

Emergency Disaster Preparedness in Tertiary Level Hospital of Kathmandu Valley

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Abstract

Hospitals are among the foremost service providers or infrastructures to be impacted by any occurrence of disaster. They have a prominent as well as vulnerable role in disaster management. This study aims to access the emergency disaster preparedness in tertiary level hospitals of Kathmandu Valley. In this study, the cross-sectional study under post positivist paradigm was conducted, using both qualitative and quantitative techniques. The prominent tertiary level hospital with various initiatives in disaster preparedness was selected for case study. The study sample based on Kothari sampling, consisted of 90 respondents. The data collection was based on self-administered questionnaire, key informant interviews and disaster preparedness checklist; prepared with guidance for various national and international guidelines. The results showed that the hospital had better functional preparedness 80 percent as compared to 76 percent preparedness in Non-structural safety. Within the functional capacity, the surge and triage, Hospital Incident Command System, emergency and planning and hospital vulnerability assessment achieved the perfect score, followed by human resources with 90 percent preparedness and 84 percent preparedness in logistics and supply. The security and alarm system along with communication and coordination system had the minimum level of preparedness 46 percent and 58 percent respectively. This reduction in preparedness was mainly due to the lack of alternative communication system and the absence of escape routes and exit signage. Similarly, within the non-structural safety medical facilities was most prepared with 87 percent preparedness, followed by architectural elements preparedness of 77 percent and 71 percent preparedness in lifeline facilities. The overall result revealed the hospital to have good disaster preparedness with score of 78 percent. The study recommended that the hospital should establish an authorized body for monitoring, executing and enhancing the disaster plan and preparedness measures. As well as the preparedness measures should be continuously accessed and maintained.

Keywords

Emergency, Disaster Preparedness, Hospitals, Tertiary level, Kathmandu Valley

1. Introduction

Disasters are unavoidable conditions and their destructive effects can lead to the inability of the community to meet their need and access to health care.[1] Nepal is exposed to a variety of natural hazards and human induced disasters. More than 80 percent of the total population of Nepal is at risk from natural hazards, such as floods, landslides, windstorms, hailstorms, fires, earthquakes and Glacial Lake Outburst Floods.[2] According to Nepal Disaster Report 2017, Nepal, the 20 most disaster-prone countries in the world ranks 4th and 11th in terms of

its relative vulnerability to climate change and earthquakes, respectively, has a growing incidence of disasters every year and also is one of the countries in South Asia where affect to killed ratio due to disaster is high. Out of 21 cities around the world that lie in similar seismic hazard zones, Kathmandu city is at highest risk in terms of impact on people.[2] Research shows that when a disaster occurs, the pick of medical care needs is within the first 24 hours after the disaster, and 85-95 percentage of the survivals are rescued within first 24 hours.[3] Hence, in times of disaster, hospitals need to be well prepared to enhance their capacity for admission as well as effective services.

Kathmandu Valley, a capital city, is the most important urban concentration in Nepal. According to Ministry of Health and Population, Kathmandu houses most of the tertiary level hospitals in the country, from comprehensive health care, specialist to teaching hospitals. These hospitals serve a huge number of population in day to day basis and are also the prime choices for services during disaster. By providing timely health services, hospitals can play critical role in crisis management by reducing mortality and increasing the number of survivors, minimizing the effect of disabilities, relieving physical and mental illness. [3] According to statement of American College of Emergency Physicians in 2003, all hospitals should have a place and program to provide medical care in the form of emergency preparedness, and it is essential that the program stays active and is periodically reviewed. Hospitals that regularly practice the programs are less likely to suffer in disaster. [3]

Disaster preparedness assessment of the hospitals enlightens awareness among the hospital administrators, faculties as well as the government of the strength, weakness, and performance level of the hospital in case of disaster. Hence, the prevailing disaster preparedness of hospitals has a major impact in the services provided by them during disaster.

2. Objective

General Objective

To discover how emergency disaster preparedness is implemented in tertiary level hospitals of Kathmandu Valley.

Specific Objective

- To determine the major components in Hospital Disaster Preparedness
- To determine the gaps in hospital’s existing preparedness measures

3. Literature Review

According to IFRC, disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. That is, to predict and, where possible, prevent disasters, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences. [?] Similarly, Global Disaster

Preparedness Center has defined disaster preparedness as a continuous and integrated process resulting from a wide range of risk reduction activities and resources rather than from a distinct sectoral activity by itself.

In case of Hospitals, when large number of patients additional to the normal serving capacity of hospital, require the services in a short span of time, which exceeds the ability of coping with normal management and resources of the hospital, formulates a disaster for the particular hospital. Therefore, the disaster for a hospital can also be defined as, a temporary lack of resources which is caused due to sudden influx of unexpected patient load. The vital role of any hospital, apart from providing health services, is to be prepared for emergencies and calamitous events [4]. To achieve this role, hospitals ought to have well prepared and applicable disaster plan.

In context of Nepal, it has been stated that if the hospital is prepared for a major earthquake, it is prepared for everything including more minor but recurring disasters. [5] Hence, generally in Nepal guidelines and policies are developed with reference to Earthquake. As per the report on Non-structural Assessment of Hospitals in Nepal prepared by National Society for Earthquake Technology-Nepal (NSET) under WHO-Nepal, the major components contributing to the functionality of Hospitals after an Earthquake are also listed as; structural components, non-structural components and emergency disaster preparedness.

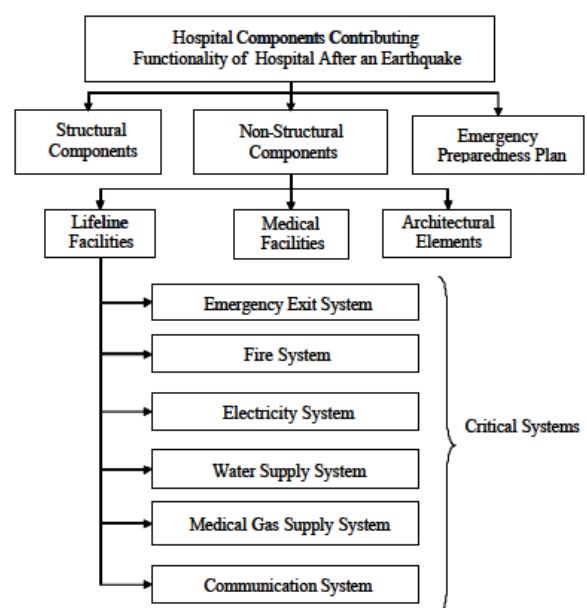


Figure 1: Major Components of Hospital [6]

Emergency preparedness for hospitals, initially comprises the awareness of vulnerabilities that might impact the ability of the hospital to cope with adverse incidents like natural disasters to MCIs. The vulnerability might be in; structural sector or non-structural sector; as buildings location, design, materials used, etc. or functional capacity of the hospital.

In the advent of emergency, damage to any of the above sectors, might halt the planned services of the hospitals. The vulnerability assessment must be addressed through the involvement of hospital operations planning, finance, public services as well as technical team of architects and engineers. For better performance, hospitals must be designed with compliance to building codes and health guidelines, similarly there must be legislative measure and financial support to maintain and retrofit most critical facilities to enhance its capacity. Even in WHO prepared guideline for Safe Hospitals in Emergencies and Disasters, the measure of safety is carried out through Structural, Non- Structural and Functional Indicators.

Hence, the measure of emergency preparedness in hospitals can be carried out through three basic themes; Structural, Non- Structural and Functional.

4. Methods

In this research paper entitled Emergency Disaster Preparedness in Tertiary Level Hospitals of Kathmandu Valley, both qualitative and quantitative method was used to achieve the research objective. The nature of this study depicts the research to be Cross sectional study under post positivist paradigm.

The initiation of this research has been through the identification of a problem. The realistic observation of recent disasters; Gorkha earthquake 2015, impacts on the service delivery and the functioning of the hospital led to the realization for the need to study the disaster preparedness in hospitals. The problem identification was simultaneously followed by topic selection, which would enlighten the disaster preparedness level among hospitals. Literature review followed the topic selection, where various national and international guidelines, policies, articles, and journal papers were studied. Among the studied guidelines; Guidelines on Emergency Preparedness and Disaster Management for Hospitals Nepal, 2002, Health Sector Emergency Preparedness and Disaster

Response Plan 2003, Non-structural Assessment of Hospitals in Nepal NSET, 2004, and WHO prepared Guideline for Safe Hospitals in Emergencies and Disasters, 2010 were accessed for identification of major components of disaster preparedness in hospital. Whereas, Nepal Building Code, Non-structural Safety in Health Facilities, 2004, WHO prepared Guideline for Safe Hospitals in Emergencies and Disasters, 2010, and Guide for Evaluators, PAHO were referred for standard values of indicators and parameters of major components of disaster preparedness. Based on these literature, conceptual framework of the study was designed. Various tertiary level hospitals were assessed for case study, however detail study was carried out in one hospital in which data collection was done through visual assessment, interview with key informants and questionnaire survey.

Then, the data analysis was done with the help of Nepal Building Code, Non-structural Safety in Health Facilities, 2004, WHO prepared Guideline for Safe Hospitals in Emergencies and Disasters, 2010, and Guide for Evaluators, PAHO, from where the non-structural safety and functional capacity of the hospital was analyzed and the findings was prepared. The findings were then validated with the experience of the hospital during Gorkha earthquake 2015. For the validation; in depth interview with the selected staffs, administration as well as the visitors and the patients was conducted. The interview questions were based on the same disaster preparedness checklist, used to evaluate the hospital, focusing mainly on their experience and the problems they faced.

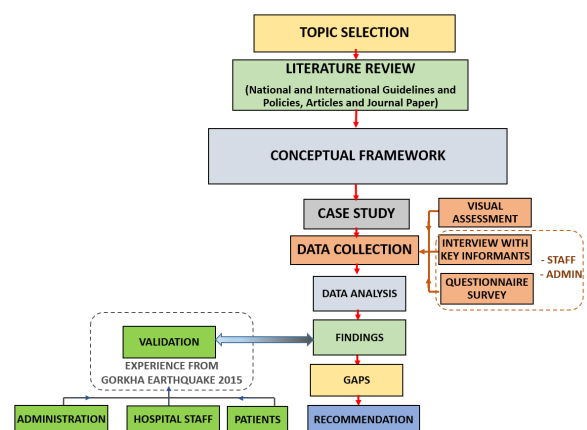


Figure 2: Flow chart of Research Methodology

Based on the findings and validation, the gaps in the measures of disaster preparedness in the hospital was obtained. These gaps were then accessed to provide

proper recommendation to the hospital for attaining more effective disaster preparedness. The flowchart in following Figure 2 illustrates the research methodology of this study.

In this research, the measures for disaster preparedness in tertiary level hospitals has been carried out in three basic sectors, with the guidance from literature review, research design is done in three basic sectors; Structural safety, Non-structural safety and Functional Capacity, with reference from the WHO Safe Hospitals in Emergency and Disasters indicators and the NSET Guidelines of Seismic Vulnerability Assessment of Hospitals in Nepal. Within the non-structural safety, indicators as medical facilities, architectural elements and lifeline facilities were identified, whereas in functional capacity indicators as hospital vulnerability assessment, emergency and disaster planning, security system, communication, surge and triage, safety and alarm, transportation system, coordination system, human resources and logistics and supply were identified for determining hospital disaster preparedness. The following Figure 3 illustrates the conceptual framework of this research.

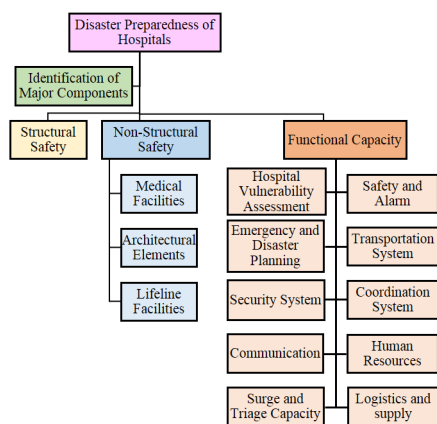


Figure 3: Conceptual framework of Research

Among the three, data of structural sector was based on the secondary data provided by Ministry of Health and Population from document on Non-Structural Vulnerability Assessment of Hospitals in Nepal prepared by NSET. Similarly the data for non structural and functional sector was collected based on the indicators as well as the parameters to measure each indicators.

For the case study, among the three tertiary level teaching hospitals of Kathmandu Valley, the hospital categorized operational in severe earthquake scenario

according to hospital seismic assessment carried out by NSET in 2004 was selected. The evaluation tool was based on the study of various standards, guidelines and checklists provided by WHO as well as the MoHP.

Survey In this study, tertiary level hospital was studied; as the human resources, facilities and instruments for emergency disaster preparedness are mainly found here. In order to achieve the research objective, following modes were used to collect data.

- Questionnaire Survey
- Key Informant Interviews
- Visual Assessment Checklist

The interview was basically with the hospital representatives as head of departments and administrations who had experience and knowledge about emergency disaster preparedness.

Data Analysis

After the data collection in the non structural and functional sector of disaster preparedness in the selected hospital, the obtained data was transferred to Excel spreadsheet. The measuring parameters in the preparedness checklist were all in polar question format. Hence the outcome of each statement was coded as per binary code on the basis of negative and positive findings, 1=yes or 0=No. Each binary code was then summed to determine the degree of preparedness in the selective hospital. The total summed score, was averaged to a range of zero to 100, for homogeneity. Based on this score the level of emergency disaster preparedness was categorized into five levels: scores 0-20 indicate very poor, 21-40 poor, 41-60 moderate, 61-80 good and 81-100 show very good level of preparedness. These cutoff points are according to approaches used in similar studies.[7] [8] [3]

5. Results

The selected hospital responded and cooperated to the study. The hospital attained an overall score of 78 in disaster preparedness and was categorized with good disaster preparedness. Within the study, non-structural safety measures scored 76 whereas the functional capacity scored 80. The following Figure 4 elaborates the attained score under each indicator.

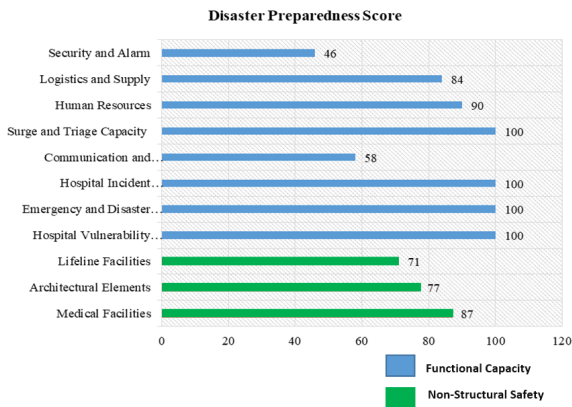


Figure 4: Hospital Score on each indicators

The above fig:4 illustrates that the functional capacity of hospital is more advanced than the non-structural safety of the hospital. Within the functional capacity, the indicators of hospital incident command system, emergency and disaster planning and hospital vulnerability assessment secured the perfect score. The least score of security and alarm indicator, could be due to lack of escape route planning and building escape layout. Likewise, the communication and coordination system also has minimum score, as the hospital has limited alternative communication system, which is the hand held radio used by security personnel. Similarly, in Non-structural safety, the top score has been allotted to medical facilities, for its proper installation and support system of equipment and supply. The absence of illuminous exit signs in corridors leading to open area reduced the scoring of lifeline facilities. The above average scores for each indicator reflect that the hospital has undertaken initiatives in disaster preparedness however some sector of preparedness are lagging behind the other perfectly planned sectors. As disaster preparedness is a continuous approach the sectors lagging behind can easily be uplifted through proper planning and execution, during future preparedness activities.

6. Gaps

The overall study of the disaster preparedness in the hospital, its validation with recent disaster of Gorkha earthquake 2015, reflected good level disaster preparedness. But some major gaps were discovered during the study. The most prominent was the gap in continuity of disaster preparedness measures. As the hospital had carried out nonstructural retrofitting, the nonstructural safety should have been perfect. But there was variation found in the safety measures

because the equipment and utilities added after the retrofitting were not secured and fitted as per the required procedure for safety. Even the safety measures are not mentioned regularly, so once the safety measures are damaged they are not reinstated as to prior condition. The damage in thread used for strapping supplies in cabinets were not replaced after damage. The same problem is seen in false ceiling fittings of connecting corridor between the main block and emergency. This recently added false ceiling has already been damaged and some portions worn out. The main building though constructed more than 25 years ago still has intact and sound false ceiling; braced with vertical and angled braces. This clearly shows that the procedures to secure the false ceiling were not followed in the later additions of hospital area. Likewise within the architectural elements safety, the existing worn out flooring in staircase and ramp reflects that the hospital lacks regular monitoring and maintenance. The other gap within lifeline facilities is the redundancy in strengthening of every major to minor components involved in supply of facilities from supply source to users, as filtration system for water supply. Within the medical gas supply system, hospital lacks provision of alarm for leakage or disruption in supply. The other noticeable difference was amongst the disaster plans and program, and its execution. The hospital was found to be regularly conducting training and workshops on disaster and its preparedness. But the practical exercise through drills is only focused on accidents. Similarly, according to the hospital disaster plan every staff has to be aware of the contents of the plan. Even though most of the staff are aware that the hospital has a disaster plan, insignificant number of staff know the contents of the plan. These gaps between plans and actions must be gradually reduced. Likewise, hospital does not have directional exit signage and evacuation route plans throughout the hospital, this minimizes the capacity of inhabitants of the hospital building to make a safe exit. Hospital also lacks alarm system for identifying evacuation time or emergency. Similarly, some gaps were found in provision of alternative communication system. Hospital basic mode of communication is the cell phones, with alternatives of pager and land-line phones. However, if there is failure in national telecommunication system, alternative means of communication is only the hand held radios used by security personnel, which will be inadequate to fulfill the demand of communication during disaster. Even if the number of

hand held radio is increased training must be provided beforehand on how to use those devices during disaster. The other relevant gap was noticed in internal means of transportation, as most of the trolleys, wheelchairs and beds were not in sound condition for transfer of patients. Some of the beds wheels were damaged and most of their wheels had flat tire, even the wheelchairs tires were flat with damaged brake system. The one-time installment and storage system of stockpiling of emergency medicine and supplies is a major gap in management of emergency supplies within the hospital. The lack of monitoring and restocking provision of medicine and supplies had led to out dated supplies and medicine in the stockpile. Likewise, the other gap found in this study is the monitoring of disaster preparedness. The hospital needs to have an authorized body responsible for monitoring the disaster preparedness measures, ensuring the services and functioning of the hospital are as per disaster plan, and even the measures for safety are properly executed in the hospital various departments.

7. Recommendation

The major recommendations of this research work to the studied tertiary level hospital are illustrated as follows;

Nonstructural Safety:

The measures enforced for safety of medical facilities; as chaining, anchorage or bolting, should be homogeneously installed in placement and fixing of all the equipment, furniture, supplies and cabinets. These safety measures should also be continuously assessed and maintained, to confirm they are in sound functional condition. These measures should also be installed and enforced during future expansion of hospital services. Hospital maintenance department should be responsible for ensuring that the safety measures are properly executed. The flooring of the staircase and ramp should be instantly replaced and maintained to obtain a leveled non slippery flooring. The flooring of overall hospital should be regularly monitored and periodically maintained. The false ceilings in external connecting corridor must be re installed with proper vertical and angled bracing. Similarly, the doors, windows and wall partition should be regularly accessed and maintained. And the safety measures for architectural elements should also be installed and enforced during future expansion of

hospital services. Here also the maintenance department should ensure the proper execution of architectural elements safety measures. Hospital should properly mount the cable network running haphazardly in corridors and also should continue to properly fix the cables that might be installed in future for further need of communication and electrical supply. Hospital should install directional exit signs in corridors leading to emergency exit. The existing practice of safety measures of lifeline facilities must be continuously assessed and maintained, and even continued in future expansions of hospital by hospital maintenance department. The supply system of lifeline facilities; water, medical gas, HVAC, etc. should be properly strengthen from the source of supply to the end user distribution system, even the minor areas as filtration system or the choice of tap in water supply should be considered. The services department should monitor and maintain the strengthening support system for lifeline facilities. The regular monitoring and periodic maintenance of all non-structural components should be a continuous process, executed effectively in the hospital.

Functional Capacity:

Hospital disaster plan document should be made easily available to every staff of hospital through library. This will enable a clear understanding of the vulnerabilities of the hospital, the importance of safety measures provided and the responsibility of staff themselves in case of disaster. Hospital library should be responsible for availability of disaster plan in library. Hospital should have a proper alternative system for communication, in case the cell phones are not functional. Alternative communication system as hand held radios, hams or satellite phones can be installed. However, proper training should be provided to all the staffs on how to use the alternative means of communication. The means of transportation via trolley, wheelchair and beds within the hospital should be in well functional condition. The wheels, foot hold and brake system should be in sound condition. The means of transportation functionality should be accessed by the nursing department and maintained by the maintenance department. Similarly, hospital should have escape route maps at regular intersections of corridor as well as in each wards and cabins. The staffs should be made aware of escape routes to follow by the disaster committee, whereas the patients should be made aware of escape routes to follow by the nursing

department staff. Hospital should continue with the emergency accidents drills as it was helpful in guiding the staffs during earthquake to perform their respective duties. However, in addition to this, hospital should also simultaneously carry out stimulation and drills for evacuations, so the staffs are also well aware of the evacuation procedures during earthquake. Hospital disaster committee should lead these stimulation and drills. Hospitals emergency stockpile of medicines and supply should be inspected regularly and restocked. Hospital pharmacy group within the HICS should be responsible and authorized for maintaining the supply of medicine in emergency stockpile. The medicine and supplies of the stockpile should be periodically inspected and restocked, so the new medicines and supply will regularly replace the stockpiled supplies. The supplies and medicine obtained from restocking the stockpile can be used during hospital medical camps of students where large number of supplies is consumed or can be sold through pharmacy which can finance the next purchase of emergency stockpile supplies. Overall, the existing preparedness measures should be continued and maintained in future expansions of hospitals. Also, the practice of disaster preparedness measures should be regularly accessed by the disaster management committee with the coordination from all the departments of hospital. Hospital should also have a well functional alarm system for notifying emergencies, which must be well known to every staff. This alarm system must be heard from every part of hospital. Hospital disaster committee or HICS coordinator must have the authority to sound the alarm. Likewise, hospital should also have alarm system for medical gas leakage to prevent secondary disaster as fire. The following table 10 illustrates the actors for functional capacity as well as the people involved for those safety measures Since this study was limited to Disaster preparedness of Tertiary Level Hospital within Kathmandu Valley in case of earthquake, for future research other major hazards with mass casualty incidents as, flood, fire, conflict, epidemics, etc. can be studied. The study can also incorporate all types of hospitals from primary hospital to secondary and specialized hospitals. The monitoring and evaluation system of hospital disaster preparedness can also be one of the field of study in Hospital disaster preparedness.

8. Limitation

There are numerous hospitals that are on service throughout the country, however this research will cover only the tertiary level hospitals within Kathmandu Valley. Hence the prevailing conditions of study area shall not be generalized to every hospital within the country. In this study, disaster preparedness for earthquake will only be studied. The waste management system of the hospital which requires expert detailing, will not be assessed in this study. Likewise, within the research demarcation, the hospital building structural safety will also be based on the secondary data extracted from NSET document on Non-Structural Vulnerability Assessment of Hospitals in Nepal.

9. Conclusion

“By failing to prepare, you are preparing to fail” – Benjamin Franklin

The occurrence of disaster cannot be predicated or even prevented, however there can be protection from its impacts; through proper preparation and mitigation measures. Hospitals are the most important institution in disaster response. According to the American College of Emergency Physicians, hospitals that regularly practice the disaster preparedness are less likely to suffer in disaster. The studied tertiary level hospital is in right direction and has already achieved a great amount in preparedness measures. Through every experience with emergency and disaster they have updated and strengthened their preparedness. The efforts of the hospital disaster committee towards emergency and disaster preparedness are admirable, however still more needs to be done. As disaster is unpredictable, the hospital must continue with these preparedness measures along with regular monitoring and maintenance process for it is important to be prepared, and preparedness is a continuous process.

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