







Resilient Hospitals

An inter-regional guidance on strenghtening resilience to health emergencies and disasters in health facilities

PAHO
Pan American Health Organization
World Health Organization
Americas Region

World Health Organization
Eastern Mediterranean Region

Resilient Hospitals

An inter-regional guidance on strenghtening resilience to health emergencies and disasters in health facilities

Washington, D.C., 2024

PAHO
Pan American Health Organization
World Health Organization
Americas Region

World Health Organization
Eastern Mediterranean Region

Resilient Hospitals: An inter-regional guidance on strengthening resilience to health emergencies and disasters in health facilities

ISBN: 978-92-75-12906-7 (PDF)
ISBN: 978-92-75-12907-4 (Print)

Suggested citation: Pan American Health Organization. Resilient Hospitals: An inter-regional guidance on strengthening resilience to health emergencies and disasters in health facilities. Washington, D.C.: PAHO; 2024. Available from: https://doi.org/10.37774/9789275129067.

Cataloguing-in-Publication (CIP) data: Available at http://iris.paho.org.

Sales, rights, and licensing: To purchase PAHO publications, email: sales@paho.org. To submit requests for commercial use and queries on rights and licensing, visit: https://www.paho.org/en/publications/permissions-and-licensing.

PHE/CPI/2024

Contents

List of Figures

List of Tables

List of Boxes

Acknowledgements

This guidance document is the result of inter-regional collaboration between the World Health Organization (WHO) Regional Office for the Eastern Mediterranean (WHO/EMRO) and the Regional Office for the Americas (Pan American Health Organization, PAHO/WHO).

This document is one output of the cross-departmental collaboration between the departments of Universal Health Coverage/Health Systems, Health Emergencies, and Healthier Populations and these two regional offices.

This document was prepared by John Abo, Merette Khalil, Alex Camacho, and Hamid Ravaghi, under the technical coordination and guidance of Ciro Ugarte, Dalia Samhouri, and Celso Bambaren.

This document was peer-reviewed and enriched by the technical expertise of WHO colleagues from WHO/EMRO: Rana Hajjeh, Awad Mataria, Richard Brennan, Maha ElAdawy, Hala Sakr, Ali Ardalan, Osman ElMahal, Jehan AlBadri, Ghada AlKayyali (WHO Jordan), Munia Abu El Hawa (WHO Occupied Palestine Territories), as well as colleagues from PAHO/WHO Juan Carlos Sánchez, Patricia Bittner,Enrique Pérez Gutiérrez, Amalia Del Riego, Felipe Cruz Vega, Diana Albán, Daniel de Jesús, Mauricio Cerpa, Leonardo Hernández, Ernesto Bascolo, along with Hermes Cortés, Martin Acosta, Lorenzo Barraza, Reynaldo Holder, Solange Mora, Alejandro Santander, Dana van Alphen (developer of the PAHO SMART Hospitals Initiative) , and Carolina Pineda who provided valuable technical input in the development of the accompanying STAR-H toolkit. Thanks to colleagues from WHO Headquarters: Qudsia Huda, Lee Wallis, Ann Lise Guisset, Mazen AlMalkwai, Rasha Nusr, Redda Seifeldin, and Elena Villalobos Prats.

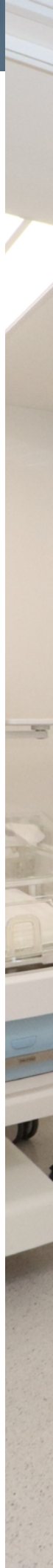
Feedback was also incorporated by multidisciplinary professionals who participated in various technical meetings, such as the Expert Consultation on Hospital Resilience in 2022: Jonathan Abrahams (Australia) Heba Ali, Griffith University (Australia); Hamid RezaKhankeh, University of Social Welfare and Rehabilitation Sciences (Iran [Islamic Republic of]); Ayoko Honda, Hitotsubashi University (Japan); Jamal Melhem, Jordan University Hospital (Jordan); Ali Alsaad, Almaqased Hospital (Jordan); Roger Hamoush, Roumieh Governmental Hospital (Lebanon); Qasem AlSalmi, Royal Hospital (Oman); Shagufta Hassan, Aga Khan University Hospital (Pakistan); Dr. Saeed Sarahneh, Al-Istishari Hospital Ramallah (Palestine); Theodoro Herbosa, University of the Philippines (Philippines); Nebil Achour, Anglia Ruskin University (United Kingdom); and Richard Greenhill, Texas Tech University (United States of America).

Special thanks to the Asian Disaster Preparedness Center for its technical contribution to this document and for its support in building the capacity of national hospital resilience mentors in piloting the hospital resilience matrix in their respective countries. Special thanks are also given to the WHO Collaborating Center for Resilient Health Services at the Mexican Social Security Institute (IMSS) for its support.

In the Americas collaboration was extended through three consultation workshops for the development of the initiative and concepts. **By PAHO:** Alfonso Tenorio, Nicolas Lagomarsino, Liz Parra, Luis De la Fuente, Lealou Reballos, Karen Taborda, Michelle Narvaez, Marion Bullock DuCasse, Isani Chang, Fabiola Michel, Patricio Yépez, Alejandra Bonadé, Magdalena Alcocer, Alexander Valle, Chantal Calvel, Claudio Canales, Pablo Galindo, José Luis Pérez, Sergio Alvarez, Manuel Loayza, Wilmer Marquiño, Laura Osorio, Lenin Flores, Duniesky Cintra, Luis Macias, Valeria Zevallos, Franklin Hernández, and, Eduardo Ortiz. **Anguilla:** Valerie Beach-Horne. **Antigua and Barbuda:** Loriann Henry Johnson. **Argentina:** Carla Moretti, Claudia Congett, Gabriela Sosa, Gisela Gambeta, Gustavo Varela, Patricia Spinelli, Silvia La Ruffa. **Bahamas:** Annouch Armbrister, Antoinette Bumberbatch, Carlyne Smith-McKenzie, Sherlin Brown, Tezel Lightbourne. **Belice:** John Bodden. **Bermuda:** Brett Lefkowitz. **Bolivia:** Angel Sinuri, Lizeth Gancy. **Bonaire:** Jane O'Flynn. **Brazil:** Flávia Caselli Pacheco. **Canada:** Andre La Prairie, Benoit Hermant, Cavan van Ulft, Liam Totten, Robin McNeill, Tiffany Smith. **Chile:** German Castro Besnier, Paola Pontoni Zuñiga, Yocelyn Price, Renato Calcano, Claudia Jimenez, Aldo Vivanco. **Colombia:** Néstor Laverde, Robert Turriago, Ana Zapata. **Costa Rica:** Carlos Salguero, Daisy Benítez, Keylor Castro, Priscilla Herrera, Rocío Sáenz. **Cuba:** José Betancourt, José Ernesto Labastida. **Dominica:** Anneke Wilson, Laura Esprit. **Dominican Republic:** Eduardo Rafael Montaño, Gina Estrella, José Luis Cruz, Luis Osoria Lara, Octavio Andrés Comas. **Ecuador:** Santiago Tarapues, Cristina Jácome, Francisco Guevara, Diego Vallejo, Elizabeth Vallejo de Solezio, Roddy Camino, Patricio Placencia. **El Salvador:** Carmen Guadalupe Melara, Gloria De Calles, Jeannette Suarez, Jorge Alberto Ramírez, Miguel Francia. **Grenada:** Terence Walters. **Guatemala:** Gabriela Ochoa, Piedad Sanchez, José Daniel Caballo, Virginia Herzig. **Guyana:** Denicia Williams, Horson Harris, Lakan Singh, Leon Persaud, Narine Singh, Vasha Bachan, Abbigail Liverpool, Tamica Noel. **Haiti:** Giliane Magloire, Jean Patrick Alfred, Marcus Cadet. **Honduras :** Angela Lourdes Salgado, Antonio Laeiz. **Jamaica:** Claudine Goodin, Debbie Carrington, Gail Ranglin Edwards, Harold Daniels, Lorna Burrell, Nicole Dawkins-Wright, Shirley Hibbert. **México:** Alejandro Lopez Sámano, Federico Viloria, Gabriel Rodriguez, Jorge Loria, Jorge Luis Ponce, Sandra Elizondo Argueta. **Montserrat:** Arlene Ponteen. **Nicaragua:** Eduardo Vado, José Luis Narvaez, Luis Iván Gutiérrez. **Paraguay:** Carlos Torres Alujas. **Perú:** Alicia Garnique Rios, Carmina Christen, Lucas Cureau, Miriam Salazar, Pedro Crisostomo Poma, Silvia Berrospi Reyna, **Saint Kitts and Nevis:** Eren Hanley, Katrina Smith, Latoya Mathew-Duncan, Sylvester Belle. **Saint Vincent and the Grenadines:** Simeon David Llerena. **St Lucia:** Glensford Joseph. **Suriname:** Oscar Mesones Lapouble. **The Cayman Islands:** Dani Coleman. **The Turks and Caicos Islands:** Charlene Higgs. **The Virgin Islands (British):** Rodney Brathwaite. **Trinidad and Tobago:** Jeremy Harrilal, Patti-Ann Williams, Paul Francis. **United States:** Brittany Hayes, Christopher Jones, Christopher Perdue, Dayra Carvajal. **Uruguay:** Adriana Alfonso, Bonny Andres Otazu, Gaston Casaux, Mariela Anchén. **Venezuela:** Raúl Carbonell.

Abbreviations and acronyms

AAR	after-action review
CAP	corrective action plan
COVID-19	coronavirus disease 2019
EMRO	Eastern Mediterranean Regional Office of the World Health Organization
EMS	emergency medical services
EMT	emergency medical team
EOC	emergency operations center
EOC-H	hospital emergency operations center
HEDRM	health emergency and disaster risk management
HR	human resources
HVAC	heating, ventilation, and air conditioning
IAP	incident action plan
IC	incident commander
ICS-H	hospital incident command system
ICT	information and communication technology
IMS	incident management system
IMS-H	hospital information management system
IMT	incident management team
IMT-H	hospital incident management team
IPC	infection prevention and control
IPCHS	integrated people-centered health services
JAS	job action sheet
PAHO	Pan American Health Organization, Regional Office for the Americas of the World Health Organization
PIO	public information officer
PPE	personal protective equipment
PPRR	prevention, preparedness, response, and recovery
RCCE	risk communication and community engagement
SOP	standard operating procedures
STAR-H	Strategic Toolkit for Assessing Risks in Health Facilities
WHO	World Health Organization



Neonatal Intensive Care Unit. Hospital General de Zona 1, IMSS, Tapachula, Chiapas, Mexico. WHO MEX-35 Collaborating Center for Resilient Health Services. 2023

**When crisis strikes,
hospitals save lives.**

A resilient hospital must maintain its functionality and protect the investment it represents, continuing to provide essential health services to the community and leaving no one behind.

Introduction

In both emergency and routine situations, hospitals and health facilities are essential community institutions and a beacon of hope for people seeking health services (1). Hospital systems represent a significant investment on the part of countries, including the private sector. In many countries, hospitals and hospital systems, which are symbols of social wellbeing and security, account for up to 70% of the government's health budget (2).

The COVID-19 pandemic, coupled with the increasing frequency and health impacts of disasters and emergencies, has contributed to unparalleled recognition of the importance of resilience. However, although global evidence and literature on hospital resilience remains nascent and divergent, scholars have synthesized a conceptual framework as a starting point for the operationalization of these dynamic and ever-evolving concepts (3).

Resilience can be broadly described as the capacity to absorb, adapt, transform, and recover from various unexpected shocks (1). Applied to hospital disaster risk management, this translates to the ability of a hospital or health facility to withstand the impact of a hazard (whether natural or human-induced and including biological hazards) that threatens to disrupt routine services, while at the same time maintain the functionality of critical health services and recover to its original state. Past experience has indicated that hospitals can and do learn to reduce disaster risks and improve future response efforts.

Improving hospital resilience not only is key to improving access to health care during emergencies, but also further reduces vulnerabilities, challenges, and inequalities and contributes to universal health coverage (UHC), global health security, disaster risk reduction, climate adaptation and mitigation, sustainability, and health equity (3).

It is not uncommon for hospitals to find themselves simultaneously in different phases of the disaster risk management cycle, such as preparing for and responding to multiple incidents and/or various hazards. Recognizing the dynamic nature of hospital resilience and the diversity and severity of disaster events, hospitals are continuously transforming, adapting, and learning to maintain their functionality and provide quality and uninterrupted critical life-saving services to the most affected.

Strengthening hospital capacities for preparedness, response and recovery is essential to mitigating the consequences of hazards. However, this is easier said than done, given the current challenges and contextual realizations of healthcare operations. In order to tackle these challenges, hospitals must develop the necessary capacities and resources and train staff before an emergency strikes. Hospital emergency and disaster risk management often must compete with routine hospital work and priorities, which stretches hospital resources even further. As a result, risk reduction and preparedness often receive less attention.

The guidance presented in this publication emphasizes how key actions can be integrated into a hospital's routine operational systems, functions, and services in a way that will strengthen how the facility prepares for, responds to, and recovers from the impact of a range of hazards, including epidemics and pandemics, while building back better.

Purpose and intended user

These operational guidelines aim to provide simple and practical recommendations that will enhance hospital resilience throughout all phases of disaster risk management: before, during, and after a health emergency or disaster.

This guidance has been developed for use by hospital managers; heads of hospital departments; members of hospital emergency management committees, including support services and administration; and finance and health authorities responsible for planning and coordinating health emergency and disaster risk management in health facilities.

What is Hospital Resilience?

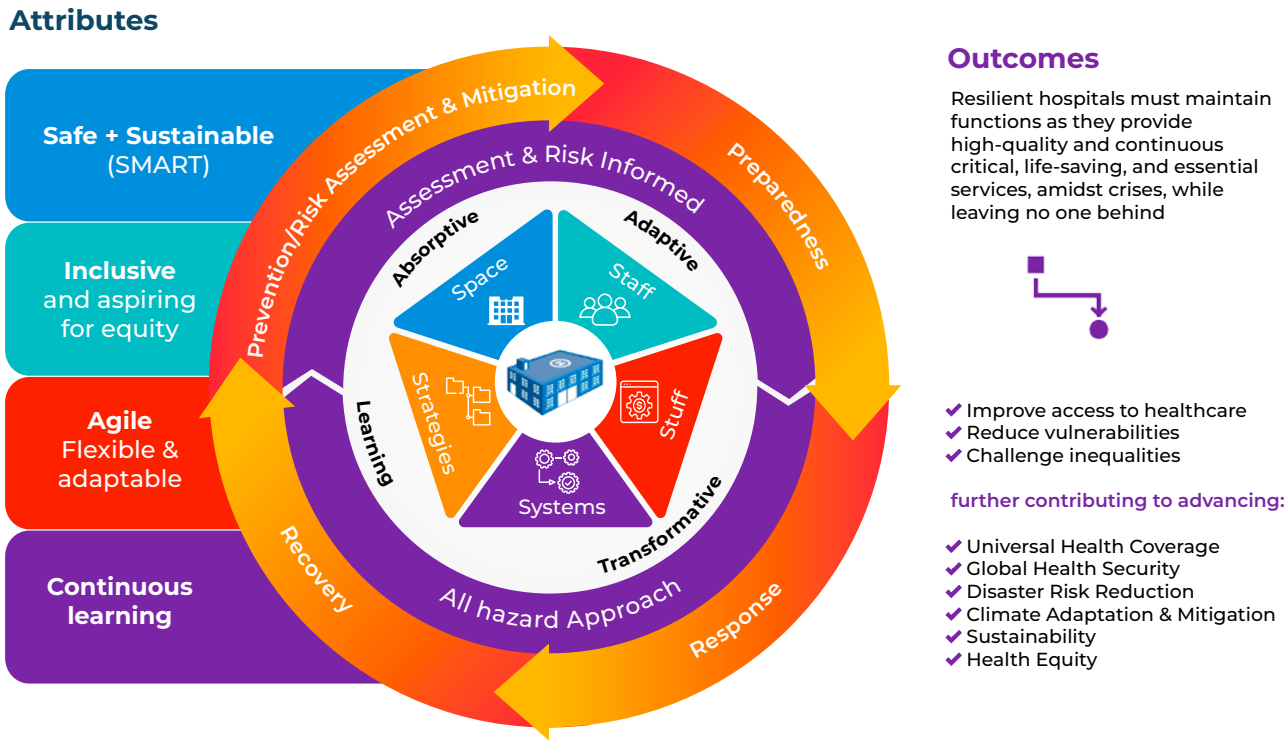
Building on extensive research and contributions from the World Health Organization (WHO) Eastern Mediterranean Regional Office (EMRO) and the Pan American Health Organization (PAHO), the following information helps to conceptualize hospital resilience by offering context and common language. This will enable users to operationalize the guidance presented in this document.

In May 2022, WHO/EMRO hosted an expert consultation of multidisciplinary global and regional policymakers, hospital managers, academics, and WHO representatives to validate a draft framework for hospital resilience and discuss interventions for its operationalization and evaluation (4). This conceptual framework (Figure 1) served as a starting point for future discussions on strengthening hospital resilience, outlining resilient hospital components, capacities, attributes, their primary outcome and subsequent impacts.

Resilient hospitals are embedded within and interdependent on health systems and community resilience. Figure 1 shows a resilient hospital at the center. Resilient hospitals utilize the components space, staff, stuff, systems, and strategies to absorb, adapt, transform, and learn, using all these capacities, sometimes simultaneously.

Hospital resilience manifests throughout all four stages of the health emergency and disaster risk management (HEDRM) cycle: prevention, preparedness, response, and recovery (PPRR) (orange circle), within a risk-informed and all-hazard approach (purple circle). Notably, the four primary resilience capacities occur throughout the often-overlapping stages of the HEDRM cycle. This process ensures that they can achieve their primary outcome of providing high quality and continuous critical and essential services amid crises, while leaving no one behind; with varying impacts. As a result, resilient hospitals exhibit four attributes, as shown to the left of the circle.

Figure 1. Conceptual framework for hospital resilience



Source: WHO/EMRO. Adapted from the article What is Hospital Resilience?"

Outcome and impacts:

The primary outcome of resilient hospitals is the continuity of services and the maintenance of critical hospital functions. Resilient hospitals must remain functioning, as they provide high-quality and continuous critical, life-saving, and essential services, amid crises, while leaving no one behind (1).

Within this framework, the best performing hospitals adapt to the challenges they face, including, but not limited to, disaster-related challenges, the changing context, the health system's shortcomings, and internal hospital deficiencies. Resilient hospitals also must ensure the delivery of integrated people-centered health services (IPCHS). Through IPCHS, resilient hospitals contribute to building stronger health systems, healthy communities, and sustainable development.

The impact of strengthening hospital resilience becomes evident through improved access to health care and reduced vulnerabilities, challenges, and inequalities This further contributes to the advancement of universal health coverage (UHC), global health security, disaster risk reduction, climate adaptation and mitigation, sustainability, and health equity (3).

Capacities, Components, Context:

Capacities of resilient hospitals

Combining the most frequently cited definitions from empirical literature, resilient hospitals display the following four capacities:

- Absorptive: resist or withstand the unforeseen shock of a health emergency or the impact of the disaster, without loss of function.
- Adaptive: respond with or use alternate reserves or processes to maintain essential functions and meet immediate and acute community needs (ensure continuity of efficient, safe, high-quality, and person-centered health services).
- Transformative: recover from the disruption rapidly and at a sensible cost; reduce vulnerability to risk and improve readiness for future emergencies.
- Learning: review and reflect on the effectiveness of past actions to inform future actions; question assumptions; challenge and change existing learning structures. The framework highlights the cross-cutting nature of the learning capacity across the PPRR cycle as well as through the absorptive, adaptive, and transformative capacities (3).

"

Integrated people-centered health services (IPCHS) offer universal access, social equity, and financial protection within a primary healthcare-led approach and are therefore critical to attaining various Sustainable Development Goals (SDGs).

Components:

The interdependence of six components influences hospital resilience: space, staff, stuff, systems, strategies, and services. With functioning health services as the primary outcome, the interventions listed in this guidance document span the remaining five components across the HEDRM cycle.

Space:

In this model, "space" encompasses both the structural and nonstructural components mentioned in the Hospital Safety Index (5). This includes the safety and structural and architectural integrity of the physical building; its critical infrastructure and alternative back-up systems (i.e., power; water and sewage; heating, ventilation, and air-conditioning [HVAC]; fuel; gas; hazardous waste management; and fire protection); and the quality and functionality of its medical equipment.

Staff:

Hospital managers describe health workers as their most valuable asset and a hospital's resiliency is dependent, in large measure, on their resiliency. Just as important as their cognitive capacities (e.g., creativity, leadership, and decision-making) and epistemic capacities (e.g., knowledge and technical competencies), hospital managers must take into account the availability, distribution, and safety of health workers, along with their psychological resilience, job satisfaction and motivation, and commitment to hospital preparedness and response.

Stuff:

This component includes finance, logistics, and supply chain management. One of the most critical issues related to hospital resilience, especially in low- and middle-income countries, is finance and its implications on staffing, logistics, and supplies. Hospital resilience requires the availability of emergency or flexible funding to ensure swift resource mobilization, logistics, and supply management. Resilient hospitals are financially sound and can procure and mobilize the necessary resources to ensure business and services continuity.

Systems:

The systems component is analogous to the roof of a hospital. It enables critical overarching areas to function, such as leadership and coordination, communication and information systems, and risk communication and community engagement. This, in turn, supports all other components.

The systems component is the bridge between strategies (in-theory) and services (in-praxis). The systems component is among the most critical, as it enables and coordinates the planning, management, and operationalization of other components such as staff, space, stuff, and strategies, to deliver safe and continuous services within the various stages of PPRR.

"

A safe hospital is a facility whose services remain accessible and functioning at maximum capacity and within the same infrastructure immediately following a natural disaster. The term “safe hospital” encompasses all health facilities, regardless of the level of complexity.

To strengthen a hospital's soft resilience, hospital managers must build adaptive capacities: leadership, planning, and emergency management. This will contribute to updated risk-informed strategies, protocols, and procedures; the scaling up of communications and community engagement during emergencies; optimizing the use of data, evidence, and information; managing logistics, supplies, and finance; and motivating the hospital workforce to ensure functionality and continuity of life-saving, essential, and quality services during emergencies.

Strategies:

Resilient hospitals require strategies to mitigate and assess vulnerabilities and risks and comprehensive and proactive all-hazard preparedness, response, and recovery plans, including plans for surge capacity and services continuity during emergencies. Specific standard operating procedures (SOP) are needed to implement these strategies and ensure business continuity, functionality, and critical operations.

Context:

Hospital resilience during times of crisis is influenced by several broader health system factors, including capacity, governance, financing, information, workforce, and infrastructure. These factors are interconnected and must work in conjunction with each other to ensure that hospitals respond effectively to emergencies and maintain the delivery of essential services.

Figure 2. Attributes of resilient hospitals

Aerial view of a hospital with solar panels and ventilation systems (HVAC). Hospital General de Zona 1, IMSS, Tapachula, Chiapas, Mexico. WHO Collaborating Center MEX-35 for Resilient Health Services. 2023

The key actions proposed in the operational matrix are guided by national policies, guidelines, and standards developed by national actors, such as the ministries of health, finance, planning, environment, economic development, and local government and disaster management agencies (which, among other responsibilities, include establishing building codes and fire safety standards).

Strengthening hospital resilience is intricately embedded within the context and considerations applied to improving national disaster health systems and community resilience.

Attributes:

According to experts in the field, while there are varying attributes of resilient health systems, there are fewer associated with hospital resilience *(3)*. The above-mentioned context and components of hospital resilience build upon the SMART Hospitals Initiative concepts and toolkits, which PAHO/WHO has piloted and implemented in the Caribbean over the last decade. According to the 2017 SMART Hospitals Toolkit, hospitals are SMART when they are both safe and green. Taking this concept further, according to PAHO/WHO's latest Resilient Hospitals Initiative, a resilient hospital is a safe, smart/sustainable, and inclusive facility that is flexible and adaptable, able to learn from experience, and recover in a timely and efficient manner *(6)*.

Informed by the conceptual framework (Figure 1) and the goals of the resilient hospitals initiative, the following four attributes (Figure 2) underpin this operational guidance. Resilient hospitals must be:

1. Safe and sustainable
2. Inclusive (aspiring for equity)
3. Agile (flexible and adaptable)
4. Continuously learning

Figure 2. Attributes of resilient hospitals

Source: Adapted from the PAHO/WHO initiative "Hospitals Resilient to Health Emergencies and Disasters."

Hospitals that are resilient, both structurally and nonstructurally, are able to resist the impact of hazards and reorganize hospital space so that it is more inclusive. Resilient hospitals must also be flexible, adaptable, and learning when it comes to the following areas: staff; financial matters; logistics and supply chains (stuff); strategies and leadership; coordination; community engagement; and monitoring and evaluation systems. They must be able to rapidly transform past experiences into future recovery efforts.

Links between attributes, capacities, and components

Hospital resiliency stems from relationships and links that exist between the capacities, components, and attributes outlined in the operational matrix. For example, in this guidance document, the **space component** (structural and nonstructural elements of a health facility) impacts hospital **safety**, which is a goal of resilient hospitals. Hospital safety is usually referred to as the hospital's **hard resilience**.

Certain **attributes** of resilient hospitals and hospital safety are also linked to the space component. These include a facility that is **accessible** and **inclusive** to the needs of the communities it serves, using gender-transformative approaches to strengthen the hospital and health system and aspiring toward health equity in the delivery of services and in their internal operations. The delivery of inclusive and equitable health services must integrate awareness and application of the social determinants and power inequalities that inhibit the equitable access of hospital users to health services, especially during emergencies *(7)*.

Strengthening hospital resilience is also linked to other **attributes**. A safe hospital must be environmentally **sustainable**. Beyond simply ensuring that hospitals are green and climate-conscious, sustainable and resilient hospitals actively mitigate their contribution to climate disasters and other hazards. **Fiscal sustainability**, or the need to protect the investment and sustainably mobilize resources to maintain functionality, is another critical attribute of hospital resilience. A hospital's safety is often associated with the absorptive **capacity**.

A hospital's functionality, referred to as **soft or operational resilience**, involves the **components** needed to ensure the continuity of health services delivery in emergencies and disasters. Efforts to strengthen soft resilience are linked to these components: **systems** (leadership, community engagement, communication, and learning), strategies (policies and plans), **stuff** (financial and material resources), and **staff** (human resources). Soft resilience requires the **attribute** of **agility**, that is to say, hospital leadership must be flexible and adaptable in the coordination, relocation, and surge of the various components.

The **learning attribute** spans all components of a resilient hospital and runs throughout the overlapping stages of the HEDRM. These attributes are often associated with **adaptive**, **transformative**, and **learning capacities**.

Operationalizing hospital resilience

With the above considerations in mind, the following four questions help encourage discussion and contribute to operationalizing hospital resilience (1).

- Hospital resilience **for what**? Outlines the **primary outcome** of hospital resilience and its impacts. The attributes of hospital resilience must be considered in its evaluation.

- Hospital resilience **to what**? Highlights the systematic, **risk-informed, and all-hazard approach** to strengthening resilience, as informed by WHO's integrated approach to HEDRM.
- Hospital resilience **through what**? Mainstreaming HEDRM into routine hospital operations, integrating lessons learned from acute events, and building absorptive, adaptive, transformative, and learning capacities, help ensure resilience **before, during, and after** an emergency or disaster.
- Hospital resilience **of what**? Strengthening the resilience of a hospital's (or a health system's) structural and nonstructural elements, or its parts, contributes to the resilience of the whole.

For the purpose of operationalizing hospital resilience, this guidance document and the operational matrix (see following section) the "**through what**" and "**of what**" by describing specific interventions for each component (space, staff, stuff, systems, strategies, and services) throughout the HEDRM cycle.

Because resilience capacities are dynamic by nature, the stages of PPRR overlap within the HEDRM, particularly in multi-hazard approaches to disaster risk management. In order to simplify the structure of this guidance document, and as informed by WHO guidelines on health systems resilience and health emergencies, the HEDRM is divided into three stages: (1) **before**, (2) **during**, and (3) **after** the emergency or disaster (see Table 1).

Table 1. Three stages of health emergency and disaster risk management

	BEFORE EMERGENCY AND / OR DISASTER (routine hospital operations)			DURING EMERGENCY AND / OR DISASTER	AFTER EMERGENCY AND / OR DISASTER
	Risk Assessment & planning	**Risk Reduction (prevention & mitigation)**	**Preparedness**	**Emergency response**	**Recovery**
Objectives	**Identify** potential Hazards, vulnerabilities an **prioritize** risks that can disrupt normal hospital operations	Prevent new or increased risks and **eliminate or mitigate existing ones** and mainstream HEDRM in regular hospital operations	Develop **capacities to respond** to and recover from impact of hazards	Manage **actual risks** to the hospital which cannot be effectively reduced	**Return** to the normal hospital operations and **build back better** including learning lessons for continuous capacity development
Linkages with the national level	National coordination **mechanisms, guidelines, strategies and standards** for Health system strengthening and Health security *(e.g., Ministry of Health, Disaster Management Agency, Environmental Protection Agency, National Building Code / Fire Safety, Ministry of Finance, Planning, Economic Development Agency, etc.)*				
Key Outcomes: **Services**	Save lives by maintaining **function(s)** and providing **quality** (safe, effective, patient centered, timely, efficient, equitable) and continuous critical and essential services, amids the crises, while leaving **no one behind**				

BEFORE: Routine hospital operations

This phase encompasses **risk assessment and planning**, **risk reduction**, and **preparedness**. Each of these areas includes key actions before an emergency and/or disaster.

The first and most important step is risk assessment to inform planning *(1)*. Hospital resilience begins with a strategic risk assessment, during which hospitals consider multiple potential hazards and vulnerabilities and prioritize the risks that must be managed to avoid disruption to hospital services. A risk assessment must be integrated into routine hospital operations and must be used to continuously update and adapt resilience plans, based on regular multi-hazards risk assessments *(1)*.

Risk reduction encompasses actions that hospitals take to prospectively manage risks, through forward-looking management (prevention of new or increased risks) and corrective management (mitigation, reduction, or elimination of existing risks) *(8)*. Guided by a risk-informed and all-hazards approach, hospitals must focus on institutionalizing risk reduction and readiness plans within routine hospital operations, while ensuring safety, agility, inclusivity, and learning.

Preparedness interventions focus on developing and strengthening a hospital's capacity to respond to and recover from the impacts of multiple hazards. Guided by the HEDRM and STAR-H frameworks *(8)*, preparedness marks the beginning of compensatory risk management, which follows through the recovery stage. The goal of compensatory risk management is to strengthen the hospital's resilience to residual risks that cannot be effectively reduced.

DURING: Response Phase

During **response**, interventions and key actions focus on saving lives, protecting property, and taking action to stabilize and control the incident as it progresses. As mentioned, compensatory risk management extends through the response phase, with the primary objective being to manage the actual risks that the hospital cannot effectively reduce prospectively *(8)*. The ability of the hospital and its systems to mobilize timely and coordinated response during emergencies depends on capacities developed during the preparedness phase. During response, hospitals focus on interventions that were developed based on anticipated hazard impacts; activate systems; and apply strategies, utilizing the collective knowledge and skills of hospital staff to perform agreed-upon roles and responsibilities, backstopped by appropriate resources.

AFTER: Recovery Phase

Recovery is divided into two areas: recovery and learning. During the recovery stage, short-, medium-, and long-term interventions (directed at damaged facilities) are initiated during **early recovery**, **rehabilitation**, and **reconstruction** respectively. Building on compensatory risk

management, recovery interventions and key actions focus on reactivating and strengthening essential health services and facility operations from the transition from emergency response back to routine and improved operations *(8)*. These include, but are not limited to, cleaning and repairing facilities, the return of normal hospital functions and services, and ensuring that staff are in the right physical and mental state to return to routine duties and functions.

Hospital resilience is a result of a continuous process of learning, as evidenced by tangible improvements that reduce disaster risks and increase the capacities of hospitals over time. The recovery phase highlights the importance of identifying lessons and implementing corrective actions through after-action reviews (AAR) and corrective action planning, as shown in the conceptual framework for hospital resilience (Figure 1).

Figure 3 shows that hospital resilience results from a permanent and continuous practice of identifying lessons and implementing corrective actions.

Figure 3. **Continuous learning process**

Hospital Resilience Operational Matrix

The hospital resilience operational matrix is organized into three stages: before, during, and after an emergency or disaster. The matrix presents key actions and interventions for the following five components: space, staff, stuff, systems, and strategies.

		BEFORE EMERGENCY AND/OR DISASTER (routine hospital operations)			DURING EMERGENCY AND/OR DISASTER	AFTER EMERGENCY AND/OR DISASTER	
		Risk Assessment & planning	**Risk Reduction** (prevention & mitigation)	**Preparedness**	**Emergency response**	**Recovery**	
Objectives		**Identify** potential hazards, vulnerabilities, and **prioritize** risks that can disrupt normal hospital operations	Prevent new or increased risks and **eliminate or mitigate existing ones** while mainstreaming HEDRM into regular hospital operations	Develop **capacities to respond** to and recover from the impact of hazards	Manage **actual risks** to the hospital that cannot be effectively reduced	**Return** to normal hospital operations and **build back better,** including learning lessons for continuous capacity development	
Linkages with the national level		National coordination **mechanisms, guidelines, strategies, and standards** for health system strengthening and health security *(e.g., Ministry of Health, Disaster Management Agency, Environmental Protection Agency, National Building Code / Fire Safety, Ministry of Finance, Planning, Economic Development Agency, etc.)*					
Key Outcomes: **Services**		Save lives by maintaining **function(s)** and providing **quality** (safe, effective, patient centered, timely, efficient, equitable) and continuous critical and essential services during the crises, while leaving **no one behind**					
HARD RESLIENCE	**SPACE** Including both structural (constructive) and nonstructural (infrastructural) elements	Hospital emergency and strategic disaster risk assessment	Implement **structural mitigation** (e.g., retrofitting, firewalls, flood barriers). Follow design codes and safe building code requirements for new facilities	Identify and test **key operational areas** for hospital readiness and response (e.g., evacuation routes, safety areas, patient reception and triage, isolation, decontamination, space expansion, alternative care sites, hospital EOC, logistics).	Conduct **rapid damage assessment**	Clean and repair damage to facilities (ST-MT-LT)	AFTER ACTION REVIEW (AAR) AND CORRECTIVE ACTION PLANNING (documentation of lessons learned and improvements)
						Restore critical systems such as electrical, telecom, water, waste, medical gases, HVAC (ST-MT)	
						Construct a new safe + green hospital per building codes (LT)	
		Hazard and vulnerability assessment	Implement **nonstructural mitigation** interventions for infrastructure and backup systems (e.g., protect critical hospital equipment, facilities, and lifelines in terms of quality and functionality: power, water, communication, sewage, HVAC, fuel, gas, hazardous waste management, and fire protection, including alternate sources)).		Be flexible in the expansion, use, and repurposing of available spaces	Return repurposed spaces to normal function and use (ST-MT)	
		Capacities assessment for routine and emergency operations	Assess the **accessibility of infrastructure** and risk reduction interventions for people with disabilities			Ensure health facilities are designed to accommodate community needs (e.g., women's privacy, accessibility for people with disabilities, etc.).	
SOFT RESILIENCE	**STRATEGIES** Policies, plans, and coordination, including diversity, equity, and inclusion	Coordination mechanism with local authorities	Integrate DRM into **hospital accreditation**/reaccreditation and licensing (and relicensing) systems for both public and private hospital operations		Monitor **early warning information** from, for example, metrological services, disaster management and public health agencies.	Validate, review and document early warning information, including actions taken.	
		Assessment of community needs, including for vulnerable populations	Strengthen the emergency unit's **routine emergency services** and coordination with other hospital departments (e.g., trauma management, communicable diseases, routine triage).	Establish an **emergency preparedness program** with annual work plan, resources, targets, and budget (e.g., risk informed, response and recovery planning, SOPs, training program for response, resourcing, external coordination, partnerships, simulation exercises).	Activate all-hospital response plans and SOPs according to established triggers (including operational mechanisms for coordination, service continuity, mass casualty, and fatality management).	Scale down the response and activate the recovery plan.	

			Develop **risk informed** business development plans, programs, and strategies, including for budgetary processes.	Mainstream disability, equity, and inclusion into preparedness.	Develop, evaluate, and update incident action plans to address response activities, ensuring no one is left behind.	
			Promote **SMART (Safe + Green) Hospital interventions**, including plans, strategies, and coordination mechanisms for the decarbonization of routine hospital operations (e.g., waste management, renewable energy, purchase of sustainable products)	Develop service continuity plans and SOPs (e.g., planning team, identification of critical services and functions, identification of alternate care sites, and information and data backup systems.	**Infection prevention and control** and surveillance **Referral pathways** (internal and external)	
			Strengthen **hospital support services** by establishing update operational procedures and capacity development plans for routine operations (e.g., maintenance and engineering, dietary, radiology, laboratory, security, administration, central supply, pharmacy, housekeeping, etc.).	As part of all hazard hospital response plans, establish clear roles and responsibilities for the hospital's **HIMT** and **EOC**. Develop a **communicable disease outbreak plan** (e.g., hospital surveillance system, isolation, triage, case management, public health coordination, IPC, reporting).		
			Strengthen hospital capacity development plans in hospital services and leadership (e.g., human resources, supply chain management, financial and clinical management, and DRM.	Develop a **mass casualty management plan** (e.g., patient reception and triage, casualty care, critical care, surgery, surge capacity) and **mass fatality management plan** (e.g., coordination, identification, morgue, legal issues, return of bodies to family, PPE, etc.).	Conduct rapid assessment of response needs	Assess damage and losses (MT/LT)
			Risk communication and community engagement. Establish **linkages with local media** and engage in routine public relations activities (i.e., corporate social responsibility). Ensure **accessible information** and communication for people with disabilities, indigenous people, and other groups			
			Reinforce **safety messages** using posters flyers, information campaigns, etc. (e.g., fire safety, IPC, chemical safety, communicable disease)	Establish **community outreach programs** to support preparedness in local communities, including engaging vulnerable groups and ensuring the community is aware of alternate plans (e.g., training, exercise, community DRM planning) Develop, test, and update **risk communication messages** for various target groups	Implement **crisis communication** strategies (e.g., press statements from the public information officer, coordinate media interviews, issue internal and external safety messages, report and share information through IMS: • within the hospital (internal) • with patients and community (external hospital communication mechanisms) • with other hospitals, networks, health systems actors and national level. Inform communities on **alternate service platforms** during emergencies.	
			Ensure that appropriate support services and easy-to-understand information are available for **populations with special needs** (e.g., PWD, indigenous people, etc.).			
			Establish a robust **hospital information management system** for routine hospital operations in which data sets can be used for DRM planning, emergency response and recovery, and M&E	**Reinforce preparedness to operationalize emergency systems** (e.g., training, resources, coordination, partnerships with other hospitals, linkages with external stakeholders, simulation exercises, evidence-based research to improve operational procedures).	**Early warning system** (e.g., local EOC, meteorological department, disease surveillance system, procedures for activating response plan, communicate and share EW information).	Validate review and document early warning information including actions taken.

	SYSTEMS Leadership and coordination, information management, RCCE, including monitoring & evaluation, accountability, and learning				**Hospital incident management system/team** (e.g., define roles and responsibilities of the incident management team, job actions sheets, resource mobilization procedures, incident action planning, internal/external coordination, communication, reporting, documentation, continuity of essential services, safety and security, staff well-being).	Activate stand-down procedures for hospital response operations (e.g., identify triggers for deactivation of hospital EOC, consolidate information and documentation on the response, conduct debriefing plan for after action review).	
					Activate the hospital emergency operations center **(EOC)**, which includes activation/deactivation, location, alternate arrangements, security, set up, vertical and horizontal linkages.	Initiate **recovery planning.**	
					Identify and address workflow and operations bottlenecks (e.g., overcrowding in the emergency department). • Innovate in the delivery of services • Develop feedback mechanisms and evaluation of response and recovery interventions. Identify critical indicators and data sets to facilitate decision making for response & recovery (e.g., bed capacity occupancy rate, maps, HR on duty, staff contacts list, medical supplies/equipment, oxygen, water, fuel, chemicals, etc.).		
	STUFF Finance, logistics, and supply chain management, and sustainability		**Strengthen routine management of equipment and supplies** (e.g., preventive maintenance of equipment, supply chain, logistics system, inventory system, procurement system).	**Stock and inventory management of emergency medicines and supplies.** Consider a needs-based allocation/distribution strategy and backup/alternate /duplicate systems for supply management. Establish emergency **procurement procedures,** including budget. Develop an emergency **supply list.** Establish **vendor and service agreements**.	Ensure that resource mobilization is timely and flexible, enabling agile response operations. Conduct rapid needs assessment. Use needs-based and risk adjusted standards for allocation, distribution, and use of supplies and medicines. Activate aid and vendor agreements.	Update inventory and restocking of supplies. Equipment management (inspect, replace damaged parts, clean, repair, refurbish as necessary, and store).	
				Secure **emergency flexible and sustainable finance mechanisms**		Mitigate direct and indirect costs of recovery (including repairs and reconstruction).	
	STAFF Human resources		**Integrate HEDRM into HR development strategies, plans, and programs** (e.g., map staff capacity and skills, include DRM roles in staff job descriptions, provide training for new staff, update staff directory).	Develop **staff competencies** on the application of response protocols, plans, and roles (e.g., staff training and exercises, including participation in community activities as part of the wider response system).	Support for **safety, security, health and welfare** of staff and families (e.g., rest facilities, food, monitoring of stress (burnout), protective measures like PPEs, immunization, insurance, security/safety).	Mental health and psychosocial support (e.g., stress debriefing, consultation, monitoring and reporting of warning signs)	
				Establish a system to **mobilize human resources** for response (e.g., establish mobilization procedures, map availability and competencies, provide clear tasks and roles, update the staff directory, recall off-duty staff, offer support and incentives such as remuneration, rest, and accreditation of volunteers).	**Financial and non-financial incentives** (e.g., leave, insurance for benefit claims).		

Organization of a team evaluating the Resilient Hospital methodologies: STAR-H, ISH, INGRID-H. Villa El Salvador Emergency Hospital, Lima, Peru. 2022

1. BEFORE: Routine Hospital Operations

This section describes key actions before an emergency or disaster strikes. This phase is divided into three sections: **risk assessment and planning**; **risk reduction**; and **preparedness.** During the pre-emergency phase, hospitals utilize their learning, absorptive, and adaptive capacities to identify, prioritize, prevent, and mitigate risks that could potentially disrupt operations.

Comprehensive and sound risk assessment enables hospitals to prioritize and conceptualize required interventions *(8)*. This step is followed by planning, to operationalize the identified interventions and mainstream them into routine hospital systems and processes. Mainstreaming will help ensure that they are not considered ad hoc interventions or simply as an additional staff responsibility.

Risk reduction activities also must be mainstreamed into the hospitals' risk management and development agendas to ensure that existing risks are mitigated and that new risks do not develop as a result of the facility's advancement and growth.

Similarly, as part of the pre-incident phase, preparedness measures are planned and appropriate resources assigned to support their implementation as well as the development of capacities and capabilities to respond and recover effectively. This marks the beginning of the compensatory risk management phase, where hospitals seek to strengthen resilience to residual risks that cannot be effectively reduced.

As part of the continuous learning process, hospitals should repeat risk assessments on an ongoing basis. This enables facilities to prioritize risks and update their disaster risk management systems and plans. Continuous learning is one of the critical capacities that hospitals must develop in order to address new and emerging risks.

1.1 Strategic Risk Assessment and Planning

Strategic risk assessment and planning is the first step toward hospital resilience and health emergency and disaster risk management (HEDRM) *(3)*. Hospitals must conduct regular risk assessments, including hazard, vulnerability, and capacity assessments, to inform planning. The interplay between hazards, vulnerabilities, and capacities is dynamic and constantly evolving. Therefore, as risks change over time, hospitals must continuously monitor the evolving landscape and assess, identify, and prioritize risks in order to adapt preparedness measures to changing scenarios and maintain readiness to respond.

During this stage, hospitals should ensure they have strong leadership and management systems in place, in both normal and emergency times. It is also important to have clear and structured coordination mechanisms with local authorities, including neighboring hospital networks; ministries of health, finance, and planning; disaster management agencies; environmental protection authorities; etc. In coordination with these structures, hospitals must have access to up-to-date community needs assessments, including special considerations for vulnerable groups.

The United Nations Office for Disaster Risk Reduction defines risk as the probability of an outcome having a negative effect on people, systems, or assets. These effects can result from natural or human-induced hazards, coupled with vulnerable conditions already present in the hospital, including its ability to mobilize a timely and effective emergency response *(9)*. Before planning begins, hospital managers must understand which hazards might disrupt hospital services and their potential consequences, both internal to the hospital and in the surrounding community that the hospital serves.

Risk assessment is a process to determine the nature and extent of risk by analyzing hazards and evaluating existing conditions of vulnerability that together could potentially harm people, damage property, disrupt services, and affect livelihoods and the environment on which they depend. Risk assessment, therefore, is an integral part of decision and policy-making processes and requires close collaboration among various parts of society. Conducting a risk assessment of hospitals requires coordination and engagement with subject matter experts in areas such as engineering, architecture, safety, and disaster management. Hospitals can build on previous assessments conducted by local authorities, when conducting their own evaluation.

Hazards and vulnerability maps detailing the specific geographical location of the hospital and local communities are valuable reference tools that should be available through local disaster management authorities or information management systems. Information about local communities will also help hospitals to anticipate and prepare for potential response needs, especially if they may be called on to meet specific needs of vulnerable population groups. This type of information includes response capacities of local organizations (e.g., fire and rescue department, civil defense, local health department, ambulance service), which support hospital response during emergencies.

1.1.1 Why conduct a risk assessment?

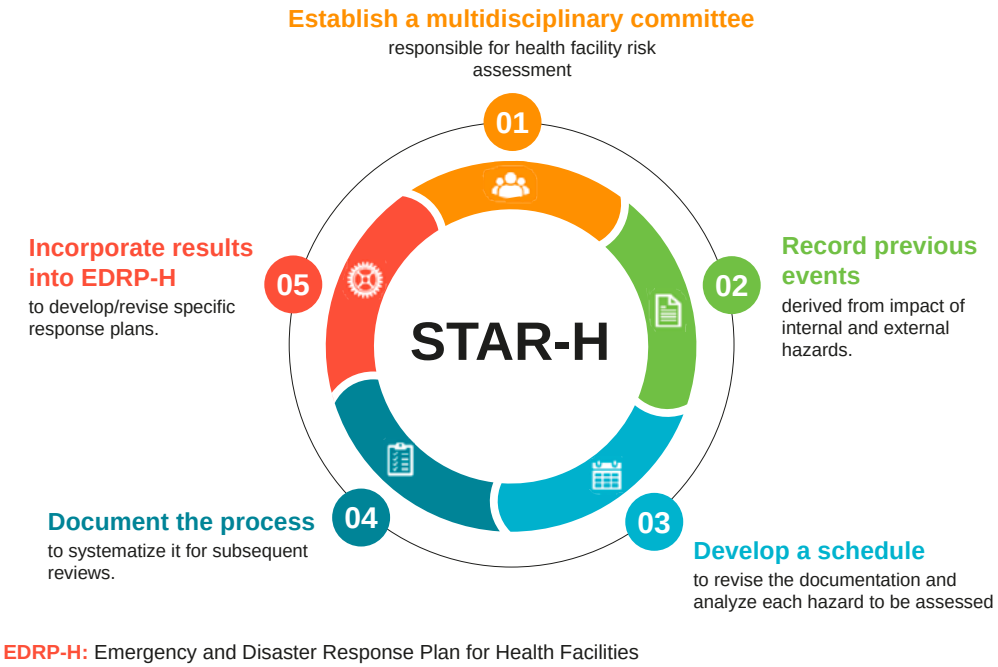
A risk assessment yields essential information that hospitals must consider and analyze as they build resilience.

- Identify potential hazards (natural, biological, technological, and societal) and the likelihood that they will affect the hospital (internal emergency) and the local community (external crisis) or a combination of both.
- Look for vulnerabilities or weaknesses that make hospital assets (structural, nonstructural, emergency management systems) more susceptible to the effects of hazard.
- Analyze a disaster's potential consequences on people, property (structural and nonstructural), services, livelihoods, and the environment, both in the hospital and the community.
- Identify current capacities to manage the impact of hazards, including the hospital's ability to maintain routine and emergency operations, leadership and management, and coordination mechanisms with local authorities and other stakeholders. This includes capacities to support the needs of affected communities, including the vulnerable groups.

1.1.2 Conducting a hospital-level risk assessment for strategic planning

The WHO Strategic Toolkit for Assessing Risks in Health Facilities (STAR-H) outlines a simple five-step approach to hospital risk assessment (see Figure 4). The STAR-H tool generates a report that includes hazard-specific risk scores, as well as general recommendations for using them appropriately. It includes four dimensions of assessment: (a) likelihood of the hazard occurring, (b) severity of impact on the lives of the occupants, the health facility, and the facility's operations, (c) vulnerability, and (d) coping capacity.

Figure 4. STAR-H implementation cycle



EDRP-H: Emergency and Disaster Response Plan for Health Facilities

Source: PAHO/WHO. STAR-H: Strategic Toolkit for Assessing Risks in Health Facilities.

1.1.3 Risk assessment and reduction tools

- Pan American Health Organization. STAR-H: Strategic Toolkit for Assessing Risks in Health Facilities. Washington, D.C.: PAHO; 2023. Available from: https://bit.ly/4bjK0Su.
- The Johns Hopkins University, John Hopkins Medicine. Community Health Needs Assessment. Baltimore: The Johns Hopkins University; c2024. Available from: https://bit.ly/3SWyC7V.
- United Nations Office for Disaster Risk Reduction. Disaster Risk Assessment. Governance System, Methodologies, and Use of Results. Geneva: UNISDR; 2017. Available from: https://bit.ly/49Ba4aq.
- World Health Organization. WHO guidance for business continuity planning. Geneva: WHO; 2018. Available from: https://bit.ly/42gtwpU.

1.2 Risk Assessment Tools

Disaster risk reduction is the concept and practice of reducing disaster risks through systematic efforts to analyze and reduce the causal factors of disasters. Its interventions aim to prevent new and reduce existing disaster risks and manage residual risk, all of which contribute to strengthening resilience and achieving sustainable development.

The risk reduction phase emphasizes mainstreaming disaster risk reduction into hospital development planning processes and strengthening routine operational activities so as to ensure hospital safety, agility, inclusivity, and learning. This requires critical examination of the planning of each program, activity, and project, not only from the perspective of improving hospital operations, but also as an opportunity to reduce existing disaster risks. This will minimize their potential to create disasters and increase the capacity to respond to and recover from the impacts of hazards. During this stage, hospitals prospectively manage risk by taking both forward-looking (prevention) and corrective (mitigation) risk management approaches.

Mitigation and prevention efforts aim to reduce the potential damage and suffering that disasters can cause. While disaster risk management cannot prevent disasters, it can prevent them from becoming compounded as a result of neglecting causal factors and manageable risks. Mitigation specifically refers to actions taken to lessen the severity of a disaster's impact. The adverse impacts of hazards, in particular natural hazards, often cannot be prevented fully, but certain strategies and actions can substantially lessen their scale or severity. While certain disaster risks cannot be eliminated, prevention aims at reducing vulnerability and exposure in such contexts where, as a result, the risk of disaster is removed. Investing in measures that prevent hazards can greatly reduce the burden of disasters.

The following section recommends actions by components of hospital resilience, as part of routine hospital operations.

Space:

Most hospital disaster-related problems result from a lack of structural and nonstructural safety and resilience. However, in addition to these elements, hospital managers must also consider environmental implications and strive to make hospitals not only safe but also green *(10)* (environmentally) and financially sustainable, in addition to being inclusive. Consider the following aspects of hospital safety:

1.2.1 Structural mitigation

The design and construction of new hospitals must take into account risk information related to hazards in the surrounding area and the building's vulnerabilities. This will enable the incorporation of mitigation measures at the early design stage, helping to strengthen the structure's ability to withstand the effects of the hazard.

In the case of existing hospital buildings, where risk information was not taken into account at the design and construction stage, it is still possible to put in place mitigation measures:

- Retrofit the building to strengthen its existing structure to make it more hazard-resistant, particularly to earthquakes and hurricanes.
- Install firewalls to reduce the potential for the uncontrolled spread of a fire to different areas of the hospital, facilitating the decision to evacuate or stay in place.
- Construct floodwalls as barriers to temporarily contain runoff water from rivers or other waterways, which may rise to exceptional levels during seasonal or extreme weather events.

1.2.2 Nonstructural mitigation

Damage to nonstructural elements can severely paralyze the hospital's ability to function, even when the structure itself remains undamaged. This includes the building's non-load-bearing features, such as exterior and partition walls, windows, ceilings, elevators, mechanical and electrical equipment, lighting systems, furniture, etc. The breakdown in hospital services due to damage to nonstructural elements can be significant and costly, given that the structure of the building itself represents only around 15–20% of the total cost of the hospital.

Appropriate steps should be taken to identify vulnerable nonstructural elements that could be damaged and reduce or eliminate the risks. Consider the following six measures that will contribute to a hospital's ability to remain functional in emergencies (11, 12):

- Remove: in many cases, this may be the best option. Hazardous materials that could spill should be stored outside the hospital premises.
- Relocate: this would reduce danger in most cases. An example is a weighty object placed on a high shelf that could fall and seriously injure someone. Relocating it to a floor-level rack reduces the risk.
- Restrain: restrict the movement of certain objects, such as oxygen cylinders and electrical generators, to prevent further damage or injury to staff or patients.
- Reinforce: strengthen existing elements, such as unreinforced walls or vents, using wire mesh and filling with cement.
- Replace: substitute with something that does not represent a danger. For example, heavy roof tiles place an added burden, in terms of weight, on the building, making it more susceptible to movement during an earthquake. A solution would be to switch to a lighter and safer roof.

- Redundancy: plan for alternate sources of critical nonstructural hospital elements, especially lifelines involving power, water, communications, HVAC, fuel, gas, waste management, etc.

1.2.3 Infrastructural accessibility and agility

People with disabilities experience significant health inequalities as compared to those without disabilities. According to the World Report on Disability, approximately 15% of the world's population lives with some form of disability; of these, some 2–4% experience significant difficulties in functioning *(13)*. This situation is exacerbated during emergencies, when people with disabilities are two to four times more likely to be injured or die in disaster situations because of inadequate community-wide planning and access to emergency and disaster assistance.

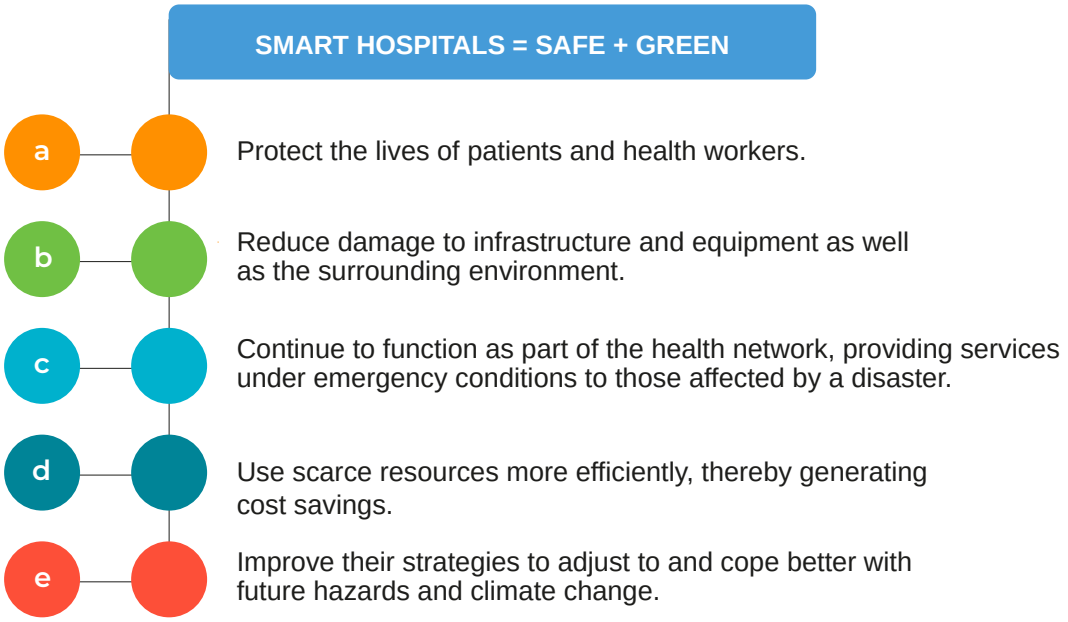
In addition to physically inaccessible spaces in the hospital, people with disabilities also face communication barriers and other challenges due to a lack of awareness and training. Making staff aware of the unique needs of people with disabilities will improve health equity and inclusivity. Disabilities can be visible and invisible, including, for example, hearing, physical, intellectual, psychosocial, and visual (14). Hospitals may consider allocating specific spaces for emergency treatment of people with disabilities. As part of the hospital plan, this may entail converting existing space to facilitate providing assistance.

To build resilience, hospitals must ensure that readiness plans take into account people with disabilities. The Disability Inclusion in Hospital Disaster Risk Management (INGRID-H) tool evaluates the measure of disability-inclusivity according to five areas: (1) visibility of persons with disabilities; (2) participation of persons with disabilities; (3) universal access; (4) response capacities developed; and (5) hospital emergency and disaster response plan.

A resilient and inclusive hospital will consider the following interventions to support people with disabilities:

- Space for wheelchairs; open space close to the front desk; adequate floor space to move around.
- Wide doorways so that wheelchairs and mobility scooters can pass.
- Use of assistive technology, such as touch screens.
- Easily accessible switches and handles (e.g., lights, elevators, doors).
- Visual notifications for people who are deaf and oral notifications for those who are blind (e.g., audiovisual fire alarms).
- Accessible and easy-to-understand signage.
- Access ramps and handrails.

Ultimately, hospital managers should aim to build SMART hospitals, in accordance with the following principles:



Three essential tools from the SMART Hospitals Toolkit *(10)* provide important information about improving hospital resilience:

- The Hospital Safety Index *(HSI)* enables hospital managers to determine the probability that a hospital will remain functioning during an emergency. It focuses primarily on structural and nonstructural indicators and includes functional factors.
- The Baseline Assessment (BAT) tool allows hospital managers to collect baseline information to guide retrofitting decisions. This tool complements the Hospital Safety Index and the Green Checklist and contains sections on energy and water consumption; indoor environmental quality (IEQ); building components; an occupant survey; and land use (local zoning regulations) *(15)*.
- The Green Checklist helps hospitals to identify priority interventions that would minimize their contributions to climate change, such as conserving resources, cutting costs, increasing operational efficiency, and reducing carbon emissions.

In addition to the Green Checklist, the publication WHO Guidance for Climate Resilient and Environmentally Sustainable Health Care Facilities outlines interventions that focus on four areas: (1) the health workforce; (2) water, sanitation, hygiene, and healthcare waste management; (3) sustainable energy services; and (4) infrastructure, technologies, and products *(16)*.

Strategies

Most hospital disaster-related problems result from a lack of structural and nonstructural safety and resilience. However, in addition to these elements, hospital managers must also consider environmental implications and strive to make hospitals not only safe but also green (10) (environmentally) and financially sustainable, in addition to being inclusive. Consider the following aspects of hospital safety:

As hospitals work toward the goal of resilience, a strategy with strong objectives and goals provides the blueprint for planning and executing the appropriate action – within the facility's budgetary constraints. Hospitals must have a clear strategic direction in order to perform the institutional oversight needed to achieve its resilience goals and objectives.

The following strategic considerations contribute to hospital resilience:

- Policies should include roles and responsibilities of all public, private, and civil society stakeholders, across the components of an all-hazards hospital disaster risk management strategy and include those responsible for planning and coordination, International Health Regulations (IHR 2005), surveillance and early warning, emergency preparedness and response, recovery, and health services.

- Risk assessment findings should inform planning to reduce risks, and develop capacities, exercises, and reviews, especially those conducted for multisectoral risk management involving local authorities and organizations. There should be coherence and continuity between the plans for different levels and jurisdictions.
- The hospital disaster risk management coordination mechanism and dedicated units/persons should be established to ensure appropriate coordination across hospital departments, other area network hospitals, the local health authority, and other sectors.
- Diversity, equity, and inclusion in hospital policies, plans, and programs should be mainstreamed to improve coping capacities and lessen the adverse impacts of hazards on vulnerable community populations.

1.2.4 Hospital accreditation system

In most countries, the systems for accrediting and licensing of hospitals are vital to ensuring quality of services and patient safety, through assessment of the performance of hospitals based on established standards and the implementation of continuous improvements.

The accreditation process is one entry point for the integration of disaster risk management into regular hospital operations. For example, part of a facility's accreditation process could be tied to compliance with international and/or national hospital accreditation standards regarding emergency and disaster management. Based on experiences during the COVID-19 pandemic, the Joint Commission[1] revised its emergency management standards and requirements, as part of the hospital's accreditation process *(17)*. Along these lines, ministries of health, responsible for (re) licensing operations in both private and public hospitals, should include elements of emergency management in the accreditation process.

1.2.5 Multidisciplinary disaster management committee

WHO publications and guidelines on emergency and disaster management, including recent reviews of successful responses to the COVID-19 pandemic,[2] point out that it is critical to establish a multidisciplinary HEDRM committee. This committee is charged with developing processes, policies, and procedures, conducting staff training and education, and securing the necessary resources to ensure a hospital's prompt, coordinated, and effective response to all emergencies. The committee is responsible for all facets of the emergency operations plan, including the incorporation of simulation exercises and after-action reviews intended to examine the response and identify opportunities for improvement.

1 The Joint Commission accredits and certifies more than 22,000 healthcare organizations and programs in the United States, including hospitals and healthcare organizations that provide ambulatory and office-based surgery, behavioral health, home health care, laboratory and nursing care center services.

2 These documents are available online from WHO HQ, WHO/EMRO, and PAHO/WHO.

1.2.6 Hospital business development plans

A resilient hospital is able to remain functioning in emergency situations. This requires a readiness for resource generation and reallocation to ensure financial sustainability and continuity of business and services *(18)*. The organizational evolution of a hospital requires that it continuously improve and expand operations to meet the demands of the community it serves. This includes planning to construct a new building (if necessary), upgrading equipment, using technology, expanding health services, or recruiting additional staff *(19)*. Business continuity plans must be risk-informed and included in the planning process to align with risk-reduction goals.

1.2.7 Routine hospital operations

During routine times, optimizing hospital functionality and efficiency is essential to ensuring readiness and resilience. The resources mobilized for an emergency response are the same resources that hospitals use for routine operations services. Therefore, prior to an emergency, hospitals must establish robust operational procedures to manage, for example, trauma and infectious diseases in the emergency unit, including patient reception, triage, assessment, decontamination, isolation, and casualty care. It will also be necessary to ensure the availability of medicines, medical supplies, triage tags, and equipment to meet an increased demand.

Nonmedical support services are equally essential when it comes to maintaining a hospital's ability to function. Examples of these services include administration and finance; engineering and maintenance; housekeeping; security; laboratory; radiology; blood bank; and central supplies. Hospitals may consider integrating support and allied health services during normal times, to make it easier to adjust to emergency demands.

Hospital security measures, developed to safeguard routine hospital operations, are critical during emergencies to protect patients, staff, and hospital property; ensure continuity of care; prevent the spread of disease; and maintain public trust. Consider the following:

- Have a system in place to ensure the safety of patients, visitors, and staff, including controlling access, securing sensitive areas, protecting staff and property from crowds, and processing identification cards, locks, and keys.
- Protect hospital property during the recovery phase by securing medical equipment and supplies, controlling inventory, and monitoring for theft and damage.
- Maintain communication with staff, patients, and other stakeholders to keep them informed of security measures and any changes to hospital operations.
- Coordinate with local law enforcement to ensure a coordinated response to security threats and to receive support in securing hospital premises. Include them in a post-disaster review of the execution of security plans.

1.2.8 Green hospital operations

Climate change is having an impact on healthcare and health systems, as they are forced bear the costs associated with increased illnesses, changes in disease prevalence rates, and the health impacts of more frequent extreme weather events. At the same time, healthcare operations themselves contribute significantly to climate change. Hospitals have a significant impact on environmental health, both upstream and downstream from the point of service delivery, through the natural resources and products they consume and the waste they generate. Consider the following recommendations to decarbonize hospital operations.

Box 1. Global Green and Healthy Hospitals: Decarbonizing hospital operations

Global Green and Healthy Hospitals: Decarbonizing hospital operations

Global Green and Healthy Hospitals (GGHH) is a global advocacy network comprised of more than 70 countries. The international network of hospitals, health systems, and organizations works to reduce their environmental footprint, including the decarbonization of hospital operations. Some ways in which this can be done:

- Develop a hospital or system-wide multidisciplinary sustainability task force to help ensure that environmental health and sustainability plans are implemented throughout the hospital.
- Develop policies and protocols on hazardous chemicals and materials to protect the patients, workers, community health, and the environment, while helping drive society-wide demand for alternatives.
- Segregate waste at the source and initiate recycling for non-hazardous waste.
- Cut waste and greenhouse gas emissions through composting, recycling (including anesthetic gases), smarter purchasing (minimizing packaging, using reusable rather than disposable products, and buying recycled products), and minimizing waste transport (local treatment and disposal).
- Reduce greenhouse gas emissions and energy costs over time by using alternative forms of clean and renewable energy such as solar and wind energy, and biofuels.
- Implement water conservation strategies: install efficient faucets and toilets, routinely check plumbing and pipes to prevent leaks, eliminate seal and cooling water on medical air compression and vacuum pumps, and retrofit refrigeration systems.
- Consider harvesting rainwater and/or recycling water for process water use.
- Implement on-site wastewater treatment technologies when no local service is available.

1.2.9 Capacity development plans

Capacity development is a continuous process whereby people and the hospital as an organization apply, strengthen, create, adapt, and maintain capacity over time

to achieve developmental goals. To sustain and appropriately use these capacities at the right time and in the right situation, disaster risk management competencies must be an integral part and built into hospital staff capacity development plans implemented by human resources (HR) departments (20). Capacity development activities such training, seminars, exercises, and learning exchanges should include HEDRM competencies, including operationalizing regular functions related to supply chain, facility management, financial management, and information management, which are also critical during emergencies.

Systems

As discussed previously, the solid and robust functioning of routine hospital services, enabled by well-trained staff and well-established policies, plans, procedures, and standards, significantly contributes to the continuity of services during emergencies and ultimately, resilience. Similarly, strengthening the hospital's soft resilience, particularly its systems, during routine times is critical to enabling an effective response.

1.2.10 Risk communication and community engagement

Risk communication and community engagement (RCCE) is a fundamental part of HEDRM. It not only improves hospital operations, efficiency, and culture on an everyday basis, it is the cornerstone of effective emergency management. Risk communication information should target hospital staff, patients, visitors, and the wider community to help people make the best possible decisions for their safety, health, and well-being.

Box 2. Principles of effective RCCE

Principles of effective RCCE

- The perception of risk, rather than a technical risk assessment, motivates people's actions. The perception of risk is usually emotion-based and influenced by local and cultural factors.
- People understand according to their own experiences and background. Therefore, risk communication must be contextual.
- People often display "herd behavior" and follow leaders in an emergency. Therefore, engaging the right leaders and influencers in a community is essential.
- Behavioral change to take action for a health intervention is a process. It requires multiple ways of communication, repeated strategically, numerous times, and from various sources.
- In an emergency, people are in a state of fear and do not always think rationally. Thus, risk communication must appeal to the heart and instinct.

Numerous risks exist inside hospitals, even during normal times, including but not limited to, fire, security, patient safety, infection prevention and control, chemical safety, etc. The following actions may help to integrate RCCE into routine hospital operations:

- Reinforce safety messages using posters, flyers, and information campaigns, with language appropriate to the context.
- Use the opportunity of national/international day celebrations to reinforce safety messages (e.g., fire safety month, International Disaster Risk Reduction Day, International Patient Safety Day, International Nurses Day, Earth Day, etc. Click here to view a complete list of United Nations international days and weeks.
- Use websites and social media to reinforce communication. These platforms can provide quick audience feedback so that messaging can be adjusted, if necessary.
- Counteract the infodemic by disseminating verified information and messages from trusted sources (health authorities, WHO, etc.) and debunk harmful myths related to health emergencies.
- Vulnerable groups (e.g., migrants, minority communities, hard-to-reach populations) are especially susceptible to the effects of health misinformation, due to limited access to credible and accurate information sources. This can diminish access to and an uptake in health care, which may already be limited. Identify these vulnerable groups and use appropriate strategies, messaging, and communication tools to reach them.
- Establish linkages with local media and engage in routine public relations activities as part of corporate social responsibility.

1.2.11 Hospital information management system

Information systems facilitate the planning, management, and delivery of healthcare services and hospital operations, such as integrated patient care, the hospital's business and legal functions, staffing and human resource management, and supply chain management. Because system data can be used for strategic and project management and research, including during an emergency, robust hospital information management systems significantly support hospital risk reduction, preparedness, response, and recovery. For instance, important data sets, such as patient census, bed availability, staff capacities, resources, building blueprints, and facility maps, are important for timely decision-making in emergency situations.

The hospital information system should be capable of sharing patient data with other network hospitals to enable continuity of care via telemedicine and other means. The information can similarly contribute to national health and disaster management databases by providing information about health promotion, disease prevention, early detection efforts, planning, resource allocation, epidemiology, etc., at local, subnational, and national levels. The hospital information system should also be able to provide information to third-party systems such as the

national drug safety council, the registration department, road safety council, the police, emergency services, and others.

In the absence of hospital information management software, hospitals can consider using the District Health Information Software 2 (DHIS2). This modular, web-based, open-source health management data platform can be used for statistical data collection and aggregation, validation, analysis, management, and presentation.

Stuff

As mentioned, it is important to recognize the significance of mainstreaming HEDRM into routine hospital operations. By strengthening the routine management of equipment and supplies, for example, hospitals not only strengthen these critical services and functions but also enable them to be quickly adapted to emergency situations. This gives hospitals the flexibility to reallocate limited material resources to where they are most needed to meet a surge in demand for patient care. The following points can help to strengthen the routine management of equipment and supplies.

1.2.12 Preventive maintenance program

A preventive maintenance program is an essential part of successful facility management. It keeps equipment operating efficiently, increases employee safety, and helps avoid extensive and costly repairs down the road. In addition, it may make financial sense, as remedial maintenance costs three to four times more than preventive maintenance. The key is having an established system to monitor and schedule maintenance to enhance productivity and ensure that hospital assets function when most needed.

Box 3. Advantages of preventive maintenance programs

Advantages of preventive maintenance programs

- Keep operational disruptions to a minimum. Scheduled maintenance can be planned and is less disruptive to the hospital's daily operations.
- Preventive maintenance prevents unplanned downtime, which leads to idle employees, a halt in operations, and missed deadlines and targets.
- Keeps machines in good working condition with regular replacement of parts, fluids and oil changes, and quality inspections.
- Equipment that is running efficiently saves on energy and power costs.
- Extends the life cycle of equipment and increases its performance.
- Promotes safe working conditions, as routine checks uncover hazards and prevent unsafe working conditions, leading to fewer on-the-job injuries and accidents.

Consider the following preventive maintenance actions:

- Ensure that machinery is clear of debris before and after every shift.
- Routinely check all machinery belts, fluid levels, and filters and replace them as needed.
- Calibrate machines regularly.
- Inspect structural building elements at least once a year.
- Comprehensively check and repair building systems (electrical, plumbing, network) at least once a year.
- Examine fire detectors twice a year and ensure they remain in compliance with local regulations.
- Confirm that safety and caution areas are properly marked.
- Regularly review and identify your network security (e.g., viruses, malware).
- Ensure that employees comply with safe practices, such as password security and proper email practices (avoiding phishing schemes, etc.).
- Change Wi-Fi and other network passwords at least twice a year.

1.2.13 Supply chain, inventory, and procurement logistics

Logistics are a key element of the supply chain and require planning and executing actions that support purchasing, inventory management, and replenishment of goods and services. Keeping the supply chain moving efficiently, affordably, and proactively helps deliver positive patient outcomes by ensuring that patients and providers have the required medicines and equipment.

The ability to easily track, trace, and audit hospital inventory from product to patient can save lives, as it allows for quick action and prompt decision-making when it comes to mobilizing resources to support emergency response. In addition, a well-functioning logistics system and robust supply chain regularly enable the hospital to limit unnecessary delays and inefficiencies. Consider these key actions to strengthen the hospital supply chain and logistics:

- Implement a centralized purchasing system to optimize inventory control and oversight.
- Utilize vendor-managed inventories with barcode scanners to do away with the need to key in orders or make urgent phone calls to replenish stock.
- Have a secure and accurate digital system to ensure records are correct so staff can focus on patients, not paperwork.

1.2.14 Healthcare financial management

The primary role of financial management in healthcare organizations is to manage money and risk in a way that helps hospitals to provide healthcare efficient services to all patients. It is important that hospitals have the ability to access available reserves and disburse funds promptly to address emergency needs, thus ensuring the uninterrupted flow of supplies and services.

The routine responsibilities of finance departments in non-emergency periods include fulfilling purchase orders, finalizing sales of merchandise and services, negotiating contracts with service providers and contractors, running payroll, and maintaining cash reserves for unexpected or unplanned expenses. A strong foundation and good financial practices and standards prior to an emergency will facilitate quick and timely action and decision-making in emergency situations.

Staff

Human resource management deals with employee issues such as hiring, training, development, compensation, motivation and retention, communication, and administration. Integrating HEDRM into routine hospital HR development will enhance the capacity of healthcare workers to prepare for and respond to disasters.

1.2.15 Integrating HEDRM into routine human resources development

Integrating HEDRM into routine hospital human resource development strategies, plans, and programs requires a combination of assessment, training development, incorporation into job descriptions, creation of work groups, partnerships, and evaluation. The following are key actions to facilitate this process:

- Assess existing capacity: Conduct an assessment of the knowledge, skills, and attitudes of healthcare workers related to HEDRM to identify gaps and opportunities for improvement. Map, monitor, and maintain employee capacities and skills.
- Develop HEDRM training programs: Develop training programs that integrate HEDRM into the routine training and development of healthcare workers. These programs should include a range of topics, such as disaster preparedness, response, and recovery, risk communication, and psychosocial support.
- Include HEDRM-related competencies in staff job descriptions and performance evaluations to ensure they have the necessary knowledge and skills to perform their roles in emergencies. This improves monitoring and evaluation and can be the basis for awards, incentives, and promotions.
- Regularly update the directory of staff contacts. A list of contacts can be used in call-tree exercises when it is necessary to recall staff or mobilize the hospital incident management team.

- Encourage employees to pursue professional growth related to HEDRM by establishing training program targets and plans as part of performance management and professional staff development.
- Include roles and responsibilities of staff related to HEDRM in the orientation and training of new staff.
- Create HEDRM work groups or committees that include healthcare workers from a variety of departments to oversee the integration of HEDRM into human resource development.
- Develop partnerships with HEDRM experts and organizations to provide technical support and guidance for the development and implementation of HEDRM training programs.
- Regularly evaluate the effectiveness of HEDRM training programs and update them based on feedback and changing needs and circumstances.

1.2.16 Risk reduction tools and resources

- Pan American Health Organization. SMART Hospitals Initiative resources. Washington, D.C.: PAHO; [2023?]. Available from: https://bit.ly/49Txp6U.
- World Health Organization. WHO guidance for climate-resilient and environmentally sustainable health care facilities. Geneva: WHO; 2020. Available from: https://bit.ly/3HBQRZS.
- World Health Organization. Checklists to assess vulnerabilities in health care facilities in the context of climate change. Geneva: WHO; 2021. Available from: https://bit.ly/3OG4b3i.
- Pan American Health Organization. Disability Inclusion in Hospital Disaster Risk Management (INGRID-H). Washington, D.C: PAHO; 2018. Available from: https://bit.ly/3HYgofV.
- Global Green and Healthy Hospitals. GGHH guidance documents. [Reston, VA]: GGHH; [c2024]. Available from: https://bit.ly/3SWJTFi.
- World Health Organization. Health service continuity planning for public health emergencies: a handbook for health facilities. Geneva: WHO; 2021. Available from: https://bit.ly/492h6nU.
- World Health Organization. Risk communication and community engagement Action Plan Guidance. COVID-19 preparedness and response. Interim guidance. Geneva: WHO; 2020. Available from: https://bit.ly/3UaBw9U.
- World Health Organization. An ad hoc WHO technical consultation managing the COVID-19 infodemic: call for action, 7–8 April 2020. Geneva: WHO; 2020. Available from: https://bit.ly/3SySlZX.

- United Nations Office for Disaster Risk Reduction. Public Communication for Disaster Risk Reduction. Geneva: UNISDR; 2017. Available from: https://bit.ly/3UEph62.
- The International Network of Health Promoting Hospitals and Health Services. 2020 Standards for Health Promoting Hospitals and Health Services. Hamburg: International HPH Network; 2020. Available from: https://bit.ly/3HWdxUz.

1.3 Preparedness

Any hazard that impacts a hospital, resulting in an emergency or disaster, can create a variety of consequences. Therefore, pre-crisis planning is essential to ensure that the proper knowledge and skills have been developed and are in place to safely respond and recover.

Hospitals that are prepared can respond quickly and appropriately, reducing unnecessary deaths, injuries, and suffering. This lessens the impact of a hazard or threat and contributes to resilience. Capacities are built around linkages with early warning systems and include activities such as response planning, resourcing, coordination, partnerships, evacuation, risk communication, training, and exercises. Formal institutional, legal, and budgetary support is essential.

Preparedness builds the capacities needed to efficiently manage all types of emergencies and achieve an orderly transition from response through sustained recovery.

United Nations Office for Disaster Risk Reduction (UNDRR) defines preparedness as "the knowledge and capacities developed by governments, professional response and recovery organizations, communities, and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent, or current hazard events or conditions."

Readiness, as defined by WHO, is "the interface between longer-term preparedness actions and the immediate response to emergencies. Interventions aim to build, improve, and sustain the operational capabilities to respond to risks and ensure sustained capacities, thus maintaining a state of readiness to respond in a timely and effective manner."

Space

1.3.1 Organizing space to operationalize response

Hospitals must be flexible and able to adapt existing facilities or spaces to meet emergency demands. Critical operational functions must be activated in specific pre-identified areas of the hospital. Consider the following actions:

- Pre-identify which areas of the hospital will be critical to response operations. These areas can include patient reception and triage; treatment areas sectioned off according to priority; evacuation/safe area; decontamination area; hospital emergency operations center (EOC); etc. Establish the appropriate arrangements to support these functions and have at the ready plans and maps.
- Identify operational areas using signage, colored markings, or symbols, such as arrows, to guide patient flow during a mass casualty response.
- Identify facilities or spaces that can be adapted or converted to expand a hospital's capacity for mass care (e.g., corridors/lobby; open spaces; gymnasium or auditorium as alternative care sites; a conference room as the hospital EOC). Step-down facilities will require specific provisions and human resources. (More on step-down facilities in Section 3: Response.)
- Make arrangements to support the operationalization of functional areas during the response: water sources (arrangements for runoff); personal protective equipment (PPE) available in decontamination area; triage tags/ribbons and PPE in triage area; communication equipment, maps, and charts in the hospital EOC.
- Group patients into cohorts, based on their risk of infection or whether they have tested positive for a certain disease during an outbreak. Using separate wards or specific buildings during infectious disease outbreaks can reduce the spread of the disease *(21)*. During grouping by cohort, is important to allocate appropriate and separate areas for family members and visitors. Assign a hospital liaison and provide regular updates on the status of patients.

Strategies

1.3.2 Emergency preparedness program

Emergency preparedness is more than simply having a plan. It requires a program, with an established workplan, budget, and a full-time person responsible for its implementation and monitoring. The emergency preparedness program provides the structure for the development of emergency response and recovery plans.

- Response and recovery plans should be risk-informed and based on a sound risk assessment process. They should be developed in a participatory and consultative manner, engaging key internal departments to promote ownership and external

organizations, such as local disaster management authorities, local public health authorities, the fire and police departments, the national Red Cross/Red Crescent Society, and others.

- Hospitals must be aware of the demographics of the population in the hospital catchment area (e.g., older people, women, children, people with disabilities) and the community's risk profile. This information forms the basis for developing response capacities. For planning purposes, hospitals can use demographic data from local census documents, surveys, or administrative records from local authorities or public health centers.
- Hospital plans should be linked with local or area health network plans and national strategic plans.
- A plan is a detailed written document describing who does what, how, where, and when. The ministry of health has a normative role in establishing policy, guidelines, and a standard framework for hospitals to follow in developing their plans. This promotes synergy and interoperability when plans are activated during response.
- Plans are living documents that require constant updating, as the plan's details are often out of date as soon as they are written. A plan also must be revised each time it is activated, to reflect what has been learned, either during pre-disaster exercises or in response to a real-life emergency. Lessons learned should be documented and shared across different learning and knowledge management platforms, such as conferences and other shared learning events, including in hospital networks. Refer to section 3.2 on the after-action review and lessons learned process for more information.

1.3.3 Service continuity planning

Once the hospital has identified which services must remain functional in the immediate aftermath of a disaster, it can identify and prioritize resources from other services to support and augment these critical functions, such as the emergency unit, surgery department, laboratory, etc. Certain nonessential services can be delayed or temporarily suspended, including outpatient departments and elective surgeries. A final decision can be made once response needs have been met and resources have been assessed.

During a large-scale disaster response, a hospital, or parts of the facility, often cannot continue functioning, either because the facility itself has been damaged or the rapid surge in demand for health care exceeds its capacity (as some hospitals faced during the COVID-19 pandemic). To plan for these scenarios, identify alternative care sites. Plans should include decision trigger points specifying when this type of site should be activated, the setup of the facility, staffing requirements, and transferring patients to the new location.

Access to information and data is another aspect of hospital service continuity. As most hospital information management systems have transitioned to electronic data records, backup systems and data security are critical to minimizing disruption to administrative and clinical information and procedures.

1.3.4 All-hazards hospital emergency response plan

This comprehensive plan takes a multi-hazard approach, which enables hospitals to expand their capacity to deal with all hazards by strengthening core emergency response functions. The all-hazards emergency response plan is a systematic and coordinated approach to mitigate, respond to, and recover from emergencies. It provides guidance and instructions for key personnel on their roles and responsibilities and outlines communication protocols, resource management procedures, evacuation plans, incident assessment, and decision-making strategies. Consider the following steps when developing this plan:

1. Establish a planning committee: Form a multidisciplinary planning committee with representatives from various hospital departments, including administration, clinical services, emergency management, security, facilities, IT, and communications. This committee will lead the planning process.

2. Conduct a hazard identification and risk assessment: Identify potential hazards and risks, including natural hazards (e.g., earthquakes, hurricanes), technological hazards (e.g., power outages, hazardous materials spill), biological hazards (e.g., pandemics, infectious disease outbreaks), and societal hazards (e.g., transport accident, mass gatherings, active shooter incidents). Assess the likelihood and potential impact of each hazard to prioritize planning efforts.

3. Determine essential functions: Identify which of the hospital's functions must be maintained during emergencies. These may include patient care, communications, resource management, utilities, security, etc. Prioritize these functions based on how critical they are to patient safety and the ability to carry out the hospital's mission.

4. Develop emergency response procedures: Develop standardized emergency response procedures for each identified hazard. These should include clear and concise instructions for staff actions. Address key areas such as incident assessment and reporting, patient management, communications, evacuation, resource management, staff roles and responsibilities, and coordination with external agencies.

5. Establish an incident management system (IMS): The IMS is a standardized structure for managing emergencies. Designate an incident commander who will be responsible for overall coordination and decision-making. Establish command staff positions, such as operations, planning, logistics, and finance/administration, to ensure efficient management of resources and staff.

6. Create an emergency operations center (EOC): Designate a physical location for the EOC, which will serve as the central command and coordination hub. Equip the EOC with the necessary communication tools, information systems, and resource management capabilities. Determine staffing requirements and protocols for activating the EOC. As an option, convert an existing conference room into an EOC.

7. Coordinate with external partners: Establish partnerships and formalize agreements with external entities, including local emergency management agencies, neighboring hospitals, public health departments, and first responders. Collaborate on planning, resource sharing, information exchange, and mutual aid agreements. Ensure there are clear lines of communication and coordination during emergencies.

8. Train and educate staff: Conduct regular training and education sessions to familiarize hospital staff with the emergency response plan, their roles and responsibilities, and relevant procedures. Provide training on incident management, emergency communications, first aid, and other related topics. Ensure staff members are aware of their roles within the IMS.

9. Test and exercise the plan: Regularly conduct exercises and drills to test the effectiveness of the emergency response plan. This may involve tabletop exercises, functional exercises, or full-scale simulations. Evaluate the response, identify strengths and areas for improvement, and revise the plan accordingly. Engage external partners and agencies in joint exercises to enhance coordination and interoperability.

10. Maintain and update the plan: Review and update the emergency plan, at a minimum annually, or whenever significant changes occur in the hospital's infrastructure, operations, or regulations. Stay informed about emerging threats and evolving best practices in emergency management. Continuously improve the plan based on lessons learned from real incidents, exercises, and feedback from staff and external partners.

1.3.5 Hospital incident management team

The hospital incident management team (HIMT) is a group of individuals responsible for managing and coordinating the response to emergencies or incidents in the hospital setting. The HIMT is typically activated during significant events that require a coordinated and structured approach to emergency management.

Box 4. Functions of the hospital incident management team

Functions of the HIMT

- Incident command: Designating an incident manager establishes a clear command structure. This position is responsible for overall management of the incident, strategic direction, and decision-making.
- Coordination and communication: Ensures effective coordination and communication among departments, staff, and external agencies involved in the emergency response, facilitating the flow of information, establishing communication channels, and ensuring timely and accurate dissemination of information.
- Resource management: Assesses resource needs, identifies available resources, and coordinates their allocation and utilization. This includes personnel, equipment, supplies, and facilities. The HIMT may also establish resource tracking, procurement, and logistical support systems.
- Incident assessment and situational awareness: Gathers and analyzes information to assess the incident's impact, scope, and evolving needs. Maintains situational awareness by monitoring the incident's progression, evaluating hazards, and anticipating potential challenges or changes in the situation.
- Planning and operations: Develops incident action plans, strategies, and operational procedures based on assessments and objectives. Oversees implementation of response actions, manages incident-specific operational periods, and adapts plans as needed.
- Safety and security: Ensures the safety and security of patients, staff, and visitors during the incident. Implements measures to mitigate risks, address security concerns, and establish protocols for managing access, traffic control, and other safety-related aspects.

Box 5. Elements of the hospital incident management team

Elements of the HIMT

- Leadership and roles: Define clear roles, responsibilities, and reporting relationships for IMT members. Provide training for the incident commander and key section chiefs.
- Organizational structure: Establish an organizational chart that reflects the IMT structure, lines of reporting, and communication flow.
- Standard operating procedures: Develop SOPs that outline protocols for activating an incident; communications, decision-making, resource management, and coordination.
- Communication systems: Establish reliable communication systems, including alternatives to traditional means.
- Preparedness training: Provide training on incident management principles, emergency procedures, roles, and responsibilities. Conduct regular drills, exercises, and simulations to enhance preparedness and ensure effective coordination among team members.
- Activation and response: Activate the IMT in response to significant incidents, following established protocols and criteria. Assemble the team, conduct initial briefings, and ensure a smooth transition to the response mode.
- Incident action planning: Develop incident action plans with response objectives, strategies, and specific tasks. Establish operational periods, assign responsibilities, and coordinate activities within the IMT and with other response entities.
- Documentation and reporting: Maintain accurate records of incident-related activities, decisions, and resource utilization. Prepare situation reports, incident status updates, and other necessary documentation for internal and external stakeholders.
- Coordination with external partners: Establish effective communication and coordination with external agencies, including local emergency management organizations, public health departments, law enforcement, and other healthcare facilities. Foster partnerships, mutual aid agreements, and information sharing to enhance overall response capabilities.

1.3.6 Hospital emergency operations center

The hospital emergency operations center (H-EOC) is a centralized location within a hospital or health facility where key personnel and resources are coordinated and managed during emergencies or major incidents. It serves as the central hub for communication, decision-making, and resource allocation, ensuring an organized and effective response. The following is an overview of the functions and key elements of a hospital command center.

Box 6. Functions of the hospital emergency operations center

Functions of the H-EOC

- Incident management and coordination: This facilitates the overall management and coordination of the hospital's response to emergencies. It ensures that all departments and personnel work together, following established protocols and procedures.
- Situational awareness: The H-EOC maintains real-time understanding of the incident and the hospital's operational status. It gathers and analyzes information from various sources, monitors the incident's progression, and assesses the impact on the facility.
- Decision-making and policy development: Provides timely and accurate information to leadership and stakeholders to support decision-making and assists in developing policies, procedures, and guidelines specific to the incident, ensuring a consistent and cohesive response.
- Resource management: Assesses resource needs and availability within the hospital, including staff, supplies, equipment, and space. Coordinates the allocation and utilization of resources, ensuring they are directed to areas of highest priority.
- Communication and information management: Establishes and maintains communication channels internally within the hospital and externally with relevant stakeholders and agencies, ensures the timely and accurate flow of information, facilitates coordination, and updates key staff and stakeholders.
- Coordination with external partners: Interfaces with external organizations, such as emergency management agencies, public health departments, and other healthcare facilities, sharing information, coordinating mutual aid support, and collaborating on the broader response efforts.
- Patient tracking and management: Oversees the tracking and management of patients throughout the facility. It ensures that patients are appropriately triaged, treated, and transferred as necessary, while accurately maintaining patient status and location records.
- Continuity of operations: Helps maintain hospital functions and services during emergencies. It assesses and addresses operational impacts, establishes contingency plans, and coordinates the resumption of normal operations after the incident.

Box 7. Elements of the hospital emergency operations center

Elements of the H-EOC

- Physical space: The H-EOC requires a designated physical space within the hospital that can accommodate staff, communication systems, information displays, and resource management tools. The space should be secure, accessible, and equipped with essential technology and infrastructure.
- Incident management team: Key staff include IMT members, department heads, administrative leaders, and subject matter experts. Each has clearly defined responsibilities and reporting structures.
- Communication systems: Reliable communication systems are essential and may include telephones, radios, Internet access, computer networks, and other internal and external communication tools.
- Information management tools: These enable gathering, analysis, and dissemination tools and include computer systems, displays, incident management software, and information-sharing platforms.
- Resource tracking and management: The H-EOC should have inventory management systems and tracking software to manage hospital resources, including staff, supplies, equipment, and beds.
- Standard operating procedures: Well-documented SOPs outline functions, roles, and responsibilities. They should be regularly reviewed, updated, and shared with staff.
- Backup systems and redundancy: To ensure continuous operations, the command center should have backup power, redundant communication systems, and contingency plans.

1.3.7 Mass casualty and mass fatality management

Mass casualty management plans build on the capacity of hospital emergency units to manage trauma victims in routine times, such as major traffic or industrial accidents. During large-scale disasters, hospitals must cooperate with other partners as part of a comprehensive system that involves stakeholders from local authorities, response organizations, and other hospitals.

Resources to meet emergency response demands are limited, and therefore, strategies must include prioritizing the allocation of resources to where they are most needed (this also helps save lives). Planning for mass casualties begins at the area of impact and considers first responders and the controlled transport of patients, so as not to overwhelm any one single hospital. As the incident evolves, the strategy also must consider the management of patients as they arrive at the hospital, which requires coordination with different hospital services/departments, including the potential need for secondary transport of patients to other facilities for continuity of care. Hospitals should build capacity to deal with critical interventions outlined in hospital response plans. Planning for mass casualty incidents includes:

- A mechanism for in-house management of the incident, linked to local and national incident management structures and systems. The HIMT leads command, control, coordination, and communication functions, working out of the designated hospital EOC.

- Arrangements for receiving patients, mass casualty triage, and emergency care, led by the emergency department, must be coordinated with other hospital services such as laboratory, radiology, surgery, critical care units, and wards.
- Response plans should outline how other nonmedical hospital services support the response:
    - ◊ Engineering/maintenance, to ensure uninterrupted hospital lifelines are available to support critical operations such as power, water, HVAC, communications, waste management, etc., when local service providers also have been affected. The unit plays a role in setting up alternative care sites; the hospital EOC; and rest facilities for staff working extended shifts.
    - ◊ Administrative and financial arrangements are required to quickly access cash reserves for the emergency procurement of goods and services, including establishing mutual aid agreements with vendors. Hospital administration should plan for sharing critical information related to patient census, bed capacity, list of resources (both material and staff), etc. with the HIMT to facilitate decision-making. Equally important, they must document and maintain records related to procurement and contracting. The analysis of this information will be an important component of the after-action review.
    - ◊ Security, to ensure controlled access and egress to critical areas of the hospital. This is to prevent overcrowding, provide a safe working environment for hospital staff, and ensure the smooth flow of vehicles and people inside and surrounding the hospital. This unit also coordinates with local law enforcement units when required.
    - ◊ Nutrition department ensures the adequacy and quality of food supplies for patients and staff, especially during extended response operations.

Mass fatality management addresses the challenge hospitals face when managing a large number of cadavers. Most hospitals either have no plan to manage mass fatalities or the existing plan is inadequate or outdated. Additional surge capacity must be identified in advance. Plans to expand existing space in the morgue, if needed, must be developed and other alternatives explored, such as refrigerated storage trucks or refrigerator space, with due care given to the social and cultural sensitivity of the issue. Hospitals can coordinate plans with local authorities and response organizations for on-site management of cadavers rather than transporting dead bodies to the hospital, allowing health facilities to focus efforts and resources on life-saving medical care.

Hospitals must be able to identify and decontaminate patients who have been exposed to hazardous materials that pose a threat to their health and the safety of the facility. Hospitals must plan for trained and protected staff to conduct

decontamination procedures away from the emergency department, using appropriate PPE. Consideration should be given to patient privacy (managing their valuables and clothing) and to handling any weapons brought into the hospital.

Communication failures, often a predictable consequence of a disaster, will have a major impact on response efforts. Hospitals must examine internal communications systems (staff and patients) and communication channels with external agencies. Multiple layers of redundancy are required to deal with expected communication challenges. They include two-way radios, public address systems, mobile phones, SMS, and dedicated phone lines in the emergency operations center. In addition, a backup system can use runners to carry messages.

1.3.8 Communicable disease outbreak plan

Infectious disease outbreaks can potentially overwhelm a hospital's capacity to deliver routine services. Human and material resources, including hospital space and medicines, may not be adequate to meet the demand, particularly in the case of an epidemic lasting several weeks, months, or years, as was the case with the COVID-19 pandemic. This type of situation requires a health facility to adapt its priorities and work routines to mount a coordinated, systemic response to a rapidly evolving, potentially complex situation. Epidemics and pandemics also impact the ability of other sectors to continue providing services and can have a significant socioeconomic impact on the broader community. Hospitals should consider potential consequences for staff (e.g., transportation and banking) and for external service providers, especially hospital lifelines and suppliers of critical medical supplies.

Hospitals should review their readiness to cope with the influx of patients and the increased demand for healthcare services. This includes prioritizing and implementing actions for biological threats, especially those that may cause severe acute respiratory illness, in order to identify suspected cases, limit transmission within the facility, and provide specialized medical care. Actions include activating protocols and procedures for isolation in physical spaces; education and training of staff in the use of PPE; patient management; and sample collection and handling.

During slow-onset emergencies, such as an infectious disease outbreak, hospitals should have the following in place:

- Hospital surveillance system.
- Updated case definition from the Ministry of Health.
- Triage protocols for disease outbreaks.
- Sufficient PPE and staff trained to use it properly.
- Emergency unit protocols to isolate suspected patients.
- Established referral pathways, both internal and external.
- Activation of the HIMS, with IPC staff forming part of the HIMT.

Box 8. Enhancing hospital readiness for outbreak emergencies

Enhancing hospital readiness for outbreak emergencies

- Leadership and the HIMT are essential to managing emergency operations. In hospitals that already have crisis management and emergency preparedness plans, it is suggested that these be adapted to the core requirements for both outbreak response and maintenance of routine essential services.
- Coordination and communication ensure that risk analysis and decision-making are informed by data, thus ensuring effective confidence among all hospital staff and stakeholders. This includes communication and coordination within the hospital and links with local and national authorities, including communities and primary health services.
- Surveillance and information management is fundamental to the monitoring and control of outbreaks, especially in hospitals and long-term care facilities. Hospital information management complements surveillance and is important to raising public awareness about the associated health risks and the measures required to reduce these risks.
- Risk communication and community engagement will help limit or stop the spread of rumors about an outbreak and can be used to convey accurate and clear information about the disease.
- Surge capacity (human resources/bed capacity/equipment/supplies) enables a hospital to expand its ability to manage a sudden or rapidly progressive surge in demand for services. Take into account those who provide health services to the affected population: members of emergency medical teams, doctors, nurses, etc. who may come from other countries or from other parts of the same country that were not affected by crisis, etc.
- Continuity of essential support services must be addressed in response plans. As an outbreak evolves and requires the rapid scale-up of emergency preparedness and operational readiness, hospitals must also direct attention to the need for routine medical and surgical care.
- Patient management includes admissions or referrals, triage, diagnosis, treatment, patient flow, tracking, discharge, and follow-up, as well as management of support services, pharmacy services, and logistics and supply functions.
- Infection prevention and control (IPC) minimizes the risk of transmission to hospital staff, close contacts, visitors, and other healthy patients or residents in long-term care facilities who are being cared for in-hospital.
- Rapid identification and diagnosis ensure a logical and practical chain of events during case management. Laboratory services will provide support to activities such as surveillance, IPC, and patient management.
- Occupational health, mental health, and psychosocial support are required to reduce the adverse psychological and social impacts of the emergency on hospital patients, staff, and members of the affected community.

1.3.9 Community engagement

As mentioned previously, emergencies and disasters significantly strain a hospital's limited resources as well as the broader local response system. One major challenge is the immediate on-scene control of a chaotic situation, where communication is often problematic (see section 1.3.7 on mass casualty and mass fatality management). Often, people on the scene will take patients to the nearest hospital, using any available means of transport, without communicating with the receiving hospital. This can overwhelm the capacity of the closest hospital and underutilize other nearby facilities.

Hospital emergency plans must have linkages with community plans in order to create synergies and make emergency response as efficient as possible. Hospitals can initiate this process by engaging in community preparedness and developing the basic response skills of community first responders, so that patients are classified, prioritized, and transported to the right hospital. This will help identify and give priority to critical patients that require immediate medical care; reduce lost time (helping to save lives); and prevent any one hospital from becoming overwhelmed. Community outreach can be further strengthened through planning, simulation exercises, and after-action reviews.

1.3.10 Risk communication

Risk communication has been an effective strategy when the public and the affected community engage with health authorities and experts as equal partners in the exchange of information, advice, and opinions. Risk communication is a link to the public, working to convince vulnerable communities to engage in efforts to reduce disaster risk, taking into account their needs, perceptions, traditions, and culture.

Hospitals should have a plan to work with the media, although it is not recommended to grant media access to a hospital during a disaster. Instead, the media receive regular, factual updates on the status of the facility and what activities are underway. Briefings should be scheduled at a predetermined place and time. As part of the HIMT, a public information officer (PIO) is assigned to lead communication efforts, under the supervision of the hospital incident commander. The PIO has the following responsibilities:

- Establish a designated media staging and briefing area, located away from the H-EOC and areas where patients are treated.
- Maintain contact community PIOs and those in local agencies to collaborate on developing consistent public information and media messages.

- Seek review and approval by the incident commander of public information and media messages before their release.
- Develop information and status update messages on a regular basis to keep hospital staff, patients, and visitors informed about the incident and the status of the community and hospital.

Box 9. Developing risk communication messages

Developing risk communication messages

- Develop goals and key messages. The failure to communicate effectively is often due to the lack of clear communication goals and key messages. Setting goals and identifying messages should be completed before issuing any public comment, especially in emergency situations. WHO and the Ministry of Health can provide technical guidance.
- Identify the audience. The general public is not a monolith, but rather a combination of subgroups. Effective communication will require identifying or segmenting these subgroups and developing targeted messages (e.g., at-risk population, influencers, decision-makers, or those not directly affected but who have a stake in the emergency).
- Test messages. A message that works for you will not necessarily work for your audience. Testing helps you examine your assumptions about what will work and why. It helps you learn more about the target audience you communicate with. Testing will provide evidence that communications are working or how to adjust them. It is a necessary process that saves time and money by not wasting efforts on ineffective communications.
- Channels and tools. Communication messages and channels must be tailored to the target audience, even when the message content is essentially the same. Sources must be trusted by the target population (e.g., social media, community boards, broadcast media, community leaders, influencers).
- Monitoring. The purpose of monitoring is to determine whether you are reaching the intended target audience and if the messages are understood. Monitor deliberate behavioral changes that have taken place. Use epidemiological trends, the media, social media, key informant interviews, and surveys to check if messages are effective. Monitoring also helps manage, address, and correct misinformation.

1.3.11 Operationalizing emergency systems

Solid emergency systems and plans that reflect a collaborative planning process are the starting point for initiating response activities. It is important to integrate hospitals into national emergency care systems as part of routine resilience interventions. To strengthen the operationalization of these systems, consider the following actions:

- Integrate preparedness into training programs to develop staff capacities, including on the use of equipment.

- Conduct orientation sessions for key stakeholders, including their role in the system (e.g., local authorities, local health department, other hospitals, fire department).
- Carry out hospital simulation exercises to test arrangements and make revisions as required. Draw participants from a variety of hospital departments and hold drills frequently and during nights and weekends, after which the hospital can build up to full-scale, functional exercises involving the management of moulage "casualties." Community participation is critical to identify elements that work or that need improvement.
- Conduct operational research to improve systems and procedures.

The WHO emergency care system framework captures essential emergency care functions at the scene of injury or illness, during transport, and through to emergency unit and early inpatient care. This reference is included in section 1.3.18, tools and resources.

Stuff

1.3.12 Stock and inventory management

When hospitals require immediate access to medicines and supplies, they look to medical inventories for accurate information about current stock levels and their specific location. Hospital inventory management systems must be robust as well as flexible, a lesson that hospitals learned during the COVID-19 pandemic. Inventory management processes must be able to track the progress of inventory items from delivery through final use, including data related to usage. The following recommendations will help ensure that hospital supplies and inventory management systems contribute to emergency preparedness:

- Assess the vulnerabilities of key supply chain infrastructure (e.g., transportation routes, bridges, seaports, airports) that can disrupt supply; develop supply chain contingency plans to minimize potential impacts.
- Keep a centralized inventory.
- Keep an accurate list of items and maintain adequate stock levels. This will enable demand-driven procurement, identification of trends, and help predict future needs.
- Manage expiration dates and recalls, preventing waste and unnecessary financial losses.
- Identify alternatives to items in the inventory or identify new vendors.
- Establish buffer inventory to avoid depletion of existing stock.
- Develop emergency procedures for procurement, control, security, and reporting.

1.3.13 Procurement and management of emergency medicines and supplies

Effective emergency procurement procedures require a combination of pre-planning, flexibility, speed, transparency, risk management, and coordination. This ensures that hospitals have the necessary stock of emergency medicines and supplies to meet an increased demand during surges and that patients receive timely and adequate care.

Effective procurement systems also enable hospitals to optimize resources and avoid duplication of efforts, which can lead to cost savings. Emergency procurement procedures are critical to ensuring that necessary goods and services are quickly acquired to help those affected by the crisis. The following are key considerations to enhance hospital readiness:

- In the event of a health emergency or disaster, hospitals should consider having dedicated supplies and arrangements in place, as response efforts will rapidly deplete existing stocks. Regular audits will help determine if stock levels are accurate. Emergency supplies also can be rotated into the daily-use stream to ensure the cache does not expire.
- Predefined procurement criteria and thresholds for different procurement methods should be established beforehand to ensure that the procurement process is transparent and consistent.
- Emergency procurement procedures should be flexible enough to adapt to changing needs and circumstances. This includes the ability to change procurement thresholds and methods and to consider alternative sources of goods and services.
- The procurement office must preestablish potential sourcing contracts for items typically used in a declared emergency. This will provide arrangements for vendors to quickly deliver needed items and services.
- Develop emergency procurement procedures that shorten the process to save time. This includes appropriating available budgets that can be quickly accessed for emergency procurement.
- Develop a list of critical emergency equipment and supplies. Monitor its regular status and establish contingency arrangements as to where and how such items can be sourced out.
- Emergency procurement procedures must be transparent, accountable, and auditable. This includes clear documentation of the procurement process, open communication, and regular reporting on procurement activities.

- Emergency procurement procedures should include risk management strategies to ensure that goods and services are acquired safely and efficiently. This includes assessing and mitigating risks associated with the procurement process, such as fraud, corruption, and safety risks.
- Effective coordination and communication between all parties involved in the procurement process is essential. This includes coordination with other disaster response agencies, local authorities, and community groups.

1.3.14 Vendor and service agreements

Establishing vendor and service agreements, as part of preparedness, requires a combination of needs assessment, vendor selection, contract negotiation, performance monitoring, risk management, and regular review and update. The goal is to ensure that the necessary goods and services are available during an emergency and that vendors are held accountable for meeting the agreed-upon standards. Consider the following key elements when establishing such agreements:

- Conduct a **needs assessment** to identify the types of goods and services that will be needed during an emergency.
- **Select vendors** that can provide the necessary goods and services during an emergency, taking into account their availability, reliability, and cost-effectiveness.
- Develop **service-level agreements** (SLAs) that define the scope of work, deliverables, timelines, and quality standards for each vendor.
- **Negotiate contracts** with vendors that include terms and conditions, such as pricing, payment terms, performance metrics, and dispute resolution mechanisms.
- Establish a system for **monitoring vendor performance** to ensure they meet the service-level agreement and contractual obligations.
- Develop a **risk management** plan that includes contingency plans for supply chain disruptions, vendor failures, and other unforeseen events.
- Regularly **review and update** vendor and service agreements based on changing needs and circumstances, as well as feedback from stakeholders.

1.3.15 Emergency financial mechanisms

Establishing flexible and sustainable financial mechanisms prior to disaster response ensures that funds are available when needed. Effective emergency response depends not only on the availability of funding but also on how funds are allocated and spent. The goal is to ensure that funding is available and used efficiently and effectively. The following recommendations will improve a hospital's financial readiness:

- **Resource mapping:** Identify potential external sources of funding (including government grants, private donations, international aid) and funds that are available internally.
- **Budget development:** Develop a budget that outlines the costs associated with emergency response activities.
- **Funding strategies:** Develop strategies for securing funding, such as grant applications, corporate sponsorships, and fundraising events. Establish an emergency fund and procedures for fast-track spending modalities to accelerate disbursement, accompanied by sound financial management and accountability.
- **Partnerships:** Establish partnerships with other organizations, including government agencies, nonprofits, and private sector entities, to leverage resources and funding.
- **Flexibility:** Ensure that financial mechanisms are flexible enough to respond to changing needs and circumstances, such as the scale and severity of the disaster and the emergence of new threats. Establish flexible procurement rules that allow hospitals to negotiate directly with suppliers. Lift time and due-diligence constraints on the bidding process, the minimum number of candidates, and advance payments.
- **Sustainability:** Develop sustainable financial mechanisms that can be used over the long-term, including strategies for maintaining funding and attracting new sources of support.
- **Accountability:** Establish a system and procedures for tracking and reporting on the use of funds, including regular audits and performance evaluations. Establish clear emergency spending authorization levels as part of hospital response plans.
- **Timeliness:** Establish processes and procedures to ensure timely access to funds during a disaster response. Consult with national and local authorities regarding reimbursement regulations and requirements and ensure required documentation is prepared according to guidelines.

Staff

1.3.16 Developing staff competencies

Developing the competencies hospital staff require to effectively apply emergency response protocols, plans, and roles requires a systematic and comprehensive approach. The goal is to ensure that hospital staff have the necessary knowledge and skills to effectively respond to emergencies and mitigate the impact on patients and the community. Consider the following actions to reinforce staff preparedness:

- **Assess training needs:** Conduct an assessment of the knowledge, skills, and abilities of hospital staff related to emergency response protocols, plans, and roles in order to identify gaps and areas that need improvement.
- **Assign emergency roles and responsibilities.** When assigning tasks, use the title of the position rather than the name of the staff member, as the position will remain but the name of the person may change due to staff rotation or attrition.
- **Develop job action sheets (JAS)**, quick reference guides on specific emergency tasks: the purpose, supervisor to whom they report, and a breakdown of the task (immediate, 0–2 hours; intermediate, 2–12 hours; extended response task, more than 12 hours), and demobilization. JAS can be used during debriefing and after-action reviews to learn from experiences and make improvements where needed.
- **Develop training programs:** Develop and implement training programs that are tailored to the specific needs and roles of hospital staff, e.g., emergency response plans and procedures, incident command systems, triage and patient management, communication protocols, and the use of PPE. Provide regular refresher training to ensure that hospital staff maintain competencies and knowledge of emergency response protocols and roles.
- **Establish an annual program of exercises** in which staff can review and practice expected emergency tasks and apply emergency response protocols and roles in a realistic setting. Exercises can range from simple discussion-based exercises (tabletop exercises) for different units or functions to a more comprehensive full-scale or functional exercise at the end of the year, which combines all response functions. Hospitals are also encouraged to participate in community exercises with local authorities, response organizations, and other area network hospitals to practice and test local area plans and arrangements.
- **Incorporate emergency response competencies into performance evaluations:** Job descriptions should reflect required emergency response competencies and be part of performance evaluations for hospital staff, to ensure accountability for emergency roles and responsibilities.

- **Foster a culture of preparedness** throughout the hospital, through ongoing communication and engagement with staff, patients, and community partners. This can include activities such as awareness campaigns, community outreach, and partnerships with local emergency management agencies.

1.3.17 Mobilizing human resources for response

Establishing an effective system to mobilize and notify human resources before and while the disaster response plan is activated requires planning, training, staffing, partnerships, resources, and evaluation. Hospitals can ensure they have the human resources necessary to respond to disasters and provide quality care to patients by considering the following recommendations:

- **Develop a human resource management plan** that outlines staff roles and responsibilities during disasters, identifies the skills and competencies needed, and establishes protocols for mobilizing and managing staff.
- **Create a staffing matrix** outlining the number and category of staff needed for different types and levels of emergencies. The staffing matrix should consider factors such as the projected number of patients, the severity of injuries, and the availability of resources.
- **Establish a call-down system** to notify and mobilize staff quickly during emergencies. The call-down system should include protocols for contacting staff (in addition to phone calls, hospitals can use SMS, pagers, or make announcements using the hospital public address system), verifying their availability, and deploying them to an appropriate location.
- **Maintain an updated directory of staff contacts**, assigning responsibility for keeping the HIMT members' contact information updated as well as that of focal points in local organizations and agencies: EOC, public health, fire department, police, civil defense, etc.
- **Develop transportation arrangements** for recalling off-duty staff.
- **Provide facilities for staff working extended hours** and those who cannot return home, including food, refreshments, and rest facilities. Hospitals may consider how best to support the families of recalled staff members who were forced to evacuate. Hospital training programs should include family preparedness and enhancing staff resilience (their ability to report back to work when needed).
- **Consider providing incentives for staff** who are recalled to work during emergencies and those working extended shifts. This can be in the form of allowances, overtime pay, insurance, or paid leave after the crisis, including issuing commendations/certificates for exemplary service that can be included in staff performance records for future promotion and salary adjustments.

- **Develop partnerships** with other health facilities and organizations and emergency management agencies to share resources and expertise during disasters. This can include mutual aid agreements, prearranged contracts, and cross-training programs.
- **Ensure adequate resources** are available to support the mobilization of staff during disasters. This can include supplies, equipment, and transportation.
- Regularly **evaluate and improve the system** to ensure that it is effective and efficient. This includes reviewing staffing matrices, conducting after-action reviews, and updating training programs and protocols.

1.3.18 Emergency preparedness tools and resources

- American College of Emergency Physicians. Hospital Disaster Preparedness Self-Assessment Tool. [Irving, TX]: ACEP; [date unknown]. Available from: https://bit.ly/3Hu3xBM.
- Pan American Health Organization. Preparedness Index for Health Emergencies and Disasters. Washington, D.C.: PAHO; 2019. Available from: https://bit.ly/4b8yY27.
- World Health Organization. Rapid hospital readiness checklist: Interim Guidance. Geneva: WHO; 2020. Available from: https://bit.ly/4b4tBRw.
- Pan American Health Organization. STAR-H: Strategic Toolkit for Assessing Risks in Health Facilities. Washington, D.C.: PAHO; 2023. Available from: https://bit.ly/4bjK0Su.
- Pan American Health Organization. INGRID-H: Disability Inclusion in Hospital Disaster Risk Management. Washington, D.C.: PAHO; 2018. Available from: https://bit.ly/3u7P8s3.
- World Health Organization. Mass casualty management systems: strategies and guidelines for building health sector capacity. Geneva: WHO; 2007. Available from: https://bit.ly/3SrQ5or.
- World Health Organization. Service Availability and Readiness Assessment (SARA) Reference Manual, Version 2.2. Geneva: WHO; 2015. Available from: https://bit.ly/3UhIWZj.
- WHO Academy. Mass casualty preparedness and response in emergency units. [Geneva]: WHO; 2022. Available from: https://bit.ly/3OgKI98.
- Pan American Health Organization, World Health Organization, International Federation of Red Cross and Red Crescent Societies. Management of Dead Bodies after Disasters: A Field Manual for First Responders. Second (revised) edition. Washington, D.C.: PAHO; 2016. Available from: https://bit.ly/3UCZgUn.
- World Health Organization. Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 Preparedness and Response. Geneva: WHO; 2020. Available from: https://bit.ly/3UaBw9U.

- World Health Organization Regional Office for the Western Pacific. The COVID-19 risk communication package for healthcare facilities. Manila: WHO WPRO; 2020. Available from: https://bit.ly/3vP6Cdi.
- World Health Organization. WHO COVID-19 Essential Supplies Forecasting Tool (COVID-ESFT) v4. Geneva: WHO; 2022. Available from: https://bit.ly/3Ss6QzI.
- International Search and Rescue Advisory Group. INSARAG Guidelines. Geneva: INSARAG; 2020. Available from: https://bit.ly/4979L6i.
- World Health Organization. Classification and Minimum Standards for Emergency Medical Teams. Geneva: WHO; 2021. Available from: https://bit.ly/3u8cU7d.
- World Health Organization. Simulation exercise resources. Geneva: WHO; 2024 [cited 19 March 2024]. Available from: https://bit.ly/3ws9pcw.
- Pan American Health Organization. Herramienta de Evaluación de la Preparación Hospitalaria Frente a la Violencia [Hospital Preparedness Assessment Tool for Violence] [Spanish only]. Washington, D.C.: PAHO; 2024 [cited 19 March 2024]. Available from: https://bit.ly/3TgjRwK.
- Incident Command System for Hospitals (currently in Spanish only; will soon be available in English). Available from: https://bit.ly/3P39EkW.
- Pan American Health Organization. Caja de herramientas: preparación de los países para emergencias de salud y desastres [Toolkit: Country Preparedness for Health Emergencies and Disasters] [Spanish]. Washington, D.C.: PAHO; [date unknown] [cited 19 March 2024]. (Currently in Spanish only; will soon be available in English). Available from: https://bit.ly/47GNw6g.
- World Health Organization. WHO Emergency care systems framework. Geneva: WHO; 2018. Available from: https://bit.ly/3V14jhF
- World Health Organization. WHO Tools for strengthening emergency care systems. Geneva: WHO; [date unknown]. Available from: https://bit.ly/3P2OB1H.

Redundancy of a firefighting system. Hospital General Regional 2, IMSS, El Marqués, Querétaro, Mexico. WHO Collaborating Centre MEX-35 for Resilient Health Services. 2021

1.4 Role of volunteers

Past disaster situations have drawn many volunteers who wish to assist, a phenomenon known as "convergent volunteerism," in which unexpected and/or uninvited healthcare workers arrive to render assistance. While volunteers can be a good source of additional manpower in emergency situations, well-intentioned, inexperienced volunteers, who are unfamiliar with the local hospital response system and the affected community, can add to the confusion or even hamper operations. Hospitals must carefully consider whether or how to best utilize volunteers and manage their services. Consider the following points before engaging volunteers in a hospital setting.

- Hospitals can pre-accredit a multidisciplinary pool of volunteers, defining when and how they will be used and the specific tasks they are expected to perform. Hospitals would also be able to engage this pool of volunteers in pre-disaster preparedness activities, such as training and exercises.
- Plans should be enacted to review, verify, and periodically reverify the professional credentials of medical practitioners. The credentialing process for medical volunteers ensures that qualifications align with assigned tasks and relate to medical practices in the affected country. Volunteers from medical universities and colleges are a good source of volunteers, primarily when a hospital is affiliated with one.
- Define how to identify and request appropriate volunteers. Indicate a preferred order for accepting volunteers: (e.g., staff from affiliated facilities, followed by partner facilities, then national medical volunteers, and finally, unplanned or ad hoc health professionals).
- Develop arrangements for how volunteers will be supervised and evaluated as part of an organization's emergency response plan.

1.5 Emergency medical team (EMT) initiative

Based on the experiences of the International Search and Rescue Advisory Group (INSARAG), WHO developed an EMT initiative to improve the timeliness and quality of health services provided by national and international EMTs and enhance the capacity of national health systems to activate and coordinate rapid response capacities.

As part of this initiative, WHO developed guidance on the standardized classification and accreditation of response teams. Accredited EMT teams are composed of health professionals – doctors, nurses, paramedics, support workers, logisticians – that treat or support patients affected by an emergency or disaster. As outlined in the WHO publication, EMTs are divided into four categories based on their mobility and the level of care they provide. Table 2 shows the trade-off between mobility and the level of care that characterizes each of the types of EMT.

Table 2. WHO classification of emergency medical teams (EMTs)

WHO classification of EMTs			
Type	**Description**	**Capacity**	**Minimum length of deployment**
1 Mobile	Mobile outpatient teams to access the smallest communities in remote areas	>50 outpatients per day	2 weeks
1 Fixed	Outpatient facilities with or without tented structure	>100 outpatients per day	2 weeks
2	Inpatient facilities with surgery	>100 outpatients and 20 inpatients 7 major or 15 minor operations per day	3 weeks
3	Referral leave care, inpatient facilities, surgery, and high dependency	>100 outpatients and 40 inpatients, including 4–6 intensive care beds 15 major and 30 minor operations per day	4–6 weeks
Specialized care teams	Teams that can join local facilities or EMTs to provide supplementary specialized care	Variable	Variable

Capacities are developed in terms of standardized operational procedures to guide the response activities of EMTs. Once a team passes the classification process, it can join the WHO registry of internationally deployable teams. Similarly, local teams from host countries will be able to seamlessly integrate into foreign EMTs and work together cooperatively. This ensures quality standardized emergency care is delivered and a well-coordinated medical response is deployed, improving health outcomes for the affected population.

2. DURING: Response Phase

Even the most well-prepared hospitals will find themselves facing certain inevitable consequences of a health emergency or disaster. Complex challenges include a surge in demand for medical services, limited resources, and the disruption of communications and supply lines. Similarly, even a small, unexpected increase in patient admissions can overwhelm a hospital. Staff attrition and the limited availability of critical equipment and supplies can further reduce access to health care.

Although compensatory risk management is initiated during the preparedness phase, it continues into the recovery, where the goal is to strengthen a hospital's resilience to residual risks that cannot be effectively reduced. During the response phase, hospitals are likely to rely on the four resilience capacities outlined earlier: absorb residual risks that cannot be effectively reduced; adapt to the surge in demand for high-quality and continuous health services; transform, and learn from the recovery as they resume normal functions.

Amid these challenges and demands, hospitals must be able to initiate a timely and effective response.

Box 10. Quick guide for initiating hospital emergency response

Quick guide for initiating hospital emergency response

1. Activate the hospital's emergency response plan and set up the hospital incident management system (HIMS).
2. Open the hospital emergency operations center (EOC).
3. Quickly gather, verify, and validate critical information related to the incident, the status of hospital systems, and the hospital's operational capacity.
4. Establish incident objectives to provide direction and establish priorities. Develop strategies and actions to accomplish the plan's objectives.
5. Assign positions on the hospital incident management team (HIMT), based on staff qualifications and availability.
6. Estimate requirements and assign resources, based on situation assessments.
7. Initiate appropriate community alerts and notifications.
8. Establish communications and response links with appropriate local response partners.
9. Conduct briefings to share the incident action plan (IAP), its execution, and progress.
10. Reassess the effectiveness of IAP strategies and tactics. As new information becomes available, adjust the plan, allocation of resources, and priorities.

Space

2.1 Damage assessment and repurposing hospital space

The direct impact of certain hazards, such as earthquakes, floods, cyclones, fires, or explosions, can affect a building's structural integrity and nonstructural elements. When this is the case, hospitals must be ready to conduct a rapid damage assessment of their facilities. This process determines the nature and extent of damage and provides information that is critical to establishing response priorities. It is important to note that the actions presented in this section link to the preparedness component (see section 1.1), in which performance protocols have been developed for hospital response plans.

Once the HIMS and the response plan have been activated, consider the following immediate steps:

- Unit heads should rapidly assess the damage to and functionality of critical infrastructure in areas under their responsibility, using a standard form or checklist.
- Assessments should contain information on the status of the following systems: HVAC, power, telecommunications, water supply, medical gas, sanitation, roads (internal and immediate vicinity), and include needs for external assistance.
- Assessment reports should be sent to the designated lead in the HIMT, through agreed-upon channels. As an example, in many HIMT structures, this information is reported to the director of the infrastructure branch, led by the engineering department unit head, under the operations section chief.
- The HIMT discusses the assessment reports to determine the incident action plan (IAP) priorities.

Hospitals must also plan to maximize the use of available hospital space to accommodate the increased demand for patient care. Response plans should indicate how to convert existing areas, such as corridors, lobby, gymnasium, auditorium, and conference rooms, as needed to meet the demand.

Strategies

2.2 Monitoring early warning information

Access to early warning systems and the information they provide is critical to a hospital's emergency and disaster response. Sources of early warning information include:

- Disease surveillance systems, either in-hospital or through the Ministry of Health.
- Meteorological department, for storms, floods, and drought.
- National disaster management agency.
- Local authorities and emergency operations centers.
- Local news media.

Hospitals may be notified of an emergency or disaster situation through a central dispatch system, such as law enforcement, emergency medical services (EMS), the local health department, or the local emergency management authority. There are three types of notifications:

- Advisory indicates no system response is needed, but the potential for a response exists.
- Alert indicates the need for a response is likely or imminent, prompting an elevated level of response readiness.
- Activation indicates a response is required.

In most cases, hospitals receive little or no advance warning of an incident, particularly in the case of sudden-impact disasters such as earthquakes, flash floods, landslides, or explosions. However, when affected, hospitals must be ready quickly mobilize a response, managing issues such as fire, injuries, evacuation, damage to the structure and equipment, etc.

2.3 Activate the all-hazards response plan

The activation of the hospital response plan begins with early warning information (scenarios that are likely to disrupt normal hospital operations) and preidentified triggers (decision points based on changes in the availability of resources, requiring adaptations to healthcare services delivery along the care continuum) (22). Consider the following recommendations for the timely activation and mobilization of a hospital emergency response:

- Clearly establish and define the response triggers that will enable early recognition and quick mobilization of appropriate response resources (e.g., number of potential casualties, magnitude of the emergency, hazardous materials, terrorist activity).

- Develop tiered levels of activation of the response. Each level should have clearly defined parameters (e.g., impact on the hospital, hospital services needed, logistics requirements).
- Be ready and able to mobilize an around-the-clock response, including on weekends and holidays.
- Identify, by position, who is responsible for and authorized to activate the response plan (e.g., senior medical officer on duty, hospital manager, emergency unit head, or other).
- Activate the hospital EOC.

Table 3 is an example of a hospital response activation matrix. When adapting a similar structure, it is important to base the structure on each hospital's individual capacity.

Table 3. Hospital response activation matrix

Activation level	Definition/parameters	Authority to activate	Notification
1 **Alert/ notification**	Information received indicating a situation or event will have an actual or the potential for an unusual impact on hospital facility operations.	**Administrator on duty (business hours) or nursing supervisor (all other times)**	• Administrator on call • Emergency unit charge nurse, incident commander • Environmental services or engineering supervisor • Health systems or network EOC • Safety officer, security supervisor • Telecommunications unit • Local government)
2 **Minor Impact**	An actual situation or event that has a minor impact on facility operations Emergency unit (EU)/clinical factors • 10 actual patients, or 3 major trauma patients • More than 4 hours EU wait time • More than 50% above normal EU patient census • 1–10 patients admitted above licensed bed count Logistical Factors • Disruptions are limited, contained, and/or have a minor impact on operations • 15% of staff not available for duty • Shortage of noncritical items or only a 48-hour supply of critical items remaining • Need for horizontal evacuation of patients/visitors/staff from an area of a building	**Incident commander**	• Administrator on call • Emergency unit charge nurse • Environmental or engineering supervisor • Health system or network EOC • Safety/security officer • Telecommunications • Other departments managers as conditions warrant • Local government/public safety/ public health/EOC

Activation level	Definition/parameters	Authority to activate	Notification
3 **Moderate Impact**	An actual situation or event that has a moderate or unusual impact on facility operations Emergency unit/clinical factors • 20 actual patients or 5 major trauma patients • Greater than 8 hours EU wait time • Greater than 100% EU patient census above normal over 8 hours • 11–30 patients admitted above licensed bed count (in patient census) Logistical Factors • Disruptions affecting a major or mission-critical area or system or affecting general operations • 25% of staff not available for duty • Shortage of critical items or 24-hour supply remaining of critical items • Need for vertical evacuation of patients/ visitors/staff from one floor of a building • Event lasting more than 8 hours	**Incident commander**	• Administrator, EU charge nurse, emergency management coordinator • Environmental and engineering supervisors • Health system or network EOC • Nursing office • Safety officer and security supervisor • Telecommunications • Other department managers as conditions warrant • Local government/ public safety/ public health/EOC
4 **Major Impact**	An actual situation or event that has a major or unusual impact on facility operations Emergency unit/clinical factors • 50 actual patients • More than 12 hours EU wait time • More than 200% above normal patient census • 31–50 patients admitted above licensed bed count (in patient census) Logistical Factors • Physical plant or utility disruption affecting multiple areas or systems • 40% of staff not available for duty • Critical shortage of essential items • Complete evacuation of a patient care building • Event lasting more than 24 hours	**Incident commander, in consultation with hospital CEO**	• Administrator, EU charge nurse, emergency management coordinator • Environmental and engineering supervisors • Health system or network EOC • Nursing office • Safety officer and security supervisor • Telecommunications • Other departments managers, as conditions warrant • Local government/ public safety/ public health/EOC

2.4 Infection prevention and control

Hospital surveillance systems are used to detect outbreaks of infectious diseases. Monitoring disease trends and changes to patterns can prompt hospital managers, the infection prevention and control (IPC) team, and the hospital disaster management committee to investigate and make notifications, according to IHR reporting guidelines.

IPC practices play a key role in reducing infectious disease outbreaks, especially in the healthcare facility setting. Every hospital program should designate a focal point to incorporate standard IPC precautions, using hospital IPC guidelines for the following:

- Hand hygiene.
- Health workforce protection (e.g., at a minimum, post-exposure prophylaxis, vaccinations, use of PPE).
- Safe use and disposal of sharps.
- Decontamination of medical devices and equipment.
- Triage of infectious patients.
- Reprocessing of reusable medical equipment and instruments.
- Routine environmental cleaning.
- Respiratory hygiene and cough etiquette.
- Aseptic non-touch techniques.
- Effective waste management.
- Appropriate handling of linen and bedding.

2.5 Rapid needs assessment

In the immediate post-impact period, the incident commander (IC) conducts a rapid assessment of the hospital's affected areas to determine response needs. This comprehensive assessment (rather than an assessment of individual hospital components) provides an overview of the impact on the hospital's operational environment. It prioritizes response actions and resources and focuses on what is needed to save lives and prevent impact-related mortality. What is required in terms of supplies, equipment, and medicines will depend on the type of emergency and the hospital's response capacity.

The following questions can serve as a guide to conducting a rapid assessment of needs.

- What is the emergency? What hazard is involved?
- Does a safety/security risk exist (e.g., hazardous materials, violence)?
- Is the situation stabilized or can it grow into something more serious?
- What is the impact on the hospital facility (e.g., damage, injuries, disruption)?
- How many patients are expected to arrive? These are just estimates based on the hazard and pattern of injuries. For example, an earthquake creates a high volume of trauma patients, but the arrival of patients might be delayed due to blocked roads. However, the first wave of patients (walking wounded or those with minor injuries) may be transported by bystanders without having received medical attention.
- What resources are required to manage the emergency? Are they available, or is external support required?

Hospitals must also prepare arrangements to:

- Manage the influx of family members by establishing a family coordination center/space to manage their concerns while maintaining controlled access to the critical hospital areas.
- Arrange how visiting VIPs will be managed so as not to disrupt emergency response.

2.6 Hospital incident management system

Once the hospital's emergency response plan is activated, the HIMS (23) becomes operational. The HIMS is the core entity for command, control, coordination, and communications related to the hospital's collective response. Upon activation of the HIMS, the hospital incident management team (HIMT) begins working from the designated health emergency operations center (H-EOC).

Once the HIMS is activated, consider taking the following critical actions:

- The IC, who has conducted a rapid damage and needs assessment, assigns tasks to members of the HIMT.
- The HIMT and critical hospital staff and responders review job action sheets (what they will do, when they will do it, and who they will report it to once it is done).
- Information is updated on the availability of hospital resources (human and material resources, bed space, and the ability to meet a surge).
- An IAP is developed and shared with the local EOC or field command post (see following section).
- The hospital uses preestablished protocols to prepare to receive patients and conduct triage.

- The HIMT receives updates on the status of the response and adjusts the IAP accordingly.
- Response actions are updated, based on internal and external communications.
- The liaison officer manages dealings with external support agencies.
- Safety officers monitor security issues related to response operations and provide advice to address problems.

In situations that require an extended response, the HIMT must ensure the following:

- Priority areas/services of the hospital must have the required support to remain functional.
- Procedures to recall staff must be activated and consideration given to the use of volunteers.
- Elective surgeries and other nonessential hospital services must be canceled or postponed during an extended response phase.

2.7 Incident action planning process

The incident action planning process and the IAP are central to emergency response. The incident action planning process helps synchronize operations and ensure they support incident objectives.

An IAP is developed for each operational period.[1] The IAP guides the initial incident management decision-making process and the continuing planning activities. The IAP is the vehicle through which expectations are communicated. It provides clear guidance on priority actions to those managing the incident. The IAP also serves as a key reference document for the after-action review process.

The IAP includes a comprehensive list of the tactics, resources, and support needed to accomplish objectives within a specified time frame. The various steps in the process, executed in sequence, help ensure a comprehensive IAP. The following should be considered when developing the IAP:

- Developing the IAP is a cyclical process, based on an operational period; planning steps should be repeated during each operational period.
- The HIMT develops the IAP, using the best information available at the time of the planning meeting. Staff should not delay planning meetings in anticipation of receiving further information at a later date.

1 An operational period is the period of time scheduled for execution of a given set of tactical actions, as specified in the incident action plan. Operational periods can vary in length, but usually do not exceed 24 hours.

- During the initial stage of incident management, the situation can be chaotic and situational awareness hard to obtain. The IC is often forced to quickly develop an initial plan with limited or incomplete information. The HIMT should be briefed on the initial plan.
- As the incident evolves, additional lead time, staff, information systems, and technologies will allow for more detailed planning and cataloging of actions and lessons learned.

Box 11. Key features of an incident action plan

Key features of an incident action plan

- Informs the hospital EOC, external organizations, and staff about the incident objectives for the coming operational period, the specific resources needed, priority actions to achieve objectives, and other operational information (e.g., weather, constraints, limitations, safety).
- Identifies work assignments and provides a roadmap for the operational period to help individuals understand how their efforts contribute to the success of the overall operation.
- Shows how specific supervisory staff and various operational elements fit into the organization.
- Provides a schedule of key meetings and briefings during the operational period.

The following meetings and briefings are part of the planning process and are repeated in each operational cycle until the conclusion of the incident.

- **Developing/updating objectives:** The IC establishes the incident objectives for the initial operational period. At the conclusion of the initial operational period, the IC reviews the incident objectives and may validate them, modify them, or develop new objectives.
- **Strategy meeting/command and general staff meeting:** After developing or revising the incident objectives, the IC meets with the command and general staff (and others, as appropriate) to discuss objectives and provide direction.
- **Preparing for the tactics meeting:** Once the approach to achieving or working toward achieving the incident objectives is determined, the operations section chief plans a meeting to develop tactics and determine the resources required during the operational period.
- **Tactics meeting:** Key players review the proposed tactics and plan the assignment of resources. The operations section chief leads the tactics meeting. Key participants include the logistics section chief, safety officer, a planning representative, and others.

- **Planning meeting:** Following the tactics meeting, staff collaborate to identify support needs and assign specific resources. The planning meeting serves as a final review and approval of operational plans and resource assignments developed during and after the tactics meeting. At the end of the planning meeting, command and general staff confirm their support for the plan.
- **IAP preparation and approval:** Based on concurrence at the planning meeting, the IC approves the plan.
- **Operational period briefing:** Each operational period begins with an operational period briefing. Incident supervisory and tactical staff receive the IAP during the briefing. Members of the command and general staff present the incident objectives, review the current situation, and share information related to communications or safety. Supervisors then brief assigned staff on their respective assignments.

2.8 Hospital EOC

The HIMT uses the hospital EOC to convene team members and coordinate response activities (clinical, support services, administration, and finance); prioritize resources; manage information; and ensure the safety and security of operations. In addition, it uses the 4C's (communication, cooperation, coordination, collaboration) to facilitate the decision-making process.

Since the hospital EOC is not a permanent facility, hospitals must determine what triggers will lead to the decision to activate operations, as this will require converting existing space and acquiring essential equipment and resources, such as IT and communications equipment, maps, boards, etc. The hospital response plan must clearly define these triggers and identify who is authorized to activate the EOC. Possible criteria for activating the EOC include:

- Increased demand on the hospital to manage the emergency.
- A large number of patients.
- A situation that requires the prioritization and allocation of limited resources to critical areas to ensure continued operations.
- The need for coordinated engagement among multiple hospital departments, including the potential participation of external support agencies and coordination with other agencies' EOCs.

Consider the following needs when selecting the location and design of the H-EOC:

- **Accessibility:** The area is easy to reach from any part of the hospital, on a 24/7 basis, but does not interfere with critical operations, such as the emergency unit, or with public access areas.

- **Flexibility:** There is sufficient space to house equipment, furniture, supplies, and technology to accommodate the HIMT.
- **Sustainability:** There is adequate infrastructure to support uninterrupted emergency operations, 24/7, including access to emergency power circuits, outlets, lighting, computer systems, etc. and arrangements for food, water, and rest during extended periods of operation.
- **Security:** The facility, its occupants, communications systems and equipment, and sensitive information must be protected. Only authorized persons are allowed to enter the area.
- **Survivability:** The location must be able to withstand the impact of local hazards and avoid typical internal risk areas. In situations in which the primary location does not functional well, the plan must include an alternate location.
- **Interoperability:** The location must be planned to ensure the ability to use technology to exchange routine and time-sensitive information with other EOCs.

2.9 Communication and coordination

Crisis communication describes the process of providing facts about an emergency or disaster that requires an immediate response. The initial phase of a crisis is characterized by confusion and intense media interest. Information is usually incomplete and the facts are sparse. Channels of communication are often disrupted. It is essential to recognize that information from the media, outside organizations, and even other response agencies may not be completely accurate. It is vital to learn as much about what happened as possible, determine the organization or agency's communication responses, and confirm the event's magnitude as quickly as possible. The job of crisis communicators is to provide information to hospital staff, patients, and the public that is easy-to-understand, credible, accurate, consistent, and timely, thus allowing them to make informed decisions.

In the initial phase of a crisis, accuracy in terms of what information is released and the speed at which response officials acknowledge the situation are critical. Not having all the facts at hand at the earliest stage does not release crisis communicators from their responsibility to inform staff, decision-makers and the public about what is known. An honest statement to the effect of "we still don't know" is better than a complete information blackout.

Gathering and sharing information (both internal and external) is critical to successfully managing the incident **within the hospital**. The following strategies and technologies (where available) will promote effective internal communication:

- Gather information from different hospital departments via phone, intranet, email, or fax.
- Provide radios to specific areas of the hospital and assign designated channels or frequencies.
- Make forms, which have been completed by staff, available on the intranet/Internet or provided in hardcopy format.
- Share regular situation updates, response guidance, and requests for assistance via radio, intranet/Internet, hardcopies, or face-to-face meetings.
- Make arrangements to use a runner system to transmit information, especially if primary channels of communication fail.
- Involve key command staff and medical–technical specialists to ensure that all hospital staff receive the correct information, thus dispelling rumors and alleviating concerns. This also helps manage an excess of information (including false or misleading information).

Keep patients and visitors properly informed. Use the following means to transmit information about what has happened and what is being done to address the issues:

- Announcements over the hospital's public address system.
- Personal reassurances from the staff.
- Through the hospital's television channel (if available).
- Strategically post information updates throughout the hospital.
- Print material distributed with patients' individual meal trays.

Communication with **external response partners** is also essential. If a situation unfolds without initial notification by EMS, fire, or law enforcement, external response partners must be updated on the situation and requests for assistance. As part of the hospital's external communications, key considerations include:

- Periodic information sharing and joint decision-making among all local area network hospitals will help maximize hospital resources and prevent overwhelming the capacity of smaller facilities.
- Establish links with known community groups of local amateur radio operators that are reliable, skilled, and possess dependable communication equipment. Keep in mind that most amateur radio channels are not secure and unintended recipients, such as the media and the public, may overhear these messages.

- Teleconferencing and video conferencing are also useful tools.
- Maintain a regularly updated resource directory of external agencies and vendors to make it possible to rapidly locate contacts.
- The assigned liaison officer is the hospital's principal contact with all outside agencies and will often be the conduit for two-way communication between the H-EOC and local EOC and other local area coordinating centers.

During the initial phase of an emergency, crisis communicators should take steps to establish credibility with **the public**. This allows the public to put a face to the role of responding to, investigating, and resolving crisis situations. How a spokesperson handles public and media inquiries and what they say also establishes credibility for the hospital and health system. Commit to the public that you are in charge and control and will continue to provide new information as it becomes available. When communicating with the public and affected groups, consider the following:

- Convey empathy and reassurance. Reduce emotional turmoil.
- Designate crisis or hospital spokespersons and identify formal channels and methods of communication.
- Establish a general and broad-based understanding of the crisis circumstances, consequences, and anticipated outcomes based on available information.
- Adapt predeveloped messages and communication materials from health authorities and WHO.
- Reduce crisis-related uncertainty to the extent possible.
- Help the public understand the responsibilities of the various organizations involved in the response.
- Promote self-efficacy (explain to people that they can help themselves or reach a goal) through personal response activities and share how and where they can get more information.

Box 11. Tips and guidance on crisis communication

Tips and guidance on crisis communication (24)

- Don't over-reassure: The objective is not to alleviate all concerns, but rather provide accurate details. Consider statements such as: "This is a dangerous storm, but people can take actions to limit risk. If possible, stay home and off the streets until the storm passes and the roads clear."
- Acknowledge uncertainty: Offer only what you know: "The situation is developing, and we don't yet have all the facts. However, based on what we do know, we expect ..."
- Emphasize that a process is in place to learn more: Describe that process in simple terms: "Samples are taken from each person reporting flu-like symptoms. These samples are being tested now to identify the exact strain."
- Give anticipatory guidance: If you are aware of future adverse outcomes, let people know what to expect. For example, to foreshadow the side effects of antibiotics, you could say, "This broad-spectrum antibiotic is an effective medication, but it can cause stomach upset, including nausea and diarrhea in some people."
- Be regretful, not defensive: Say, "We wish that more doses of vaccine were currently available" or "We feel terrible that ..." when acknowledging organizational mistakes or failures.
- Acknowledge people's fears: Don't tell people they shouldn't be afraid. They are scared, and they have a right to their worries. Instead, use statements like, "We understand people are concerned and afraid, and it is normal to be frightened when facing a wild reality."
- Acknowledge the shared misery: Some people will be less frightened than they are miserable, feeling hopeless and defeated. Acknowledge the suffering of a catastrophic event, and then help move people toward the future through positive actions. Use statements like: "Right now, with so many people in shelters, it's hard to see how things can return to normal. We are working hard to start the process of returning people to their homes."
- Express wishes: Say, "I wish we knew more" or "I wish our answers were more definitive."
- Be willing to address "what if" questions: These are the questions that everyone is thinking about and to which they want expert answers. However, it's often impractical to fuel "what ifs" when the crisis is contained and not likely to affect large numbers of people. On the other hand, it is reasonable to answer "what ifs" if the "what ifs" could happen, and people need to be emotionally prepared for them. Use statements like, "We have considered the possibility that the situation will get worse, and we have identified additional locations for shelters."
- Give people things to do: In an emergency, some actions are directed at victims, those exposed, or those who have the potential to be revealed. Simple actions in an emergency will give people a sense of control and help motivate them to stay tuned to what is happening. It may also be helpful to give people a choice of actions matched to their level of concern. Give a range of responses: a minimum response, a maximum response, and a recommended middle response. Use statements like, "You may wish to cook spinach thoroughly before eating it. You may wish to avoid eating spinach. Or, you may wish to eat only prepackaged frozen spinach."
- Ask more of people: Perhaps the most crucial role of the spokesperson is to ask people to manage the risk and work toward solutions with you. People can tolerate considerable risk, especially voluntary risk. If you acknowledge the risk's severity and complexity and recognize people's fears, you can then ask for the best of them. A spokesperson, especially one on the ground and at personal risk, can model the appropriate behavior – not false happiness, but genuine willingness to go on with life as much as possible and make reasonable choices. Your determination to face risk will help others look for role models.

Stuff

2.10 Timely and flexible resource mobilization

Timely and flexible resource mobilization is critical to enabling hospitals to rapidly respond to emergencies. Implementing the strategies described below helps hospitals ensure that patients receive the right medicines, medical supplies, and necessary care during emergency situations:

- **Pre-emergency planning:** Develop detailed plans that include inventory management systems specifically designed for medical supplies and medicines; outline strategies for procuring, storing, and organizing essential medications and supplies based on potential emergency scenarios. By maintaining up-to-date inventories and understanding the specific needs of the patient population, hospitals can ensure the availability of the right medicines and supplies during emergencies.
- **Stockpiling and just-in-time inventory:** Maintain strategic stockpiles of essential medicines and supplies to meet immediate emergency demands. Regularly monitor and replenish these stockpiles as needed. Employ just-in-time inventory management techniques to keep supplies readily available without excessive overstocking, optimizing space and minimizing waste.
- **Collaborative networks and regional coordination:** Participate in collaborative networks and regional coordination systems to facilitate the sharing of medicines and medical supplies during emergencies. This can include coordination with local, regional, and national emergency management agencies, neighboring healthcare facilities, and community organizations. Through these networks, hospitals can request and provide assistance, share surplus resources, and ensure a more equitable distribution of medicines and supplies across the affected areas.
- **Efficient supply chain management:** Establish efficient supply chain management systems to streamline the procurement, transportation, and distribution of medicines and medical supplies. This includes establishing relationships with reliable suppliers, implementing real-time tracking systems, and utilizing advanced logistics technologies. By optimizing the supply chain, hospitals can ensure the timely delivery of medicines and supplies to the front line of emergency response.
- **Prioritization and allocation:** Prioritize the allocation of medicines and medical supplies based on the severity and urgency of patient needs. Hospitals may implement triage protocols to identify and categorize patients according to the level of care required. This allows hospitals to allocate resources where they are most needed, ensuring that critical medicines and supplies are provided to patients who require immediate attention.
- **Flexible resource redistribution:** Maintain flexibility in resource allocation by

redistributing medicines and supplies within a facility or across different departments based on changing demands during emergencies. This includes shifting resources from nonurgent areas to critical care units or reassigning staff to efficiently utilize available supplies. Hospitals may also collaborate with local pharmacies and suppliers to access additional resources when necessary.

- **Continuous monitoring and adaptation:** Continuously monitor the usage and availability of medicines and medical supplies during emergency response. Hospitals can quickly adapt their resource mobilization strategies by closely tracking inventory levels, usage patterns, and patient needs. This may involve adjusting procurement plans, increasing production, or identifying alternative suppliers to address any shortages or surpluses.
- **Regulatory compliance:** Adhere to regulatory requirements and guidelines related to procuring, storing, and distributing medicines and medical supplies. Compliance with regulations ensures that the right medicines and supplies are procured from approved sources and meet quality and safety standards. This helps prevent the use of counterfeit or substandard products during emergencies.

2.11 Needs-based and risk-adjusted standards

The result of the needs assessment will guide the HIMT on what resources are required to support the response. If the available resources are insufficient to meet the demand, the role of the HIMT is to prioritize existing resources and allocate them to meet surge needs. Overall, establishing needs-based and risk-adjusted standards for emergencies requires a combination of needs and risk assessments, standardization, prioritization, allocation, monitoring and evaluation, and regular review and update. The ultimate goal is to ensure that resources are distributed fairly and effectively, with a focus on meeting the most urgent needs of the affected population.

Consider the following actions to manage resources during the response phase:

- **Needs assessment:** Conduct a comprehensive assessment to identify the needs of the affected population, including vulnerable groups and those at higher risk.
- **Standardization:** Develop standard criteria for assessing needs and risk, including indicators and thresholds for determining the severity of the emergency.
- **Prioritization:** Prioritize resources based on the severity of the emergency, the needs of the affected population, and the level of risk.

- When resources are limited (as was the case with PPE during the COVID-19 pandemic), standards of use can be modified, using a risk adjustment approach to adapt to the shortage until resource availability stabilizes. Explore existing tools, such as the PPE calculator developed by the U.S. Centers for Disease Control and Prevention (CDC) to estimate how long the remaining supply of PPE will last, based on the average consumption rate. This tool can help a health facility make projections for future needs.
- The HIMT can activate mutual aid and vendor agreements so that supply of critical hospital supplies will not be interrupted.

- **Allocation:** Develop a transparent and equitable process to allocate resources, such as food, water, shelter, and medical supplies. Identify the most effective means of delivery and distribution (e.g., through local organizations and community networks).
  - Decisions on relocating resources from nonessential areas may relate to space, facilities, equipment, supplies, and medical personnel.
  - Request additional resources (if needed) through EOCs from local authorities, public health departments, law enforcement, etc.
  - Coordinate closely with local EOCs and field command posts to monitor and control the distribution of patients to prevent overwhelming any one hospital.
  - Allocate scarce equipment, supplies, and medicines in a way that saves the largest number of lives, in contrast to focusing on saving individuals. Consider:
    - Changing infection control standards to permit group isolation rather than single person isolation units;
    - Limiting the use of ventilators to surgical situations;
    - Creating alternate care sites in facilities that were not designed to provide medical care, such as schools, churches, or hotels (temporarily modify privacy and confidentiality protections).
- **Flexibility** in adjusting standards on the use of medical supplies, such as the use and reuse of common supplies and equipment (gloves, gowns, masks, and hospital beds).
- **Monitoring and evaluation:** Establish a system to monitor and evaluate the effectiveness of the standards, including tracking the allocation and distribution of resources and assessing the impact on the affected population.
- **Regular review and update:** Regularly review and update standards based on changing needs and circumstances as well as feedback from the affected population and stakeholders.

Staff

A hospital's human resources play a critical role during emergencies. They help develop and implement disaster preparedness plans and manage staff safety, meet staffing needs, and ensure that patients receive uninterrupted care during an emergency and adequate follow-up care after the emergency has passed.

2.12 Staff safety, security, health, and welfare

A hospital's human resources are key to managing the increased emergency demand and maintaining essential services for existing inpatients. They are even more important during extended response operations, when staff burnout is common and, if not appropriately managed, can lead to increased medical errors, hospital-acquired infections, staff shortages, overall hospital inefficiencies, and a breakdown in operations. The following actions are recommended for the management of human resources during emergencies:

- **Monitor signs and symptoms of staff burnout and stress.**
- **Provide ample rest time and rest facilities for staff by managing work schedules.**
- **HIMT safety officers should brief staff on resources available to them.**
- **Monitor safety and security issues regularly to ensure a secure work environment.**
- **Maintain controlled access to critical hospital areas.**
- **Provide immunizations for staff.**
- **Monitor and document incident-related staff injuries. Provide needed support and compensation as appropriate.**
- **Maintain adequate staffing levels during emergencies to prevent overworking and fatigue, which can compromise staff safety and health.**
- **Provide mental health support services for staff and their families, including counseling, stress management, and peer support.**
- **Develop family support plans to ensure that the families are informed, prepared, and cared for during emergencies and are aware of available support services.**
- **Establish partnerships with local emergency management agencies and other organizations to share resources, expertise, and support during emergencies.**

2.13 Response tools and resources

- **Pan American Health Organization. Health Sector Multi-Hazard Response Framework. Washington, D.C.: PAHO; 2019. Available from:** https://bit.ly/3SjPX9i**.**
- **World Health Organization. Report of the WHO global technical consultation on public health and social measures during health emergencies. Geneva: WHO; 2022. Available from:** https://bit.ly/3u1D6AB**.**
- **World Health Organization Regional Office for Europe. Hospital emergency response checklist. Geneva: WHO; 2011. Available from:** https://bit.ly/49b0gmH**.**
- **World Health Organization. Infection prevention and control in the context of coronavirus disease (COVID-19): A living guideline. Geneva: WHO; 2023.**
  Available from: https://bit.ly/3Im2e8x.
- **World Health Organization. Minimum requirements for infection prevention and control programs. Geneva: WHO; 2019. Available from:** https://bit.ly/3SAzLSk**.**
- **World Health Organization. Decontamination and reprocessing of medical devices for health care facilities: aide-memoire. Geneva: WHO; 2022.**
  Available from: https://bit.ly/3TPsjTW.
- **World Health Organization. Transmission-based precautions for the prevention and control of infections: aide-memoire. Geneva: WHO; 2022.**
  Available from: https://bit.ly/49Ts5Aq.
- **California Emergency Medical Services Authority. Hospital Incident Command System: Guidebook and appendices. [Rancho Cordova, CA]: California EMSA; 2014. Available from:** https://bit.ly/3vVg9Q3**.**
- **World Health Organization. Communicating risk in public health emergencies: a WHO guideline for emergency risk communication (ERC) policy and practice. Geneva: WHO; 2017. Available from:** https://bit.ly/3HDq3rY**.**

  World Health Organization. Everyone's business: Whole-of-society action to manage health risks and reduce socio-economic impacts of emergencies and disasters: Operational guidance. Geneva: WHO; 2020.
  Available from: https://bit.ly/3uagyxl.
- **World Health Organization. Guidance on preparing for national response to health emergencies and disasters. Geneva: WHO; 2021.**
  Available from: https://bit.ly/3UYUj8z.
- **World Health Organization. Classification and Minimum Standards for Emergency Medical Teams. Geneva: WHO; 2021. Available from:** https://bit.ly/3u8cU7d**.**
- **Hanfling D, Hick JL, Stroud C, editors. Crisis Standards of Care: A Toolkit for Indicators and Triggers. Washington, D.C.: National Academies Press; 2013. Available from:** https://bit.ly/3SeM7yg**.**

Wastewater treatment plant. Hospital General de Zona 33, IMSS, Bahía de Banderas, Nayarit, Mexico. WHO Collaborating Center MEX-35 for Resilient Health Services. 2022

3. AFTER: Recovery phase

This section covers two stages: **recovery** and **learning**. Immediately after a crisis, time-critical interventions save lives. These actions lay the foundation for sustainable recovery and a speedy return to normalcy. The recovery phase includes short-term interventions for early recovery; short- to medium-term interventions that contribute to rehabilitation; and medium- to long-term interventions aimed at reconstruction. Ideally, the transition through these stages of recovery will help hospitals increase their readiness for the next emergency. The primary objective of the recovery phase is to return hospital operations to their pre-emergency levels and build back better through transformative and learning capacities.

Hospitals become more resilient when they put to good use the lessons learned during the response to and recovery from previous disasters and health emergencies. Improving resiliency requires hospitals to embrace a continuous learning process and make changes to improve practices over time. The experiences and the lessons learned must be analyzed and applied as an integral part of a constant improvement cycle and must be ingrained in the hospital's organizational culture. They must be entrenched both in routine management and in the delivery of routine hospital services. Robust emergency and disaster risk management programs will contribute to implementing hazard prevention and mitigation interventions and develop capacities to manage crises, based on a contextual assessment and prioritization of risks. These interventions are critical to a hospital's overall resilience and readiness.

3.1 Recovery

Stuff

3.1.1. Hospital recovery actions

In order to minimize the interruption of medical services, recovery begins quickly in the hospital setting. It is imperative to return to normal operations as soon as possible in order to continue providing ongoing medical care to in-hospital patients and to serve the medical needs of the broader community. Disaster response and recovery operations are interdependent, overlapping, and often conducted simultaneously. The assessment of community health and social service needs and the recovery resources to meet these needs may occur during ongoing response operations. Quickly clearing debris and repairing damage to the facility are examples of early recovery interventions during the response phase.

As a hospital transitions to recovery, facilities that were repurposed in the short term will revert to their regular use and functions. However, when hospital infrastructure

has sustained serious damage, it may be necessary to adapt or use the temporary facilities to ensure continuity of care. The following are some examples.

- Tent facilities or other alternative care sites can be used to meet immediate emergent healthcare needs in the impacted community. Emergency medical teams may assist in setting up these facilities to provide inpatient and outpatient services.
- Mobile clinics.
- If major reconstruction of damaged facilities requires a significant amount of time to complete, temporary modular buildings may be required as an interim measure.

Other key hospital activities to consider during the recovery phase include:

Access

- Safe access and egress must be ensured to/from buildings for people, ambulances, and the delivery of supplies.

Buildings

- Prior to use, the buildings, or parts of the buildings, are declared safe for their intended use by appropriate governmental/regulatory agencies responsible for: fire (Life Safety Code);[1] environment (water and air quality); and engineering (structural and electrical integrity, medical gas system, etc.).
- Firefighting system and services are available.
- Appropriate plan for pest control and/or containment is in place.
- There are adequate staff and resources to maintain facilities (buildings and facility equipment) currently in use.
- Adequate environmental control systems are in place (waste management, noise, IPC, radiation safety, general building safety, water quality, HVAC).

Electrical system

- The main switchboard and utility transfer switches are operational.
- Fuses and breakers are operational.
- Transformers have been inspected.
- Emergency generators, backup batteries, and fuel are available for the intensive care unit (ICU) and other critical areas. Generators have sufficient fuel.
- Equipment has been tested to confirm voltage and amperage.

Facilities/engineering

1 The Life Safety Code is a set of fire protection requirements designed to provide a reasonable degree of safety from fire. It covers construction, protection, and operational features designed to provide safety from fire, smoke, and panic.

- Cooling plant is operational (chiller/DX/absorption unit, pumps, valves and controls, cooling towers, fan coil units).
- Heating plant is operational (boiler system; support systems [feedwater pumps, diesel tank, etc.]; heating system [converters, valves, etc.]; process steam [sterilizers, general building systems, etc.]; fuel tank refilled; fuel vendor available).
- Distribution system is operational (ductwork, including functional smoke detection/alarm capability and dampers; piping; valves and controls, including functional emergency fan shutdown tied into the fire alarm system and emergency smoke purge capability; risers; filtration; negative pressure [ability to maintain CDC-compliant air exchanges]).
- Treatment chemicals (water treatment, boiler treatment) are available.

Waste management system

- System in place for trash handling (e.g., conveyors, compactors) and removal (solid and liquid).
- System in place for the storage and disposal of regulated medical and hazardous waste.

Water system

- Potable water is available for drinking, bathing, dietary services, and all planned patient services.
- Distribution pumps are operational.
- Water towers/tanks are operational.
- Sewer systems (sanitary, storm) are operational.
- Fire suppression (fire pumps, sprinkler risers and lines, standpipes, and water flow detection/alarm capability) are operational.

If rebuilding a hospital is necessary during long-term recovery, communities may take the opportunity to establish an environmentally friendly permanent facility that addresses prior vulnerabilities. Approaches have been identified to address a hospital's vulnerability and make the facility and the community more resilient and sustainable, using a combination of structural, nonstructural, and functional interventions.

- **Structural hardening**, the use of construction elements (e.g., impact-resistant glass; waterproofing measures; backup systems for critical utilities such as electricity, heating, ventilation, and air conditioning [HVAC], plumbing) that maximize resiliency.

- **Incremental adaptation**, an approach that addresses operational vulnerabilities that can lead to loss of function. For example, critical systems can be moved out of a basement or lower-level floor in flood-prone areas. Some hospitals locate emergency departments on the second floor and parking and/or administrative offices on the ground floor. In addition, critical systems can be made redundant (e.g., multiple emergency power generators).
- **Rebuilding and renovation** provide opportunities to improve facility design features that impact patient care and experiences (e.g., locating the emergency room, operating rooms, and radiology in proximity to one another).
- **Reestablishing essential primary care** clinics and ensuring coordination with other components of the health system.
- **Adopting construction standards** and practices that ensure safety and continued functionality in a disaster.
- **Considering opportunities** to improve the sustainability of healthcare facilities (e.g., reduced carbon footprint, reduced water waste).

Strategies

3.1.2 Short-term recovery strategies

Short-term recovery is immediate and overlaps with response. Short-term recovery (for inclusive and continuous service delivery, IPC, and surveillance) includes actions such as providing essential public health and safety services, restoring interrupted utilities and other essential services, reestablishing transportation routes, and providing food and shelter for those displaced by the incident.

Short-term recovery should focus first on ensuring that the immediate medical needs of the population are being met. Often, this requires:

- Guaranteeing access to urgent care centers and shelters, with appropriate support for at-risk individuals, including vulnerable groups.
- Functioning supply chains for acquiring medicines and medical supplies.
- Applying standard precautions during the delivery of vaccines to both health workers and individuals.
- Monitoring hospital staff for symptoms and illnesses and establishing reporting procedures to aid in the early detection of diseases.

As short-term recovery continues, the focus shifts to restoring emergency health services (inpatient and outpatient) and reestablishing the delivery of primary health care. This is especially critical for medically vulnerable persons, such as those requiring ongoing care for chronic diseases. If immediate care is not restored promptly, preexisting conditions could worsen, prompting a secondary surge in disaster casualties.

3.1.3 Assessment of damage and losses

Although the post-disaster assessment of damage and losses overlaps between the response and recovery phases, this evaluation should be conducted more extensively during recovery. It is critical to determining the impact of the disaster on hospitals and guiding both the response and recovery efforts. It involves evaluating the extent of damage to hospital facilities, medical equipment, and supplies, as well as the impact on hospital operations and patient care. This assessment report further provides an estimated cost of repairs and replacement required to restore hospital functionality. More so, it provides the necessary information for decision-making, resource allocation, and planning for the restoration of hospital operations and patient care.

A systematic process for conducting a damage and loss assessment includes the following steps:

- **Identification of affected areas:** The first step is to identify the areas that have been affected by the disaster. This includes the hospital facility, medical equipment, and supplies, as well as the surrounding infrastructure and community.
- **Rapid needs assessment:** A rapid needs assessment is conducted to determine the hospital's immediate needs, such as medical supplies, equipment, and personnel. This assessment is critical in determining the initial response to the disaster.
- **Damage assessment:** Once immediate needs have been addressed, a detailed assessment of physical damage to hospital facilities (the structural integrity of the hospital buildings), the functionality of medical equipment, and the availability of essential supplies. This information is crucial in determining the resources required for repair and replacement.
- **Loss assessment:** Conducting a loss assessment helps determine the impact of the disaster on hospital operations, patient care, and staff. The assessment looks at the loss of functionality caused by the disaster, including the impact on hospital operations and patient care, the number of patients and staff affected by the disaster, as well as the impact on hospital finances and reputation.
- **Reporting and communication:** The results of the assessment are reported to hospital management, local authorities, and other stakeholders. This includes communicating the extent of damage and losses, as well as the immediate and long-term needs of the hospital, such as infrastructure repairs, staff training, and disaster preparedness measures.

3.1.4 Step-down facilities

In the aftermath of a disaster, hospitals often are inundated with patients, many of whom may not require the advanced level of care that a hospital provides. This creates bottlenecks in the healthcare system, delaying treatment for those who need it most. As a solution, a step-down facility is used to move patients who are stable but still require medical attention out of the hospital and into a more comfortable and less stressful environment. This frees up hospital beds and allows medical staff to focus on the most critical cases.

Setting up step-down facilities requires careful planning and coordination to ensure that patients receive the care they need. Consider these issues when setting up a step-down facility:

- **Location:** The facility should be located in an area that is accessible and safe for both staff and residents – close to the hospital or medical center to which it is connected. This helps ensure patients can be easily transferred from the hospital to the step-down facility.
- **Staffing:** The facility must be adequately staffed in order to operate effectively and efficiently. Staff includes medical personnel, security personnel, administrative staff, and volunteers.
- **Shelter:** The facility should provide residents with safe and comfortable shelter – whether in the form of tents, trailers, or other temporary weather - resistant structures.
- **Protocols and procedures:** These must ensure the safe transferal of patients from the hospital to the step-down facility. They must also ensure that patients receive the appropriate level of care and that their medical needs are continually assessed.
- **Food and water:** The facility should have a reliable source of food and clean water, either through a catering service or through donations from local businesses and organizations.
- **Sanitation:** The facility should have adequate sanitation facilities, including toilets, showers, and handwashing stations. Regular cleaning and disinfection will maintain a clean and hygienic environment.
- **Medical care:** The facility should have adequate supplies and staff to provide first aid and basic medical care. This can include triage services, dispensing of medications, and referrals to hospitals and other medical facilities, as needed.
- **Security:** Proper security measures for the safety of patients and staff include ensuring the facility is secure, protecting patients from infection, and providing a safe and comfortable environment.

3.1.5 Rehabilitation services

Patient rehabilitation for those who require these services (including people with disabilities and other vulnerable groups) is critical for several reasons. It helps restore physical function and mobility, manage chronic conditions, address mental health needs, and prevent secondary health issues. Patient rehabilitation is a key component of helping individuals recover and rebuild their lives.

Emergencies and disasters may reduce the capacity of caregivers and care settings, such as residential homes, to provide for and support people with disabilities. The situation of children and older people with disabilities becomes even more acute in emergency situations, when they are separated from their families and traditional community care mechanisms.

Rehabilitation, particularly for people with disabilities, requires a range of interventions. Appropriate space (at least 12 m^2) should be allocated for rehabilitation services. Key interventions include:

- Providing mobility/assistive devices: mobility aids, such as wheelchairs, crutches, and walking frames, enable people with disabilities to move around and participate in daily activities.
- Physical therapy improves strength, flexibility, and mobility and reduces pain and discomfort.
- Occupational therapy helps develop the skills and strategies needed to perform daily activities and participate in work or educational settings.
- Prosthetic and orthotic services can provide custom-made devices to replace or support lost or impaired limbs or body parts.
- Accessible infrastructure, such as ramps, elevators, and accessible toilets, provide access to buildings and public spaces.

Communities with limited resources and underdeveloped rehabilitation systems are likely to experience difficulty in delivering these services in disaster situations. As a result, the health and well-being of people with disabilities and other vulnerable groups may be further compromised, with far-reaching consequences that last long after the initial disaster.

Systems

3.1.6 Standing down response operations

To accelerate recovery without duplicating efforts, disaster response operations should prioritize timely and accurate communication with department managers, critical decision-makers, emergency response teams, stakeholders, vendors and contractors,

and, if applicable, the public. Once the response has concluded, demobilization guidelines will facilitate a more organized and expedited return to normal operating conditions.

Planning for demobilization and post-incident recovery requires collaborative understanding of the elements of recovery and the processes related to the careful restoration, strengthening, and revitalization of the site, surrounding infrastructure, and operations.

The demobilization process of standing down response resources in an efficient and timely manner provides considerable cost benefits. Consider the following issues for initiating demobilization:

- Identify triggers that will initiate demobilization (these will vary from emergency to emergency). For example, triggers can be based on information from local authorities (e.g., all patients have been transported to the hospital; all patients have been treated in the emergency unit and transferred to the ward; or are waiting transfer to another facility).
- Identify surplus resources and their likely release dates. The hospital IC approves the release or demobilization of response resources prior to initiating the process.
- Identify staff travel needs and coordinate travel arrangements, as necessary.
- Scale down operations in the hospital EOC and eventually deactivate the facility, returning the space to its original use.
- Verify that decontamination procedures and the necessary resources are available.
- If necessary, develop/communicate a plan to dispose of hazardous materials or waste.
- Plan for equipment repair, decontamination, maintenance services, and inspections, as necessary.
- Consolidate documentation related to the response (e.g., IAP, communication logs, job action sheets, situation reports) in preparation for the after-action review process.
- Initiate impact assessments and post-incident reviews.

3.1.7 Information technology and hospital information systems

The importance of robust IT and medical records systems cannot be overstated during disaster response and recovery operations. They enable efficient patient tracking, data analysis, resource management, coordination, communication, and continuity of care. During these operations, hospitals must ensure that they are able to retrieve existing medical records or create new ones. This particularly applies to situations in which a hospital has been damaged or is unable to function. Consider the following:

- Ensure that all internal and external systems (backup systems, clinical systems, medical information systems, and patient registration systems) are functional and that, if necessary, alternative means of capturing patient information are available.
- There is sufficient physical storage space to ensure the security and integrity of medical records (e.g., records are protected from fire, environmental hazards, and unauthorized access) or sufficient cloud-based storage.
- Systems are in place to ensure that medical records are accessible and can be quickly retrieved when needed.

3.1.8 Post-disaster recovery planning

Planning for post-disaster recovery is just as important as planning for response. Ideally, recovery plans would have been developed prior to the disaster and be initiated while the response is still ongoing. This would allow hospitals to continue to provide care and maintain financial viability. A hospital's return to day-to-day operations may be progressive. Planning should take into account that systems that have been ramped up to accommodate a medical surge will be dismantled as patients' needs allow. Extra equipment, supplies, and medications will return to pre-incident inventory levels as soon as is reasonable.

Hospitals may consider the following recommendations for planning recovery activities:

- Designate a disaster recovery manager to serve as the conduit for the disaster recovery program.
- Develop a recovery workplan with time frames and work vendors, identifying areas that need to be rebuilt, reconfigured, and restored to full functionality.
- Conduct a cost–benefit analysis associated with recovery (e.g., staffing, supplies, temporary storage), including restoring systems where backups are available. Include an estimated timeline for completion.
- Consolidate all information regarding damage to the facility.
- Consult hospital staff on the recovery plan and take the opportunity to build back better to improve hospital resilience.
- Prioritize recovery objectives related to the delivery of healthcare services by essential functions.
- Maintain, modify, and/or demobilize the healthcare workforce according to the facility's needs.

- Work with local emergency management, public health authorities, service providers, and contractors to ensure priority restoration and reconstruction of critical building systems, transportation capacity, and IT and communications systems.

At its core, recovery is a partnership between the affected community, government, aid organizations, and the private sector. As such, successful recovery is built on effective communication among these key stakeholders. This helps manage expectations about what the hospital can and cannot do; who is responsible within the hospital organization for leading the recovery effort; and what communities can expect in terms of recovery assistance.

Box 13. Community engagement and communication during recovery

Community engagement and communication during recovery

During recovery, affected communities are often overwhelmed by large volumes of information – at a time when they are under stress and often unable to process the information. Local officials can prioritize what information is most relevant to a community's recovery, such as:

- What is happening with the recovery process?
- What support is available?
- How can community members qualify for or receive such support?
- What can they do if they have questions, concerns, or complaints?

Acknowledge the impact of the disaster on human well-being by validating people's experiences. Track and manage rumors and false information that may cause community disunity and conflict. Focus on providing information that helps individuals and communities make decisions about their future, supporting their self-recovery.

Stuff

During the short-term recovery period, it may not be feasible to provide the same standard or level of care as was previously available. However, it is a moral and legal imperative to provide some level of care. Therefore, resources must be properly allocated and hospitals must conserve, adapt, and/or substitute certain supplies to ensure that functionally equivalent or crisis care is provided, depending on the situation.

3.1.9 Update inventory, restock supplies, and repair equipment

Consider the following during the recovery period:

- Equipment and supplies located inside damaged buildings, whether they are submerged under water, exposed to temperature extremes, or to smoke, fumes, etc., must be approved for reuse by an appropriate governmental agency. Keep records of approved equipment.
- Hospitals must be able to maintain equipment that is used for patient care.
- There is adequate equipment and supplies onsite (including oxygen) for planned services.
- There is access to and availability of pharmaceuticals, including psychotropics; critical medical equipment for those with special medical needs; and proper refrigeration for storage of drugs and biologicals.
- There is a mechanism in place for replenishing supplies.
- Flashlights and batteries (including radio and ventilator batteries) are available.

3.1.10 Mitigate the direct and indirect costs of recovery

During recovery, direct costs are commonly associated with hospital departments or patients. Indirect costs, on the other hand, can include areas such as hospital overhead, facilities and administrative costs, or shared expenses. Hospitals may consider the following measures to reduce financial costs during recovery:

- Gather the necessary documentation to process insurance claims for the rehabilitation or reconstruction of damaged facilities (e.g., receipts, damage assessment reports, insurance policies).
- Check equipment warranties for after-sale service and support to save on the cost of repairs and rehabilitation.
- Provide staff with the necessary documentation to facilitate social security claims, benefits, or loans. Consider providing hospital staff with financial aid, such as loans or a salary advance, during the recovery process.
- Identify and prepare documentation to support post-disaster financial assistance from the government or grants from bilateral or multilateral donors and partners.
- Maintain and update patient records, adapting them to disaster recovery program requirements (if applicable). Address payroll continuity, supply chain financing, losses covered by insurance and submission of claims, and any legal issues that may arise.

- Work with private sector partners, civil society organizations, and the government to identify "cash-for-work" opportunities for affected hospital staff.
- Provide financial incentives such as overtime pay for staff who work extended hours during the response/recovery.

Staff

3.1.11 Mental health and psychosocial support

Disasters can significantly impact the mental health and psychosocial well-being of hospital staff, who may experience stress, anxiety, and burnout as a result of their work during an emergency. Providing support to hospital staff in the recovery phase requires a comprehensive and integrated approach to addressing their unique needs and challenges. Consider the following interventions to support staff mental health and well-being and promote a culture of resilience and recovery:

- Psychological first aid (PFA) is an evidence-informed approach that helps people cope with the immediate aftermath of a disaster. Trained or nontrained professionals can deliver PFA, which aims to provide practical and emotional support to those affected.
- Mental health screening helps identify hospital staff who may be experiencing mental health issues and require additional support and connects them with the appropriate resources.
- Employee assistance programs provide confidential counseling services to hospital staff. These programs can help staff cope with stress, anxiety, and other mental health issues.
- Peer support programs allow hospital staff to provide emotional support to one another. Peer support can be particularly effective in reducing stigma and providing a safe space for staff to discuss their experiences.
- Training and education on mental health and psychosocial support for hospital staff can include stress management, coping skills, and communication strategies.
- Resilience-building programs help hospital staff develop skills and strategies to cope with stress and adversity. These programs can include mindfulness, meditation, and yoga.
- Work-life balance should be encouraged, as this helps hospital staff to manage stress and prevent burnout. This can include flexible work schedules, time off, and access to child care and other support services.

3.1.12 Financial and nonfinancial incentives

Financial and nonfinancial incentives can recognize and reward hospital staff for their work during disaster response/recovery. Incentives can boost staff morale, increase motivation, and promote a culture of resilience and recovery. Possible incentives include:

Table 4. **Financial vs. non-financial incentives**

Financial incentives	Nonfinancial incentives
• Provide hospital staff with **additional pay** (overtime pay or hazard pay) for their work during response/recovery. • Offer **performance bonuses** to hospital staff who demonstrate exceptional performance during response/recovery. • Provide **grants or scholarships** to hospital staff who wish to further their education or training in disaster response or related fields. • **Reimburse expenses** incurred by hospital staff during the disaster response/recovery, such as transportation or lodging.	• **Publicly recognize** hospital staff for their efforts, through press releases, social media posts, or similar channels. • Provide hospital staff with additional **time off** after the response/recovery. • Offer **professional development opportunities** to hospital staff, such as conferences or training programs related to disaster and emergencies. • Encourage **peer recognition** by having hospital staff nominate colleagues for their contributions during the disaster response/recovery.

3.1.13 Demobilizing staff and volunteers

When a health facility is damaged following a disaster, hospital staff may find themselves temporarily displaced. At the same time, other health facilities that remain operational will likely experience a surge in the demand for health care due to an area-wide reduction in capacity. Considering that workforce retention is critical to ensuring that skilled workers are available once a damaged facility is again fully operational, the temporary transfer of displaced medical staff to facilities that remain functional can reduce the risk of losing staff.

An effective staff demobilization process requires careful pre-planning, coordination, and communication. The following actions can help ensure that the process is safe and effective.

- Develop and implement a demobilization plan, with steps and a timeline. Assign clear roles and responsibilities to hospital staff and volunteers during the process. This can include tasks such as packing and/or returning equipment and supplies or cleaning the hospital facility.

- Debrief hospital staff and volunteers about their experiences and lessons learned. This feedback can be used to improve future disaster response efforts. During the debriefing, look for signs and symptoms that require monitoring and what action to take if staff experience adverse health effects.
- Engage in a wellness check process and monitor the medical workforce's behavioral health needs.

◊ Monitor staff absenteeism or resignations during or following the incident, as a result of stress.

◊ Complete staff medical surveillance forms that can become part of their health records.

- Ensure the safety and security of hospital staff and volunteers during the demobilization process by providing PPE, ensuring adequate lighting in the hospital facility, and having security personnel on site.
- Provide mental health support to hospital staff and volunteers during and after the demobilization process. This can include counseling services, peer support groups, and other resources to help manage stress and trauma (see 3.1.12).

3.2 After-action review (AAR) and lessons learned process

Building back better is intended to use the post-disaster recovery, rehabilitation, and reconstruction phases to increase hospital resilience. Building back better requires integrating disaster risk reduction measures into the restoration of physical infrastructure and systems and into the revitalization of livelihoods, economies, and the environment, thus promoting sustainable development.

During the recovery phase, consider the following actions to promote sustainability and enhance resilience:

- Use engineering interventions to reconstruct and strengthen damaged facilities (as compared to their pre-disaster level).
- Use recovery opportunities to establish redundant systems, especially critical hospital lifelines, using green technology.
- Share best practices and lessons learned to facilitate the exchange of learning and knowledge.
- Update hospital policies, guidelines, and procedures, including practices used in routine operations, based on what was learned from the disaster (and from preparedness prior to the emergency) to enhance readiness for future response.
- Support psychosocial recovery to strengthen the mental health of staff.
- Review and adapt development projects and investments to take into account possible risks, based on prior experience.

Identifying lessons following the response to an emergency is essential for all emergency management procedures. These exercises contribute to quality improvements and strengthened preparedness and response systems. In addition, systematic post-event learning contributes to a culture of continuous improvement and can be a means of sharing innovative solutions to tackle emerging disaster risks. It contributes to promoting organizational learning and, if institutionalized, will transform the hospital into a learning organization.

The after-action review (AAR) is a qualitative review of actions taken to identify best practices, gaps, and lessons learned in response to an emergency. The AAR offers a structured approach for individuals and organizations, including hospitals, to reflect on their experiences and perceptions of the response. This will enable a hospital to identify, systematically and collectively, what worked, what did not, and why, thus identifying ways to improve the next response. An AAR can range from quick informal debriefing sessions with team members to more extensive facilitator-led workshops with broad, multisectoral participation. An AAR is not an external evaluation of an individual or a team's performance. It does not seek to measure performance against benchmarks or critical performance standards. Still, it is a constructive collective learning opportunity where relevant stakeholders involved in preparedness for and response to the emergency can find common ground to improve capacities.

During extended response operations (such as the COVID-19 pandemic), intra-action reviews can be conducted to adjust and improve emergency and disaster management. As is the case with inter-action reviews, these reviews can be in the form of debriefings that discuss "what went well and what needs to be improved?" with regard to the management of the incident. Intra-action reviews can be conducted at the hospital departmental level or with the HIMT.

Once a hospital returns to routine health operations and the emergency response plan has been deactivated, the HIMT can plan for an after-action review of the entire hospital's response operations. This exercise helps develop corrective action plans (CAP) to improve systems, plans, and arrangements, in preparation for a subsequent emergency response.

3.2.1 Collect and review relevant background information

The AAR team collects and reviews background information in order to understand the response actions that were taken. This provides a common framework for discussion. Background information can include the national emergency response plan, contingency plans, and the incident management structure. It can also include documents developed during the response, such as response plans, situation reports, operational reviews and response evaluations, media reports, debriefing notes, etc.

3.2.2 Develop trigger questions

An AAR is a "discovery" of the events that transpired, through the lens of people who played a role and is informed by their experiences. In conjunction with the AAR, trigger questions are used to guide group or individual discussions, prompting the group to think innovatively and generate new ideas. Open-ended questions will help generate discussion and frame the scope of the analysis. Trigger questions should be adapted to the context and expected outcomes for each function. An AAR answers four significant questions:

- What was expected to happen?
- What actually occurred?
- What went well and why?
- What can be improved and how?

Collectively, staff involved in the operations know what happened, but individually they may not. A facilitator-led review is the of the best ways to reconstruct what transpired. Recount the day's events and ask questions that prompt and encourage people to fill in the blanks. In situations where you were a primary observer and decision-maker, help participants fill in the blanks through your eyes and experiences. Add context and perspective where appropriate to make the situation clearer.

3.2.3 Identify strengths, challenges, and capacities

During the AAR, participants will identify as many of the strengths and challenges they encountered as possible during the response. By the end of the AAR, the following outputs are expected:

- Clear articulation of best practices and their impacts on the response, using root cause analysis to identify the factors that enabled the best practices.
- Clear articulation of challenges faced during the response and their impacts, using root cause analysis to identify the limiting factors that contributed to the challenges.
- Given the understanding of best practices and challenges, identification of clear actions required to embed the best practices, address the challenges, and strengthen preparedness for future responses.
- Using the actions described above, the elaboration of explicit activities, responsible focal points, required resources, and timelines for implementation.

3.2.4 Build consensus among participants

Building consensus consists of a final summary of best practices, challenges, new capacities developed, and AAR indicators. Consensus can be reached through plenary or group discussions. These discussions should validate results and create a sense of ownership to ensure that corrective actions are taken. Before closing, convene a final working group session to integrate any additions or comments.

3.2.5 Debrief the AAR team

The AAR team debriefing aims to reflect on the overall planning, preparation, and conduct of the AAR. The debriefing can also establish the roles, responsibilities, and timelines for completing the AAR reports and other deliverables. This should occur within one week of completing the AAR.

The AAR team debriefing can frame a discussion on how to improve the AAR process for the next event, considering that flexibility in undertaking an AAR allows planners to adjust and find the best model for the culture and system under review. This is also an opportunity for the AAR team to discuss and finalize the executive summary, which is presented to senior management.

3.2.6 Debrief hospital management

Senior management should be briefed on the outcomes of the AAR, including the identified best practices and challenges and the agreed-upon follow-up actions. One aim of the debriefing is to gain the support for mobilizing the resources required to carry out the identified actions. Senior management's endorsement of the AAR outcomes also increases the likelihood and impact of learning at a broader institutional level and contributes to a culture of continuous improvement and critical analysis. Senior management may also authorize wider circulation of the general results.

3.2.7 Write the AAR report

The output from an AAR is a written report that provides recommendations based on the information gathered during the event. The report's author(s) should have access to all notes taken in order to integrate the findings into the final report. The report should include a CAP, identified during the AAR, for follow-up action.

It is important to note that recommendations from one incident are not necessarily appropriate for all situations. Therefore, careful consideration must be given to a particular recommendation from one event before implementing that same recommendation in a subsequent scenario. The post-AAR follow-up provides an opportunity to witness and document how the implementation of the AAR CAP improves emergency management capacities and future response operations.

3.2.8 Lesson learned process

There will be a number of, if not many, recommendations for future action and/or improvement. Some may call these lessons learned. However, if these same recommendations continue to appear in subsequent exercises or actual emergency responses, the lessons have simply been identified rather than learned. A more comprehensive process is required for lessons to be learned and integrated into organizational change.

Evaluation is the outcome of a review process. It encompasses setting objectives, observation, hot wash, after-action report, corrective action program, and validation. This process is commonly called "lessons learned."

Hospitals should consider creating a repository of critical challenges, best practices, and recommendations resulting from AARs, which can be easily accessed during emergency preparedness and response. This repository serves as an institutional memory of lessons learned and provides a resource for emergency preparedness and response stakeholders. Its objective is to facilitate and share learning between emergencies and apply findings to other contexts and events. Recording lessons in a central location helps ensure that the same mistakes are not repeated.

Electrical backup system. Hospital General de Zona 1, IMSS, Tapachula, Chiapas, Mexico. WHO Collaborating Center MEX-35 for Resilient Health Services. 2023

3.3 Recovery tool and resources

- World Health Organization. Guidance for After-Action Review. Geneva: WHO; 2019. Available from: https://bit.ly/3HGTWaP.
- World Health Organization. After-Action Review (AAR) Portal: Guidance and courses. Geneva: WHO; 2024 [cited 19 March 2024]. Available from: https://bit.ly/48YB57a.
- World Health Organization. Intra-Action Review (IAR) Portal: Guidance and courses. Geneva: WHO; 2024 [cited 19 March 2024]. Available from: https://bit.ly/3SlwbtT.
- World Health Organization Eastern Mediterranean Regional Office. Implementation guide for health systems recovery in emergencies: Transforming challenges into opportunities. Cairo: WHO EMRO; 2020. Available from: https://bit.ly/3w6PKi2.
- World Health Organization. Recovery toolkit: supporting countries to achieve health service resilience. Library of tools and resources available during the recovery period of a public health emergency. Geneva: WHO; 2016. Available from: https://bit.ly/48ZI6EU.
- World Health Organization, Handicap International, International Committee of the Red Cross, CBM. Emergency medical teams: minimum technical standards and recommendations for rehabilitation. Geneva: WHO; 2016. Available from: https://bit.ly/49hTaNl.
- World Health Organization, War Trauma Foundation, World Vision International. Psychological first aid: Guide for field workers. Geneva: WHO; 2011. Available from: https://bit.ly/3Ory6w6.
- Pan American Health Organization. Herramienta de evaluación posdesastre de hospitales [Post-disaster assessment of hospitals] [currently available in Spanish but forthcoming in English]. Washington, D.C.: PAHO; 2023.Available from: https://bit.ly/49wxxt3.
- World Health Organization, CBM, International Federation of Red Cross and Red Crescent Societies, International Organization for Migration, United Nations Children's Fund, United Nations Office for Disaster Risk Reduction. Guidance note on disability and emergency risk management for health. Geneva: WHO; 2013. Available from: https://bit.ly/42WonDY.

References

1. Ravaghi H, Khalil M, Abrahams J, Sakr H, Samhouri D, Mataria A, et al. Strengthening hospital resilience in the Eastern Mediterranean Region. East Mediterr Health J. 2023; 29(4):229–231. Available from: https://bit.ly/49rsBpf.

2. World Health Organization. Comprehensive Safe Hospital Framework. Geneva: WHO; 2015. Available from: https://bit.ly/4csMEWw.

3. Khalil M, Ravaghi H, Samhouri D, Abo J, Ali A, Sakr H, et al. What is "hospital resilience"? A scoping review on conceptualization, operationalization, and evaluation. Front Public Health. 2022;10:1009400. Available from: https://bit.ly/3vpqovU.

4. World Health Organization. Summary report on the expert consultation on hospital resilience in the Eastern Mediterranean Region. East Mediterr Health J. 2023;29(1):73–74. Available from: https://bit.ly/3HAfSob.

5. Pan American Health Organization. Hospital Safety Index. Guide for Evaluators. Second edition. Washington, D.C.: PAHO; 2019. Available from: https://bit.ly/3HVdvwa.

6. Pan American Health Organization. PAHO makes progress in 13 countries with its "Hospitals Resilient to Health Emergencies and Disasters" initiative. Washington, D.C.: PAHO; 2023 [cited 19 March 2024]. Available from: https://bit.ly/49bcgF2.

7. Mansour W, Arjyal A, Hughes C, Gbaoh ET, Fouad FM, Wurie H, et al. Health systems resilience in fragile and shock-prone settings through the prism of gender equity and justice: implications for research, policy and practice. Confl Health. 2022;16(1):7. Available from: https://bit.ly/3INOtQa.

8. Pan American Health Organization. STAR-H: Strategic Toolkit for Assessing Risks in Health Facilities. Washington, D.C.: PAHO; 2023. Available from: https://bit.ly/4bjK0Su.

9. World Health Organization. Glossary of Health Emergency and Disaster Risk Management Terminology. Geneva: WHO; 2020. Available from: https://bit.ly/3IRcJRy.

10. Pan American Health Organization. Smart Hospitals Toolkit. Washington, D.C.: PAHO; 2017. Available from: https://bit.ly/3x1ophO.

11. Asian Disaster Preparedness Center. Hospital Preparedness for Emergencies (HOPE) course syllabus. Bangkok: ADPC; [date unknown]. Available from: https://bit.ly/3Sjrhhf.

12. Pan American Health Organization. Principles of disaster mitigation in health facilities. Washington, D.C.: PAHO; 2000. Available from: https://bit.ly/4bbWqf0.

13. World Health Organization, World Bank. World Report on Disability 2011. Geneva: WHO; 2011. Available from: https://bit.ly/43uqbEm.

14. Pan American Health Organization. Disability Inclusion in Hospital Disaster Risk Management. Washington, D.C.: PAHO; 2018. Available from: https://bit.ly/49buxS5.

15. Pan American Health Organization. Smart Hospitals - Baseline Assessment Tool Workbook. Washington, D.C.: PAHO; 2020. Available from: https://bit.ly/47QRCcc.

16. World Health Organization. WHO guidance for climate-resilient and environmentally sustainable health care facilities. Geneva: WHO; 2020. Available from: https://bit.ly/4av5zOJ.

17. The Joint Commission. R3 Report: New and revised standards in emergency management. Oakbrook Terrace, IL: The Joint Commission; 2022. Available from: https://bit.ly/3vUtacF.

18. World Health Organization. WHO guidance for business continuity planning. Geneva: WHO; 2018. Available from: https://bit.ly/3TNRfLv.

19. World Health Organization. Health service continuity planning for public health emergencies: a handbook for health facilities. Geneva: WHO; 2021. Available from: https://bit.ly/3VqyvmF.

20. Pan American Health Organization, CARICOM, HRH Action Task Force. Policy Brief - Strengthening Human Resources for Health (HRH) to Respond to COVID-19 and Other Emerging Pandemics in the Caribbean. 27 November 2021. Washington, D.C.: PAHO; 2021. Available from: https://bit.ly/3vSFr1b.

21. World Health Organization. Minimum requirements for infection prevention and control programmes. Geneva: WHO; 2019. Available from: https://bit.ly/4arykM1.

22. Hanfling D, Hick JL, Stroud C, editors. Crisis Standards of Care: A Toolkit for Indicators and Triggers. Washington, D.C.: National Academies Press; 2013. Available from: https://bit.ly/3SeM7yg.

23. California Emergency Medical Services Authority. Hospital Incident Command System: Guidebook and appendices. [Rancho Cordova, CA]: California EMSA; 2014. Available from: https://bit.ly/3vVg9Q3.

24. World Health Organization. Communicating risk in public health emergencies: a WHO guideline for emergency risk communication (ERC) policy and practice. Geneva: WHO; 2017. Available from: https://bit.ly/3x6s9ij.

Annex 1
Glossary of health emergency and disaster risk management terminology

The following definitions of terms related to disaster risk management have been abstracted from the publication: World Health Organization. Glossary of Health Emergency and Disaster Risk Management Terminology. Geneva: WHO; 2020.

After Action Review (AAR)
After an activation, operation, or exercise has been completed, a process involving a structured facilitated discussion to review what should have happened, what actually happened, and why (WHO 2015a).[1]

All-hazards approach
An approach to the management of the entire spectrum of emergency risks and events based on the recognition that there are common elements and common capacities required in the management of these risks, including in the responses to virtually all emergencies.

The development of common or generic capacities that can be applied to all risks. These generic capacities are complemented by specific measures for the unique characteristics of each risk or event. Standardizing a management system to address the common elements, greater capacity is generated along with specific measures to address the unique characteristics of each event (WHO 2015a).[1]

Build back better
The use of the recovery, rehabilitation, and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies, and the environment (UNGA 2016).[2]

Business continuity plan
A document that describes how an organization will maintain and restore critical operational functions and services to a predetermined acceptable level in the event of an occurrence that disrupts its operational capabilities (WHO 2015a).[1]

Capacity
Combination of all the strengths, attributes, and resources available within an organization, community, or society to manage and reduce disaster risks and strengthen resilience.

Capacity assessment
The process by which the capacity of a group, organization, or society is reviewed against desired goals, where existing capacities are identified for maintenance or strengthening, and capacity gaps are identified for further action (UNGA 2016).[2]

Capacity development
The process by which people, organizations, and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions.

Climate change
A change in the state of the climate that can be identified (for example by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer (IPCC 2012).[3]

Cold debrief
A debriefing session held after a period of time has passed following an exercise or incident, in order to discuss, with the benefit of hindsight, any observations and issues that may have been overlooked during a hot wash (WHO 2015a).1 Also referred to as "cold wash."

Command
The act of managing, directing, ordering, or controlling by virtue of explicit statutory, regulatory, or delegated authority. The common short name for "incident command," involving making decisions, implementing plans to manage an incident, and controlling their effects (WHO 2015a).[1]

Coordination
Management processes to ensure integration (unity) of effort. Coordination relates primarily to resources, and operates vertically (within an organization) as a function of the authority to command, and horizontally (across organizations) as a function of the authority to control (WHO 2015a).[1]

Critical systems (hospitals)
Within a hospital, critical systems include the electrical, telecommunications, water supply, fire protection, waste management, fuel storage and medical gases, and heating, ventilation, and air conditioning (HVAC) systems. The failure or disruption of critical systems can stop or impede the functioning of the hospitals (WHO 2015a).[1]

Decontamination
A procedure whereby health measures are taken to eliminate an infectious or toxic agent or matter on a human or animal body surface, in or on a product prepared for consumption, or on other inanimate objects, including conveyances that may constitute a public health risk (WHO 2010a).[4]

Disability
A limitation in a functional domain that arises from the interaction between a person's intrinsic capacity, and environmental and personal factors (WHO 2011).[5]

Disaster
A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability, and capacity, leading to one or more of the following: human, material, economic, and environmental losses and impacts.

Note: The effect of the disaster may be immediate and localized but is often widespread and can last for a long period of time. The effect may test or exceed the capacity of a community or society to cope using its own resources, and therefore may require assistance from external sources, which could include neighboring jurisdictions, or those at the national or international levels (UNGA 2016).[2]

Disaster management

The organization, planning and application of measures preparing for, responding to, and recovering from disasters.

Note: Disaster management may not completely avert or eliminate the threats; it focuses on creating and implementing preparedness and other plans to decrease the impact of disasters and "build back better." Failure to create and apply a plan could lead to damage to life, assets, and lost revenue (UNGA 2016).[2]

Disaster response

Actions taken directly before, during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety, and meet the basic subsistence needs of the people affected (UNGA 2016).[2]

Disaster risk

The potential loss of life, injury, or destroyed or damaged assets, which could occur to a system, society, or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability, and capacity.

Note: The definition of disaster risk reflects the concept of hazardous events and disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socioeconomic development, disaster risks can be assessed and mapped, in broad terms at least. It is important to consider the social and economic contexts in which disaster risks occur and that people do not necessarily share the same perceptions of risk and their underlying risk factors (UNGA 2016).[2] This definition can apply to "risk" associated with hazardous events, emergencies, and disasters.

Disaster risk assessment

A qualitative or quantitative approach to determine the nature and extent of disaster risk by analyzing potential hazards and evaluating existing conditions of exposure and vulnerability [and capacity] that together could harm people, property, services, livelihoods, and the environment on which they depend.

Note: Disaster risk assessments include: the identification of hazards; a review of the technical characteristics of hazards such as their location, intensity, frequency, and probability; the analysis of exposure and vulnerability, including the physical, social, health, environmental, and economic dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities with respect to likely risk scenarios (UNGA 2016).[2]

Disaster risk management (DRM)

The application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk, and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses (UNGA 2016).[2]

Disaster risk reduction (DRR)

Activities aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.

Note: Disaster risk reduction is the policy objective of disaster risk management, and its goals and objectives are defined in disaster risk reduction strategies and plans (UNGA 2016).[2]

Early warning system (EWS)

An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses, and others to take timely action to reduce disaster risks in advance of hazardous events.

Emergency

A type of event or imminent threat that produces or has the potential to produce a range of consequences, and which requires coordinated action, usually urgent and often non-routine.

Emergency medical team (EMT)

Groups of health professionals (doctors, nurses, paramedics, etc.) that treat patients affected by an emergency or disaster.

Emergency operations center (EOC)

The facility from which a jurisdiction or agency coordinates its response to major emergencies/ disasters (WHO 2015b).[6]

Emergency response plan

A document that describes how an agency or organization will manage its responses to emergencies of various types.

Note: It provides a description of the objectives, policy, and concept of operations for the response to an emergency; and the structure, authorities, and responsibilities for a systematic, coordinated, and effective response. In this context, emergency plans are agency- or jurisdiction-specific, and detail the resources, capacities, and capabilities that the jurisdiction, agency, or organization will employ in its response (WHO 2017a).[7]

Evacuation

Moving people and assets temporarily to safer places before, during, or after the occurrence of a hazardous event in order to protect them.

Note: Evacuation plans refer to the arrangements established in advance to enable the moving of people and assets temporarily to safer places before, during, or after the occurrence of a hazardous event. Evacuation plans may include plans for return of evacuees and options to shelter in place (UNGA 2016).[2]

Exercise

A form of practice, training, monitoring, or evaluation of capabilities involving the description or simulation of an emergency, to which a described or simulated response is made (WHO 2017c).[8]

Note: Exercises help determine a valid indication of future system performance under certain conditions, and to identify potential system improvements (WHO 2015b).[6]

Full-scale exercise

An exercise that simulates a real event as closely as possible and is designed to evaluate the operational capability of emergency management systems in a highly stressful environment, simulating actual response conditions, including the mobilization and movement of emergency personnel, equipment, and resources.

Note: The purpose of a full-scale exercise is to test/evaluate most of the functions of an emergency plan in the most realistic manner possible. Ideally, the full-scale exercise should test and evaluate most functions of the emergency management plan or operational plan. Differing from the functional exercise (FX), a full-scale exercise typically involves multiple agencies and participants physically deployed in a field location (WHO 2017c).[8]

Functional exercise (FX)

A fully simulated, interactive exercise that tests the capability of an organization to respond to a simulated event. The exercise tests multiple functions of the organization's operational plan.

Note: The purpose of an FX is to test or validate the response capability of specific functions or departments in an organization to a situation in a time-pressured, realistic situation. A functional exercise focuses on the coordination, integration, and interaction of an organization's policies, procedures, roles, and responsibilities before, during, or after the simulated event (WHO 2017c).[8]

Hazard

A process, phenomenon, or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption, or environmental degradation. Source of potential harm (ISO 22300:2018).[9]

Note: This may include the latent property or the inherent capability of an agent or substance which makes it capable of causing adverse effects to people or the environment under conditions of exposure (UNGA 2016, WHO 2009).[2, 10]

Health system
The people, institutions, and resources, arranged together in accordance with established policies, to improve the health of the population they serve, while responding to people's legitimate expectations and protecting them against the cost of ill-health through a variety of activities whose primary intent is to improve health (WHO 2011).[5]

Hot debrief
A debriefing session held immediately after an exercise or incident to identify the strengths and weaknesses of plans, policies, and procedures.

Note: In a hot debrief, participants and the exercise management team provide immediate feedback or a debriefing event. Individuals share perspectives on strengths, weaknesses, and areas for improvement, which are incorporated in the exercise report (WHO 2015a, WHO 2017c).1, 8 Sometimes referred to as a "hot wash."

Incident
An action, event, or phenomenon which may cause loss of life or injury, property damage, social and economic disruption, and/or environmental degradation (WHO 2015b).[6]

Incident action plan (IAP)
A statement of intent that is specific to an incident or event. It details the response strategies, objectives, resources to be applied, and tactical actions to be taken (WHO 2015a)[1].

Incident management system (IMS)
System that defines the roles and responsibilities of personnel and the operating procedures to be used in the management of incidents (ISO 22300:2018).[9]

Infection prevention and control (IPC)
A practical and proven set of organizational and technical approaches and measures to prevent the spread of avoidable infections and antimicrobial resistance within both community and healthcare settings (WHO 2019c).[11]

Lessons learned
Identified issues for which remedial actions may be implemented, in order to improve performance (WHO 2015a).[1]

Logistics
The aspect of emergency (risk) management that deals with the procurement, distribution, maintenance, replacement, and repatriation of material and human resources, including the provision of support infrastructure and services to response staff (WHO 2015a).[1]

Mass casualty incident
An event which generates more patients at one time than locally available resources can manage using routine procedures.

Note: It requires exceptional emergency arrangements and additional or extraordinary assistance (WHO 2007).[12]

Mental health and psychosocial support

Any type of local or outside support that aims to protect or promote psychosocial well-being and/or prevent or treat mental disorder.

Note: Traditionally, mental health care has been used by health professionals to describe specialized interventions to treat individuals diagnosed with mental health conditions. Psychosocial support and psychosocial interventions are terms used by a broader range of workers in the emergency response field to refer to activities that support both the psychological and social health of individuals and communities as a whole rather than focusing specifically on treating mental health conditions (IASC 2007).[13]

Mitigation

The lessening or limitation of the adverse impacts of hazards and related disasters.

Note: The adverse impacts of hazards, in particular natural hazards, often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures include engineering techniques and hazard-resistant construction as well as improved environmental and social policies and public awareness. It should be noted that, in climate change policy, "mitigation" is defined differently, and is the term used for the reduction of greenhouse gas emissions that are the source of climate change (UNGA 2016).[2]

Mutual aid agreement

Prearranged understanding between two or more entities to render assistance to each other (ISO 22300:2018).[9]

National disaster management agency

The national government agency that is responsible for coordinating disaster or emergency management policy and practice.

Note: There is no common definition for this agency or organization, as the name and scope of functions varies across countries and is usually defined by national legislation or policies. Synonyms: national disaster management organization, national emergency management agency.

Natural hazards

Hazards that are predominantly associated with natural processes and phenomena (UNGA 2016).[2]

Personal protective equipment (PPE)

Protective clothing (gowns, gloves, boots, etc.) and equipment (masks, shields, respirators, earplugs, etc.) necessary to shield or isolate a person from biological, chemical, physical, sonic, and thermal exposure (WHO 2015a).[1]

People with disability (PWD)

Those who have long-term physical, mental, intellectual, or sensory impairments which, in interaction with various barriers, may hinder their full and effective participation in society on an equal basis with others (UN 2006).[14]

Preparedness

The knowledge and capacities developed by governments, response and recovery organizations, communities, and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent, or current disasters.

Note: Preparedness action is carried out within the context of disaster risk management and aims to build the capacities needed to efficiently manage all types of emergencies and achieve orderly transitions from response to sustained recovery. Preparedness is based on a sound analysis of disaster risks and good linkages with early warning systems, and includes such activities as contingency planning, the stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation, and public information, and associated training and field exercises. These must be supported by formal institutional, legal, and budgetary capacities.

Prevention

Activities and measures to avoid existing and new disaster risks.

Note: Prevention (i.e., disaster prevention) expresses the concept and intention to completely avoid potential adverse impacts of hazardous events. While certain disaster risks cannot be eliminated, prevention aims at reducing vulnerability and exposure in such contexts where, as a result, the risk of disaster is removed. Examples include dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high-risk zones, seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake, and immunization against vaccine-preventable diseases. Prevention measures can also be taken during or after a hazardous event or disaster to prevent secondary hazards or their consequences, such as measures to prevent the contamination of water (UNGA 2016).[2]

Readiness

The ability to quickly and appropriately respond when required (UNGA 2016).[2]

Reconstruction

The medium- and long-term rebuilding and sustainable restoration of resilient critical infrastructures, services, housing, facilities, and livelihoods required for the full functioning of a community or a society affected by a disaster, aligning with the principles of sustainable development and building and "build back better," to avoid or reduce future disaster risk (UNGA 2016).[2]

Recovery

The restoring or improving of livelihoods and health, as well as economic, physical, social, cultural, and environmental assets, systems, and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and "build back better," to avoid or reduce future disaster risk (UNGA 2016).[2]

Rehabilitation

The restoration of basic services and facilities for the functioning of a community or a society affected by a disaster (UNGA 2016).[2]

The restoration of normal functioning of people and communities (WHO 2009).[10]

Resilience

The ability of a system, community, or society exposed to hazards to resist, absorb, accommodate, adapt to, transform, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management (UNGA 2016).[2]

Response

The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety, and meet the basic subsistence needs of the people affected.

Note: Disaster response is predominantly focused on immediate and short-term needs and is sometimes called disaster relief. Effective, efficient, and timely response relies on disaster risk-informed preparedness measures, including the development of the response capacities of individuals, communities, organizations, countries, and the international community. The institutional elements of response often include the provision of emergency services and public assistance by public and private sectors and community sectors, as well as community and volunteer participation. "Emergency services" are a critical set of specialized agencies that have specific responsibilities in serving and protecting people and property in emergency and disaster situations. They include civil protection authorities and police and fire services, among many others. The division between the response stage and the subsequent recovery stage is not clearcut. Some response actions, such as the supply of temporary housing and water supplies, may extend well into the recovery stage (UNGA 2016).[2]

Response plan

Documented collection of procedures and information that is developed, compiled, and maintained in readiness for use in an incident (ISO 22300:2018).[9]

Retrofitting

Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

Note: Retrofitting requires consideration of the design and function of the structure, the stresses that the structure may be subject to from particular hazards or hazard scenarios, and the practicality and costs of different retrofitting options. Examples of retrofitting include adding bracing to stiffen walls, reinforcing pillars, adding steel ties between walls and roofs, installing shutters on windows, and improving the protection of important facilities and equipment (UNGA 2016).[2]

Risk
The potential loss of life, injury, or destroyed or damaged assets, which could occur to a system, society, or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability, and capacity (UNGA 2016).[2]

Risk analysis
The process to comprehend the nature of risk and to determine the level of risk (ISO 22300:2018).[9]

Risk assessment
The process of determining risks to be prioritized for risk management, by the combination of risk identification, risk analysis, and evaluation of the level of risk against predetermined standards, targets, risks, or other criteria.

Note: Risk assessments include a review of the technical characteristics of hazards, analysis of exposures and vulnerability, and evaluation of the effectiveness or prevailing coping capacities in respect of likely risk scenarios (WHO 2015b).[6]

Risk communication
The interactive exchange of information and opinions concerning hazards, risks, and risk-related factors (WHO 2015b).6 Range of communication capacities required through the prevention, preparedness, response, and recovery phases of a serious public health event to encourage informed decision-making, positive behavior change, and the maintenance of trust (WHO 2018a).[15]

Note: Risk communication should be a two-way interaction in which experts and nonexperts exchange and negotiate perceptions relating to both scientific and community values and preferences (WHO 2009).[10]

Safe hospital
A facility whose services remain accessible and functioning at maximum capacity, and with the same infrastructure before, during, and immediately after the impact of emergencies and disasters (WHO 2015a).[1]

Situational awareness
Being aware of and attentive to what is happening in a given environment at a particular time, with particular emphasis on the effect of changes in the environment; in effect, knowing how an incident or event is evolving (WHO 2015a).[1]

Surge
Sudden demand for health services in a mass casualty incident where additional capacities (in terms of the amount of personnel, equipment, or supplies) and/or capabilities (in terms of specialized expertise) are required (WHO 2007).[12]

Surge capacity
Ability of institutions such as clinics, hospitals, or public health laboratories to respond to increased demand for their services during a public health emergency (WHO 2015b).[6]

Surveillance
The systematic ongoing collection, collation, and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary (WHO 2010a, WHO 2016).4, [16]

Sustainable development
Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WHO 1998).[17]

Tabletop exercise (TTX)
A facilitated discussion that uses a progressive simulated scenario, together with series of scripted injects, to make participants consider the impact of a potential emergency on existing plans, procedures, and capacities.

Note: A tabletop exercise simulates an emergency situation in an informal, stress-free environment. A tabletop exercise is a discussion around an exercise scenario or narrative that is guided by a facilitator of an emergency situation, designed to elicit constructive discussion between participants; to identify and resolve problems; and to refine existing operational plans (WHO 2017a, WHO 2017c).[7, 8]

Vulnerability
The conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards (UNGA 2016).[2]

Vulnerable group
Individuals who share one or several characteristics that are the basis of discrimination or adverse social, economic, cultural, political, or health circumstances and that cause them to lack the means to achieve their rights or otherwise enjoy equal opportunities (ISO 22300:2018).[9]

References for Annex 1

1 World Health Organization. Framework for a Public Health Emergency Operations Centre. Geneva: WHO; 2015. Available from: https://bit.ly/4aaY2ET.

2 United Nations General Assembly. Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction. Note by the Secretary-General. (A/71/644). New York: United Nations; 2016. Available from: https://bit.ly/4arHnwI.

3 Intergovernmental Panel on Climate Change. Managing the risks of extreme events and disasters to advance climate change adaptation. A special report of working groups I and II of the Intergovernmental Panel on Climate Change [Field CB, Barros V, Stocker TF, Qin D, Dokken DJ, Ebi KL, et al., editors]. Cambridge: Cambridge University Press; 2012. Available from: https://bit.ly/4a4xcOR.

4 World Health Organization. Protocol for assessing national surveillance and response capacities for the International Health Regulations (2005). Geneva: WHO; 2010 [cited 29 April 2019].

5 World Health Organization. Health systems strengthening: glossary. Geneva: WHO; 2011. Available from: https://bit.ly/4cqbdTT.

6 World Health Organization. Public health for mass gatherings: Key considerations. Geneva: WHO; 2015. Available from: https://bit.ly/497CAzs.

7 World Health Organization. Emergency response framework (ERF). Geneva: WHO; 2017. Available from: https://bit.ly/3TxA6Er.

8 World Health Organization. WHO simulation exercise manual: a practical guide and tool for planning, conducting and evaluating simulation exercises for outbreaks and public health emergency preparedness and response. Geneva: WHO; 2017. Available from: https://bit.ly/4ctuS5q.

9 International Organization for Standardization. ISO 22300:2018. Security and resilience: vocabulary. Geneva: ISO; 2018. Available from: https://bit.ly/3vrlSgt.

10 World Health Organization. The public health management of chemical incidents. Geneva: WHO; 2009. Available from: https://bit.ly/3VCXvaa.

11 World Health Organization. Infection prevention and control. Geneva: WHO; 2019 [cited 29 April 2019]. Available from: https://bit.ly/49bDISm.

12 World Health Organization. Mass casualty management systems: strategies and guidelines for building health sector capacity. Geneva: WHO; 2007. Available from: https://bit.ly/3TLS2fY.

13 Inter-Agency Standing Committee. IASC guidelines on mental health and psychosocial support in emergency settings. Geneva: IASC; 2007.
Available from: https://bit.ly/43sUH1v.

14 United Nations. Convention on the Rights of Persons with Disabilities. New York: United Nations; 2006 [accessed 29 April 2019]. Available from: https://bit.ly/3Tufm0s.

15 World Health Organization. Joint external evaluation tool: International Health Regulations (2005). Second edition. Geneva: WHO; 2018.
Available from: https://bit.ly/3IOVHTV.

16 World Health Organization. International Health Regulations 2005. Third edition. Geneva: WHO; 2016. Available from: https://bit.ly/4a3s8dt.

17 World Health Organization. Health promotion glossary. Geneva: WHO; 1998.
Available from: https://bit.ly/3x5MRPc.

The guidance presented in this publication emphasizes how key actions can be integrated into a hospital's routine operational systems, functions, and services in a way that will strengthen how the facility prepares for, responds to, and recovers from the impact of a range of hazards, including epidemics and pandemics, while building back better. This information has been developed for use by hospital managers; heads of hospital departments; members of hospital emergency management committees, including support services and administration; and finance and health authorities responsible for planning and coordinating health emergency and disaster risk management in health facilities.

PAHO
Pan American Health Organization
World Health Organization
Americas Region

World Health Organization
Eastern Mediterranean Region

9 789275 129067