



## Business Continuity in Medical and Healthcare Services

**Dr. Mohammad Sabbah**

Ramat Gan Academic College, Tel-Aviv., Rambam medical center, Haifa. Israel.

Address: Turan, 1695000, box:610. Israel.

### ABSTRACT

Published Online : July 29, 2024

"Business Continuity" refers to maintaining business functions or quickly resuming them in the event of major disruption, natural disasters, and humanitarian disasters. There is a difference between the disaster recovery plan and "Business Continuity" planning. A disaster recovery plan focuses mainly on restoring infrastructure and operations after a crisis, making it just one part of a complete "Business Continuity" plan. All organizations must have "Business Continuity" planning for disastrous events and such planning should cover business processes, assets, human resources, business partners, and customers.

Hospitals are organizations in every aspect. The structure of hospitals is a hierarchical structure, in which there is a chain of command and management. General Managers, department managers, and personnel. Also, hospital structures include various infrastructures, each of which is supported by a chain of different supplies. Damage to one of the hospital's structures, or damage to its supply chain, can endanger its survival.

### KEYWORDS:

Business continuity, emergencies, planning, operations, medical system, hospitals, preparedness, disasters.

### OVERVIEW

"Business Continuity" refers to maintaining business functions or quickly resuming them in the event of major disruption, natural disasters, and humanitarian disasters [1]. Critical services or products are services and products that must be delivered to ensure survival, avoid causing injuries and meet legal or other obligations of an organization. "Business Continuity" planning is a set of proactive planning processes that ensure critical services or products are delivered during a disruption.

A "Business Continuity" plan includes:

- Plans, measures, and arrangements to ensure the continuous delivery of critical services and products.
- Identification of necessary resources to support business continuity, including personnel, information, equipment, financial allocations, legal counsel, infrastructure protection, and accommodations [2].

There is a difference between the disaster recovery plan and cigarettes, are the most important risk factors that threaten

*Corresponding Author: Dr. Mohammad Sabbah*

*\*Cite this Article: Dr. Mohammad Sabbah (2024). Business Continuity in Medical and Healthcare Services. International Journal of Clinical Science and Medical Research, 4(7), 278-286*

"Business Continuity" planning. A disaster recovery plan focuses mainly on restoring infrastructure and operations after a crisis, making it just one part of a complete "Business Continuity" plan.

One common "Business Continuity" planning tool is a checklist that includes supplies and equipment, the location of data backups and backup sites, where the plan is available and who should have it, and contact information for emergency responders, key personnel, and backup site providers.

Understanding whether the "Business Continuity" plan works requires testing. The strategy of testing is most convenient and provides an opportunity to identify gaps and places of improvement. A plan needs to be tested rigorously to know if it's complete and if it fulfills its intended purpose. [3]

The development of a "Business Continuity" plan involves four steps:

- 1- Develop a business impact analysis: this step should identify the personnel and resources needed to maintain "Business Continuity" in the event of a disaster.
- 2- Develop a "Business Continuity" plan and disaster recovery plan: the "Business Continuity" plan identifies how the organization will monitor incidents that may cause a business disruption. A successful "Business Continuity" plan identifies

## Dr. Mohammad Sabbah, Business Continuity in Medical and Healthcare Services

how to ensure employee safety, recovery of essential activities, organizational asset protection, and effective communication.

- 3- Establish a "Business Continuity" plan leadership team: leadership provides direction in the event of a disaster by overseeing the response and recovery efforts.
- 4- Implement employee training programs: this step can help the employees develop skills in how to respond in the event of a disaster [4].

"Business Continuity" planning according to the World Health Organization (WHO):

The goal of the WHO health emergencies program within "Business Continuity" planning is to ensure that all countries are prepared for emergencies, prevent crises, and respond to disasters, to reduce the mortality and morbidity of affected populations. In this case, there is a need for a set of actions to prepare for all types of emergencies and to minimize disruption of operations. These actions include developing, implementing, simulating, monitoring, and regularly updating "Business Continuity" plans.

"Business Continuity" planning helps increase an organization's resilience in the face of potential disruptions, and to improve the ability of organizations to operate during emergencies.

The WHO established "Business Continuity" guidance; the main objectives of plans for emergencies are to:

- Guarantee the safety of staff, premises, and assets.
- Maintain critical programs and operations.
- Ensure the ability to deliver a swift and effective emergency response.

The head of each WHO office is responsible for developing, maintaining, testing, and implementing the "Business Continuity" plan by:

- Ensuring that the staff is familiar with the "Business Continuity" plan and can quickly assume their roles if the plan is activated.
- Maintaining the plan, and ensuring it is regularly reviewed, tested, and updated at least once a year.
- Approving and signing off on the plan and all subsequent revisions.

The heads of WHO offices should only sign plans that have been tested.

The "Business Continuity" plan must address the risks most likely to affect the functioning of the organization. All scenarios that could affect any aspect of WHO operations (human resources, infrastructure, information technology, and communication) should be considered, including both internal and external incidents (fires, floods, earthquakes, conflicts, mass protests).

According to the WHO, "Business Continuity" plans should:

- Be practical, realistic, and feasible.
- Be simple and easy to perform.
- Promote needs-based and efficient use of resources.

- Be based on strong procedures so that they are easy to operationalize and implement.
- Be regularly tested and validated.
- Be monitored and regularly updated according to evolving risks and needs.

The WHO has a well-defined corporate risk management policy that takes a comprehensive approach to risks, including technical/ public health, financial, staff, systems, and structures. Each head office in the WHO assembles a team that includes representatives from operations, logistics, security, human resources, administration, information and communication technologies, and programs. The process of "Business Continuity" planning begins by identifying the high-impact risks to the WHO office and assessing their potential consequences for functions and operations.

"Business Continuity" planning should comprehensively address the safety of the staff, premises, and assets. Identifying the priority risks and evaluating the risk response actions already in place allows for planning of further actions that need to be taken.

Identification of critical operations and functions that need to be continued should be based on criteria such as:

- Lifesaving activities.
- Maintenance of essential health services.
- Critical liaison with the ministry of health.
- Vital enabling functions such as logistics and security.

To be effective, the "Business Continuity" plan needs to be subject to constant improvement and must be tested to ensure emergency management procedures. Exercising is, therefore, an integral part of planning, as it enables:

- Validation of the adequacy of emergency plans, systems, and procedures.
- Familiarization of all staff with the plan, its procedures, and systems.
- Enhancement of the functioning of the office during an emergency.
- Maintenance and updating of the "Business Continuity" plan [5].

The WHO strategy for emergency preparedness:

National governments and the international community have demonstrated their commitment to working together to improve emergency preparedness at all levels. Countries have been working on emergency preparedness for many years, demonstrating that a high level of preparedness contributes to effective responses to many types of emergencies, and reduces their impact.

The WHO principles for emergency preparedness are built upon the following set of principles:

- Safeguarding, maintaining, and restoring the health and wellbeing of communities.
- Communities are critical to effective emergency management. Community members are the first responders and the first victims of any emergency,

## Dr. Mohammad Sabbah, Business Continuity in Medical and Healthcare Services

and they are essential members of the preparedness process.

- Preparedness requires sustained political commitment, partnerships, and funding.
- Health systems and emergency preparedness reinforce one another, and along with other systems contribute to the resilience of communities and countries.
- Emergency preparedness should be addressed with an all-hazards approach. Many elements of emergency preparedness are common to all hazards, and plans for emergency preparedness should be designed to incorporate them.
- Planning and implementation of emergency management actions should include prevention and mitigation of risks, preparedness activities, coordinated response, and recovery and reconstruction.
- Addressing the health dimensions of emergency preparedness requires the health system to interact with other government sectors at all levels of the national system, the commercial sector, and civil society, including non-governmental and community organizations.

Emergency preparedness needs to be considered within two main frameworks:

1- The level at which preparedness is implemented:

Community: effective emergency preparedness can only be achieved with the active participation of local governments, civil society, organizations, commercial organizations, local leaders, and individual citizens.

National: preparedness efforts should be made for emergencies that occur on a local or national scale as well as for large-scale disasters and pandemics with international ramifications.

International: global and regional preparedness is essential for responses to emergencies that surpass the capacities of local and national authorities.

2- Strategic approaches to preparedness:

Operation readiness: high levels of readiness will allow a timely, effective, and efficient response. Achieving readiness is a continuous process of establishing, strengthening, and maintaining a multisectoral response infrastructure that can be applied at all levels.

Health systems resilience: health systems, including public health functions, must be strengthened from emergent hazards. Emergency risk management and preparedness help make a health system more resilient.

The WHO presents a process for developing and implementing emergency preparedness:

- Coordinating
- Financing
- Assessing risk and capacity
- Planning

- Implementing
- Evaluating and taking corrective action
- Exercising

Emergency preparedness is required for the following types of emergencies:

- 1- Emergencies due to natural hazards:
  - a. Biological hazards
    - Local and international outbreaks
    - Outbreaks due to pathogens with pandemic potential
    - Pandemics
  - b. Emergencies due to hydrometeorological and geophysical hazards:
- 2- Emergencies due to human-induced hazards:
  - a. Emergencies due to technological hazards: examples: industrial pollution, nuclear radiation, toxic waste, dam failure, transport accidents, factory explosion, fires, and chemical spills.
  - b. Emergencies due to societal hazards: mostly associated with different forms of violence on scales ranging from civil unrest through armed conflicts and terrorism to the deliberate use of chemical, biological, radiological, and nuclear agents [6].

The WHO has strategically analyzed the hazards which threaten the health of the populations it serves. This analysis is used to identify the major health threats for which contingency plans need to be developed and implemented; the aim is to mitigate the potential health consequences of these threats and to be ready to respond.

The WHO and the ministry of health partners (UN) need to ensure that specific health sector contingency plans are available for all major health threats; this enables preparation for threats and reduction of their potential public health consequences, identification of needs and outlining related actions, planning the implementation of these actions, identifying resources and the time needed for implementation. All plans must be regularly updated based on the evolving risks and environments.

The WHO is involved in contingency planning exercises with the UN to ensure all necessary health issues and partners. The key principles of contingency planning according to the WHO should be:

- Practical
- Simple and easy to do
- Realistic and feasible
- Needs-based and efficient, ensuring fair use of resources
- Process-driven for effective operationalization
- Regularity tested through exercises
- Monitored and updated [7]

### Business Continuity in Organizations

All organizations must have "Business Continuity" planning for disastrous events and such planning should cover business

## Dr. Mohammad Sabbah, Business Continuity in Medical and Healthcare Services

processes, assets, human resources, business partners, and customers [3].

Organizations can have different responses to disaster events. In recent years, research has been carried out into disasters and large-scale accidents, and it is now better understood. Although disasters remain unpredictable, organizations now realize that they can take positive steps that will significantly reduce their risk. "Business Continuity" planning is an aspect of management that establishes what is vital for an organization's survival following a major disaster affecting normal operations [8].

Many organizations test a "Business Continuity" plan two to four times a year. The schedule depends on the type of the organization, the amount of key personnel, and the number of business processes. Common tests include exercises and simulations; the testing team is usually composed of the recovery coordinator and members from each functional unit. Every "Business Continuity" plan must be supported from the top down. This means senior management must be represented when creating and updating the plan. Management is also the key to promoting user awareness [3]. Any organization needs to find good management solutions that can survive and sustain beyond any disaster or crisis. Each organization must expand its knowledge of business continuity, crisis management, and resilience to ensure continuity during and after the disaster. It is also essential to develop tools that will enable the organization to successfully manage the internal and external crisis.

Some elements are considered obstacles during disasters for organizations. These elements are critical in an emergency. For example, the supply of equipment, transportation, communications, and human resources. The organizations' awareness of these obstacles and their understanding can provide them with critical survival in the continuation of their activity. In the event of a disaster, no matter how much of the aforementioned elements are damaged, the organization to succeed and survive during and after the disaster must set priorities for it. Also crucial for the organization is to overcome obstacles and to return to normal activity in the fastest period.

"Business Continuity" planning is designed to prevent failures and to ensure continuity. The organization must maintain the ability to respond to any disruption. This enables the critical activities of each organization to resume operations as quickly as possible after any major disaster or failure affecting the organization's essential facilities and services [9].

There is not one recommended plan for maintaining business continuity. There is a need for each organization to develop a comprehensive plan for disaster management, a dynamic generic program that can be adapted to various emergencies. This planning will be directed at 4 objectives: identifying risks that harm the organization's routine activity, developing a plan to reduce the impact of the identified risk, training

employees to work according to the plan, and examining the effectiveness of the program [10].

### **Business Continuity in Medical and Healthcare Services**

Hospitals are organizations in every aspect. The structure of hospitals is a hierarchical structure, in which there is a chain of command and management. General Managers, department managers, and personnel. Also, hospital structures include various infrastructures, each of which is supported by a chain of different supplies. Damage to one of the hospital's structures, or damage to its supply chain, can endanger its survival. A hospital has a large population of patients who are supposed to receive treatment with continuity, even in case of an emergency. If a hospital cannot guarantee its survival during a disaster, it then must be evacuated to preserve the lives of patients hospitalized there. Despite business process management being around for more than twenty years, and continuity of care being discussed for over fifty years, healthcare organizations still strive to provide better service to their patients [11].

Healthcare continuity of operation is becoming the subject of increasing concern around the world. Events like terrorist activities, natural disasters, long-term power outages, and the threat of flu pandemic subject healthcare to real risks and makes it necessary to develop "Business Continuity" plans.

The lack of resources or clarity around the direct threat put many healthcare organizations at risk. "Business Continuity" planning is a decision-making process to decrease operation loss and maximize operation recovery and activity following any disaster that may occur at any time [12].

During a disaster, the supply chain in an organization may be affected, such as electricity and power supply, transportation, and communications. This can result in the disruption of the supply of medicines and medical equipment to the hospital, which can put the system in a state of helplessness and endanger the treatment process. During the disaster, there may also be a disruption in the computer system which can track the course of treatment for hospitalized patients, especially patients who receive critical treatment in critical departments.

Hospitals must implement a preparedness plan to ensure "Business Continuity" in the vital supply chain for the various hospital facilities; they need to store supplies of medicines and medical devices in a safe and accessible place that will allow them to use compliance during a disaster. A hospital must include technical information in its "Business Continuity" plans to ensure the ability to access medical history for patients being hospitalized. In case of damage to the facility's storage in the event of catastrophic damage such as earthquakes, rehabilitation time will be longer. An example of readiness for the "Business Continuity" of technological system and information is the Haiti earthquake disaster. Clinics functioned quickly and properly because local cell phone networks and mobile devices had been made part of the readiness plan.



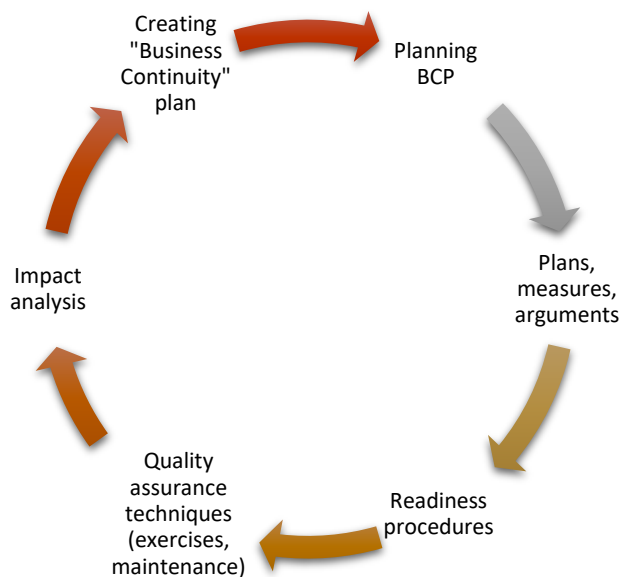


Figure 1. "Business Continuity" Planning Cycle

Although the issue of the supply of pharmaceuticals and medical equipment should be under government supervision, different companies and hospitals can use different strategies to reduce the disruption of their functional continuity and supply chain. This is about the acquisition of adequate supplies of drugs and equipment that can be kept in warehouses in case of a disaster. Identifying critical problems in various facilities of the hospital and planning correctly can

greatly minimize the damage done to the facility. The hospital should find an alternative product in case the used product is lacking. Healthcare providers need to update governmental bodies about any shortfall expected in the supply of drugs or foreseeable problems in the future product delivery so that the government can take measures to help deliver the product to hospitals, thereby minimizing supply chain disruption [13].

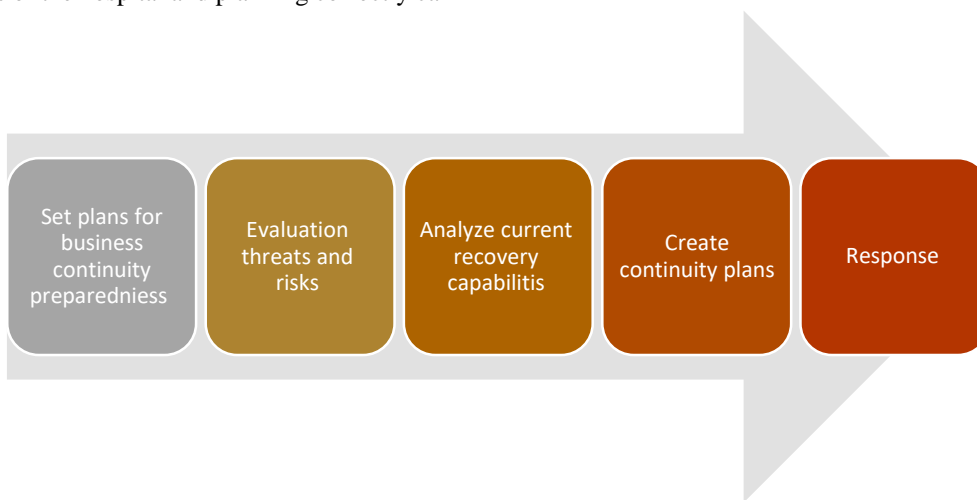


Figure 2. Preparing a "Business Continuity" Plan for Disaster Readiness

The year 2010 was named by the United Nations the year of natural disasters. The UN launched a worldwide campaign to improve the safety of hospitals and their continuity of operations in the face of natural disasters.

Many actions have been taken concerning international policies and in the academic community in the search for solutions to improve preparedness and responses to humanitarian emergencies while maintaining continuity of operation.

Croatia and Serbia in the southeast region of Europe have suffered the greatest impacts of natural disasters on their

healthcare facilities. Serbia is located in a region that is known for rapid climate change. During the last decade, a great number of healthcare facilities in Serbia were endangered due to ineffective construction and poor planning on part of the hospitals.

In Croatia, the situation is much better; there have been only sporadic and non-significant hospitals damaged during the disasters, mainly because of better prevention and proper maintenance [14].

Pandemic influenza planning presents challenges both for governments and for healthcare institutions. During a

## Dr. Mohammad Sabbah, Business Continuity in Medical and Healthcare Services

pandemic, governments must play a leadership and coordinating role; at times like these, health departments are the lead agency for responding to pandemic influenza. Healthcare organizations have been advised to develop pandemic plans; standard plans would be useful not only in assuring government and the community in general but also in assisting businesses seeking to assess their supply chain threats in case of a pandemic.

Many Australian departments of healthcare hold the primary source of information in case of a pandemic. Some have identified the website of their local health department as a source of information such as whether the pandemic has been detected in their area, where their local influenza clinic is, what services are being offered by local hospitals, and whether and when, and where, vaccines and antiviral medications will be available [15].

The ability to sustain critical systems (water loss, electrical power outages) is one of the main points in "Business Continuity" planning.

The hurricane seasons of 2004-2005 in Florida, USA taught healthcare leaders the importance of "Business Continuity" planning and how crucial it is. Florida Hospitals Association conducted a statistical analysis of the impact of hurricanes during the 2004 season. From the ninety-three hospitals that were surveyed, forty-one reported losing water supply, and eleven reported losses of another type of critical support function.

Electrical power is one of the most critical systems in hospitals. Many hospital managers do not consider that in most hospital facilities, the emergency generator does not provide enough power to cover all areas of the hospital facilities. For example, the elevator system is not considered in a backup power plan, but it is crucial and necessary for critical care patients in case of evacuation. Electrical power ensures continuity and functionality of the medical equipment to support critical care patients.

Another important critical system is water supply; water is needed for drinking, bathing, cleaning, heating, and air conditioning. The loss of water supply in the first days of impact requires the hospital to decide whether or not it is necessary to evacuate. The hospital manager needs to consider the priority of the water supply, and they must also understand that indirect hazard impact could affect their facility.

The Federal Emergency Management Agency (FEMA) determined that between 1976 and 2001 there were a total of 906 major disasters (including the terrorist attack on the twin towers in the United States), followed by organizations and companies (thousands) affected by these disasters. Due to the lack of updated rehabilitation emergency plans, many businesses and companies were forced to shut down. DATAPRO checked that 43% of firms affected by a serious crisis would never reopen their businesses, and another 29% failed within two years. According to FEMA, out of all businesses hit by Hurricane Andrew in 1992, 80% of them

had no plan for "Business Continuity" to maintain a business; they failed within two years as a result [16].

For example, during Hurricane Katrina, some hospitals that were not affected by direct flooding were without water for up to ten days due to the damage to water infrastructure.

Hospital managers also need to ensure ventilation and air conditioning systems. The airflow needs to be controlled to establish negative pressure for isolation from external contamination resulting from industrial accidents or terror events.

During the 2004 and 2005 hurricane seasons, the hospitals experienced elevation of temperatures due to lack of backup generators. Besides, without ventilation and air conditioning, the hospital is susceptible to mold growth.

Another important issue is an information technology (IT). "Business Continuity" planning for IT is required and crucial, with multiple contingencies including emergency power, communications, mirror computing site, and off-site data storage. During the 2004 hurricane season, the Florida Hospital Association increased its awareness of the need to bridge the communications gap between hospitals and their communities.

The hospitals needed to consider and identify these known gaps in coverage or infrastructure deficiencies:

- 1- Know the hospital's capabilities and limitations.
- 2- Ensure that a risk assessment is conducted for mitigation projects.
- 3- Develop mitigation plans and projects to ensure resiliency.
- 4- Develop contingency plans for the hospital's critical systems.
- 5- Communicate the urgency of these systems to service providers and verify priority restoration during response and recovery.
- 6- Educate each department head and key staff members on continuity plan roles.
- 7- Conduct regular exercises involving mission-critical systems.
- 8- Use exercises and real experiences to learn about all mission-critical systems.
- 9- Review the "Business Continuity" plan annually to ensure that it is up to date [17].

The ice storms during 2008/2009 winter seasons caused significant healthcare challenges in the Midwest and Northeast of the US. Many areas suffered significant power outages. Most of the healthcare facilities in this area have emergency management plans, and several of them have disaster recovery plans for their information technology systems. In some cases, however, this was not enough; it is essential to develop the critical infrastructure necessary for day-to-day emergencies in a way that can be scaled up to meet the needs of larger and more severe emergencies.

The healthcare sector knows what it is not doing in healthcare preparedness, but it is not clear exactly where it stands and how to accomplish the reoccurring recommendations for

## Dr. Mohammad Sabbah, Business Continuity in Medical and Healthcare Services

improvement. It is necessary to integrate the business continuity plan with emergency management and disaster recovery, collaborate with the emergency management director, and discuss what currently exists for departmental plans.

For any program to be successful, an awareness and training program is needed, as well as a schedule for maintaining and exercising the plan in case of emergency; protection of staff is very critical, it is necessary to provide for the safety and wellbeing of employees during any crisis. Further considerations include employee's family needs, the need to offer support to employees, childcare centers; housekeeping needs to be ready to set up space for overnight arrangements, and a plan needs to be developed for food services to accommodate staff staying overnight and working extra shifts.

Electronic and hard-copy documents, records, and information systems need to be available to support essential functions under the full spectrum of emergencies. Hospital personnel must be identified before an emergency to have full access to records and systems to conduct their essential functions.

Communications systems, including cell phones, e-mail systems, pagers, and similar mechanisms should be evaluated for interpretability and flexible exchange of use across the hospital where feasible. Phone numbers, e-mail addresses, and information addresses need to be available to all staff. Communication between the staff is one of the most critical components of business continuity planning [18].

The success of the "Business Continuity" plan is dependent on it being fully integrated into the organization. Senior management needs to have a thorough understanding of the processes and the ways they contribute to the strategic goals of the hospital [5].

In the children's hospital of Philadelphia, the business continuity plan is integrated by engaging the clinicians responsible for patient care through their monthly downtime task force. Business Continuity planning procedures are also included in the operations section of the emergency operation plan under the "Business Continuity" branch [9].

The Royal Victorian Eye and Ear Hospital located in East Melbourne, Australia, identified the need to ensure "Business Continuity" operation in the event of outages. In this case, in the final finding, there was a lack of formal "Business Continuity" documentation to assist the hospital in responding to a "Business Continuity" disruption.

"Business Continuity" practice is a novel concept for the healthcare systems; before the planning process, there needs to be a firm understanding of the strategic goals. It is necessary to stay focused on the processes and away from thoughts about disasters scenarios, and it is necessary to make sure that all the key stakeholders have an understanding of "Business Continuity" planning, and the healthcare services need to engage with another institution for "Business Continuity" training [5].

Blood services across the world are increasingly organized on a national basis, in line with the recommendations of the World Health Organization.

On the 24<sup>th</sup> of September 2012, following heavy rainfall, floodwater entered the Filton Blood Center in Britain. The floodwater caused a one-hour power loss, resulting in the loss of data services and telephony, refrigeration, environmental monitoring, air handling, and building management systems. The local emergency teams were formed at all other sites around the country in readiness to receive products from Filton Center.

The senior fire officer suggested evacuating Filton Blood Center, and it would be out of use for several weeks. Continuity of services to hospitals was maintained by providing services elsewhere and transferring blood stocks to other locations.

Within six hours, 12,000 products were transferred to other blood centers. A communication plan was activated for hospitals served by Filton of alternative provision and delivery schedules; this communication plan allowed hospitals to understand the event, and the result of this action was that the National Health blood services supplied every hospital without any delay.

After the accident, some key items for improvement were identified, including changing the command-and-control procedure, review of national provisioning plans, changes in fire training, and the need to create a mass-messaging facility to improve staff communication.

The Australian Red Cross Blood services followed the same recommendations of the WHO. On the 4<sup>th</sup> of July 2012, the Australian Red Cross Lifeblood / Blood Service (ARCBS) experienced failures in its network; operations continued using manual work for forty-two hours before the transition to the disaster recovery system. The major incident affected operations for over two weeks. The staff and management-maintained "Business Continuity" during the initial forty-two-hour outage; the "Business Continuity" plan was invoked as soon as the nationwide system outage occurred. By day two, plans were made to stagger user access to the disaster recovery system, with collection staff given the highest priority. On day three, the national blood supply contingency plan was activated to stage "white alert"; staff worked extra shifts to maintain the blood supply to hospitals. By day nine, blood stocks were improving, and the disaster recovery plan environment had stabilized [19].

Regional medical services play an important role in rescuing injured people, and it is necessary for local governments to continuously provide not only administrative services but also regional medical services.

In the event of a disaster, many people may be injured; therefore, medical institutions have to continue their services despite damages sustained. To ensure good "Business Continuity" operations in the medical system, it is necessary to consider the level of need for medical services, medical

## Dr. Mohammad Sabbah, Business Continuity in Medical and Healthcare Services

service delivery capabilities, and the gaps between medical needs and the capability of medical services.

During the Great East Japan Earthquake that occurred on March 11, 2011, 11 hospitals collapsed, 289 were partially damaged, 45 were unable to take in outpatients, while 84 were unable to accept inpatients from the disaster. The medical systems estimated the number of people not able to receive medical service based on the number of injured individuals in the disaster and the number of available resources in the hospitals [20].

Fourteen hospitals in Miyagi, Japan, were examined after the Great East Japan Earthquake. The main objective was to analyze the situation regarding stock related to disaster medicine to ensure "Business Continuity" (liquid fuel, water, medical goods, equipment, and food).

In terms of lifelines, medical supplies, and food, the number of disaster base hospitals (fourteen hospitals) with one day of stock or less in reserve before the disaster was seven hospitals (50%) for electricity supplies (liquid fuel), eight hospitals (57%) for water tanks, six hospitals (42.9%) for medical goods and equipment, and six (42.9%) for food and drinking water.

After the earthquake, electricity companies restored electricity in five hospitals (38.5%) within one day and to eight hospitals (61.5%) on day two or later. Water supplies were not disrupted or were restored to five hospitals within one day, and to eight hospitals on day two or later. Three hospitals suffered damage to water pipes, these three hospitals could not use their water supplies.

In the first seventy-two hours after the disaster, all fourteen hospitals required supplies (fuel, oil, kerosene, generators, and food). Approximately twenty-four hours after the disaster, two of the fourteen hospitals stopped admitting severely injured patients due to electricity and water stoppages and lack of medical and other supplies.

Many of the disaster base hospitals in Miyagi after the Great East Japan Earthquake did not have sufficient stockpiles of fuel for emergency electricity, water, drugs, medical supplies, and food. This is evidence of the lack of sufficient reserves as required for the "Business Continuity" of hospital operation during a disaster [21].

Internal disasters can significantly disrupt core functions of health information services including the provision of information of clinicians; missing medical data records or other information may give rise to a situation of clinical risk. External or internal disasters can cause permanent or temporary damage to medical records and threaten the integrity or availability of critical patient information.

The hospital health information service (HIS) is essential for patient care. All hospitals in the State of Victoria have a health information service department, 50% of the hospitals have experienced an internal disaster within the past decade; the most commonly occurring internal disasters were computer system failure. The Victoria hospitals were under investigation regarding their preparedness for systems failure

and other problems affecting normal business functioning caused by internal disasters.

The objectives of the study were to examine the level of preparedness, contingency plans for internal disasters, back-up plan systems readiness, and recovery plan, and identify potential risks for the HIS.

Only 38% of all the hospitals had contingency plans for the HIS. 46% of the large hospitals had resource allocation by health information services for disaster planning, 9% of the medium hospitals, and none of the small hospitals. 82% of the large hospitals had back-up systems plans, 73% of the medium hospitals, and 63% of the small hospitals. None of the hospitals had a planning team for internal disasters. 73% of the large hospitals had a disaster recovery plan, 55% of the medium hospitals, and 38% of the small hospitals.

There was cause for concern that there was a lack of uniformity in preparedness; larger hospitals were generally more prepared than smaller hospitals in terms of internal disaster contingency planning, related resource allocation, and recovery plans [22].

### SUMMARY

"Business Continuity" in hospitals is an issue that still needs to be looked into now and then to learn lessons and reach a situation in which every hospital considers these lessons and implement them in a reality. Health preparedness is one of the biggest and most complex issues in the history of public health studies. According to all studies around the world, repetitive exercises that include simulations of emergencies to multifaceted events can ensure good preparedness for hospital facilities, staff, and patients. Only with repeated drills, including exercises and controls, hospitals can be alerted and prepared for such emergencies.

### REFERENCES

1. Lindors K. & Tittle E. How to create an effective Business Continuity plan. 2017. Available from: <https://www.cio.com/article/2381021/best-practices-how-to-create-an-effective-business-continuity-plan.html>
2. Government of Canada. A guide to "Business Continuity" planning. Ministry of Public Works and Government Services. Catalogue No. D82-37/2003E. 2015. Available from: [https://www.jumpjet.info/Emergency-Preparedness/Disaster-Mitigation/A\\_Guide\\_to\\_Business\\_Continuity\\_Plan\\_ning.pdf](https://www.jumpjet.info/Emergency-Preparedness/Disaster-Mitigation/A_Guide_to_Business_Continuity_Plan_ning.pdf)
3. Nagata, T., Himeno, S., Himeno, A., Hasegawa, M., Lefor, A., Hashizume, M., Ishii, M. Successful hospital evacuation after the Kumamoto Earthquakes, Japan, 2016. *Disaster Medicine and Public Health Preparedness*, 2017, 11(5), 517-521. Available from: DOI: 10.1017/dmp.2016.180



4. Steps for developing an effective Business Continuity plan. In *Availity*. 2016. Available from: <https://availity.com/Blog/2016/November/4-Steps-for-Developing-an-Effective-Business-Continuity-Plan>
5. WHO guidance for business continuity. *World Health Organization*. Document number WHO/WHE/CPI/2018.60. 2021. Available from: <https://apps.who.int/iris/handle/10665/324850>
6. A Strategic framework for emergency preparedness. *World Health Organization*, ISBN: 978-92-4-151182-7. 2017. 2021. Available from: <https://apps.who.int/iris/bitstream/handle/10665/254883/9789241511827-eng.pdf?sequence=1>
7. WHO guidance for contingency planning. *World Health Organization*. WHO/WHE/CPI/2018.13.2018. 2021. Available from: <https://apps.who.int/iris/bitstream/handle/10665/260554/WHO-WHE-CPI-2018.13-eng.pdf>
8. Speight P. Business continuity. *Journal of Applied Security Research*, 6(4) 529-554. 2011. Available from: <https://doi.org/10.1080/19361610.2011.604021>
9. Véronneau S., Cimon Y. & Roy j. A Model for improving organizational continuity. *Journal of Transportation Security*, 2013, 6, 209–220. Available from: <https://doi.org/10.1007/s12198-013-0112-4>
10. Cerullo V., Cerullo M.J. Business continuity: A comprehensive approach. *Information System Management*, 2006, 21(3) 70-78. Available from: <https://doi.org/10.1201/1078/44432.21.3.20040601/82480.11>
11. Martinho R., Rijo R. & Nunes A. Complexity analysis of a business process automation: case study on a healthcare organization. *Procedia Computer Science*, 2015, 64(1) 1226-1236. Available from: <https://doi.org/10.1016/j.procs.2015.08.510>
12. Geelen-Baass B.NL., Johnstone J.MK. Building resiliency: ensuring business continuity is on the health care agenda. *Australian Health Review*, 2008, 32(1) 161 - 173. Available from: <https://doi.org/10.1071/AH080161>
13. Tosh P.K., Fekdman H., Christian M.D., Devereaux A.V., Kisson N. & Dichter J.R. Business and continuity of operations: care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. *Chest Journal*, 2014, 146(4) e1035-e1175. Available from: <https://doi.org/10.1378/chest.14-0739>
14. Radovic V., Vitale K. & Tchounwou P. Health facilities safety in natural disasters: Experiences and challenges from south east Europe. *Environmental Research and Public Health*, 2012, 9(5) 1677-1686. Available from: <https://doi.org/10.3390/ijerph9051677>
15. Dalton Craig B. Business continuity management and pandemic influenza. *New South Wales Public Health Bulletin*, 2006, 17, 138-141. Available from: <https://doi.org/10.1071/NB06035>
16. Cerullo V., Cerullo M.J. Business continuity: A comprehensive approach. *Information System Management*, 2006, 21(3) 70-78. Available from: <https://doi.org/10.1201/1078/44432.21.3.20040601/82480.11>
17. Bierenbaum A.B., Neiley B. & Savageau C. Importance of business continuity in health care. *Disaster Medicine and Public Health Preparedness*, 2013, 3(1) 7-9. Available from: <https://doi.org/10.1097/DMP.0b013e31819e6d8f>
18. Devlen A. How to build a comprehensive business continuity programme for a healthcare organization. *Journal of Business Continuity & Emergency Planning*, 2009, 4(1) 47-61.
19. Morgan S.J., Rackham R.A. & Penny S. Business continuity in blood services: Two case studies from events with potentially catastrophic effect on the national provision of blood components. *VoxSanguinis Journal*, 2015, 108(2) 151-159. Available from: <https://doi.org/10.1111/vox.12205>
20. Ogawa K., Kaneko M., Kajihara C., Sano M. & Munechika M. Systematization of countermeasures to improve business continuity of regional healthcare in a disaster. *Total Quality Science*, 2016, 2(2) 60-69. Available from: <https://doi.org/10.17929/tqs.2.60>
21. Kudo D., Furukawa H., Nakagawa A., Yamanouchi S., Koido Y., Matsumura T., Abe Y., Konishi R., Matoba M., Tominaga T. & Kushimoto S. Resources for business continuity in disaster-based hospitals in the Great East Japan Earthquake: Survey of Miyagi prefecture disaster base hospitals and the prefectural disaster medicine headquarters. *Disaster Medicine and Public Health Preparedness*, 2013, 7(5) 461-466. Available from: <https://doi.org/10.1017/dmp.2013.77>
22. Lee C., Robinson K.M. & Wendt K. The preparedness of hospital health information services for system failures due to internal disasters. *Health Information Management Journal*, 2009, 38(2) 18-26. Available from: <https://doi.org/10.1177/183335830903800203>