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Special Feature Article

Business Continuity Plan (BCP) Formulation Steps and Business Continuity Management (BCM) for a University Hospital in Japan that Experienced the Great East Japan Earthquake

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Abstract

Located in Sendai, Japan, Tohoku University Hospital (TUH) played an essential supporting role after the Great East Japan Earthquake (GEJE) in March 2011, having dispatched many medical staff to and accepted many patients from affected hospitals in the coastal area. Although it did not suffer significant human or property damage, the hospital experienced long-term disruption of lifelines and elevator stoppages. The episode revealed the importance of establishing proactive measures for resources related to the continuation of hospital functions and culminated in the formulation of a Business Continuity Plan (BCP), initiated in November 2016. The first edition of BCP

was compiled in November 2017 through the following steps: 1) Establishment of the BCP committee; 2) Review of critical operations/estimated Recovery Time Objective (RTO); 3) Investigation of human and material resources; 4) Risk analysis, assessment, and measures; 5) Development of a proactive measures list/damage assessment; 6) Reexamination of action plan, report of BCP documents; and 7) Development of the first edition of BCP. A formulated BCP requires Business Continuity Management (BCM) because, over the years, dissociation occurs between the items in the initial plan and the actual situation. Business continuity is focused more on the ability to make and modify plans than on the format of the plans. Based on the experience with the 2011 GEJE, the hospital must ensure that its facilities and equipment are operating to continue its medical activities and fulfill its social responsibilities even in a disaster. As part of BCM activities, TUH has been conducting emergency facility/equipment inspection training since 2018. A checklist has been created to efficiently inspect the ward building, which has the 21st floor above ground and underground, without using an elevator. This checklist has been updated with each training. In response to the request for temporary school closure due to the spread of the new coronavirus in February 2020, the hospital's BCM activities have been successful, leading to a prompt survey of hospital staff attendance. A steady BCP formulation process, which includes investigating resources, prioritizing operations, and considering alternatives, requires considerable time and effort. Still, the awareness of each department in TUH was increased, leading to the formation of an organization capable of responding quickly and flexibly to irregular situations.

Keywords: business continuity plan (BCP), business continuity management (BCM), prioritization of operations, alternative methods, resource management

Introduction

Hospitals, as public institutions of society, are expected to continue to provide medical care and protect the lives and health of residents even in times of disaster^{1,3)}. While this may seem usual for residents, it is worth wondering whether hospitals are

prepared for disasters and taking all possible measures. This paper describes the process of developing a BCP at TUH, which experienced a temporary malfunction due to the GEJE in March 2011, the steps involved in developing the plan, and its subsequent business continuity management (BCM).

I. Tohoku University Hospital BCP Formulation

TUH is one of the largest hospitals in Japan, with 1,160 beds, 3,300 employees, and approximately 100 departments (as of December 2019). At the 2011 GEJE, many medical institutions in the coastal areas of Miyagi, Iwate, and Fukushima prefecture were destroyed or shut down by the tsunami, and many patients were rushed to the remaining hospitals. To protect the services in those hospitals from exhaustion, TUH dispatched a large number of medical staff for an extended period, accepted many patients, and was able to provide logistical support as a "fortress of last resort" for local medical care⁹⁾. On the other hand, various issues emerged from the perspective of maintaining our hospital functions. TUH experienced functional failures, such as long-term lifeline disruptions¹⁾ and elevator stoppages⁶⁾, and keenly realized that not only architecture earthquake resistance measures but also measures for human and material resources related to functional maintenance and restoration would markedly affect the level of subsequent operations⁸⁾.

After the GEJE, emergency medical center staff volunteers in THU compiled an "action plan for each department" until 2014 that would form the

framework of the current BCP. However, the final plan still needs to be developed. In 2016, Tohoku University, a national university corporation, officially formulated the university BCP, and our hospital was also required to formulate BCP.

We referred to the Ministry of Health, Labour and Welfare's "Guidance for Preparation of Hospital Disaster Response Plans Based on the BCP Concept"⁴⁾, the Tokyo Metropolitan Government's "Guidelines for the Formulation of Business Continuity Plans (BCP) for Medical Institutions"¹²⁾, as well as BCP-related books^{2), 3)}.

1. BCP Formulation Process in TUH

1) Establishment of a permanent BCP committee

In formulating the BCP of our hospital, a BCP committee secretariat (hereafter referred to as the "secretariat") was established with three doctors, one nurse, two administrative staff (one facility staff and one general affairs staff), and one external expert (Figure 1). Considering that the volunteers above did not reach the final documentation and system, we aimed to establish a permanent BCP committee to implement BCP and maintain managing it as an official duty of the hospital. The BCP committee must function to ensure effectiveness, such as progress management and budgetary

measures, and was chaired by the vice hospital director in charge of disaster management. In addition, the committee was composed of representatives from about 20 departments, including the Emergency Medical Center and central facility departments, which comprised the core of response at the time of the disaster (Figure 1). The BCP Committee was formally established and held its first meeting in November 2016, followed by regular meetings (about 30 minutes) once a month for about one year to formulate BCP. The process is shown in Figure 2. At the meeting, the secretariat requested that committee members conduct the surveys in their departments and respond to the secretariat. The secretariat compiled the survey results, reported them at the next meeting, and requested the following survey. Thereby, the BCP committee repeatedly surveyed the hospital and built consensus.

2) Survey of Critical Operations/ Estimation of Recovery Time Objective (RTO)

When the committee was established, the secretariat and committee drafted the following basic hospital policies in the event of a disaster, which the hospital director approved.

(i) Ensure the physical safety and life of all hospital members and visitors, including patients, families, students,

faculty members, and staff.

(ii) Contribute to society by providing healthcare services in response to the disaster.

(iii) Cooperate and support the local community.

(iv) Prevent disturbances to the surrounding environment (e.g., fires as secondary disasters, spills of pathogens, hazardous materials, etc.).

(v) Retain critical medical, research, and educational information, facilities, and equipment, and restore the environment as early as possible.

The hospital clarified the aims to achieve during a disaster by clearly stating the above. In line with the basic policy, each department reviewed the critical tasks specific to that department to support hospital operations. Each department in the committee has a high level of expertise and specific duties (e.g., dialysis for the hemodialysis department). These unique and critical operations were divided into "daily operations that cannot be stopped even in the event of a disaster" and "new operations that will arise after a disaster." In addition, we evaluated the impact on patient's health status and the hospital's social reputation if these critical operations were interrupted for a certain period (Figure 3). The RTO was estimated based on the need to restore these critical operations by any means,

including alternative measures, before reaching the evaluation value C, which indicates that the impact is intolerable and irreversible. By creating a list that indicates the RTO for each critical operation, we could visualize essential functions of each department that need to be prioritized and those that can be delayed (Figure 3). The RTO was inevitably estimated from the perspective of maintaining the health status of patients and responding to social needs.

3) Management Resource Survey

A detailed survey was conducted on the management resources (human and material resources [hereafter referred to as "resources"]) necessary to carry out critical operations listed by each department in the second step, including the number of positions and personnel, lifelines such as electricity and water, goods, information, and other items and quantities. While most of the other processes were conducted in one month, this process took two months because it is the core of BCP.

4) Risk Analysis, Evaluation, and Countermeasures

In Step 3, each department conducted a detailed survey and analysis of resources required to perform critical operations. Each department self-evaluated these resources' preparedness level according to the following criteria: Preparation

Achievement A: Sufficient preparation, B: Started preparation and doing well, C: Started preparation but problems, D: Preparation has not been started. Specific measures to solve the issues were also described for resources rated as C or D. A list was compiled to visualize and concretize each resource's preparedness level and measures taken in advance to solve problems (for details, see the Tohoku University Hospital website)¹¹⁾. Because resource management and proactive measures for executing critical operations directly affect business continuity⁸⁾, we spent two months carefully examining Steps 3 and 4, which were considered essential for formulating BCP.

5) Formulation of Risk Countermeasure List/Assumption of Damage

Step 4 was organized and categorized into: (i) countermeasures that cover multiple departments, and (ii) countermeasures that can be solved independently by each department, and a list of "countermeasures to be implemented" was created. The table includes columns for the department (person) responsible for the countermeasures, planned implementation date, and implementation completion date to clarify where the responsibility lies and the deadline. In this process, the crisis event assumed in this BCP was an earthquake directly under the Sendai

Plain (seismic intensity of 6 or higher). The seismic intensity and damage assumptions were based on the "Sendai City Earthquake Hazard Map" published by the City of Sendai¹⁰.

6) Review of Action Plan, Compilation of BCP Documents, and Formulation of First Version of BCP

By January 2014, each department had updated the "Action Plan for each department," compiled mainly by hospital volunteers, and incorporated it into the BCP as a concrete action plan. This is a checklist of items to be implemented by each department as time passes after a disaster, and is designed to ensure that there are no omissions in the initial response immediately after a confusing disaster. The committee approved the BCP draft, including the general rules and document structure, and the first version of BCP was formulated on November 1, 2017, after approval by the Governing Council, which consisted of hospital executives. A public version of BCP is available on the hospital's website to serve as a reference for other medical institutions¹¹.

II. Business Continuity Management (BCM) at Tohoku University Hospital

BCP formulated diverges from the actual situation due to personnel, facilities, and equipment changes. Inadequacies and insufficiencies in BCP

are also revealed through drills and actual disaster experiences. If left unchecked, BCP will be rendered useless in the event of the next disaster, so periodic updates are necessary.

The essence of business continuity activities is not to formulate a document called "BCP" but to build an organization capable of constant BCM, including document updating, and to raise awareness. More than the "plan" itself, it is about fostering the "ability (equal to business continuity capability) to make and revise plans". Improving business continuity capability leads to a quick and flexible response to unforeseen circumstances and more flexible recovery.

As part of its BCM activities, the hospital updates its BCP annually and conducts various drills. Here, we introduce an emergency facility and equipment inspection drill and an example of an initial response to a novel coronavirus infection, in which BCM led to an actual response.

1. Emergency Facility and Equipment Inspection Drills

Since 2018, we have repeatedly conducted emergency facility and equipment inspection drills (hereafter "drills"). This activity is based on the GEJE's experience in 2011. It is a prerequisite for the hospital to continue its medical functions, fulfill its social

responsibilities during a disaster, and ensure that its facilities and equipment are operational even if alternative means are used.

As mentioned above, this large hospital has 1,160 beds, and nearly 10 buildings are involved in medical treatment. The largest building is the ward, which has two basement levels, 17 floors above ground, and a helipad. During the GEJE, elevators stopped running, and maintenance and inspection personnel had to move from the second basement to the heliport, equivalent to the 19th floor above ground, by stairs to perform inspections⁹). In addition to the physical burden, if inspections are not conducted promptly and systematically, assessing the damage to multiple high-rise buildings takes considerable time, making it difficult to decide prompt hospital management policies.

This drill focuses on how efficiently critical facilities and equipment can be inspected within one hour after a disaster occurs, when the first Disaster Control Headquarters meeting is held. Inspectors work in pairs, wearing helmets and carrying multiple communication devices and inspection checklists (Figure 4). Since elevators are not used, practical considerations such as removing inspectors with pre-existing heart, leg, or back problems from ward inspection responsibilities

are also necessary. The initial drill in 2018 showed firsthand that inspecting all areas in a limited time was impossible. This led to updating existing inspection checklists and establishing more efficient inspection routes and methods through repeated drills under different damage scenarios. Above all, the most significant benefit of the project was that the contractors engaged in maintenance and inspections, and the staff in charge of facilities and equipment in the hospital could "spontaneously" review the inspection checklists.

2. Initial Response to Request for Temporary Closure of all Schools Due to the Spread of COVID-19

BCM activities were most effective in the early stages of the COVID-19 pandemic in February 2020, when the government task force suddenly issued a request for temporary closure of all elementary, junior high, and senior high schools in Japan on February 27, when COVID-19 was gradually spreading⁵). At first glance, this request had nothing to do with medical institutions. Still, nurses and other hospital staff with children in the early elementary school grades could not secure a place to leave their children. In some areas, this reduced medical treatment functions at designated medical institutions for infectious diseases ⁷).

"Decrease in the number of staff" is one of the most critical issues to consider in the process of BCP planning. Whichever the cause is an earthquake or an infectious disease, "insufficient staff" numbers would occur similarly. In any case, it would severely impact the continuation of hospital functions. Early in the morning of the following day, Friday the 28th, a survey of the impact on hospital staff, especially nurses' attendance, was conducted until March 28. Due to the temporary support of school childcare and other services, it was revealed that there were few absences due to the simultaneous closure of schools starting on Monday, March 2, and that the continuation of hospital functions was not significantly impacted.

The larger the organization, the longer it takes to implement the initial response. In this case, there was no significant impact on hospital functions. Still, it was an excellent example of a continuous BCM effort that led to a prompt initial response by imagining that "school closure will reduce the number of staff".

Conclusion

In formulating BCP, "resource management" for executing critical operations was considered vital, and a thorough investigation of resources was conducted. Although the diligent survey

work required a great deal of time and effort, each department was able to clarify its weak points and establish a roadmap for solving problems through committee activities. In addition, a BCM system was established, and the PDCA (Plan, Do, Check, and Action) cycle was used to manage problem-solving progress by holding regular committee meetings. The resolution of issues will bolster the hospital's resilience. We recommend that those planning to start BCP/BCM also follow the procedures for formulating BCP, referring to guidelines and manuals, rather than copying and pasting so-called "templates." The fruits of the labor required will be considerably more significant than the effort required.

Many issues need to be addressed in the BCP of this hospital, such as hospital evacuation and response to CBRNE (C: Chemical, B: Biological, R: Radiological, N: Nuclear, E: Explosive) hazards. We must also improve our flood response timeline to cope with floods, which have increased in size and frequency in recent years. We will continue to promote BCM activities and aim to become a resilient medical institution in the face of disasters and trusted by society.

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Conflict of Interest

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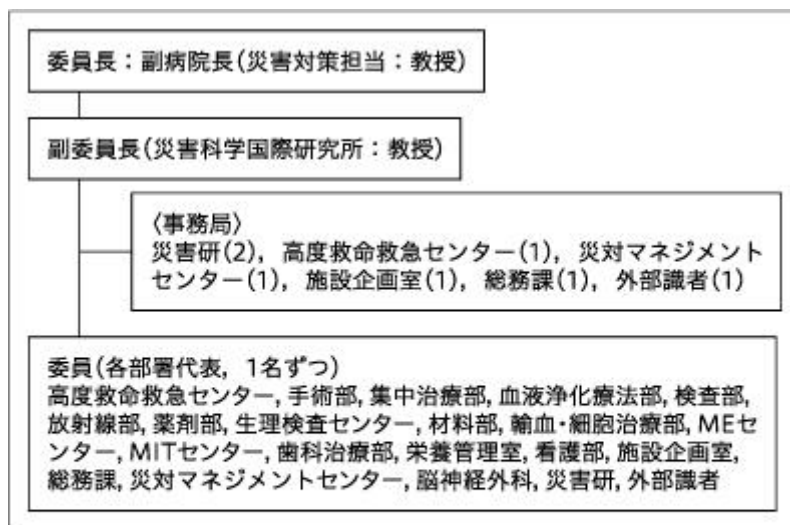


図1 東北大学病院 BCP 委員会構成

委員長には病院幹部である副病院長（災害対策担当）が役職指定で就く。委員には災害対応の中心となる高度救命救急センター、手術部、集中治療部、中央診療部門など約 20 部署の代表が就いた。

Figure 1 Structure of Tohoku University Hospital BCP Committee

The vice director (in charge of disaster management), a senior hospital official, was appointed as the chairperson of the BCP committee. The committee members included representatives from about 20 departments, including the Advanced

Emergency Medical Center, Department of Surgery, Department of Intensive Care, and Department of Central Medicine, which play central roles in disaster response.



図2 東北大学病院 BCP 策定行程

厚生労働省や東京都の医療機関BCPガイドライン、成書を参考に行程を立案。2014年までにまとめた「部署ごとのアクションプラン」をBCP内に取り込んだ。

Figure 2: Tohoku University Hospital BCP Development Process

BCP was formulated using the BCP guidelines and manuals of the Ministry of Health, Labour and Welfare and Tokyo Metropolitan Government for medical institutions. The "action plan for each department" compiled in 2014 was incorporated into BCP.

部署名	重要業務	重要業務 (中項目)	新規 or 通常	業務中断時間 (与目標復旧時間)										理由		
				<1時間	3時間	6時間	12時間	24時間	3日	1週	2週	1ヵ月	3ヵ月			
病院 本部	安全確保	職員	新規													一時も中断できない
		施設														
		患者と来訪者														
	生活支援	職員	新規													家族の支援も考慮
		患者														
	多数傷病者受入体制構築	トリアージエリア	新規													災害拠点病院としての社会的使命、発災後1時間以内に受け入れ可能にする
		外来														
		病棟														
	通常診療業務	中央診療部門	通常													2週間以内に通常診療体制に戻す
		外来														
災害時の地域医療機関の支援	病棟	新規													災害拠点病院の役割	
	中央診療部門															

図3 重要業務と目標復旧時間調査一覧 (一部抜粋)

重要業務中断による患者健康状態・社会的影響を評価基準に沿ってA~Cに分類。重要業務のなかでも優先的に行う業務、待機的に行う業務を可視化し整理できた。図は病院本部部分のみを抜粋。

Figure 3: List of Critical Operations and Recovery Time Objective (partial excerpt)
The impact on patient health and society due to the interruption of critical operations was classified as A to C according to the evaluation criteria. Among the critical operations, priority and standby operations were visualized and organized. The figure is an excerpt from the hospital headquarters section only.



図4 緊急施設・設備点検訓練の様子

点検者は2人1組で点検チェックリストに沿って院内重要施設・設備を点検する。各組に点検ルートが定められている。毎年、異なった場所に被害想定が隠されている。災害でエレベーターが停止している可能性もあり、訓練ではエレベーターを使用しない。

Figure 4: Emergency Facility and Equipment Inspection Drill

Inspectors work in pairs to inspect critical facilities and equipment in the hospital according to an inspection checklist. Each pair is assigned an inspection route. Every year, different, hidden areas are deliberately damaged. Elevators are not used during the drill because they may be stopped due to a disaster.