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Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Medicine

journal homepage: <http://ees.elsevier.com/apjtm>Original research <http://dx.doi.org/10.1016/j.apjtm.2015.07.006>

Analysis of good practice of public health Emergency Operations Centers

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ARTICLE INFO

Article history:

Received 15 May 2015

Received in revised form 20 Jun 2015

Accepted 15 Jul 2015

Available online 21 July 2015

Keywords:

Public health

Emergency operations center

Coordination

Command

Communication

ABSTRACT

Objective: To study the public health Emergency Operations Centers (EOCs) in the US, the European Union, the UK and Australia, and summarize the good practice for the improvement of National Health Emergency Response Command Center in Chinese National Health and Family Planning Commission.

Methods: Literature review was conducted to explore the EOCs of selected countries.

Results: The study focused on EOC function, organizational structure, human resources and information management. The selected EOCs had the basic EOC functions of coordinating and commanding as well as the public health related functions such as monitoring the situation, risk assessment, and epidemiological briefings. The organizational structures of the EOCs were standardized, scalable and flexible. Incident Command System was the widely applied organizational structure with a strong preference. The EOCs were managed by a unit of emergency management during routine time and surge staff were engaged upon emergencies. The selected EOCs had clear information management framework including information collection, assessment and dissemination.

Conclusions: The performance of National Health Emergency Response Command Center can be improved by learning from the good practice of the selected EOCs, including setting clear functions, standardizing the organizational structure, enhancing the human resource capacity and strengthening information management.

1. Introduction

Risk has become more and more of a concern by governments and the public in the past few decades. Especially in the past 10 years, from terrorist attacks such as 9.11 event to public health emergencies such as SARS and pandemic influenza, countries and international communities have paid great attention to risk response. The United States set up the Department of Homeland Security as a stand-alone, Cabinet-level department to coordinate and unify national homeland security work in 2003. China established the health emergency management system from national level to local level to be responsible for emergency preparedness, and response in 2004 after SARS. The World Health Organization revised the International Health Regulation and started to implement the new version on June 2007, which put great emphasis on the coordination and the management of events that may constitute a public health emergency of international concern.

Among all the general risks, health emergencies, emerging diseases mostly, are increasingly attracting the attention from the public as they tend to frequently occur [1] and easily spread. Public health emergencies have become the global challenges for the whole international community. The response to these emergencies is not only the responsibility of health department, but also demand the joint efforts from other departments such as communication department, transportation department, border control department, *etc.* to perform different tasks. Thus, effective communication and coordination among multiple agencies is a crucial issue.

Emergency Operations Center (EOC) has been widely used in public health emergency management for better multi-agency collaboration in the past decades. The essential nature of EOC is that it greatly improves the multi-agency coordination by having the heads of the various involved agencies together to share information and participate in decision-making processes [2]. So far, many countries and regions such as the United States and the European Union (EU) as well as international organizations such as World Health Organization, have established public health EOCs either independently in the health department or as a part of the overall command system in the government.

Chinese National Health and Family Planning Commission (CNHFPC) (used to be Ministry of Health) set up the National

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Peer review under responsibility of Hainan Medical University.

Health Emergency Response Command Center (NHERCC) after SARS in 2003, and since then it has played an important role in responding to emergencies such as Wenchuan earthquake and pandemic influenza H1N1. A lot of efforts have been made to use the center more effectively and frequently both in routine time and upon emergency, including carrying out the risk assessment and conducting exercises periodically. However, there are still a lot of gaps to be addressed before the center becomes a good working center. This paper is to study and summarize the good practice of the operations of public health EOCs in selected countries and regions, and thereby to make constructive suggestions to improve the performance of the NHERCC in CNHFPC.

2. Materials and methods

A comprehensive literature search that formed the basis for this review on the public health EOCs in the United States, the EU, the United Kingdom and Australia was conducted. The countries and regions were selected mainly based on the availability of the relevant literature, together with their development levels of the EOC. There were well-developed national EOCs that were not included in the study due to the limit of the language.

For the literature review, relevant articles on the journals, dissertations, published books, and grey documents that were related to EOC of the selected countries were retrieved. The online database Pubmed, Cochrane library, NHS evidence and the general Google search instrument as well as the library database of University of Oxford were used to identify studies and reviews published in English from 1994 up to July 2014.

Search terms included public health, (disaster or outbreak or disease outbreak or risk or emergency or event) and ('EOC' or 'emergency operations centre/center' or 'command and control operations centre/center' or 'strategic health operations centre/center' or 'command centre/center' or 'situation room' or 'crisis management centre/center' or 'emergency co-ordination centre/center') along with the name of the respective country or region.

In addition, official websites of the Ministry of Health of the respective country or region were searched. Personal communication with experts helped to identify additional published literature. The reference lists of retrieved articles, abstracts, books and presentations of international workshops served as additional sources of information.

The main question to be answered by this review was 'How are the EOCs built and operated in the health department in the United States, the EU, the United Kingdom and Australia'? The topic was generally broad. To be more practical and focused, the information of EOCs related to the following aspects was collected and categorized:

- 1) What are the functions of the EOCs?
- 2) What is the organizational structure of the EOCs?
- 3) How are the human resources working in the EOCs?
- 4) What is the information management in the EOCs?

3. Results

Public health EOCs developed very fast in the past decades after SARS. Quite a number of EOCs of health authorities were set up or strengthened in the first decade of the 21st century. The EOC of the US Center for Disease Control and Prevention

(USCDC) was set up in 2001 and began to provide a centralized and physical location to manage CDC's response to domestically and internationally large-scale public health incident from 2003 [3]. The EOC of the European Center for Disease Prevention and Control (ECDC) has become operational since June 2006 [4].

In this study, one national or regional public health EOC was selected in each of the identified countries and region. The key information of the four aspects from the selected EOCs including functions, organizational structure, human resources, and information management, are summarized in Table 1.

3.1. EOC functions

The functions of EOCs are widely discussed in the emergency management discipline. Ron Perry listed the key functions of an EOC comprising: 'coordinating overall response; making policy decision; allocating personnel; gathering information; dispersing information to the public; and hosting visitors, especially VIPs' [2]. According to National Incident Management System of the United States, the core functions of an EOC include: 'coordination; communications; resource allocation and tracking; and information collection, analysis, and dissemination' [5]. There are other versions of EOC function lists, however, 'the importance of coordination, communication, management and information gathering and interpretation are the consistent themes' [6].

All selected EOCs have the function of coordinating and commanding the emergencies response activities to public health threats or planned events in their countries or regions, and abroad, which include information management, personnel deployment and resource allocation [7,8]. In addition to the basic EOC functions, public health EOCs play an important role in closely monitoring the situation, and providing a platform for the health professionals to analyze the collected information and make risk assessment based on that. To maintain the situational awareness is highlighted by all the selected EOCs, especially by Emergency Operations Center of European Center for Disease Prevention and Control (ECDC-EOC). As a supranational center, ECDC-EOC provides support for ECDC threat detection, risk assessment, investigation and risk communication activities for emerging public health threats in the EU member states and internationally. During routine time, daily risk assessment and epidemiological briefings are held in the EOC as its main functions. Besides responding to the real emergencies or events, Emergency Operations Center of US Center for Disease Control and Prevention (USCDC-EOC) and ECDC-EOC are actively involved in conducting exercises to evaluate their ability to respond rapidly and effectively to potential public health emergencies as well as make adjustment accordingly [5,9]. USCDC-EOC also emphasizes the efficiency or timeliness of personnel and resource allocation and can manage to transport them to anywhere in the world within hours after notification.

3.2. Organizational structures of the EOCs

The organizational structure is a very important aspect of EOC development and operation, which determines how the EOC is consisted of and how it works. All the selected EOCs have standardized and flexible organizational structure, and among them Incident Command System (ICS) is widely applied. Established as a standardized emergency response operating

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