IMPROVING URBAN HEALTH SYSTEM DISASTER PREPAREDNESS AND RESPONSE IN HONG KONG

Lessons from Complex Disasters

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POLICY BRIEF
August 2017

HARVARD FXB
CENTER FOR HEALTH & HUMAN RIGHTS

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SCHOOL OF PUBLIC HEALTH

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HARVARD T. H. CHAN SCHOOL OF PUBLIC HEALTH

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Supported by:

HONG KONG JOCKEY CLUB DISASTER PREPAREDNESS AND RESPONSE INSTITUTE

Funded by:

THE HONG KONG JOCKEY CLUB CHARITIES TRUST

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Policy Brief

2017

Key Messages

1. Strengthen Hong Kong's well-developed Emergency Response System by mapping medical and social needs in the community, while planning for disasters.
2. Practice institution-wide and inter-facility evacuations on a periodic basis, in addition to increased drills and training at the hospital level.
3. Ensure contingency plans for disruptions to non-hospital-based healthcare facilities and healthcare-associated services
4. Prepare for failures in backup plans for personnel, power, and supplies.

Introduction

The increasing frequency of natural disasters around the world has been accompanied by concomitant, growing sophistication in disaster planning and response.[1,2] In recent years, incident command systems, mass casualty trainings, triage protocols, inter-agency communication strategies, along with backup systems for power, personnel, and equipment have all seen an exponential growth in competence and understanding, especially in high-income countries including the United States, Australia, and Japan.[3-5]

Hospital Preparedness Plans and National Disaster Management Plans have now become the norm in many high- and middle- income countries. For some examples of these, see the US Department of Health and Human Services (DHSS) Hospital Preparedness Program Overview, the World Health Organization's Hospital and Health Facility Emergency Exercises, and India's National Disaster Management Plan.[6-8]

These preparedness plans and related exercises focus on mass casualty incidents, natural disasters, terror threats, disease outbreaks, and epidemics—all of which could potentially result in significant surges in patient volume, overwhelming a hospital's regular operational capacity. Disaster drills therefore focus on expanding a hospital's capacity to receive, triage, and treat a large number of patients through the prompt and efficient reallocation of personnel and resources. The effect of this focus at the individual hospital level on preparation to handle short-term mass casualty events—without further focused investment and attention—usually leaves hospitals inadequately prepared for disasters resulting in large-scale urban population displacement.[9]

Yet the impact of disasters on health systems, as seen in the wake of the 2004 earthquake in Indonesia; the 2011 Fukushima Daiichi triple disaster in Japan (also known as the Great East Japan Earthquake); Typhoon Haiyan 2013 in the Philippines; and in a series of major hurricanes in the United States (Hurricanes Katrina 2005, Rita 2005, Sandy 2012, and now the 2017 massive hurricanes Harvey, Irma, and Maria) underscores the inadequacy of healthcare systems in dealing with prolonged crises. In each of these widespread and complex disasters, the medical and public health needs of the community were

poorly mapped, resulting in insufficient or delayed care for minorities, the disabled, and the elderly. Retrospective analysis of Hurricane Katrina revealed the need for greater community engagement in preparedness and mitigation.[10] In Hurricane Sandy, such later analysis led to a series of resulting policy changes that underscored the need for anticipating health and social needs in the community while planning for disasters.[10, 11] These policies also clearly articulated the need for inter-facility evacuation and standardization in inter-agency coordination.[1-3]

In general, post-disaster investigations have found that preparedness and response strategies were plagued by failure of backup power and communication systems; insufficient number of staff and insufficient training among staff; failures of transportation infrastructure, leading to problems of access; barriers to cross-credentialing and cross-licensing across state lines; lack of or insufficient access to evacuation equipment; limited access to electronic health records; and lack of real-time tracking systems for beds and inventory.[12-15]

Non-hospital healthcare facilities like nursing homes and other ancillary services, including pharmacies, methadone clinics, dialysis centers, and medical supply chains, experienced similar failures on account of insufficient staffing, lack of backup power, and limited inventory.[11, 13, 16] In the United States, regulations requiring many of these organizations to have robust disaster plans went into effect in November 2016, but facilities had until November 15, 2017 to implement them.[17- 19] Many facilities have already made changes and stepped up their planning; Texas had accelerated similar requirements, which helped with Hurricane Harvey in Houston.[20, 21] However, In Hurricane Irma in Florida, nine elderly lives were lost because of high temperatures in a nursing home after air conditioning stopped because of power failure where the regulations (which cover temperature and emergency generators) had not yet been implemented.[22, 23]

The elderly have almost always been affected disproportionately. In the 2011 Great East Japan Earthquake, a quarter of the people in the Tohoku area affected by the disaster were older than sixty-five, and 14 percent were older than seventy-five.[9] Of the immediate deaths, 65 percent were of those over 60, while this age cohort formed only 30 percent of the general population.[24] The news media featured difficult stories of elderly stranded in disaster.[25] Of the cases of infection seen by clinicians in Iwate Prefecture during the five months following the disaster, the elderly made up 44 percent of the almost 17,000 patients seen.[26] Those who were bed-ridden were even more disadvantaged as the lack of sufficient nutrition and hygiene products, including diapers, worsened their prognoses.[24, 27] The elderly had trouble reaching hospitals, and eventually medical teams had to be dispatched to patients' homes to provide them care.[27] Katrina also disproportionately affected the elderly and despite improvements in Houston for Harvey, the elderly often suffered the most.[21] In Florida, some of the most vulnerable could not evacuate, either for health or financial reasons.[22, 28-30]

In addition, the combination of technology, globalization, and climate change are increasing the number of "once in a lifetime" disasters where multiple factors combine to thwart the best-laid plans. Drawing from lessons learnt after key disasters in Japan, the Philippines, the United States, and elsewhere around the world, this policy brief makes recommendations to build on Hong Kong's existing disaster plan, placing emphasis on facility-wide evacuation and on expansion of the scope of response planning to include chronic care facilities, and the elderly who shelter in place in their communities (See Appendix 1).

Emergency and Disaster Response System in the Hong Kong Special Administrative Region (HKSAR)

The existing plans discussed in the earlier policy brief, *Hong Kong's Emergency and Disaster Response System,* and also outlined on the website of HKSAR Security Bureau, particularly in *The Government of Hong Kong Special Administrative Region (HKSAR) Emergency Response System* are robust and have been strengthened in response to past emergencies like the SARS epidemic.[31, 32] Hong Kong's three-tiered response system engages a range of diverse stakeholders to meet rescue, recovery, and restoration needs after disasters.

The response system has a well-established communication and coordination strategy that spans the entire gamut of Hong Kong's administrative services, from the Security Bureau down to the frontline responders. The medical response is largely administered through the Hospital Authority (HA) and its Accident and Emergency (A&E) Departments, in close coordination with the Fire Services Control Center (FSCC) and with Emergency Medical Teams. Communications are managed through a Unified Communication Portal. Finally, each Hospital Authority hospital is required to have its own contingency plan in place. These plans are to be updated every three years, and hospitals are required to perform periodic drills. A Disaster Psychosocial Services Team (DPST) within each hospital is tasked with providing psychological first aid and acute grief support in the event of a disaster.[31] In sum, the HKSAR sophisticated emergency and disaster response system provides excellent guidance and support for disaster zones and the people affected in them.

The plan does not, however, provide sufficient direction for how to respond to large-scale disasters that require durable and tested hospital-wide or multi-hospital disaster contingency plans. It also does not provide for mapping the vulnerable and their needs in the community, precluding the mobilization of timely outreach to the urban elderly who may not be able to leave their homes or long-term facilities.

Recommendations for Healthcare Institutions in Hong Kong

The 2016-2017 Hospital Authority Annual Plan (the "Plan") sets out "major goals, work plans and program targets of the Head Office and seven Clusters."[33] While the Plan calls for strengthening manpower support to provide early rapid response to disease outbreaks, it does not include any initiative to examine or expand the Hospital Authority's disaster response capabilities. Disaster preparedness plans at the hospital level in Hong Kong have focused on outbreak control, HAZMAT preparedness, and on receiving mass casualties. It was noted, however, according to a survey conducted by DPRI's partners, that emergency department staff required more training in emergency communications and disaster management. Disaster plans and drills (when conducted), did not include hospital-wide evacuations or multi-hospital shut-downs and evacuations.[34]

Despite large-scale investments in and perceived satisfactory levels of preparedness in New York City's hospitals after Hurricane Irene (but prior to Sandy), backup systems during Hurricane Sandy failed miserably. As has been observed in major disasters around the world, catastrophic breakdowns during disasters usually result from a chain of system-wide failures (technical or human), and not merely from the absence of a first or second layer of redundancy. The scale of crises facing large urban areas throughout the world demands that hospitals, in order to remain functional, now be built and managed so as to withstand multi-faceted hazards. In New York City's hospitals, during Hurricane Sandy, generators meant to provide backup electric power failed when the generators themselves were flooded.[14] At the Fukushima nuclear plant in Japan, the backup electricity infrastructure required to

control the temperature inside the reactors failed, resulting in the nuclear rods overheating and melting.[24] At the Union Carbide tragedy in Bhopal, India, the lethal gas leak was preceded by a series of human errors and technical failures that resulted in killing or maiming thousands.[35]

Damage to the healthcare system complicates relief operations, as was seen in Indonesia's Aceh Province in the 2004 Indian Ocean tsunami where 61 percent of health facilities were affected;[32] in the 2003 Algerian earthquake where 50 percent of healthcare facilities could not function due to structural damage;[36] and in Japan (2011) in the prefectures of Iwate, Miyagi and Fukushima where 10 hospitals collapsed entirely and 290 hospitals (close to 80 percent) were severely damaged.[37]

When healthcare systems are directly affected by disasters the impact is manifold. Patients have to be promptly and safely transferred out from affected facilities, while the city as a whole, because of the disaster, loses bed-capacity and a range of out-patient services at a time when demand is likely to increase among the survivors who do not evacuate.

In addition, the elderly and disabled, and those acutely dependent on medicines, often all flock to hospitals to seek care. Their needs are often as simple as the need for refrigeration of medicines if there are power outages, or the need for chronic medicines (as they run out of supply), or they may have more demanding needs such as dialysis, respiratory support, and intravenous medications. In Japan, the elderly and displaced suffered complications from the lack of access to their chronic essential medications. In the first two weeks after the Great East Japan Earthquake, an estimated 282 people died as a result of exacerbations of their chronic diseases.[38]

These demands often last several weeks to months, as has been observed in each of the disasters mentioned above.

It is therefore wholly insufficient to focus hospital preparedness merely on the acute capacity of a single hospital to absorb more patients. Preparedness planning must extend to networks of hospitals and to chronic care facilities. It must also consider the needs of elderly and disabled people, living in the community.

It is equally important to plan, drill, and improve hospital evacuations and inter-hospital transfers, as has been necessitated in most recent major climate-related urban disasters around the world.

Drawing from the vast amount of research and policy changes that followed these disasters, and in light of the possible limitations of existing disaster preparedness practices in Hong Kong, we list from the recommendations that were prepared after recent natural disaster experience elsewhere in the world, those that may be of particular relevance to the medical and public health infrastructure in Hong Kong.

We have identified six areas of opportunity, and tailored our comments to the current health infrastructure and system in Hong Kong:

- Mapping
- Coordination
- Evacuation Drills
- Chronic Care
- Staffing
- Supplies

Mapping

1. Augment existing **live dashboards,** like Hong Kong's Accident and Emergency Information System (AEIS) in the A&Es for tracking patients, beds, and resources. Adopt one information management system across all of the Hospital Authority (HA) so that needs and availabilities become transparent, especially during disasters. Consider, for example, the recent piloting of the Management Information Portal by Dr. Tong and colleagues at the HA.[39] While large health systems in the United States have now begun to build dashboards for occupancy and wait times across their main campuses, city-wide census data across the public and private sector are still lacking. Hong Kong's geographic scale and finite number of key public and private healthcare institutions make it feasible to maintain such live dashboards.

   Dashboards with live bed occupancy and census information, a live list of available chronic care services (dialysis, chemotherapy, physiotherapy, etc.) that can be shared among administrators of both public and private hospitals, as well as among other healthcare facilities like nursing homes would help **coordination and triaging of requests for resources.** Centralizing the flow of such information through HA would result in bottlenecking of information slow, and delay response times.

2. Identify and map those people with **special medical needs in the community** (mobility difficulties; oxygen-dependent; on dialysis; on electricity-dependent equipment; etc.).[40,41] There is growing interest in developing mapping tools to identify vulnerable populations prior to and during disasters. In the US, in Fort Worth, Texas, for example, the Special Needs Assessment Program (SNAP) provides information to the Office of Emergency Management (OEM) with information on residents with permanent disabilities. The program regularly updates their registry, and makes partnerships with local community organizations and local utility companies to encourage residents to provider disability-specific information to the OEM (Residents of these communities receive information about SNAP in their monthly water bill).[42]

   Another similar US enterprise in Seattle, called Vulnerable Populations Action Team (VPAT). works with community-based organizations to ensure that vulnerable populations receive real time critical health alerts and instructions. It identifies vulnerable populations via GIS technology and by administering community surveys. RAND Corporation's toolkit for mapping special needs populations for public health preparedness is a useful resource.[43]

   Coordinating response agencies in Hong Kong may want to leverage existing resources that have information about the vulnerable in their jurisdictions. Utility companies often maintain lists of Life Support Equipment (LSE) customers.[44] Community-based organizations and religious groups that serve migrants, those with disabilities, or the elderly, would be reliable sources of information, as would retirement communities. Community awareness and community participation therefore become pre-requisite activities prior to the creation and maintenance of such registries and maps. Such data sharing and analytics must be accompanied by community consent, whether explicit or implied, and by regulations that prevent the misuse of these data.

Coordination

1. Develop disaster mitigation and planning strategies that span both public and private sector healthcare enterprises, and include not only hospitals but also other **chronic care facilities such as nursing homes, dialysis centers, and elder care centers**. Nursing homes and facilities for the elderly are currently under the Social Welfare Department, requiring closer coordination and communication with the Hospital Authority. It is important that each of these agencies also has a well-developed contingency plan for evacuating patients, receiving additional patients, and ensuring continuity of critical services. They may need to enter into agreements with other healthcare facilities (preferably outside the same geographic area of risk) to care for their patients when evacuated. Despite the epic nature of 2017 Hurricane Harvey, increased coordination between entities and recent mandates requiring emergency plans from nursing home providers turned out to-have lessened the loss of life that would otherwise have occurred.[20, 45]

2. **Ensure interoperability in communication standards** across various types of healthcare institutions, and across agencies. Medical jargon and acronyms are more institution-specific and less ubiquitously uniform than is assumed, so there is a need to make a conscious effort to develop a common terminology. For example, Level 1-5 triage is a commonly used Emergency Severity Index (ESI) by emergency departments to assign "urgency" to individual patients presenting to the department, with Level 1 being most critical. Level 1-5 is also a designation used by Trauma Centers to describe the level of service offered by a hospital, where the most advanced centers are designated Level 1. During initial staging and transport, EMS services usually use the Simple Triage and Rapid Treatment (START) method of sorting into four color-coded categories in order of action required: immediate (red); delayed (yellow); walking wounded (green); and deceased (black). In stark contrast, Emergency Activation Levels on most college campuses in the US include a three-tier system where Level 1 denotes normal operations and Level 3 requires a "full activation."

3. Build **contingency plans for intra- and inter-institutional information management** during shut-downs and power failure. The increasing ubiquity of electronic medical records, digital pharmaceutical dispensing machines, and digital radiology make it easy to transmit information across institutions almost instantaneously. The loss of power also renders these services inaccessible, leading to substantial compromise in care. It is therefore important to consider redundant electronic storage services (servers) at remote locations that are not likely to be affected by the same disaster. It is equally important that pre-disaster preparations include unlocking of equipment and drugs that would be inaccessible without power and the printing of current medical charts to ensure uninterrupted patient care and facilitate communication during transfer between institutions.

Evacuation Drills

1. Conduct **facility-wide and multi-site evacuation drills**–for hospitals and long-term care facilities. Drills in hospitals in Hong Kong currently focus on mass casualty incidents and a surge of patients presenting to individual hospitals. In widening the scope of drills, evacuation decisions should consider the following:
   - Level of evacuation: shelter-in-place, horizontal, vertical, total;[46]
   - Timing of evacuation: immediate, urgent or planned (*all need to be drilled differently*);
   - Patient prioritization: who leaves first, how and when?

   Consider developing a handbook in the vein of the Medical Surge Capacity and Capability (MSCC) handbook[1] and conduct on-going audits/checks of drills in accordance with such a handbook.

2. **Incorporate unit-level planning and response in evacuation drills.** As important as Incident Command Systems are, preparation for evacuations cannot be only centralized as events prompting facility-wide evacuations are likely to have resulted in power and telecommunication failures as well. While there should be central redundancy (in both leadership and execution), it is important for each unit of the hospital to be trained and empowered to make decisions in case of communication breakdown.

3. Develop contingency plans and conduct drills for emergency **relocation of coordinating agencies** like the Emergency Support Unit (ESU), and the Emergency and Monitoring Support Center (EMSC) in Hong Kong. On September 11, 2001, the Office of Emergency Management (OEM) for New York City was located on the 23rd floor of 7 World Trade Center, the last of the buildings to collapse during the terror attack. The OEM was responsible for the city's emergency management plan and response-- and yet it was rendered useless during the worst attack on US soil since World War II. Subsequently the OEM was relocated to a 65,000 square feet facility in downtown Brooklyn. The destruction of the OEM on September 11, 2001 prompted cities across the US to review their disaster preparedness plans and move their emergency management nerve centers to secure, but low-profile sites.

Chronic Services

1. Prepare for **long-term patient surges of both acute and chronic care** patients based on closures (temporary or permanent) of other hospitals and chronic care facilities in the area. As opposed to brief spikes seen after mass casualty events, after major disasters receiving hospitals will continue to see a surge until damaged healthcare facilities are rebuilt.

2. **Prepare contingency clinical protocols for accommodating patients who would otherwise present to day care centers** including those on chemotherapy, on dialysis, and on rehabilitation services. In New York, for example, nephrologists at Beth Israel Hospital in Manhattan would go down to the emergency department, check potassium levels, and dialyze only those patients who needed emergency dialysis (as opposed to everyone who was regularly scheduled to receive thrice weekly dialysis).

3. **Plan and respond to the needs of the elderly, anticipated by the mapping exercises described above.** In cities like Hong Kong, frail, disabled and elderly residents in high-rise apartments are also particularly vulnerable. They may have limited access to food, water, medicines and electricity, due to decreased mobility in case of power (and elevator) failures. The Fire Department in NYC was inundated with 911 calls from elderly (and worried) residents in high rises. Each call took hours to respond as it entailed climbing up steep flights of stairs, and sometimes, evacuating the residents.

Staffing

1. **Develop standardize protocols for calling in additional workforce for new tasks to be performed during disasters in addition to routine operations**. Additional clinical and non-clinical staff are required for these new responsibilities: Preparing patients for transfers; transporting patients to an assembly point or staging area; monitoring waiting patients at the assembly point before they are dispatched to another facility; managing inter-facility transport; and communicating and coordinating with families.

2. **Predict staffing impact based on home locations**, **accounting for staff who may need to travel to the healthcare site from other areas.** Consider offering temporary housing close to facilities for staff whose homes have suffered damage or who would likely be unable to reach work because of lack of transportation. These issues have proved to be factors in many disasters, including 2017 Hurricane Harvey.[17]

3. **Monitor school closures to anticipate impact on staffing**. Such closings affect working parents of children who are suddenly not scheduled to go to work, have to either stay in themselves, to look after the children, or spend time arranging for alternative arrangements. Staff absence on account of non-routine school closures is a well-known phenomenon, in both rural and urban settings. The Guidelines for Disaster Evaluation and Research, developed by the World Association of Disaster and Emergency Medicine (WADEM), demonstrate that Basic Societal Functions (BSF), such as education, health, transport and others, are interconnected and interdependent. [47]

4. **Create plans to re-assign staff from closed facilities to functional ones**. Such planning should include policies that allow reallocation of personnel across the public and private sectors, if necessary. Guidance should be provided on remuneration under such circumstances. Such reassignment of staff from temporarily closed hospitals to those with high patient surges addressed a critical staffing need in New York in the aftermath of Sandy. This need persisted in some cases for as long as two months. Such reassignment requires expedited granting of clinical privileges at the new hospitals, and a redesigning of the usual team structure.

5. **Provide mechanisms for external teams (not from HKSAR) to be deployed efficiently during disasters, when necessary**. It is common for foreign teams to be unfamiliar with local nuances. In New York, for example, EMS personnel deployed from other states were not conversant with the many roads and tunnels that connect Manhattan to the surrounding boroughs. Due to the

several Hurricane Sandy-related closures, the out-of-state personnel became lost and were unable to reach the designated destinations in time, or at all.

Supplies

1. **Pre-position evacuation equipment strategically, in anticipation of flooding, power loss, and other structural damage**. Storing equipment and supplies on lower floors risks damaging them in floods; storing them on higher floors makes access difficult during power failures. It is advisable to factor the probability of various risks at each site and consider distributing evacuation equipment across the facility or storing it at locations that can be securely accessed even during complex disasters.

2. **Hospitals should store provisions of food, water, and sanitation for both patients and staff**, as staff may not be able to return home for several days in the immediate aftermath of a disaster.

3. **Consider contingency plans for storing diesel and gasoline for vehicles and generators**. In the absence of electricity, the demand for fuel will increase as hospitals, businesses and homes turn to fuel-powered generators. And although vehicles will continue to need fuel, fueling pumps may also be affected by power disruptions.

4. **Recruit high-water vehicles in case of significant land and city flooding**.[48] Several EMS vehicles that responded to Hurricane Sandy had a low chassis, preventing their use over several low-lying flooded roads. This unanticipated challenge required the last minute rerouting and recruitment of EMS vehicles already mounted on a higher chassis.

5. **Build capability for responding to unexpected failures of backup systems (including fuel, electricity, and communications).** As alluded to earlier in this policy brief, the multiplier effect of complex disaster is often not due to primary failures, but either multiple failures, or failures of the back-up systems. Planners often do not expect contingency plans to fail. As seen in New York (Hurricane Sandy), or India (Union Carbide Bhopal Gas Leak), or Japan (Earthquake + Tsunami + Nuclear Accident), the failures of backup systems led to devastating consequences. It is therefore important to drill for unexpected failures, and empower (and practice) local decision- making in case of total communication breakdown.

Conclusion

In keeping with DPRI's mission to "establish Hong Kong as a regional and international leader in disaster preparedness and response training,"[49] and building on accompanying policy briefs submitted by the FXB Center and by the CCOUC, we recommend that training programs supported by DPRI focus on:

1. Disaster preparedness within and across healthcare facilities, with additional focus on low-frequency, high-impact disasters; **long-term disasters**; and **multi-site evacuations**. (Policy Brief: *Improving Urban Health System Disaster Preparedness and Response in Hong Kong).*
2. Community preparedness including the strengthening of community outreach and **communication strategies**. (Policy Briefs: *Community Engagement in Disaster Planning and*

Response; Responding to Mental Health Needs in Disasters; and *The Changing Landscape of Early Warning Systems*).

3. Disaster response and resilience among **vulnerable populations** including children, migrants, and the **elderly** (Policy Brief: *Hong Kong's Emergency and Disaster Response System*).

APPENDIX 1

Policy Changes in the United States Following Natural Disasters

In response to the devastating toll on life and property due to weather-related events like Hurricane Katrina and Superstorm Sandy, the United States instituted a variety of measures to strengthen disaster planning and management.

- Congress established the Office of the Assistant Secretary for Preparedness and Response (ASPR)[50] within the US Department of Health and Human Services (HHS) to address a lack of integrated services and to coordinate federal medical and public health responses.

- Congress charged ASPR to work with the Centers for Medicare and Medicaid Services to identify those facilities that have electricity-dependent durable medical equipment[40] and provide access to such information in a way that meets US government records regulations (such as those covering patient confidentiality from the Health Insurance Portability and Accountability Act, commonly known as HIPAA).[10] The Centers for Medicare and Medicaid Services promulgated new regulations requiring disaster preparedness planning at non-hospital healthcare facilities such as nursing homes and other ancillary services.[18]

- The ASPR developed a National Health Security Strategy that calls for coordinated actions across all stakeholder groups—governmental and NGO—to strengthen day-to-day operations in public health surveillance, trauma, and emergency systems. [50]

- The Federal Emergency Management Agency (FEMA) along with other agencies and the Department of Homeland Security (of which it is a part) created a National Response Framework that articulates a coordinated, multi-sector approach to communications during emergencies and disasters.[51]

- The Office of the National Coordinator for Health Information Technology (ONC) helped develop a makeshift electronic health record system that aided evacuated residents after Hurricane Katrina by proving critical information to pharmacies so that prescriptions could be filled.[10] The Office also facilitated a number of projects to update electronic health records, many funded through the 2009 HITECH Act (Health Information Technology for Economic and Clinical Health Act).[52]

- At the local level, response plans for non-hospital and ancillary healthcare facilities were augmented by developing contingency plans for power failure, establishing and practicing evacuation protocols, and developing effective recovery strategies that compliment response strategies.[7] Behavioral health was integrated into response planning through the provision of psychological first aid training and national disaster distress lines.[10] The new regulations from the Centers for Medicare and Medical Services affect many smaller local facilities.[18, 19]

Examples in Other Countries

Japan: Table 1: Disaster management laws and major disaster in Japan in Mulyasari F, Inoue S, Prashar S, Isayama K, Basu M, Srivastava N, Shaw R. Disaster preparedness: looking through the lens of hospitals in Japan. *Int J. Disaster Risk Sci.* 2013; 4(2):89-100.[5]

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Additional Resource

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Supported by:

Funded by:

香港賽馬會慈善信託基金
The Hong Kong Jockey Club Charities Trust
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Cover photo, Hurricane Katrina rescue activities at the main staging area on highways outside of New Orleans on the night of August 30, 2005
By Win Henderson of the US Federal Emergency Management Agency, in public domain

Leah Van Vaerenewyck assisted with background research and writing. Dr. Rex Lam, Hong Kong University, provided valuable commentary on early drafts. Susan Lloyd McGarry contributed significant editorial assistance to this brief.