MASS CASUALTY MANAGEMENT (MCM) SYSTEM ASSESSMENT IN THE WESTERN PACIFIC REGION

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Abstract. The Western Pacific is a frequent setting of Mass Casualty Incidents. Resent-response to emergencies/disasters has to contend with many limitations - showing the vital need to assess Mass Casualty Management (MCM) systems. The goal of this project is to assess the gaps in MCM for all types of MCIs in the region. Based on identified key components of MCM systems, key-informant interview (KII) tools were developed for use across different levels of MCM systems in the following countries: Fiji, Philippines, Vietnam, and Singapore. Conclusions were drawn on socio-economic costs, health facility disaster-preparedness, and human resources development (HRD), for the MCM systems of these countries. Findings and recommendations at the regional level include: 1) the Western Pacific Region is at increased risk for mass casualties; 2) MCM systems in the region are mostly incomplete or not well-coordinated and thus formulation of national policies and standards for MCM systems within individual countries is encouraged; 3) human resource is key and vital to successful MCM system development in resource- or financially-constrained countries and the study recommends strengthening and expanding of currently available training opportunities and that human resource development be focus on more community-oriented training programs; 4) some member countries of the Western Pacific Region are able to extend assistance; 5) good socio-economic and epidemiological disaster data are incomplete or unavailable; 6) there is under-utilization of Information and Communication Technology and; 7) there is a need to study the appropriateness of an MCM system insurance fund.

INTRODUCTION

The Western Pacific is a region that is the frequent setting of Mass Casualty Incidents. In public safety terms, the major natural hazards in the region are floods and storms. Political instability in some countries have led to increased risks of inadequate Mass Casualty Incident responses. Furthermore, with emerging global threats on chemical, biological and radio-nuclear emergencies, and armed conflict and terrorism, the Western Pacific Region faces challenges that would add further strain to the existing public health and emergency health systems of the WHO WPR Member States which has been suffering from low prioritization, low budget allocations, and high turnover rate of human resources for health. In recent years, experiences of stressed existing health

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systems were seen in Bali, Banda Aceh, and Pakistan, even in New York City, and London. This has shown us the vital need to assess our mass casualty management systems wherever we are (WHO/WPRO, 2006). There is an increased need for hospitals and public health systems to develop systems and be better prepared for mass casualty incidents (MCI).

In most of the WHO WPR Member States, response to emergencies/disasters has to contend with limited human resources, geographic isolation, limited material resources, poor communications, limited response protocols/procedures and poor coordination mechanisms. This project will look at the issue of Mass Casualty Management (MCM) by assessing the situation and proposing interventions in terms of health sector policies, hospital planning and delivery of services.

Goal of the Project

No region-wide study on the mass casualty management (MCM) systems of WPR countries have ever been undertaken before. The goal of this project is to assess the gaps in mass casualty management in the Western Pacific Region and identify training modules needed to improve the existing systems.

Countries were stratified according to levels of economic development, and were chosen randomly to represent WPR. This project utilized a common tool to assess the MCM systems of the following priority countries: Fiji, the Philippines, Vietnam and Singapore. Singapore represented a country with both an advanced level of economic development and advanced health system in place. Fiji represented the Pacific Islands. The Philippines represented a disaster-prone country with a moderate level of economic activity. Vietnam represented the countries with poorer economic development.

The baseline study is significant as this will be an important basis for policy development, training, education and eventual operations at the country and also regional levels.

Objectives of the Project

The objectives of this project are:

1) To assess the system of Mass Casualty Management (MCM) in selected countries of the Western Pacific Region.

2) To assess the system of Hospital disaster management in selected countries of the Western Pacific Region.

3) To assess the human resource development system for Mass Casualty Management (MCM) and Hospital disaster management in selected countries of the Western Pacific Region.

4) To recommend possible areas of improvement in the different the countries included in the study.

MATERIALS AND METHODS

Project team

The project team members consisted of the following:

1) Teodoro Herbosa, MD, Associate Professor and Chairman, Department of Emergency Medicine, College of Medicine-Philippine General Hospital, University of the Philippines, Manila,

2) Hilton Yu Lam, MHA, PhD, Senior Research Associate, Director, Health Sector Management Institute, Philippines,

3) Carmencita Banatin, MD, MHA, Director, Health Emergency Management Service, Department of Health, Republic of the Philippines,

4) Arnel Rivera, MD, Chairman, Department of Emergency Medicine, Tondo Medical Center,

5) Emmanuel Prudente, MD, MS Research Associate.

Conceptual framework

The project is designed to be comprehensive in scope. This is because of the nature of the typical hospital component of MCM systems. Therefore, this project sought to assess MCM systems for all types of mass casualty incidents (MCI), including natural, man-made, and epidemics.

Fig 1 depicts the conceptual framework of the scope of the project, as well as the MCM system components that are needed to cover the complete scope.

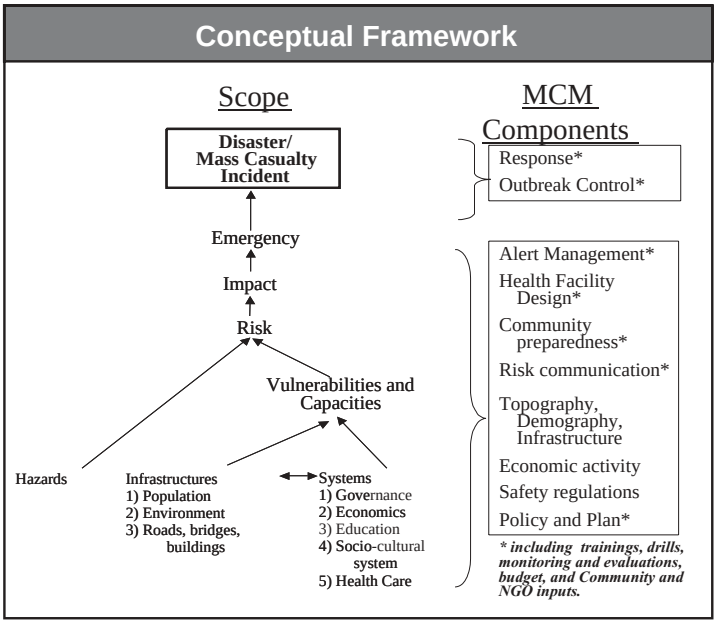

Fig 1–Conceptual framework.

KII tools development

Based on the identified components, different tools which are currently used to assess these components were reviewed and evaluated (Fig 2).

While mainly a Key Informant Interview (KII), the tools also incorporate elements of triangulation with records review and ocular inspection. Further, for each item in the tools, the respondents are asked to rate the effectiveness of the item in light of the latest MCI. Effectiveness was measure with a visual analog scale of 1 to 5, with 5 being best. Moreover, if the response was a score of less than 3, the respondents are asked to provide comments or clarification.

To ascertain the socio-economic impacts of MCIs, a tool was developed to collect data on the cost of MCIs in terms of injuries, death, non-life damages, cost of cleanup, cost of intervention, cost of rehabilitation, cost of productivity loss (of land, of farm crops and animals, and of place of employment).

After review, the tools were reformulated depending on their assessed applicability and understandability to the Western Pacific Region context. After which, separate Key Informants were identified, as to target the different KII tool components to the appropriate experts (Table 1, 2, and 3).

For each country, national, capital city and second city level data were collected with the KII tools. The resulting KII tools were a set of 12 questionnaires for each country.

Sampling design

For each country, cities chosen were as follows: capital city and a second city. The identification of the second city was made by a country local counterpart. The sampled countries and their cities are: Fiji (Suva and Lautoka); Vietnam (Ha Noi and Ho Chi Minh); Philippines (Manila and Davao); Singapore (City State only).

China and Cambodia were originally chosen as study countries. However, both

countries had difficulties in acquisition of the proper approvals in time for the study.

Data collection

Letters of endorsement of the project team from the World Health Organization to Ministries of Health of the study countries were sent to respective countries for cooperation and contact of agencies for this study. The letters of introduction and KII tools were sent between August 1-December 4, 2005.

Country visits by investigators were conducted between August 15-December 19, 2005.

Language translation

Language interpretation was provided by the national counterparts, both for interviewing the key informants, and reviewing existing records.

The collected KII data were presented back to the representatives of the assessed countries during an Informal Meeting sponsored by the WHO/WPRO EHA office on 10-12 January 2006.

Limitations

Because of time and budget, the sampling became limited to four countries, and the sub-national data was thus limited to city level. There was also no time for the conduct of a formal pre-testing of the study KII tools. Further, in the case of Vietnam and Fiji, neither forward nor backward translation of the KII tools was prepared. The Philippines and Singapore did not require any translation of the KII tools.

While accurate, the results of this study are limited in precision. This is because of the limited sampling, both in terms of national and sub-national data. The investigators were generally strangers to the countries sampled thus, the selection of the second city and the identification of the key informants were depended upon the decision of the national counterparts.

RESULTS AND DISCUSSION

National/Regional/Local issues

Rationales for the establishment of national MCM systems are varied, such as: protecting a tourism industry, concern for public health burden (*ie*, injury), attracting foreign investors, sustaining economic property, or simply a response to the increased risk of Mass casualties and the desire to save lives. Such indigenous rationale, supported by able leadership through a focal agency are factors for the sustainability of local MCM systems.

Financing

The basic issues of who should pay for what, and how much, will determine the scope and scale of the preparedness measures, response measures, pre-hospital activities, hospital activities, recovery measures, and rehabilitation measures of an MCM system. Further, if the hospital activities are to be paid for by the victims, the power of the victims as consumers become apparent in investments in updated and high technology life saving devices. Otherwise, if the payer is the government, then mostly, investments in the same components would be geared towards accreditation standards, which focus on minimum standards.

Regional Findings and Recommendations

Western Pacific Region is exposed to many hazards that increase the risk for mass casualties. Being within the Pacific Rim of Fire, as well as the Typhoon belt, the Region is no stranger to typhoons, earthquakes, volcanic eruptions, tsunamis, and droughts. Further, with rapid economic progress, many human generated or man-made hazards have also emerged, such as chemical spills, industrial explosions, red tide, and mass food poisonings. Moreover, local differences in education and wealth have also made the Region susceptible to deliberate human generated

hazards, such as armed conflicts, acts of terrorism, and others.

MCM systems in the Region are mostly incomplete or not well coordinated. Even in Vietnam, where there is a national experience in dealing with disasters, many national MCM systems are not well-coordinated. In the countries studied, most emergency service systems are not well in place. In fact, in several cities, the MCM systems were incomplete, usually lacking in measures for decontamination procedures, for internal hospital disaster procedures, and others. Adding confusion to this scenario are the difference sources of technology or knowledge that went into setting up the different components. Especially that existing training may have come from external funding that did not analyze the local situation and only imposed western standards on the country. As such, the terminology is confusing, for example, the use of the term "triage" has very different implications when understood from a public health point of view, or from a military point of view, from a hospital emergency room point of view.

Therefore, it is the recommendation of this study to encourage formulation of national policies and standards for MCM systems within individual countries. Some strategies of these policies may include the incorporation of tax shelters for incorporating certain MCM system safety features (*eg*, earthquake proofing buildings, tree-planting, Emergency Medical Services System EMSS development, etc), or legislation and penalties for noncompliance (*eg*, building codes, safety codes, participation in trainings and drills, etc).

The investigators also recognize the strength of a WHO seal or advocacy for MCM system development. This therefore also includes the recommendation that WHO formulates a set of standardized definitions, guidelines and tools, and to advocate for Disaster Risk reduction or MCI prevention and preparedness both upwards to national policy makers and downwards to first responders and community members, and even to agencies that are traditionally not members of national MCM systems, such as the military, media, and the NGOs.

Human Resource Development. Human resource is key and vital to successful MCM system development in resource- or financially-constrained countries. Well-trained and competent MCM system leaders are vital investments in MCM systems, just as infrastructures and equipments are important. People are innovators, while the infrastructures and equipments are the innovations.

Therefore, it is the recommendation of this study to encourage the strengthening and expanding of currently available training opportunities, most especially to the first responders of the MCM system. This necessitates the facilitation of Regional level talks on the movement of personnel for MCM/DRM preparedness, response and rehabilitation.

It is also recommended that human resource development to be focused more on community-oriented training programs. As the experience of the Philippines and Fiji has shown that with little national budget, trained local personnel are frustrated and tend to emigrate for better opportunities in other countries.

Several member countries of the Western Pacific Region are able to extend assistance to neighbors. Most countries in the Region are willing to help or give assistance to other countries. Fiji and the Philippines, despite being resource and budget-limited, have been consistent participants in UN Missions for disaster relief and recovery. Countries like Australia, Japan, Malaysia, and Singapore has consistently offered their tech-

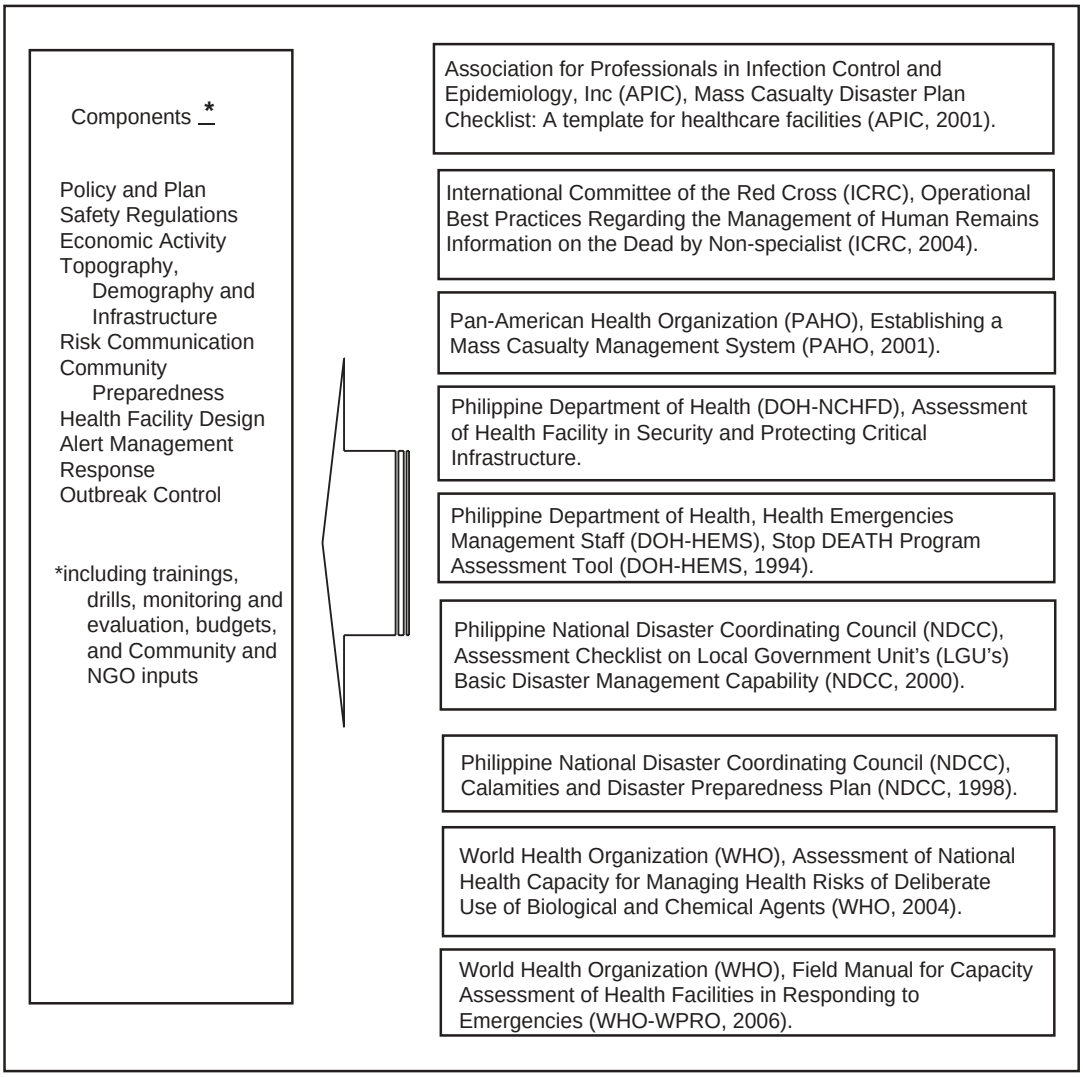

Fig 2–Review and evaluation of existing tools to assess MCM system components.

nological and financial assistance to their neighbors during times of disasters. Australia, Japan, Korea, and Singapore have been quick in responding to international level mass casualty situations in the past (Philippine Baguio earthquake; Tsi Tsi, Taiwan earthquake; Banda Aceh tsunami).

Therefore, it is the recommendation of the study to encourage the facilitation of the requesting and sending of Search and Rescue teams, emergency equipment, and supplies, including drugs and supplies. Corollary to this, the creation of standardized training programs, which would facilitate the fast and effective movement of Regional Search and Rescue and Emergency Medical Service teams, equipment and supplies.

Disaster data not available. Data on the socio-economic impact of disasters or MCIs are normally not centrally recorded, and the

Table 1
Key informants for KII tool components.

MCM component	Key informants					
	Government official in charge of emergencies	Hospital official in charge of emergencies	Health Official in charge of emergencies	Health Official in charge of emergency facilities	WHO	NGOs
Policy and Plan	Yes	Yes	Yes		Yes	Yes
Safety Regulations	Yes					
Economic activity	Yes					
Topography, Demography, and Infrastructure	Yes					
Risk Communication	Yes		Yes			Yes
Community Preparedness	Yes					Yes
Health Facility Design	Yes	Yes		Yes		
Alert Management	Yes		Yes			
Outbreak Control	Yes		Yes			
Response	Yes	Yes	Yes			Yes

Table 2
Key informants per level.

Key informant	National level	Capital city level	Second city level
1. Government Official in charge of Emergencies	KII	KII	KII
2. Health Official in charge of Emergencies	KII	KII	KII
3. Health Official in charge of Emergency Facilities	KII		
4. Hospital Official in charge of Emergency Management (Referral Hospital)		KII	KII
5. Hospital Official in charge of Emergency Management (Referring Hospital)		KII	KII
6. World Health Organization Country Representative	KII		

data that are recorded are not complete. Most data are only of direct damages sustained. However, the full economic impact of a disaster or MCI also include other costs and losses, such as the response cost (search and rescue, field first aid, alert management, etc), intervention cost (hospital emergency room and critical care services, resettlement costs, psychosocial services costs, management of dead bodies, etc), impact site cleanup costs, impact site rehabilitation costs, loss of income (business and personal), loss of government revenues, altered migration pattern of residents, and altered business flow, which usually follow the migration pattern of residents. All these are not well documented and thus limits the level of emergency services that get set up and funded.

Table 3
Key Informant Interview Matrix.

Key informant	Level	Fiji (December 12-18, 2005)	Philippines (September 5-November 7, 2005)	Vietnam (August 15-23, 2005)
Government Official In-charge of Emergencies	National	National Disaster Management Office	National Disaster Coordinating Council	DMU – Ministry of Agriculture and Rural development
	Capital City	National Fire Authority	Office of Civil Defense	Hanoi City Health Department
	Emerging City	Lautoka Police	Davao City Disaster Coordinating Council	Ho Chi Min City Health Department
Health Official In-charge of Emergencies	National	Ministry of Health	National Center for Health Facility and Development	Ministry of Health
	Capital City	St. John's Ambulance	Health Emergency Management Staff Coordinator for Manila	Ministry of Health
	Emerging City	Namaka Health Center/ Nadi Airport	Health Emergency Management Staff for Davao City	Ho Chi Min City Health Department
Health Official In-charge of Emergency Facilities	National	Ministry of Health	National Center for Health Facility and Development	No data
Hospital Official In-charge of Emergencies	Capital City Referral Hospital	Colonial War Memorial Hospital	East Avenue Medical Center	St. Paul Hospital
	Capital City Referring Hospital	Suva District Hospital	Valenzuela District Hospital	Viet Duc Hospital
	Emerging City Referral Hospital	Lautoka Hospital	Davao Medical Center	Trung Vuong Hospital
	Emerging City Referring Hospital	Nadi Hospital	San Pedro Hospital	An Giang Hospital Uong Bi Hospital
WHO		WHO South Pacific Office	WHO Philippine Representative	WHO Office for Emergency and Humanitarian Action
NGOs/Others		Fiji School of Medicine. Royal Fiji Military Forces Hospital	Davao City 911 No data	Vietnam Red Cross Vietnam Road Administration

Other, less tangible, but equally significant losses include: loss of social cohesion (individual survival *vs* compassion for others), loss of values (disasters have no respect for hard work or honesty), loss of social identity (as a consequence to loss of family, home, even of communities). Over time, if emergency situations are allowed to deteriorate, people experience widespread loss of confidence in institutions and governments. In the Region, socio-economic costs of disasters or MCIs have not been fully studied due to incomplete information.

Moreover, good epidemiological data are also neither regularly maintained nor available. Outcomes data are also not available. Therefore, basic question as to which particular program is more effective cannot be answered objectively.

With good socio-economic and epidemiological data, it would then be possible to have good evidence and cost-effectiveness assessments of programs, trainings, drills, and of other components of the MCM system.

Therefore, this study recommends the establishment of databases that may include national trauma registries. This can be generated at the local, national and even regional levels. It is the contention of this study that with more complete information, risks can be minimized, and disasters or MCIs can be prevented.

Under-utilization of Information and Communication Technology (ICT). The benefits of ICT as a tool for MCM systems are underutilized in the Region. Of the countries assessed, only Singapore has invested heavily in ICT for MCM system modeling, scenario building, forecasting, surveillance and monitoring (GPS in all vehicles carrying hazardous materials), and even decision support during response measures.

Therefore, this study recommends the encouragement of the creation of adaptable software programs (modular to be expandable as needed, and open-source to be cheaper and adaptable as needed). In the Philippines, private use of text messaging and SMS in MCI's have been very useful.

This recommendation entails encouraging the invention of locality-appropriate equipments and technologies, with appropriate patent protections, and assistance in Regional distribution of such equipment and technologies.

Study the appropriateness of an MCM system insurance fund at the national or regional levels. Insurance policies are needed in order to encourage economic activity or investment (*ie*, car insurance, unemployment insurance, health insurance, mortgage insurance, etc). Insurances, as risk protection, result in increased economic activity or investments and eventually, economic development. Of the countries studied, only Singapore has an insurance scheme to rebuild after a mass casualty. The other countries normally depend on international loans and grants for rebuilding.

However, in developing nations, including in the Region, the fact that poor people tend to live and work in disaster prone areas reflects the fact that they do not need disaster insurance to encourage them to work. Thus, with insurance, there might be increased moral hazard, or unwanted increases of risky activities and investments, resulting in more increased losses.

Therefore, it is the recommendation of this study to research the applicability of a common "disaster fund" at the community, national, and even regional levels, where appropriate. In the Philippines, an example is the ten percent calamity fund. However, this is only used in relief and recovery and seldom is it possible to use it for preparedness and training activities. The aim of this fund

creation is to encourage government units to provide services in disaster prone areas, while simultaneously decreasing vulnerability and risk. In effect, what is more needed is a payment from the workers for the privilege of living and working in disaster prone areas. The money from this form of tax is to be used for disaster risk prevention, preparedness, mitigation, and response measures. This scheme will decrease the amount of risks and activities in the disaster prone areas by discouraging people from living and working in disaster prone areas. This scheme will provide a ready fund for preparedness and response measures which maybe even as costly a relief and recovery operations. The fund therefore, becomes depended on the amount of risk (*ie*, number of people willing to pay the tax to live and work in the disaster prone area). This fund can be used to augment health insurance (catastrophic or otherwise), unemployment insurance, or worker's compensation.

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