

Scoping Review on Health Workforce Training  
Strategy in Health-Emergency Disaster Risk  
Management (Health EDRM) in Chinese Literature

Name: Wong Ka Ki

Student ID: 1155139422

Program: MSc in Prehospital and Emergency Care

Module: PHEC5008

Academic Supervisors: Dr. Hung Kei Ching, Kevin &  
Professor Colin A. Graham

## ***Abstract***

*Background:* A total of 396 natural disasters have been recorded in 2019 and caused the loss tens of thousands of human lives. The Sendai Framework for Disaster Risk Reduction emphasizes the importance to strengthen disaster management plan in order to enhance disaster management preparedness. Health workforce is one of the key components in the Health-Emergency Disaster Risk Management (Health EDRM) framework of the World Health Organization (WHO). To date, there was not a well development health workforce training strategy in dealing Health EDRM. This study aims to identify the core competencies for Health EDRM and formulate a well-structured curriculum for health workforce.

*Design:* A scoping review was conducted on Chinese language literature. Studies related to training for disaster management or curriculum on disaster management or survey on the training needs for medical professionals would be included.

*Results:* We have included five papers related to disaster management curriculum and surveys on the training needs for medical professionals. And we identified five domains which would be suggested to be the core competencies in disaster management curriculum.

*Conclusions:* The core competencies for disaster management in the past decades were yet to be identified. Given that the increasing numbers in natural or man-made disaster, disaster management is a subject that needs to be included in modern medical training and a well-structured curriculum is needed.

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## ***Introduction***

Disasters could struck anywhere and at any time around the globe. According to the World Health Organization (WHO), disaster is an occurrence disrupting the normal condition of existence and causing a level of suffering that exceeds the capacity of adjustment of the affected community [1]. A total of 396 natural disasters were recorded by the EM-DAT in 2019 [2]. More than eleven thousand human lives and 103 billion US dollars were loss around the world, not to mention the aftermath which would affect millions of people. In order to reduce the risks of disaster causing tremendous casualties and economic loss, it is important for every country to possess a well formulated disaster management plan, so as to enhance the preparation, training and medical care of health workforce to tackle the effects of disaster.

On 18<sup>th</sup> March 2015, the Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third United Nation World Conference [3]. This framework emphasizes in order to reduce disaster risks and building up resilience, it important to understand existing disaster risks, to strength current disaster management plans, to invest in disaster risk reduction and resilience, and to enhance the disaster preparedness for effective response. According to WHO's Health EDRM framework, it is important to develop multisectoral and health sector capacity development strategies for specific component [4]. One of the key components is health workforce. In order to ensure the

effectiveness of Health-EDRM strategies, a well-planned staffing requirement, education and training for competency development and occupational health and safety are important for health workforce.

China is a country that is susceptible to both natural and man-made disasters. In 2008, Wenchuan of the Sichuan Province in China was struck by a devastating earthquake and over sixty thousand lives have been lost [5]. This catastrophe not only sounded the alarm to remind us all that disaster is lurking just around the corner, but also reminds us the importance of preparing to face this kind of catastrophe. In April 2006, the National Emergency Management Office of the State Council was established in order to take charge of daily work of national emergency management [5]. In 2007, the Chinese government has passed the “Emergency Response Law of The People’s Republic of China”, aiming to improve its emergency response system [6]. Even though there were government agencies and laws established, hoping to reduce the risk of disaster and improve the resilience, the earthquake in 2008 still haunted the Chinese people. There are still much to improve. China is now consistently trying to improve its ability to prevent and mitigate disasters by improving The Master State Program for Emergency Response.

Apart from implementing policies and setting up disaster management program, workforce competency is another concern. Education on disaster management aims to

provide knowledge to reduce vulnerability to disaster [7]. According to Hyogo Framework for Action (2005-2015), the third function for reducing disaster risk is to apply knowledge so as to create a culture of safety and resilience [8]. After the Wenchuan earthquake, the Hong Kong Polytechnic University had collaborated with Sichuan University and setup a Disaster Nursing Task Force under the World Health Organization Collaborating Centre for Community Health Services [9]. The task force not only offered immediate support for post-earthquake reconstruction, it also established organized education in disaster management to health professionals, both in Hong Kong and in China. This provided the basic knowledge of disaster management to nurses however, a specific and continuous curriculum has yet to be setup in Hong Kong. Therefore, we hope that we can identify the core competencies for Health-EDRM from this review, so as to formulate a well-structured curriculum for health workforce.

### ***Research Question***

- What evidence is available for developing a comprehensive health workforce training strategy for health-emergency and disaster risk management?

## ***Hypothesis***

- This is a hypothesis generating study, no a-priori hypothesis

## ***Research Objectives***

1. To explore how a comprehensive workforce training strategy can have a positive impact on health-emergency and disaster risk management
2. To formulate a workforce training strategy
3. To enhance the preparation, training and medical care in facing health-emergency and disaster risk management

## ***Methodology***

### *Study design*

This is a scoping review focused on Chinese language literature of workforce development strategy in Health EDRM.

### *Scoping review*

The reason for doing a scoping review is because the literature of health workforce development for health-EDRM has not been comprehensively reviewed and we aimed to identify key knowledge gap for further development of a conceptual framework and as a precursor for future systematic review. This scoping review followed the



recommendation of Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist. [10]

### *Search strategy*

Searches of literature were performed in the database of China National Knowledge Infrastructure (CNKI). CNKI is the most comprehensive gateway of knowledge in China. This search engine has partnered with over 1600 institutions all over the world and it has 3 versions in different languages (English, simplified Chinese and traditional Chinese). The search result will not be differed using different version.

The search terms in Chinese language with the meaning of training, catastrophes, disasters, earthquake and floods were used including:

“Catastrophe + training” (‘zāi nán 災難’ + ‘péi xùn 培訓’)

“Disaster + Training” (‘zāi hài 災害’ + ‘péi xùn 培訓’)

“Training + Earthquake” (‘péi xùn 培訓’ + ‘dì zhèn 地震’)

“Training + Flood”. (‘péi xùn 培訓’ + ‘shuǐ zāi 水災’ / ‘hóng shuǐ 洪水’)

The articles were published between January 2010 to 15<sup>th</sup> October, 2020. In addition, the articles were presented under the category of “Medicine and health technology” (Yī

Yào Wèi Shēng Kē Jì 醫藥衛生科技) and under the sub-category of “Emergency Medicine” (Jí Jiù Yī Xué 急救醫學) in CNKI. Also, grey literature search was also commenced for the key words with the meaning of disaster rescue training.

### *Selection of Literature*

The titles and abstracts of the literature were screened by one reviewer according to the inclusion criteria. Then the full text of the included literature was screened by two reviewers independently according to the exclusion criteria and formed a finalized result as mentioned in table 1.

### *Inclusion criteria and exclusion criteria*

Inclusion criteria and exclusion criteria were established. Only articles in Chinese language would be included for the review. Also, the articles should be related to training or exploring the training needs for disaster management. The training mentioned in the articles should also be related to training provided for medical professionals including medical practitioners, nurses, paramedics, health administrators, medical or nursing students.

The included studies were reviewed by two reviewers independently. Studies which were not able to access full text would be excluded. In addition, if the study was not

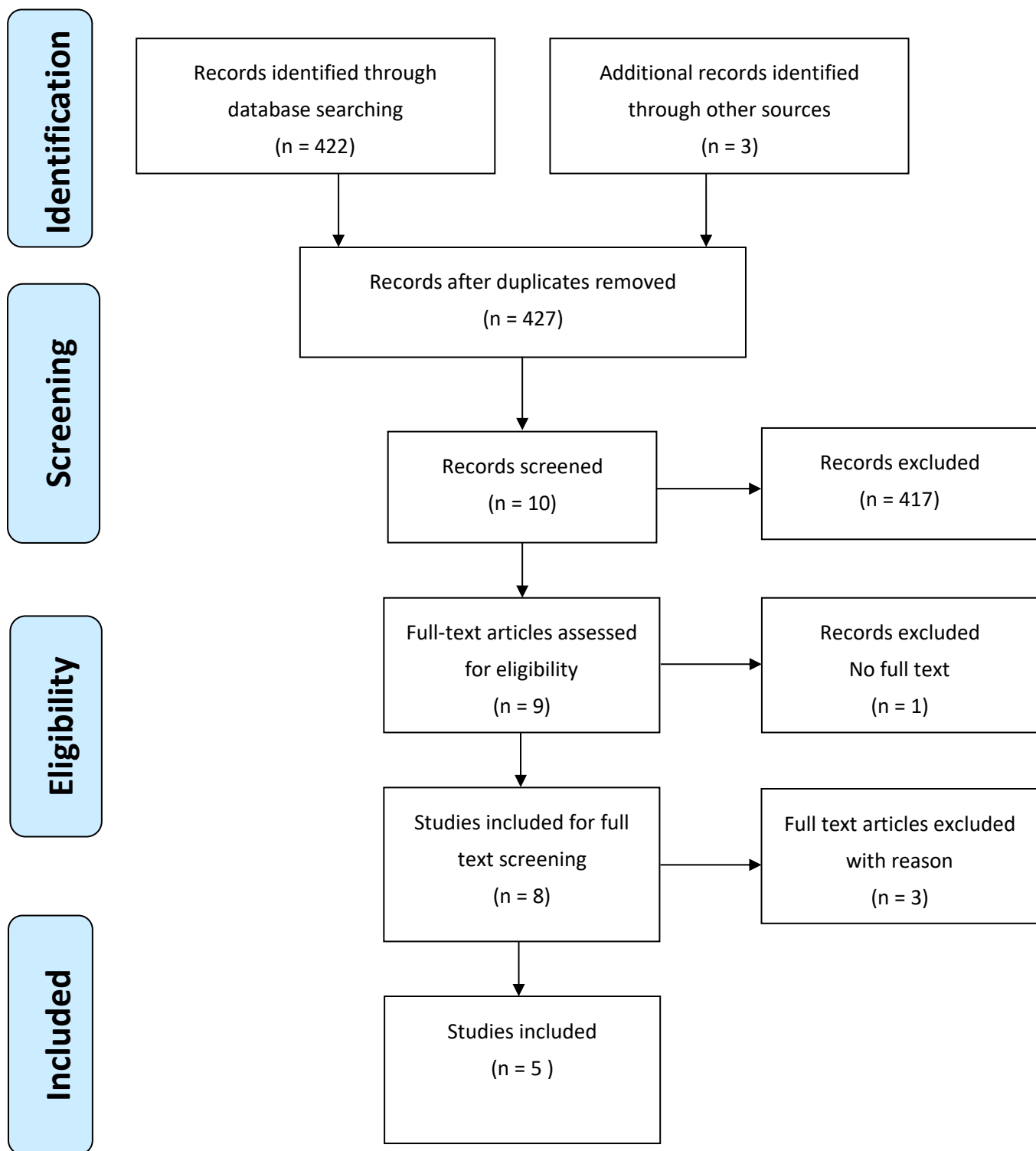
addressing the training needs related to disaster management or it was only narrative reports or expert opinions would be excluded.

#### *Data extraction*

The data of each article was extracted using the standard data extraction form (appendix I).

### ***Results***

The search strategy yielded 422 papers from CNKI. After reviewing the titles and abstracts, 414 articles were excluded as they did not match the inclusion criteria. Only 8 articles remained. Another 1 article was removed as full text was not accessible. Full text screening using the exclusion criteria was commenced and 3 studies were included. Another 2 grey literature were also included. Hence, 5 studies were included in this review. Among these 5 studies, 3 were survey investigating the training needs for healthcare professional in disaster management. 2 were retrospective studies on existing training program for healthcare professional in disaster management.



**Figure 1. Health Workforce Training Strategy in Health-Emergency Disaster Risk Management in Chinese Literature Flow Diagram**

Table 1. Included studies

Arthur, Year	Target participants	Survey content	Survey results	Suggested curriculum
Wáng Lěi <i>et al.</i> (2010)	Nurses Nursing students	<ul style="list-style-type: none"> <li>- Theory written test</li> <li>- Individual assessment</li> <li>- Communication skills</li> <li>- Group assessment</li> </ul> <ol style="list-style-type: none"> <li>1. Prehospital transfer and wound management</li> <li>2. Emergency rescue preparedness</li> <li>3. Care to the vulnerable</li> <li>4. Disaster emergency planning</li> </ol>	<ul style="list-style-type: none"> <li>- Evaluation survey</li> <li>- 6 out of 7 questions score about 4 in Likert scale</li> </ul> <p>“I acquire the basic skills to be a disaster rescuer”</p> <p>scored below 4, indicated participants required further course in order to master the skills</p>	<ol style="list-style-type: none"> <li>1. Lectures <ul style="list-style-type: none"> <li>- Concept of disaster nursing</li> <li>- Ethical consideration in disaster nursing</li> <li>- Psychological response and self-reconstruction in disaster</li> <li>- Management of emotion and restore hope</li> <li>- Legal and ethics in disaster</li> </ul> </li> <li>2. Action learning <ul style="list-style-type: none"> <li>- Disaster survival pack, Different disaster and distribution</li> </ul> </li> <li>3. Site visit <ul style="list-style-type: none"> <li>- Disaster scene, Board room hospital, Disaster medicine rescue organization</li> </ul> </li> <li>4. Role play</li> <li>5. Problem-based learning <ul style="list-style-type: none"> <li>- Emergency rescue, Care to the vulnerable, Disaster preparedness plan</li> </ul> </li> <li>6. Skills training <ul style="list-style-type: none"> <li>- Communication skills</li> <li>- Prehospital transfer</li> <li>- Interview and assessment skills of community health</li> </ul> </li> </ol>

Table 1 (continue)

Arthur, Year	Target participants	Survey content	Survey results	Suggested curriculum
Hú Hǎi <i>et al.</i>  (2012)	Medical students	<ol style="list-style-type: none"> <li>1. Demographic data</li> <li>2. General knowledge on disaster medicine</li> <li>3. Knowledge and skills in disaster rescue                             <ul style="list-style-type: none"> <li>- Rescue features in different disaster</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Disaster medicine training needs top 3: Survival skills, CPR, trauma rescue</li> <li>2. Management of disaster medicine training needs top 2: Management of disaster, knowledge of other related specialties</li> <li>3. More participants prefer professional rescue to management and coordination                             <ul style="list-style-type: none"> <li>- Training needs in different disaster top 2: Earthquake, fire</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Professional knowledge and skills are not the most deficient in a rescue team</li> <li>2. Enhancement needed                             <ul style="list-style-type: none"> <li>- Mastering professional knowledge in disaster rescue</li> <li>- Management and coordination of disaster medicine</li> <li>- Communication skills</li> <li>- Building of a disaster rescue team</li> </ul> </li> </ol>
Gǒu Jūn  Chén <i>et</i>	Doctors and nurses	<ul style="list-style-type: none"> <li>- Participation in real disaster situation after 2008; Disaster drills</li> <li>- Evaluation content:                             <ol style="list-style-type: none"> <li>1. Team structure, Team member</li> <li>3. Successful rate in resuscitation</li> <li>4. Rescue triage, Skills operation</li> <li>6. Time in reacting to disaster situation</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>- The group with standardized training has a better performance in all aspect</li> <li>- Survival rate is higher</li> </ul>	<ul style="list-style-type: none"> <li>- Enhancement of general medical knowledge and experience</li> <li>- Disaster rescue drills and outward-bound training</li> <li>- Management on emergency supply and equipment</li> <li>- Management in common infectious disease after disaster</li> </ul>

<p><i>al.</i>  (2014)</p>		<p>and report 7. Physical test, Psychological test 9. Resuscitation in critical patient 10. Commanding system 11. Supporting system</p>		<p>- Public education on disaster rescue and survival skills</p>
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Table 1 (continue)

Arthur, Year	Target participants	Survey content	Survey results	Suggested curriculum
Chén Fēi <i>et al.</i> (2014)	Health Administrator  Medical practitioners  Nurses  Medical teachers  Medical students	1. Demographic data 2. Disaster Medicine Knowledge -	a. Only 1.3% of the participants had ever received systematic training on disaster medicine b. 87.1 % of the participants have low or moderate knowledge of disaster medicine c. Media are the most common channel to acquire knowledge on disaster medicine d. Top 3 interested content i) Basic concept of disaster rescue ii) Concept of rescuing casualties and resuscitation skills iii) Post crisis psychological first aid iv) Earthquake v) Application of information technology in disaster rescue  Key content i) Basic resuscitation skills in different specialty ii) Management and prevention of infectious disease after disaster iii) Psychological crisis after disaster iv) Concept of managing different disaster v) Triage and transfer	1. Core module: - Basic concept of disaster medicine - Planning in reducing disaster - Basic elements in disaster rescue and emergency procedures - Basic skills in resuscitation of different specialties - Triage - Prevention and management of epidemic of infectious disease - Psychological management in disaster - Rescue in different disasters 2. Short term training for healthcare professionals - Importance in disaster rescue - Triage, Rescue team structure - On-site rescue procedure of major disaster - Surveillance, Detection of potential hazards - Preparation of rescuers, Utilization of PPE - Operation of different rescue devices - Common resuscitation procedures - Operations and making of simple medical devices - Prehospital assessment - Management of potential diseases



			vi) Basic concept of disaster medicine vii) Management of disaster medicine	<ul style="list-style-type: none"> <li>- Public health management</li> <li>- Intervention of psychological crisis</li> <li>- Construction and management of rescue camp</li> <li>- Basic Wilderness survival skills</li> <li>- Assessment: disaster drills</li> </ul>
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Table 1(continue)

Arthur, Year	Target Participants	Survey Content	Survey Result	Suggested Curriculum
Lú Nán Jūn <i>et al.</i> (2018)	Nurses	<ol style="list-style-type: none"> <li>1. Demographic data</li> <li>2. Training situation in disaster rescue</li> <li>3. Practical experience in disaster rescue</li> <li>4. Knowledge level related to disaster medicine</li> </ol>	<ol style="list-style-type: none"> <li>1. 41.33% participated in disaster rescue training</li> <li>2. 72.5 % participated in emergency technical training</li> <li>3. 37% participated in disaster rescue simulation drills</li> <li>4. There was significant difference in knowledge of disaster relief among different department</li> </ol>	<ol style="list-style-type: none"> <li>1. Enhancement needed                             <ul style="list-style-type: none"> <li>- Mastering professional knowledge in disaster rescue</li> <li>- Transfer of casualties</li> <li>- Management of psychological crisis</li> </ul> </li> <li>2. Simulation disaster rescue drills</li> </ol>

Table 2. Most mentioned domain to be included in the curriculum

Most Mentioned Domain	Content	Reference
Knowledge of disaster medicine	Basic concept of resuscitation, Disaster rescue, CPR, Application of tourniquet, Prehospital care and transfer of casualties, Triage Prevention and management of common infectious disease after disaster	Wáng Lěi <i>et al.</i> (2010) Hú Hǎi <i>et al.</i> (2012) Chén Fēi <i>et al.</i> (2014) Gǒu Jūn Chén <i>et al.</i> (2014) Lú Nán Jūn <i>et al.</i> (2018)
Management of psychological crisis	Psychological response and self-reconstruction Management of emotion and restore hope Post-traumatic stress disorder Principle of psychological first aid	Wáng Lěi <i>et al.</i> (2010) Chén Fēi <i>et al.</i> (2014) Lú Nán Jūn <i>et al.</i> (2018)

Table 2. (continue)

Most mentioned domain	Content	Reference
Disaster rescue drills	Drills on different disaster e.g. earthquake, flood, fire	<p>Chén Fēi <i>et al.</i> (2014)</p> <p>Gǒu Jūn Chén <i>et al.</i> (2014)</p> <p>Lú Nán Jūn <i>et al.</i> (2018)</p>
Communication	<p>Team structure</p> <p>Commanding system, Supporting system</p> <p>Management and coordination, Disaster plan</p>	<p>Wáng Lěi <i>et al.</i> (2010)</p> <p>Hú Hǎi <i>et al.</i> (2012)</p> <p>Gǒu Jūn Chén <i>et al.</i> (2014)</p>
Public Education	<p>Survival package</p> <p>Disaster reduction and preparedness plan</p>	<p>Hú Hǎi <i>et al.</i> (2012)</p> <p>Chén Fēi <i>et al.</i> (2014)</p> <p>Gǒu Jūn Chén <i>et al.</i> (2014)</p>

### ***Content analysis of the literature***

The content of the included literature was further analyzed and was shown in Table 2.

From the selected literatures, 2 were investigating the effectiveness of disaster medicine training program. Gou et al [11] provided standardized training in disaster medicine to 28 doctors and nurses for 3 years and then evaluated the effectiveness of the training program through comprehensive tests, disaster drills and practical disaster rescue operations. The results were compared to that of a team without training and it showed that the team with standardized training performed significantly better in terms of skills, organization, coordination and efficiency. It was cleared that standardized training enhanced the rescue team in terms of team structure and facilitated the rescue operation effort in a more efficient manner.

Wang et al [12] also provided a training program to 153 selected nurses and nursing students throughout China, Hong Kong, Macau and Taiwan in 2009. The purpose of the training was mainly influenced by the impact of 2008 Wenchuan earthquake. It was a program aiming to provide a standardized and well-structured disaster training. The program included lectures on concept of disaster nursing, action learning on disaster survival pack and different disasters, site visit on disaster scene and board room hospital, role plays on restoring hope and solving potential psychological problems, problem-based learning on emergency rescue and disaster preparedness plan and finally,

communication skills training. This program lasted for 2 weeks. The effectiveness of the program was evaluated through theory written test, individual assessment on communication skills and group assessment on team coordination. A survey was conducted after the evaluation and the result showed that students were satisfied with the program content and the way of delivering the program and scored a 4 out of 5 in a Likert scale. The above article provided example of the basic structure, content and the way of delivery of a training program in disaster medicine.

The other 3 articles were focused on exploring the training needs for healthcare professionals through surveys. Hu et al [13] conducted a survey in Sichuan University. 57 medical students studying the subject of 'Survival and Rescue' were recruited. The survey mainly focused on exploring the level of general knowledge on disaster medicine, knowledge and skills on disaster rescue and the knowledge of rescue features in different disasters. From the survey result, it found out that medical students required more training in knowledge of basic disaster medicine than management and coordination. It also stated that earthquake was the most interested disaster in medical students' point of view.

Chen [14] conducted another survey in Shanghai in 2014. It aimed to evaluate the level of knowledge in disaster medicine and the training needs of medical professionals. 600 medical practitioners, nurses, medical teachers, health administrators and 500

medical students were recruited into the survey. The results showed that 87.1% of the participants (both healthcare professionals and medical students) have low or moderate knowledge of disaster medicine and they lacked systematic training of disaster medicine. It also found out that the participants indicated a few important contents for the training course which include ‘first aid skills’, ‘epidemic prevention and control’, ‘psychological problems in post-disaster relief’ and ‘principles of disaster disposal’. The participants also preferred lectures and practical training as teaching method.

Lu et al [15] conducted another survey in 20 hospitals in Beijing. The aim of the survey was to evaluate the competencies of nursing staff. A total of 605 nursing staff were recruited in this survey. Less than half of the participants had had disaster rescue training or got involved into disaster rescue simulation drills. Also, nursing staff from different department showed difference in knowledge level in disaster relief.

Among these 5 articles, the most mentioned domains for disaster training course were ‘Knowledge of disaster medicine’, ‘Management of psychological crisis’, ‘Disaster rescue drill’, ‘Communication skills’ and ‘Public education’ as stated in table 2.

## ***Discussion***

### *Knowledge of disaster medicine*

Knowledge of disaster medicine had been mentioned in all of the included studies, as one of the most important elements that should be included in the curriculum of disaster medicine. The reason why it was the most important element, was that the included studies found out medical professionals were generally lack of knowledge on disaster medicine. This phenomenon created a huge gap in disaster management. Therefore, creating a well-structured curriculum in disaster medicine education is crucial.

According to the studies from Pfenninger et al [16] and Hugelius et al [17], their studies mentioned that disaster medicine was an indispensable part of medical education for disaster preparation. In Pfenninger et al [16] study, they proposed a disaster medicine course comprising 14 modules with the first three modules were about the concept of disaster medicine, disaster medical management and specific disaster medicine.

Hugelius et al [17] introduced the HOPE model for disaster nursing education. The HOPE model stands for holistic health assessment and promotion, organization and management of immediate response, professional adaptation and endurance and recovery. These four elements included practical skills in life saving and rescue; planning and organizing staff and materials deployment; promoting survival skills and



balancing staff's personal needs; skills in promoting recovery and the endurance of the affected community.

Both of these studies put the basic concept of disaster management and skills in disaster rescue in the beginning of their proposed program, indicating these elements were the basic requirement for disaster medicine education.

In China, studies [11, 15, 18] have indicated there was a knowledge gap presented in current medical training and they suggested a standardized training curriculum in disaster medicine was necessary. The survey has proven that mastering of knowledge in disaster medicine was the top priority. Therefore, future disaster training can combine the suggested curriculum and methods from the above studies. However, the curriculum should be further explored in the future so as to evolve into a well-developed program for medical personnels.

#### *Management of psychological crisis*

Disaster not only disrupt the infrastructure of a city and the physical health of a survivor, but also disrupt a person's psychological well-being. In 2008, Wenchuan was hit with an earthquake of 8.0 in the Richter scale. It took away more than 60000 souls and injured more than 300000 people [19]. A study conducted by Zhang et al [20] stated that the prevalence of posttraumatic stress disorder (PTSD) was around 13% to 37.8%

after the Wenchuan earthquake. A study conducted by Jin et al [21], it found out that although different counties may have different result in prevalence of PTSD due to the degree of exposure to the earthquake was different, the overall PTSD prevalence was 40.1% one year after the catastrophic earthquake. According to Zhang et al [20], 12% of the survivors suffered from PTSD in a high-hit area of Beichuan 2 years after the Wenchuan earthquake. And even though after 5 years, the PTSD rate was 9.2%. From these two studies, they showed that PTSD remained in most of the survivors even though the disaster has passed for a long time. Therefore, it is important to emphasize the importance in dealing with PTSD in the curriculum of disaster medicine.

As mentioned by Neria et al [21], in order to detect PTSD and provide early intervention, it is important to identify the population at risk. Older people may be more susceptible to PTSD after a natural disaster as they may have prior exposure to disaster; difficulties in dealing with financial problems; lack of social support and trauma severity [23]. A study conducted by Parker et al [23] suggested that appropriate planning on psychological first aid could greatly reduce the psychiatric morbidities.

Psychological first aid (PFA) is an evidence-informed modular approach for assisting survivors in reducing initial distress caused by a catastrophe [24]. It also provides self-care to provider himself before, during and after disaster relief effort [24].

In 2013, a study conducted after the Lushan earthquake, exploring the effectiveness of

PFA indicated that survivors showed an improvement in psychological well-being, acute stress response and anxiety or mood disturbance [25]. Not only the survivors were beneficial from PFA, rescue team members also showed a relatively stable mood which mean they cope with the rescue operation and the psychological burden well [26]. Therefore, PFA was effective in preventing PTSD and it was applicable not only in western countries, but also in China.

#### *Disaster rescue drills*

According to the findings, disaster rescue drills were the third most mentioned and wanted elements to be included in the curriculum of disaster medicine. The aim of carrying out disaster rescue drill was to allow the rescue team and the first responder to familiarized with the rescue process, the coordination and the way to apply knowledge into practice. Through regular drills, not only the rescue team can be familiar with the logistics and process in facing a disaster, the administration which plays an important role in coordinating the rescue resources and communicating with the rescue team can also detect the weak point in current system, so as to implement improvement measures.

Disaster drills have been used in the studies of Alim et al [27] and Smithers et al [28]. Both of the studies had similar format on conducting the disaster drills. They both divided participants into groups and tackled the assigned disaster scenario. Participants

had the opportunities to demonstrate basic skills in rescuing survivors and treating the casualties such as triage, cardiopulmonary resuscitation (CPR), management of trauma patients, etc. The drills were comprised of actors and patient simulators depending on what skills the participants were required to demonstrate. The performance of the participants was evaluated by skillful instructors. The results of these two studies concluded that disaster drill was an important element in disaster medicine education as it can improve the knowledge, the application of knowledge into practice and facilitate the learning and preparation for disaster.

In order to make the disaster drill more constructive, simulation medicine was a field that educators can be further explored. A study conducted by Gillet et al [29] comparing the effects on disaster drills between high-fidelity simulators and trained actors. A high-fidelity simulator was a computer-controlled mannikin that can demonstrate different medical states. The result of this study showed that a high-fidelity simulator provided a more realistic patient encounter. Comparing to trained actors, the performance on the drills may varied due to limited training and instruction provided prior to the drill and their enthusiasm. Also, some of the life-saving procedures were not able to perform and needed to be verbally expressed by the actors which diminished the realism of the drill. However, the use of high-fidelity simulators was limited due to expense and technical

problem. Nevertheless, this use of this new technology can be further explored in the future in order to integrate into disaster drills.

### *Communication*

Communication is important in daily life. But when facing disaster, communication is particularly critical. After a disaster struck, the authority needs to gather loads of information related to the disaster including the magnitude of the disaster, the actual disaster site, number of casualties, etc. Without the proper information, the authority would not be able to coordinate the mobilization of rescue manpower, emergency resources, evacuation and more importantly, the rescue plan [30]. Also, communication systems were used to disseminate vital information of the upcoming disaster, before (as warning message), during (as disaster information) and after (as relief effort information)[31]. During a disaster, most of the infrastructure of the disaster site could be knocked out including the communication system. Communication system is crucial for emergency response team to coordinate rescue and evacuation effort and also the distribution of emergency relief materials. However, if the communication systems were crippled within the city, there would be a huge problem for the administration. From the experience of hurricane Katrina, the communication systems were crippled by the hurricane and the storm surge, creating extensive flooding in the city of New

Orleans. The communication problem was solved finally, with the assistance of the military [31]. The national guard provided satellite communication and then Federal Emergency Management Agency (FEMA) sent out their Mobile Emergency Response Support (MERS) which provided mobile communications, satellite communication, support staff to provide phone and data lines. These relief measures solved the initial communication problem within the Federal government and the local and state government [32]. In the aftermath of Hurricane Katrina, the Federal government had difficulties in coordinating the emergency resources within its administration. Different departments within the Federal government were not familiar with the policy and hence, only a small fraction of precious emergency relief materials was offered to the evacuees, some of them were never used [32]. Therefore, it is particularly important to equip rescue team members with good communication skills and establish a good communication system.

Experience from hurricane Katrina showed there were a lack of communication between different agencies. The problem included i) the failure to communicate between FEMA, the state government and the local government prior to the arrival of the hurricane, ii) the failure to coordinate between the emergency relief agencies in rescue effort, iii) emergency relief personnel were not familiar with the emergency response plan, iv) the response plan was not well developed [31]. Therefore, it is

important to mention in the curriculum that in order to facilitate the rescue effort, before, during and after the disaster, a communication strategy should be developed and disseminated to all emergency response team. The emergency response team should be familiarized with the plan before the disaster struck.

In the 21<sup>st</sup> century, social media is widely used to disseminate information of all sorts. From the experience of Fiji during Tropical Cyclone Winston, social media was widely used in disseminating information about the cyclone on when and where it would struck, up-to-date pictures of the disaster and shared the information about the residents' safety [33]. It was found out that the Fiji government's website was not able to match the speed of updating the disaster information when comparing to its' own Facebook page. It also showed that the public utilized more on social media to gather information [33]. Therefore, it is important to emphasize that exploring other means of communication channels rather than relying on traditional media can facilitate in relaying vital messages to the public.

However, traditional media should not be neglected as this is the official communication channels. Media provide disaster information to the public in different stages of disaster [34]. Journalists were sent into disaster zone to gather information in order to disseminate disaster messages to the public. But journalists might not be able to enter into certain disaster-affected area which make their reports not comprehensive.

Therefore, it is important to mention that the authority should cooperate with the media, releasing important messages about the status of the disaster, in order to facilitate the prevention, preparation and recovery of the community.

### *Public education*

Public education on disaster preparedness is crucial as it provides information that the public could follow and undertake specific activities in preparing for future disasters [35]. A study conducted by Tanaka [36] stated that disaster education enhanced public readiness to prepare for future disasters. It also suggested that long-term disaster education was necessary for diverse population in different cultures. For example, it found out that various educational sources generated better readiness for disaster in Japan, whereas print-out educational sources were more acceptable in USA [36].

Another study [37] suggested a novel concept of flexible surge capacity (FSC). This concept was related to the ability of increasing human and other resources during a major incident or disaster (MID). It also aims to develop new approach, policies and preparedness within the community. Public education is one of the essential elements in the concept of FSC. The aim of public education is to equip civilians with the basic survival skills in response to MID such as performing CPR. This could enhance the self-survival skills of the public which is important to be mentioned in the curriculum.



### ***Limitations***

The actual search terms in Chinese language could be differed from English. The actual meaning of the search terms had been clarified before commencing the search. Also, problems had been encountered using CNKI. The number of articles searched before refining the category and subcategory were around 100000. Even though the search was narrowed down by choosing a suitable category and subcategory, the number of articles that were actually related to the topic was small. It was mainly due to the unfamiliar operation of this search engine. Further exploration on this search engine or change in search term will be needed if future study on Chinese literature is to be carried out.

### ***Conclusion***

This scoping review has analyzed Chinese language literature on disaster management and identified that disaster management was still a subject that was not well develop and integrated into modern medical training. Furthermore, the existing

disaster management training courses needed to be reviewed and further develop into a well-structured program so as to fit the circumstance of increasing chance of being struck by natural or man-made disaster.

### ***Recommendations***

We recommend medical school to integrate disaster medicine into modern medical training. The mode of delivery should not be limited to lectures. More interactive teaching methods can facilitate the learning process and the application of knowledge. Also, the curriculum should focus on the basic concept of disaster management, skills in handling casualties, skills in handling and preventing psychological crisis, public education and more importantly, the preparedness for future disasters.

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## *Appendix I*

### Data Extraction Form

*Title: Scoping Review on Health Workforce Training Strategy in health-emergency*

*Disaster risk Management on Chinese literature*

## 1. General Information

Date form completed  (dd/mm/yyyy)	
Name of reviewer extracting data	
Name of second reviewer	
Title of paper	
Publication type	
Country in which the study conducted	

## 2. Eligibility

Study Characteristics	
Type of Study	
Population	
Focused condition	
Outcome measures	

Decision of inclusion or exclusion	
------------------------------------	--

*Do not proceed if study is excluded from review*

### 3. Population and setting

	Description as stated in paper
Population	
Source of the population	
Method of recruitment of participants	

### 4. Participants

	Description as stated in paper
Sample size	
Participants' occupational background	
Participants' training background	

## 5. Method

	Description as stated in paper
Aim of study	
Study Design	
Sampling method	
Study duration	

## 6. Outcomes

	Description as stated in paper
Outcomes	
Self-reported reported outcomes	

## 7. Results

Outcome	Description as stated in paper
Training target participants	
Training Method	
Training curriculum	

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## 8. Limitations

	Description as stated in paper
Strength	
Limitations	
Suggested recommendation to overcome the limitation	

## 9. Conclusions

	Description as stated in paper
Conclusion of the paper	