DISASTER AND EMERGENCY PREPAREDNESS OF HOSPITALS IN MONGOLIA

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Abstract. This study was conducted to evaluate the current status of emergency preparedness and response at designated hospitals in Mongolia, using WHO protocols for an assessment of the health facilities in responding to emergencies and the development of a questionnaire for the 33 hospitals in the study. Two-thirds of the surveyed hospitals had experienced a disaster during the last ten years. These included *zud*, storms, plague outbreaks caused by *Yersinia pestis*, explosions, earthquakes, hazardous material incidents and mass casualty incidents. Almost all rural hospitals (92.6%) have no system for proper categorization, tagging and color coding of casualties and most (79.3%) do not have designated personnel for security and crowd control. Most hospitals (83.3%) have no evacuation plans for disaster situations or plans for cooperation with other health facilities. Most hospitals (85.2%) conduct no hazard and vulnerability analysis and (92.6%) of rural hospitals, and 33.3% of urban hospitals indicated that they lack financial support for training and drills. Our results reveal that hospital emergency preparedness and response are major health issues in Mongolia, improving this situation will require a change in funding patterns.

INTRODUCTION

Mongolia has experienced more than 25,000 natural and man - made disasters and emergencies over the last 10 years. Periods of *zud* (extreme cold) and drought occur about once every 10 years, invariably with disastrous consequences. Each year about 1,000-2,000 seismic tremors occur. Mortality due to injuries and poisoning has increased sharply within the last few years. One in five deaths are due to trauma, poisoning or other external factors (National Center for Health Development, 2007).

Hospitals and hospital personnel play important roles in disaster response. These vary according to the type of disaster, location, and resource availability. Hospital personnel may be responsible for incident identification, triage and treatment of victims, and issuing accurate and consistent public information. The effectiveness of hospital response is greatly enhanced by preventive integration into the process of community emergency preparedness and response planning (Baun *et al*, 2006).

During the first 72 hours of a disaster,

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local agencies are generally the first to respond (O'Leary, 2004), and staff members are often from the affected community. Hospitals should have emergency plans as well as available beds, drugs and equipment. Staff should be trained and ready to respond to large scale infectious outbreaks, chemical poisoning, or other public health emergencies.

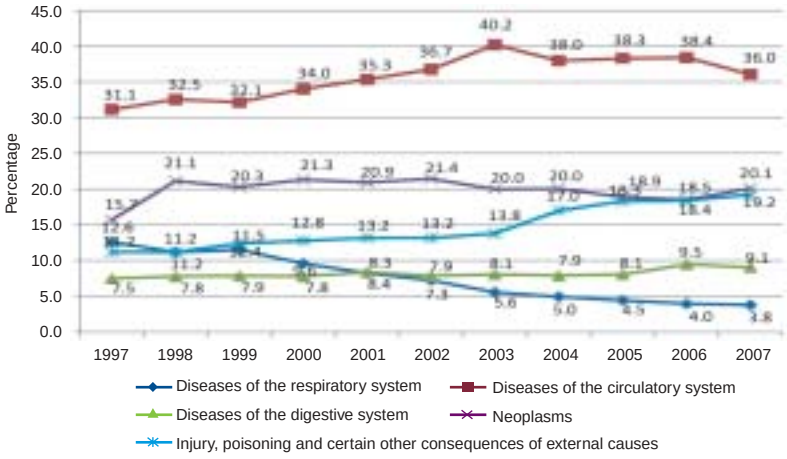

Fig 1–Five leading causes of death (1997-2007).

Mongolia is landlocked, and one of the poorer countries in Asia (WHO/RO, 2006). Winters are long and extremely cold, with frequent temperatures below -30°C. Periods of *zud* (a Mongolian term for an extremely cold winter, which almost always includes blizzards and extreme snowfall). *Zud* occur about once every 10 years, invariably with disastrous consequences (WHO, 2003).

In the last decade Mongolia has experienced enormous changes as it transitioned from a centralized to a market economy. As has been true in European countries undergoing similar changes the health sector has been particularly affected (Stuckler *et al*, 2009). Many reforms and decentralization efforts have and are continuing to take place: private medical institutions are allowed to operate, state funding or subsidies have been reduced, and several health care activities and responsibilities have been transferred from central to local levels. However, there has been a lack of specific guidelines for the systematic implementation and coordination of decentralization planning, and few reforms have resulted in the substantial and sustained improvement in the quality and accessibility of health care. Emergency medical services have been particularly impacted by these changes. Emergency medical equipment is frequently outdated, medications are often in short supply and modern equipment for communications as well as for prehospital emergencies is lacking.

Mortality due to injuries and poisoning has increased sharply during the last few years, with 2,800-3,000 people, or one in five deaths, being due to trauma, poisoning or other external factors (Fig 1).

Mongolia is at high risk for natural disasters. It is seismically active and 2 of the 10 major global earthquakes of the last century have occurred within its borders. Each year Mongolia experiences about 30 to 50 quakes of magnitude 5.0 or above (NEMA, 2005). Mongolia has also seen an increase in soil degradation and desertification over the last decades due to draught and global climate change. This has increased the number of severe dust storms as well as steppe and forest fires.

According to statistics of the National Emergency Management Agency (NEMA), over the last 10 years Mongolia has experienced some 25,000 disasters and all kinds of emergencies (double the number of the past decades), in which more than 1,100 people

died along with a loss of 9.3 million head of livestock and 55.0 million hectares of forest and pasture lands affected by fires. This amounts to an estimated 431.7 billion tugrik (USD 0.372 billion) worth of damage (WHO, 2007).

Each year approximately five Mongolian provinces experiences a disaster with high levels of suffering and death. The increasing number of emergencies has created new demands for skills in disaster preparedness and management, data monitoring capacity, and the development of policies for recovery (NEMA, 2005). Minimal research has been conducted on the management of emergency medical care in Mongolia during the last twenty years. Consequently, emergency medical issues have yet to be adequately defined and systematically addressed in policy documents. However, policy measures to improve emergency preparedness and response have been taken in recent years. One of the health sector's master plan strategies calls for improving the management capacity of the national government and the health care system for responding to natural disasters and emerging public health epidemics by providing timely and adequate resources to address these problems. There is a need to focus on strengthening the preparedness and responses of healthcare facilities (Goverment of Mongolia, 2006). The present study was conducted to evaluate the current status of emergency preparedness and response at designated hospitals.

METHODS

Study design and population

The WHO protocols for the assessment of health facilities were modified to fit the Mongolian context. A survey instrument (WHO, 2003) and a plan for directly checking the status of preparedness at each hospital were developed. Objectives of the study were chosen based on the history of most serious disasters, their location, the referent statistical indicators for disasters and emergencies, referral level, and the provision of services at health care facilities. The primary and secondary level hospitals were selected using a random sampling technique, with the Central hospitals deliberately chosen, in accordance with the WHO standard methodology on "sampling of health studies" developed by SK Lwanga and S Lemeshow. Primary hospitals were in rural areas and almost all had fewer than 50 beds, secondary level hospitals had less than 250 beds and referral hospitals had more than 250 beds. This has an absolute precision of d=0.05, 95% level of confidence, and a probability of 0.05. The study selected 18 primary and secondary level hospitals in the provinces as well as three district hospitals, the Central Clinical Hospital, the Trauma Hospital, and the National Center of Infectious Diseases. The 33 hospitals included in the study accounted for 11% of the 312 public health care facilities in the country.

We used the WHO questionnaire to survey 132 hospital personnel including directors and vice directors of medical services, admission/ICU department doctors, head nurses and accountants. Deputy Directors of major hospitals and designated staff members from various departments were the primary contact people interviewed for the study (http://www.wpro.who.int/NR/rdonlyres/AAF327BF-0795-4FF6-AB5E-44A5A31F0F7D/0/who_fieldmanual_r1.pdf, 2005 version).

Data analysis

Answers were coded, and a database of health care facilities was established. The questionnaire list was processed using Fisher's exact test, SPSS-12 program, and Microsoft Excel.

Table 1
Hospital emergency planning.

Items	Urban hospital, *n* (%) *N*=6	Rural hospital, *n* (%) *N*=27	Lowercase value *
Emergency planning group			
Yes	5 (83.3)	20 (74.1)	0.1
No	1 (16.7)	7 (25.9)	
Type of disaster			
External	3 (60.0)	6 (30.0)	0.45
Internal	1 (20.0)	6 (30.0)	
Both	1 (20.0)	8 (40.0)	
Uncertain	1 (16.7)	7 (25.9)	
Emergency-preparedness plan			
Yes	5 (83.3)	17 (63.0)	0.63
No	1 (16.7)	10 (37.0)	
Evaluation of disaster preparedness plan			
Semi-annually	1 (16.7)	2 (7.4)	0.23
Annual	3 (50.0)	12 (44.4)	
Biannual	0 (0.0)	1 (3.7)	
After come diseases report	2 (33.3)	2 (7.4)	
Uncertain	0 (0.0)	10 (37.0)	
Method of evaluation			
Discussion	1 (16.7)	15 (55.6)	0.002****
Drills	1 (16.7)	1 (3.7)	
Simulation exercises	2 (33.3)	0 (0.0)	
Discuss and performing	2 (7.4)	2 (33.3)	
Other	0 (0.0)	9 (33.3)	
Result of last evaluation			
Effective	1 (3.8)	1 (42.3)	0.11
Needs changes/improvement	5 (83.3)	15 (55.6)	
Uncertain	0 (0.0)	11 (40.7)	
Check protocols of radioactive or chemical contamination			
Yes	1 (16.7)	3 (11.1)	0.10
No	5 (83.3)	24 (88.9)	
Hospital personnel regarding use of chemical contamination protocol			
Yes	2 (33.3)	5 (18.5)	0.58
No	4 (66.7)	22 (81.5)	
Patient triage system			
Yes	2 (33.3)	2 (7.4)	0.08
No	4 (66.7)	25 (92.6)	

**P*-value for the difference between urban and rural hospitals

RESULTS

A total of 33 hospitals from different health care levels in Mongolia were assessed, mostly in rural areas (27/33 or 81.8%). Sixty-six point seven percent of the study's participating hospitals had at least one working experience in disaster and emergency

Table 2
Hazard and vulnerability analysis.

Topics	Urban hospital, n (%)	Rural hospital, n (%)	Lowercase value
Emergency preparedness, hazard and vulnerability analysis			
Yes	3 (50.0)	4 (14.8)	0.09
No	3 (50.0)	23 (85.2)	
Any disaster occurrence regular drill/exercise			
Yes	4 (66.7)	9 (33.3)	0.18
No	2 (33.3)	18 (66.7)	
Adequate financial support for training and drills			
Yes	4 (66.7)	2 (7.4)	0.005*
No	2 (33.3)	25 (92.6)	
None	3 (50.0)	24 (88.9)	
Evacuation system			
Yes	1 (16.7)	7 (25.9)	0.10
No	5 (83.3)	20 (74.1)	

**P*-value significant by Fisher's exact test

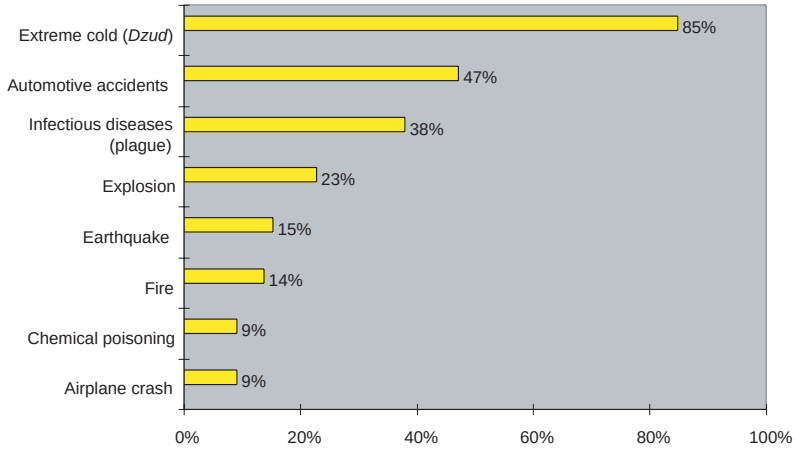

Fig 2–Perceived risk of hospitals (*n*=33) from specific emergencies. Frequency calculated on the basis of unweighted analysis of 33 responses to the question: "Do you perceive your hospital to be at increased risk from any of the following hazards?

situations, 85% of these facilities experienced *Zud* and 15% faced earthquakes (Fig 2).

Data on the emergency planning of hospitals is presented in Table 1. In general, hospitals located in urban areas had done better planning. Almost all hospitals maintained contact details in their emergency departments on personnel who were assigned to work during disasters. Few hospitals (7.4%) had disaster triage systems for categorization, tagging and color coding of patients or casualties and only 20.7% had plans to assign people to security and crowd control. Most rural hospitals (74.1%) had no evacuation plans for disaster situations or cooperative plans with other health care facilities. Only 33.3% of the urban hospitals had participated in community wide drills or simulation exercise training.

Table 2 shows an emergency preparedness hazard and vulnerability analysis. This analysis included the following: identification of hazards, listing of possible effects, problems, and determining causes, developing responses and recovery strategies, and

events triggering this strategy. Most rural hospitals (85.2 %) and many urban hospitals (50.0%) did not conduct a hazard and vulnerability analysis (p = 0.09 for the difference between rural and urban).

Most rural hospitals (92.6%) and some urban hospitals 33 (%) said that they lacked financial resources for training and drills. Some urban hospitals did have financial support including donations and allotments for disasters.

DISCUSSION

Our survey established a baseline assessment of emergency preparedness and responses among hospitals involved at the three levels of health care services. This study focused on hospital emergency preparedness related to three domains: (1) general information concerning the hospitals, (2) emergency planning, and (3) hazards and vulnerability analyses. At present there are no formal requirements for developing these areas. Knowledge of techniques such as vulnerability analysis is limited and funding is sparse.

This may be partly due to the currently weak legal environment for disaster preparedness in Mongolia. In Japan each hospital must conduct disaster drills twice a year and in the USA, The Joint Commission [previously known as the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO)] requires hospitals to have a disaster plan and to periodically run both internal and external disaster drills. There are no equivalent requirements in Mongolia.

Although our sample was derived using standard methodology there is enough variability among Mongolian hospitals so that a survey of all facilities would have given more complete information. In addition it would make follow-up studies easier. We were unable to identify and survey identical personnel at all facilities. The personnel surveyed were chosen because they were thought to be those most knowledgeable based on more than 5 years of work experience. Furthermore, this study did not collect baseline data that would allow us to correlate infectious disease patterns with future climate change in Mongolia. This will require further follow-up surveys and data collection.

In summary, the Mongolian healthcare system is currently inadequately prepared for disasters and mass casualty incidents. Given the high risk of both natural and human induced disasters in Mongolia, this is potentially a major health issue. The financial support for training and drills is almost not available in most hospitals. Moreover, it is a necessity to divert funding for additional resources to rural facilities.

We recommend that funds be allocated by government budget, domestic and foreign sources for: hazard and vulnerability assessments, development of emergency preparedness plans, recruitment and training of specialists and staff members, and regular drills. This is particularly crucial for the small rural facilities. Hospital plans should be required to include evaluations of the characteristics of the local community. Plans and drills should be integrated with and those of public and civil organizations as well as other hospitals since it is imperative that hospitals cooperate with each other to utilize their resources appropriately during disaster situations. These should be reinforced by written inter-facility contracts and arrangements. Enforcement should be linked to hospital accreditation.

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