

# Time for Order in Chaos! A Health System Framework for Foreign Medical Teams in Earthquakes

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**Keywords:** conceptual framework; disaster; earthquake; foreign medical team

#### Abbreviations:

FMT: foreign medical team  
HERAMS: Health Resources Availability Mapping System  
PAHO: Pan American Health Organization  
SOD: sudden onset disaster  
WHO: World Health Organization

**Received:** October 24, 2011

**Accepted:** November 13, 2011

**Revised:** December 6, 2011

Online publication: March 19, 2012

doi:10.1017/S1049023X11006832

#### Abstract

The number of reported natural disasters is increasing, as is the number of foreign medical teams (FMTs) sent to provide relief. Studies show that FMTs are not coordinated, nor are they adapted to the medical needs of victims. Another key challenge to the response has been the lack of common terminologies, definitions, and frameworks for FMTs following disasters.

In this report, a conceptual health system framework that captures two essential components of health care response by FMTs after earthquakes is presented. This framework was developed using expert panels and personal experience, as well as an exhaustive literature review.

The framework can facilitate decisions for deployment of FMTs, as well as facilitate coordination in disaster-affected countries. It also can be an important tool for registering agencies that send FMTs to sudden onset disasters, and ultimately for improving disaster response.

Lind K, Gerdin M, Wladis A, Westman L, von Schreeb J. Time for order in chaos! a health system framework for Foreign Medical Teams in earthquakes. *Prehosp Disaster Med.* 2012;27(1):90–93.

#### Introduction

In recent years, an increasing number of people have been affected by natural disasters.<sup>1</sup> Earthquakes, a significant type of sudden onset disaster (SOD), have caused extensive damage to infrastructure with death and severe injuries to humans.<sup>2</sup> The number of foreign medical teams (FMTs) sent to earthquakes to care for injured victims has also been increasing.<sup>3</sup>

A major problem facing FMTs in disasters is how to adapt to the medical needs of victims. Studies have shown that FMTs are focused primarily on trauma care and, to a large extent, neglect normal health care needs such as public health, essential obstetrical care, and pediatrics.<sup>2–8</sup>

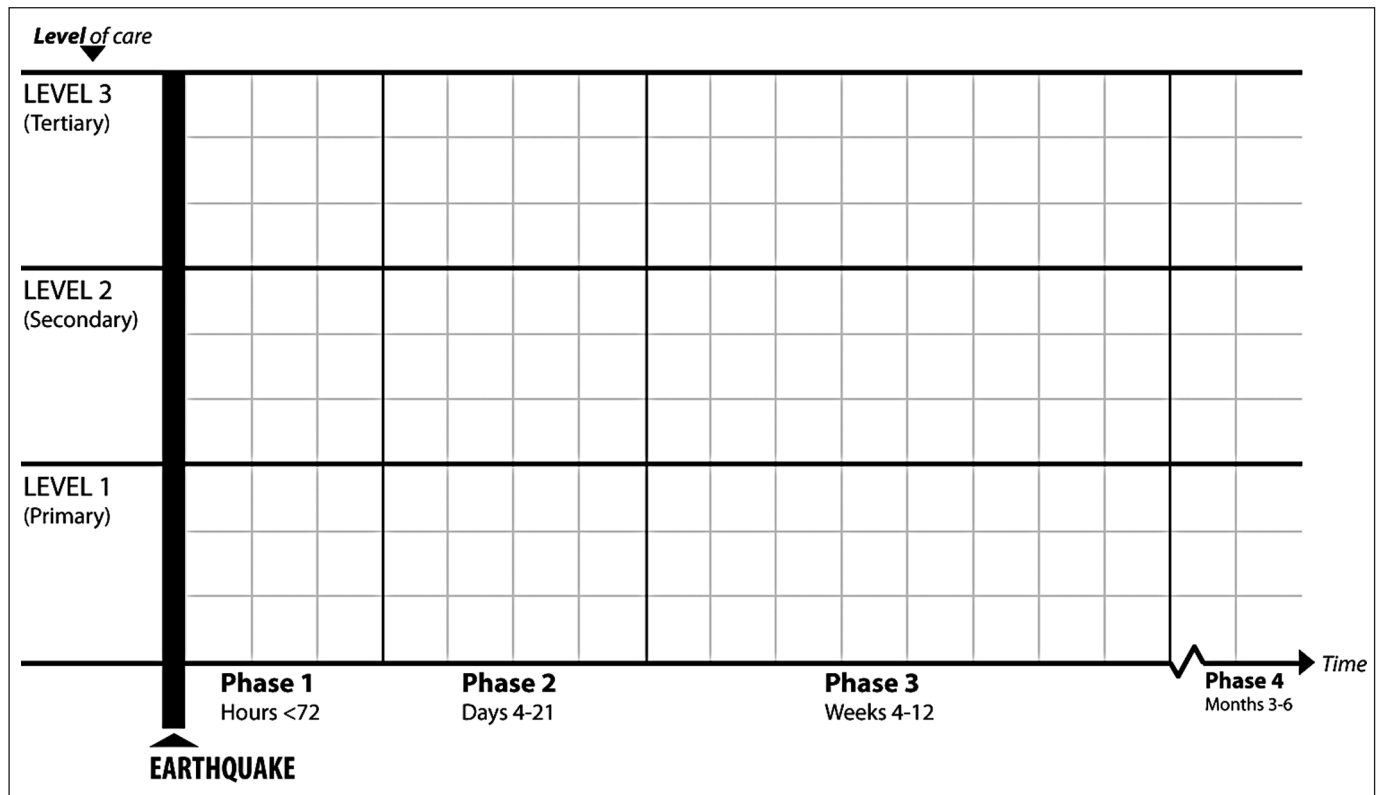
It is a challenge for local governments and international organizations to regulate the type and quantity of FMTs, and to coordinate their arrival and response.<sup>9–14</sup> Common terminologies, definitions, frameworks, and quality standards are needed to facilitate the process of improving the use of FMTs in earthquakes.<sup>15</sup> In this report, a conceptual health system framework is presented that captures two essential components of health-care response by FMTs after earthquakes: time and level of care.

#### Materials and Methods

For this field focused study, expert panels were formed and interviewed, and a literature search was conducted. The study was designed to produce practical, simple and useful results that would be applicable in the difficult field setting of earthquake events.

#### Expert Panels

A preliminary health system framework was developed based on the experience of three of the co-authors (AW, JvS, KL), all of whom have personal FMT earthquake experience.



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Figure 1. Proposed framework

The preliminary framework was presented for discussion at two international meetings of disaster experts. The first meeting, organized by Karolinska Institutet and the Pan American Health Organization/World Health Organization (PAHO/WHO), brought together 26 experts in Cuba in December 2010 to discuss how to update the 2003 PAHO/WHO guidelines for foreign field hospitals.<sup>16</sup> The experts were medical professionals representing agencies specializing in humanitarian health assistance. The second meeting took place in April 2011 in Stockholm; a total of 20 surgeons, anesthesiologists, and emergency doctors met to develop standards for providing surgical care in SODs.

The preliminary framework was discussed in detail at these meetings using a participatory approach. The framework was revised according to the feedback from these expert panel discussions.

#### Literature Review

The framework was compared with evidence from a secondary literature review. The electronic database PubMed (US National Library of Medicine) was searched for articles describing how the burden of disease varies in association with significant time delineations following earthquakes, and how changes in workload, burden of disease, or other factors significantly influence the response. The following combination of search terms was used: earthquake AND (injury OR disease OR outbreak OR injuries OR outcome OR epidemiology) AND (earthquake and foreign field hospital). Only articles with abstracts in English were included. Abstracts specifying timing or level of care after earthquakes were reviewed. Standard medical dictionaries were also searched.

A total of 1,116 abstracts were identified and screened for relevance. Of this total, 69 articles were selected for in-depth analysis. The framework was finalized after it had been circulated among members of the expert panels from the Cuba and Stockholm meetings.

#### Results

The health system framework is shown in Figure 1. The expert panels highlighted time phases and level of care as essential building blocks for the framework structure.

#### Time Phases

An important component of any disaster response framework is the definition of time phases. Based on professional experience, four phases delineated by the changing burden of trauma injuries over time following earthquakes were proposed. For clarity, Phase 1 is defined in terms of hours, Phase 2 in days, Phase 3 in weeks, and Phase 4 in months.

The expert panels agreed that Phase 1 lasts approximately 72 hours. This duration is also widely referred to in the literature.<sup>14,16-24</sup> However, in the expert panel discussions and in the literature review, it was highlighted that FMTs are not on-scene during this phase.<sup>5</sup> Thus, Phase 1 is beyond the scope of any significant contribution from FMTs.

Phase 2 lasts for two to three weeks. It is during this phase that most FMTs arrive, establish their services, and carry out trauma-related interventions. Eight articles describe a change in the health-seeking behavior and type of medical problems presenting during the first weeks after a SOD; the trauma case load

Level of Care	Definition
Level 1 (Primary)	A basic level of health care that includes programs directed at the promotion of health, early diagnosis of disease or disability, and prevention of disease. Primary health care is provided in an ambulatory facility to limited numbers of people, often those living in a particular geographic area. It includes continuing health care, as provided by a family nurse practitioner. <sup>42</sup>
Level 2 (Secondary)	An intermediate level of health care that includes diagnosis and treatment, performed in a hospital having specialized equipment and laboratory facilities. <sup>42</sup>
Level 3 (Tertiary)	A specialized, highly technical level of health care that includes diagnosis and treatment of disease and disability. Specialized intensive care units, advanced diagnostic support services, and highly specialized personnel are usually characteristic of tertiary health care. It offers highly centralized care to the population of a large region and in some cases to the world. <sup>42</sup>

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**Table 1.** Levels of health care

gradually decreases while the number of non-trauma patients increases.<sup>6,19,20,23,25–28</sup>

Phase 3 is characterized by a slow return to the usual burden of disease in the affected community. It is during this phase that FMT services are fully established and more advanced trauma care can be made available, but normal health care needs start to dominate. Phase 3 has a duration of three weeks to three months. Based on expert panel opinions and personal experience, the inclusion of a Phase 4 that begins about three months post-disaster and continues until the function of health services within the disaster zone has returned to pre-disaster levels was suggested. The length of phase 4 will vary significantly depending on factors such as the pre-earthquake context and the magnitude and severity of the earthquake.

#### Levels of Care

In addition to relevant phases, a common terminology to refer to levels of health care is proposed (Table 1). “Primary” health care was defined at a 1978 WHO conference in the Alma Alta declaration.<sup>29</sup> “Secondary” and “tertiary” levels of care are referenced in several articles and documents but are not well defined;<sup>3,6–8,21,27,28,30–41</sup> therefore, definitions from *Mosby’s Medical Dictionary* are used for these terms.<sup>42</sup>

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Primary, secondary, and tertiary levels are referred to as Levels 1, 2, and 3, respectively.

#### Discussion

The results of this paper provide a simple and easily understandable framework. The framework provides a tool that allows consistent discussion about key SOD medical response challenges during different time phases, and highlights the difference between hospitals providing secondary care and those providing tertiary care. The expert panels agreed on the need for such a framework to facilitate coherent discussions on improving coordination of FMTs. The proposed framework can lay the foundation for the ongoing process of updating WHO guidelines for foreign field hospitals after SOD events, and serve as the foundation for a process to register agencies sending FMTs to SOD events.<sup>15</sup>

For this process, defining an FMT by the level of health services provided, ranging from basic Level 1 services to advanced Level 3, is proposed. Given this definition, a recipient government may, in its initial needs assessment, specify the capacity of Level 2 and 3 services needed to: (1) cover the trauma needs of the population; (2) substitute for the potentially collapsed health care system; and (3) ensure that referrals between hospitals representing different levels is possible.

The study framework fits well with the WHO Health Resources Availability Mapping System (HERAMS) framework that suggests what type of service should be available at different levels of care.<sup>43</sup> This system will greatly facilitate the implementation of the intended function of flash appeals as stated in the revised guidelines from 2010.<sup>44</sup> A flash appeal is a document issued in response to a disaster that is beyond the capacity of the government plus any single agency. It is designed to structure a coordinated humanitarian response for the first three to six months of a disaster. A flash appeal has three main parts: (1) an analysis of the context and the humanitarian needs; (2) response plans; and (3) information on roles and responsibilities. It should also identify the best allocation of resources.<sup>44</sup>

For each level of care and time phase, quality indicators should be developed. When more advanced care is made available, it is important to highlight the difference between Level 2 and Level 3 services. For example, after the Haiti earthquake in 2010, internal fixations of femur fractures requiring strict hygiene and protocols beyond the scope of units providing Level 2 service were performed. Specialized burn care is an example of a service that should be provided only under Level 3 care. Assigning the various injury types to specific levels of care should ensure best practices and facilitate coordination of FMT services. This framework can help policymakers develop a coherent approach to planning which type of service to provide, and allow for better coordination and referral among FMTs.

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