation through post-incident reviews and worker feedback ensures ongoing improvement.[2] One of the studies among nurses emphasized the need for tailored strategies to mitigate risks and enhance response.[14]

Government, Coordination, Control and Command

Hospital preparedness hinges on effective coordination, control, and command structures both within and outside hospital premises, which are crucial for managing emergencies. The integration of inter-organizational communication and unity of command principles is vital for resolving conflicts, defining roles, and deploying staff effectively, thereby enhancing preparedness levels.[15] This highlights the collaborative efforts between government and stakeholders, emphasizing shared governance across the public and private sectors to formulate comprehensive strategies for disease prevention and management.[16] Simultaneously, evolving disaster management policies, alongside advancements in healthcare systems shifting towards curative approaches, reflect ongoing improvements in disaster risk management and public health strategies.[2] However, recent assessments reveal significant deficiencies in hospital emergency preparedness, including the absence of emergency committees and designated coordinators, inadequate preparedness programs, and the lack of essential infrastructure like emergency operation centers, highlighting critical gaps in coordination with local disaster management agencies.[17]

Communication and information management

Effective hospital preparedness during surges or disasters relies heavily on comprehensive infrastructure for information and communication technologies (ICT). This encompasses hospital information systems (HIS), radio communication systems, patient tracking, and telemedicine, which are crucial for coordinating emergency responses and media interactions.[15] Bradt et al. advocate for task allocation, internal communication enhancement, and resource gathering for surge management.[13] Inadequate communication systems, as highlighted in studies across Serbia, Nigeria, [18] and Indonesia's North Sumatra and DI Yogyakarta provinces [19], highlight vulnerabilities during crises due to poor

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safety, insufficient telecommunications infrastructure, and a lack of alternative communication methods. Addressing these gaps is critical, as effective communication not only supports emergency health interventions but also mitigates misinformation and facilitates resource mobilization in context of Nepal. Nurses' communication skills, emphasized in disaster preparedness studies in Saudi Arabia and Turkey[20], provided pivotal results in maintaining operational efficiency during disasters, necessitating robust training and support for effective communication strategies and media relations. Moreover, ensuring access to satellite communication and continuous updating of contact information are essential components of disaster preparedness in hospitals.[1]

Human Resources

Hospital disaster management involves crucial factors like parking space allocation, human resource training, and equipment provision for traffic, transfer, and evacuation operations.[21] Recent studies reveal hospitals face concerns about insufficient human resources and logistics, posing a threat to their ability to handle a surge in casualties during mass casualty incidents. To address this, they must collaborate with stakeholders.[22] Assessments of preparedness in Ethiopian hospitals reveal gaps in maintaining up-to-date staff contact lists, despite efforts to mobilize personnel during emergencies. [17] Enhancing preparedness involves integrating organizational units for training, fostering relationships between nursing staff and disaster response organizations, and innovating nursing education methods and economic systems. [23] A study from 2006 to 2016 found disparate levels of hospital preparedness against disasters, with human resources being a critical but moderately addressed aspect. Tehran had the highest preparedness at 91%, while Bushehr had the lowest at 14%.[21] This gap was noted in COVID-19 for resource-constrained nations like Nepal, where human resources are limited.[16]

Logistics and finance

Logistics and finance pose significant challenges for hospitals in emergency management, including financial resources, food services, and transportation. There are gaps in emergency medical transport capabilities and supplies like oxygen, exacerbated by a lack of local supplier agreements.[18] Pharmacy departments excel in disaster logistics and clinical management due to their routine expertise.[3] Site budgets were managed with government protocols, shifting to online payments due to verification challenges for participant travel allowances.[4] Disaster preparedness requires robust supply chain partnerships and strategic medical equipment planning.[24] Personal protective equipment's shortages during the COVID-19 pandemic highlighted the need for clear guidelines and staff education to ensure effective use and mitigate infection risks.[25]

Triage System and Management

Disaster preparedness knowledge encompasses defining disastrous events, understanding the incident command system, triage, and assessment's critical roles Triage in emergencies is a stressful task with different goals and processes from normal circumstances, crucial for quickly assessing injury severity and minimizing negative outcomes. Emergency nurses' knowledge is pivotal in triage decision-making, influencing patient outcomes significantly.[26] Research staff engaging with participants during crises must be trained in crisis management and triage.[27] During outbreaks like dengue and COVID-19, emergency departments adapt triage systems to handle increased patient volumes effectively, implementing pandemic triage protocols.[28]

Training and Responsibilities

To address the gap between knowledge and attitude in disaster preparedness, it is essential to regularly sensitize and retrain personnel, and conduct practical drills and simulations.[29] In response to COVID-

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19, hospitals are preparing by training medical officers, nurses, and health assistants in critical skills such as intubation, cardio pulmonary resuscitation, and proper infection control procedures like donning and doffing.[30] Factors influencing preparedness include offering both general and specialized training courses, using simulators for realistic exercises, and utilizing online platforms for virtual training when necessary.[15] However, some hospitals have yet to implement regular staff training, capacity testing procedures, and comprehensive emergency security protocols.[17] Effective training not only prepares personnel for disaster response but also reinforces their understanding of ethical and legal obligations, ensuring they are well-prepared to manage emergencies effectively.[23]

Safety

Again, a Peru study highlighted hospitals' vulnerability with an average Hospital Safety Index (HSI) of 0.36.[31] Community pharmacists improve patient well-being by enhancing disease management skills and home care safety strategies. They play a crucial role in managing chronic comorbidities, thereby contributing significantly to public health safety during global health threats.[32] Ensuring the safety of healthcare workers is critical during the COVID-19 pandemic, requiring collaborative efforts among national bodies to develop tailored guidelines.[33] The International Labor Organization stresses the need for improved safety measures in COVID clinics, including expanded testing for healthcare staff. In Nepal and globally, enhancing safety provisions such as quarantine and transportation for healthcare workers is essential to prevent virus transmission.[16] Evacuation moves people to safety during emergencies to prevent harm, while sheltering offers a secure place during crises when evacuation isn't possible or advised.[2]

Conclusion

The COVID-19 pandemic has exposed weaknesses in Nepal's health management, including healthcare workers' fear of disease transmission, lack of resources, and insufficient operational plans. This has resulted in delayed case detection and ineffective community response. Budget constraints and a shortage of technical professionals have also undermined communication efforts and public trust. Despite advancements like the Health Emergency Operations Center, challenges remain in updating disaster preparedness plans, training staff, and addressing infrastructure gaps. Strengthening hospital preparedness through comprehensive planning, training, and improved safety measures is crucial for future emergencies.

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