



Hospital Disaster Mitigation in Latin America and the Caribbean¹

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The Pan American Health Organization endorses the message that prevention is the best form of health care, be it the traditional prevention of communicable diseases or the modern preventive approach to natural hazards. Prevention of the health risks caused by natural disasters is definitely a new concept and is still not universally accepted by the medical community.

The constitution of the World Health Organization defines health as "a complete state of physical and mental well-being and not merely the absence of disease or infirmity." No one can argue that being unprepared for and at the mercy of natural disasters is healthy, in the broad sense of the word. Reducing the impact of disasters on public health is undeniably a health priority to the same extent as reducing the impact of household accidents or smoking.

Even though safety from natural hazards is a health issue and a health right, it calls for skills and vision far beyond the clinical field. However, the fact that sec-

tors other than health are involved should not lessen the medical community's leading role.

THE JOURNEY FROM RESPONSE TO PREVENTION

Until the early 1970s, disaster in the Americas evoked an *ad hoc* response that was provided with a great deal of generosity and solidarity, but in an improvised and uncoordinated way. That lack of coordination led to an international response that was neither technically appropriate nor culturally sensitive.

From Response to Preparedness

The earthquake that struck Guatemala on 4 February 1976 marked a turning point for Latin America. In the aftermath of this earthquake and the even deadlier quake in Peru six years earlier, shortcomings were obvious: the lack of preparedness and training of key sectors, the weaknesses in existing legislation, and the inadequacy of the national response mechanisms traditionally based on the concept of a military chain of command rather than dialogue and coordination with the civilian sector. The health sector, an early responder in large-scale disasters, was the first to realize that the way to improve its own performance was through civilian

¹ Based on a presentation at the Pan Pacific Hazards '96 Conference, held in Vancouver, British Columbia, Canada, 29 July to 2 August 1996.

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planning and training. The era of *ad hoc* response had been replaced by the era of preparedness.³

As is often the case, national resolve materialized first in the form of an internationally crafted resolution. In 1977, the Ministers of Health of the Americas instructed PAHO/WHO to establish a regional disaster preparedness program to benefit the health sector.

From Preparedness to Prevention

The severe earthquake that hit Mexico City on 19 September 1985 and the devastating mudslide in Colombia following the eruption of the Nevado del Ruiz volcano on 13 November 1985 demonstrated clearly that organized emergency response operations had limitations. Soon thereafter, both Mexico and Colombia established highly professional public institutions responsible for disaster prevention, mitigation, preparedness, and response. Other countries took similar steps. For example, Costa Rica strengthened its emergency commission, adding professionals experienced in urban planning, as well as sociologists, engineers, and architects.

The era of disaster prevention⁴ and mitigation⁵ had begun in Latin America. Nevertheless, the concept of prevention of natural disasters is still misunderstood by the medical community and by disaster managers nostalgic for an era of response and relief. An illustration of this problem is provided by the comment of a logistics official

in response to a plea for a prevention/mitigation approach: "but we *are* doing prevention; we have stockpiles."

The Region's vast experience in dealing with natural hazards has shown that there are no shortcuts to disaster reduction. Rather, countries must journey along a winding path of sustainable development, a path where progress is made as countries recognize that disaster management is more than a simple logistic exercise. The journey from *ad hoc* response to preparedness and later to prevention and mitigation has been the result of a long maturation process. The most important contribution of the International Decade for Natural Disaster Reduction (1990–1999) in Latin America and the Caribbean has been to accelerate the transition into the new era of integrated disaster reduction and development, in which the entire society cooperates in reaching a common objective: building a safer world for all.

HOSPITAL DISASTER MITIGATION

One aspect of disaster prevention falls directly under the responsibility of the health sector: the protection of health facilities against potential damages caused by natural hazards.

Magnitude of the Problem

Of the 15 069 medical facilities in Latin America and the Caribbean broadly defined as hospitals in a PAHO survey (i.e., facilities having five or more beds), an estimated 40% are located in disaster-prone areas. The principal natural hazards they face are earthquakes and hurricanes.

Certainly, there are other critical facilities, such as schools and government offices, that are vulnerable to seismic or meteorological hazards, but few, if any, are as important and vulnerable as medical facilities for the following reasons:

³ *Disaster preparedness* includes all pre-disaster activities aimed at improving and strengthening the capacity for rescue and relief of communities and institutions.

⁴ *Prevention* includes those measures designed to control the occurrence of natural hazards, thereby giving complete protection to the population.

⁵ *Mitigation* aims to reduce the impact of natural disasters and can be seen as "prevention in an imperfect world."

Table 1. Impact of disasters on hospitals in Latin America and the Caribbean, 1985-1995.

Type of disaster, location (year)	No. of hospitals affected	No. (%) of beds lost
Earthquake, Chile (1985)	79	3 271 (16.6%)*
Earthquake, Mexico (1985)	13	5 829 (~15.5%)+
Earthquake, El Salvador (1986)	6	1 860 (60%)
Hurricane Gilbert, Jamaica (1988)	22	5 065 (90%) ^s
Hurricane Hugo, Montserrat (1989)	1	67 (100%)
Tropical Storm Debby, Saint Lucia (1994)	1	25 (13%)
Hurricane Luis, Antigua and Barbuda (1995)	1	24 (16%)
Hurricanes Luis and Marilyn, Saint Kitts and Nevis (1995)	1	102 (68%)
Total	124	16 243

*Durkin WM, et al. *Earthquake Spectra* 1986;2(2, February).

+Cruz Vega F, Rojas Enríquez CA. The earthquake in Mexico, September 1985 — a case study. Presentation at the International Conference on Disaster Mitigation in Health Facilities, Mexico City, 26–28 February 1996.

^sIncludes beds temporarily unavailable during the immediate aftermath

- Medical facilities are occupied 24 hours a day by the sick and injured, as well as essential medical staff. Casualties in public offices, schools, or homes will vary considerably according to the time of day an earthquake strikes; however, the collapse of a hospital at any time will cause significant loss of life.
- Medical facilities are especially essential after a disaster. The indirect loss of life that may occur when medical services are unavailable in the aftermath of a disaster has never been fully investigated or estimated. The loss of a small health center that may be the only source of medical attention in a rural community or on a Caribbean island can be especially significant.
- The installations and equipment in modern hospitals are very expensive, often exceeding the cost of construction. Reducing the damages caused by

natural disasters should be a great motivator for implementing mitigation measures.

Statistics from the last 10 years confirm the high vulnerability of hospitals to natural hazards (Table 1).

Myths and Realities in Hospital Mitigation

In a recent presentation, Mr. V. Rosales⁶ attributed the lack of progress in hospital mitigation to several misconceptions common among decision makers and health administrators. The following are a few examples:

⁶ Adviser in hospital disaster mitigation, PAHO/WHO, Quito, Ecuador, speaking at the International Conference on Disaster Mitigation in Health Facilities, Mexico City, 26–28 February 1996.

Our hospital is more than 100 years old and has survived several earthquakes; that proves it is resistant. In fact, what this shows is that the hospital has already exceeded its "useful life." Who knows what structural defects have been plastered over? Expansions and modifications of the original and outdated design have, more than likely, weakened the building's resistance even further.

There hasn't been an earthquake or hurricane for decades! Historical data on any given site are too scarce to accurately predict the probability of a recurrence. Disaster-prone countries are only beginning to adopt systematic local risk mapping as a tool for disaster mitigation.

Vulnerability analysis and disaster mitigation require techniques too sophisticated for developing countries. The scientific level of engineers and architects in Latin America and the Caribbean is excellent. With simple professional guidelines and methods, these local experts could significantly increase the resistance of new or existing buildings at a reasonable cost. The problem is not lack of scientific knowledge but rather the failure to apply existing knowledge.

Mitigation is very costly . . . we can't afford it right now. Protecting a new structure from seismic hazards adds relatively little to initial design and construction costs, with estimates ranging from 0.5%–2% to 4%–10%. The cost of wind-resistant design is even lower. However, few new hospitals are built in the Americas. The only option is to retrofit existing structures, a more expensive undertaking. It is estimated that to adequately retrofit poorly designed structures so that they resist earthquakes can cost up to 20%–25% of the original cost of construction. However, vulnerability could be reduced appreciably by adopting simple nonstructural mitigation measures, especially in the case of wind resistance.

Hospital Mitigation in Mexico

No single disaster in Latin America had

as great an impact on health infrastructure as the Mexico City earthquake in 1985. Thirteen hospitals were totally or partially destroyed, and one out of four hospital beds in the metropolitan area was either destroyed or had to be evacuated. Most striking was the total collapse of the modern part of the Juarez Hospital, which caused the death of 561 people, 266 of whom were hospital employees. The Juarez Hospital was built in 1847, but the part which collapsed had only been open since 1971 and had been built using the latest available technology.

The earthquake in Mexico had an impact on disaster mitigation that extended far beyond national borders. It triggered the creation of a regional Latin American disaster mitigation program several years later by PAHO/WHO. It was a motivating force for many countries to seriously consider their own vulnerability to natural disasters. It was a catalyst prompting the scientific community, public sector planners, and others to join forces and form networks in order to exchange experiences and influence the decision-making process. On the technical plane, regional guidelines and publications were prepared and broadly distributed, creating a critical mass of individuals dedicated to ensuring that the fate of Juarez Hospital would not be shared by other medical facilities in the Region.

This effort culminated in an international conference on Disaster Mitigation in Health Facilities in February 1996, convened by the Government of Mexico, the Pan American Health Organization, the Secretariat for the International Decade for Natural Disaster Reduction, the World Bank, the Economic Commission for Latin America and the Caribbean, and the Organization of American States. At this conference, the participating countries reiterated their commitment to protect their populations and infrastructure from the impact of natural disasters and proposed a plan of action. It includes:

- identifying which of the existing health care facilities are of highest priority for retrofitting;
- adopting appropriate legislation;
- progressively adopting *structural* measures to ensure, by the year 2001, the structural integrity of the facilities classified as priority and the availability of essential health care services in case of earthquakes and hurricanes;
- adopting *nonstructural* measures in all existing hospitals.

They also recommended to the international financial institutions that they include risk analysis as a criteria for approval of loans or grants for hospital construction, and that they link loans and grants aimed at improving structural or nonstructural safety to the organization of disaster response by health facilities.

Adopting international recommendations or resolutions is the easy step. The Secretariat of Health of Mexico took a further decisive step by publicly launching a national initiative called "Safe Hospitals" to recognize and certify those hospitals which meet pre-established national criteria for disaster safety.

The criteria for certifying a health facility under the "Safe Hospitals" program are now being finalized. They cover three areas: (1) preparedness for prehospital and hospital management of disaster casualties, (2) nonstructural safety, and (3) structural safety according to modern norms for resistance to earthquakes.

Participation in the "Safe Hospitals" program is voluntary. A national board of independent experts will review applications and issue final recommendations. At the

request of the Government of Mexico, PAHO will convene an international committee of experts to review the national process and guarantee the validity and impartiality of the scientific and technical proceedings.

Of course, new and future facilities will remain compelled by law to meet building codes in effect at the time of construction. However, faced with the reality that the majority of existing health facilities might never be able to comply with the increasingly strict earthquake resistance engineering norms for new institutions, a two-level award is contemplated:

- Certification of hospital safety for facilities meeting all criteria.
- Recognition of efforts by those unable to meet structural requirements but meeting the other two criteria.

CONCLUSION

Hospital mitigation prevents the loss of lives of both patients and health personnel. It is prevention in the best sense of the word. However, as the resurgence of tuberculosis and the persistence of vector-borne diseases prove, the war of prevention is never decisively won; it is an ongoing battle. The topic of hospital disaster mitigation may fade from memory in the intervals between catastrophic disasters unless there is constant follow-up by the scientific community, PAHO/WHO, and lending or development institutions. PAHO/WHO will work to stimulate and support action by national health authorities and those holding the key to national budgets to emulate the Mexico initiative in the field of disaster mitigation.

