



Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Disease

journal homepage: www.elsevier.com/locate/apjtd



Editorial doi: 10.1016/S2222-1808(15)60842-8

©2015 by the Asian Pacific Journal of Tropical Disease. All rights reserved.

Tropical disease after earthquake: 2015 Nepal earthquake

Somsri Wiwanitkit^{1*}, Viroj Wiwanitkit^{2,3,4,5}

¹Wiwanitkit House, Bangkhae, Bangkok, Thailand

²Hainan Medical University, China

³Faculty of Medicine, University of Nis, Serbia

⁴Joseph Ayobabalola University, Nigeria

⁵Dr DY Patil Medical University, India

ARTICLE INFO

Article history:

Received 8 May 2015

Accepted 15 May 2015

Available online 21 May 2015

Keywords:

Earthquake
Tropical
Disease

ABSTRACT

The earthquake is usually a big disaster that causes several death and mortalities. Post earthquake crisis is an important situation for management. The recent 2015 Nepal earthquake is one of the most destructive earthquakes in history. The important concern is on the important concern of emerging diseases after earthquake. In this specific short article, the authors discusses on tropical disease after earthquake.

1. Introduction

The earthquake is usually a big disaster that causes several death and mortalities. Post earthquake crisis is an important situation for management. The recent 2015 Nepal earthquake is one of the most destructive earthquakes in history. In post earthquake crisis, lack of facilities, destroyed of infrastructures and limitation of transportation can be expected. This can superimpose the situation and lead to several problems including several medical illnesses[1,2]. External health care teams for curative management and disease control and prevention are needed[1,2]. The important concern is the emerging diseases after earthquak[1,2]. In this specific short article, the authors discuss the tropical disease after earthquake.

*Corresponding author: Somsri Wiwanitkit, Wiwanitkit House, Bangkhae, Bangkok, Thailand.

E-mail: somsriwian@hotmail.com

2. Post earthquake disease outbreaks: summarization of evidences

As noted, the emerging of diseases in post earthquake crisis is possible. There are many interesting case studies. In Haiti earthquake, the observed problem on emerging cholera is reported and it is still the disease under control program until present[3,4]. The underlying background of poor and developing countries of Haiti leads to worse situation. It is suggested to use new telecommunication technologies for following up the problem. Bengtsson *et al.* noted that “ estimates of population movements during disasters and outbreaks can be delivered rapidly and with potentially high validity in areas with high mobile phone use[5].” Date *et al.* noted that “ cholera vaccination was not implemented because of limited vaccine availability, complex logistical and operational challenges of a multidose regimen and obstacles to conducting a campaign in a setting with population displacement and civil unrest[6].”

Focusing on Sichuan earthquake, Yao *et al.* noted for the need to perform surveillance on important pathogens including “*Bacillus anthracis*, *Bordetella pertussis*, *Neisseria*

meningitidis, *Mycobacterium tuberculosis*, influenza A virus, bird flu virus (H5N1), enteric viruses and *Meningococcal meningitis*[7]". Nevertheless, Yao *et al.* found no problematic rising of the focused pathogens[7]. However, the increased risk of schistosomiasis is proposed by Zhong *et al.*[8].

Considering the Great East Japan earthquake, the additional situation of tsunami adds a more interesting case study. The outbreak of pneumonia can be seen[9]. Kim *et al.* noted that there was no epidemic in the first week post crisis[10]. However, Kim *et al.* noted that "low coverage of evacuation centers just after the earthquake as well as skewed frequencies of reported syndromes draw attention to the improvement of the early warning system[10]." Iwata *et al.* noted that "surveillance should be promptly initiated after a disaster by (i) developing a surveillance system that is tailored to the local setting, (ii) establishing a support team network, and (iii) integrating the resources that remain--or soon become--locally available[11]."

3. Important tropical diseases that can emerge after earthquake

It is no doubt that epidemic can be seen after the attack of earthquake. The important tropical diseases include wound related tropical infections, gastrointestinal diseases, mosquito and vector borne infectious diseases and respiratory diseases. Focusing on wound related tropical infections, lack of clean water and infrastructure for injuries care is the important considerations[1,2]. Keven *et al.* reported their experience on Marmara earthquake that "Gram-negative aerobic bacteria and *Staphylococcus* spp." were important pathogens to be concerned[12]. The similar findings are also observed from Wenchuan earthquake in China[13,14]. However, DU *et al.* observed no problem of drug resistance in case management[13]. Not only wound infection but also a long term complication, tetanus, should be focused. In fact, the outbreak of tetanus in post earthquake crisis is sometimes reported. The good example is the post Yogyakarta earthquake[15]. To prevent, the tetanus toxoid is suggested in case management in post crisis of any earthquake[2].

Focusing on gastrointestinal infections, several tropical diarrhea can be observed in post crisis. The situation of post earthquake cholera in Haiti is the best example[3,4]. Barzilay *et al.* noted that the mortality rate was about 1%[16]. Lack of clean water, crowded population in vacuum sites and poor sanitation facilities are the main concerns[17]. In fact, not only bacteria but also several parasites and viruses can contaminate into water and cause outbreak after crisis[18]. In the post Haiti earthquake, in addition to cholera, "*Shigella*, enterotoxigenic *Escherichia coli*, rotavirus and *Cryptosporidium*" are also important emerging problems[19]. Another report from Turkey showed that "giardiasis should be considered as an emerging disease in postdisaster situations[20]" and "the rate of enterobiasis is increased in populations living in crowded unhealthy conditions[20]." As previously mentioned, underlying underdeveloped background is the main risk for emerging of gastrointestinal disease after earthquake.

Considering mosquito and vector borne infectious diseases, there are several evidences on emerging problems after earthquake. In reports on the post Bam earthquake in Iran, emerging leishmaniasis is observable[21,22]. Zhang *et al.* reported on change of incidence of Japanese encephalitis, visceral leishmaniasis and malaria before and after the Wenchuan earthquake in China[23]. Zhang *et al.* reported that "the incidence of insect-borne disease did not increase after the Wenchuan earthquake[23]" and noted that "it is possible that vector control measures implemented after the earthquake prevented an increase in such diseases[23]." Townes *et al.* found a different situation in post crisis Haiti earthquake[24]. Townes *et al.* noted the emerging malaria and mentioned the importance of using rapid malarial testing in "the post-disaster setting where logistical and technical constraints limited the use of microscopy[24]." The concern of malaria among travelers returning from the disaster area is also mentioned and this is an interesting topic for further study in travel medicine[25,26].

Focusing on respiratory illness, influenza is a big concern. The influenza epidemic after the 2011 Great East Japan earthquake is the best example[27]. Kamigaki *et al.* concluded that "influenza can cause outbreaks in a disaster setting when the disaster occurs during an epidemic influenza season[28]." According to the study of Tohma *et al.*, the importing of influenza virus to external area of the disaster site to cause outbreak in post crisis period was also observable[29].

4. 2015 Nepal earthquake and emerging tropical diseases

The 2015 Nepal earthquake is a present global concern. To help the people through the crisis is the first importance. Donation and help from outside are needed[30]. However, plans for controlling emerging tropical diseases are needed. The situation in Nepal might be similar to the previous situation in Haiti. The underlying socioeconomic background of Nepal is not good and the expectation for emerging of many infections is raised[31,32]. In fact, Pradhan noted the preparedness for earthquake situation in Nepal which covered the preparedness to emerging diseases[31]. However, it seems that the preparedness was not complete. In addition, the cholera and malaria are also highly prevalent in Nepal in pre-earthquake period and their incidences are expected to increase in post-earthquake period[32].

5. Conclusion

Emerging tropical infectious diseases can be expected after the earthquake crisis. In the present situation of 2015 Nepal earthquake, surveillance of emerging infections is needed. This is useful to control local and international migrations of diseases.

Conflict of interest statement

We declare that we have no conflict of interest.

References

- [1] Wiwanitkit V. Medical concerns and practical points in post-earthquake management. *Arch Hell Med* 2011; **28**(6): 829-31.
- [2] Wiwanitkit V. Vaccination in post earthquake crisis. *Hum Vaccin* 2010; **6**(7): 595-6.
- [3] Domercant JW, Guillaume FD, Marston BJ, Lowrance DW; Centers for Disease Control and Prevention (CDC). Update on progress in selected public health programs after the 2010 earthquake and cholera epidemic--Haiti, 2014. *MMWR Morb Mortal Wkly Rep* 2015; **64**(6): 137-40.
- [4] Walton DA, Ivers LC. Responding to cholera in post-earthquake Haiti. *N Engl J Med* 2011; **364**(1): 3-5.
- [5] Bengtsson L, Lu X, Thorson A, Garfield R, von Schreeb J. Improved response to disasters and outbreaks by tracking population movements with mobile phone network data: a post-earthquake geospatial study in Haiti. *PLoS Med* 2011; **8**(8): e1001083.
- [6] Date KA, Vicari A, Hyde TB, Mintz E, Danovaro-Holliday MC, Henry A, et al. Considerations for oral cholera vaccine use during outbreak after earthquake in Haiti, 2010-2011. *Emerg Infect Dis* 2011; **17**(11): 2105-12.
- [7] Yao M, Zhu T, Li K, Dong S, Wu Y, Qiu X, et al. Onsite infectious agents and toxins monitoring in 12 May Sichuan earthquake affected areas. *J Environ Monit* 2009; **11**(11): 1993-2001.
- [8] Zhong B, Chen L, Liu Y, Wu ZS, Zhu HQ, Lu D, et al. [Risk assessment of schistosomiasis transmission in earthquake-stricken areas after the Lushan Earthquake in Sichuan Province on April 20, 2013]. *Zhongguo Xue Xi Chong Bing Fang Zhi Za Zhi* 2013; **25**(3): 226-31. Chinese.
- [9] Daito H, Suzuki M, Shihara J, Kilgore PE, Ohtomo H, Morimoto K, et al. Impact of the Tohoku earthquake and tsunami on pneumonia hospitalisations and mortality among adults in northern Miyagi, Japan: a multicentre observational study. *Thorax* 2013; **68**(6): 544-50.
- [10] Kim M, Kamigaki T, Mimura S, Oshitani H. [Infectious disease surveillance in Miyagi after the Great East Japan Earthquake]. *Nihon Koshu Eisei Zasshi* 2013; **60**(10): 659-64. Japanese.
- [11] Iwata O, Oki T, Ishiki A, Shimanuki M, Fuchimukai T, Chosa T, et al. Infection surveillance after a natural disaster: lessons learnt from the Great East Japan Earthquake of 2011. *Bull World Health Organ* 2013; **91**(10): 784-9.
- [12] Keven K, Ates K, Sever MS, Yenicesu M, Canbakan B, Arinsoy T, et al. Infectious complications after mass disasters: the Marmara earthquake experience. *Scand J Infect Dis* 2003; **35**(2): 110-3.
- [13] DU R, Chen HY, Deng JH, He JN, Yang M. [Distribution of pathogenic bacteria in patients of injuries combined with infection after May 12 Wenchuan Earthquake and drug resistance thereof]. *Zhonghua Yi Xue Za Zhi* 2009; **89**(6): 374-6. Chinese.
- [14] Wang T, Li D, Xie Y, Kang M, Chen Z, Chen H, et al. The microbiological characteristics of patients with crush syndrome after the Wenchuan earthquake. *Scand J Infect Dis* 2010; **42**(6-7): 479-83.
- [15] Sutiono AB, Qiantori A, Suwa H, Ohta T. Characteristic tetanus infection in disaster-affected areas: case study of the Yogyakarta earthquakes in Indonesia. *BMC Res Notes* 2009; **2**: 34.
- [16] Barzilay EJ, Schaad N, Magloire R, Mung KS, Boncy J, Dahourou GA, et al. Cholera surveillance during the Haiti epidemic--the first 2 years. *N Engl J Med* 2013; **368**(7): 599-609.
- [17] Sumner SA, Turner EL, Thielman NM. Association between earthquake events and cholera outbreaks: a cross-country 15-year longitudinal analysis. *Prehosp Disaster Med* 2013; **28**(6): 567-72.
- [18] Deno HA, Onapompe AA. Parasitic contamination in water: a brief review. *Adv Trop Med Pub Health Int* 2015; **5**(2): 20-4.
- [19] Charles M, Delva GG, Boutin J, Severe K, Peck M, Mabou MM, et al. Importance of cholera and other etiologies of acute diarrhea in post-earthquake Port-au-Prince, Haiti. *Am J Trop Med Hyg* 2014; **90**(3): 511-7.
- [20] Oztürk CE, Sahin I, Yavuz T, Oztürk A, Akgünoglu M, Kaya D. Intestinal parasitic infection in children in post-disaster situations years after earthquake. *Pediatr Int* 2004; **46**(6): 656-62.
- [21] Sharifi I, Nakhai N, Aflatoonian M, Parizi MH, Fekri A, Safizadeh H, et al. Cutaneous leishmaniasis in bam: a comparative evaluation of pre- and post-earthquake years (1999-2008). *Iran J Public Health* 2011; **40**(2): 49-56.
- [22] Sharifi I, Poursmaelian S, Aflatoonian MR, Ardakani RF, Mirzaei M, Fekri AR, et al. Emergence of a new focus of anthroponotic cutaneous leishmaniasis due to *Leishmania tropica* in rural communities of Bam district after the earthquake, Iran. *Trop Med Int Health* 2011; **16**(4): 510-3.
- [23] Zhang S, Lu Z, Liu H, Xiao X, Zhao Z, Bao G, et al. Incidence of Japanese encephalitis, visceral leishmaniasis and malaria before and after the Wenchuan earthquake, in China. *Acta Trop* 2013; **128**(1): 85-9.
- [24] Townes D, Existe A, Boncy J, Magloire R, Vely JF, Amsalu R, et al. Malaria survey in post-earthquake Haiti--2010. *Am J Trop Med Hyg* 2012; **86**(1): 29-31.
- [25] Agarwal A, McMorrow M, Arguin PM. The increase of imported malaria acquired in Haiti among US travelers in 2010. *Am J Trop Med Hyg* 2012; **86**(1): 9-10.
- [26] Gharbi M, Pillai DR, Lau R, Hubert V, Khairnar K, Existe A, et al. Chloroquine-resistant malaria in travelers returning from Haiti after 2010 earthquake. *Emerg Infect Dis* 2012; **18**(8): 1346-9.
- [27] Namiki J, Kohsaka S, Ui R. Influenza epidemic after the 2011 Great East Japan Earthquake and Tsunami. *Disaster Med Public Health Prep* 2013; **7**(2): 124-6.
- [28] Kamigaki T, Seino J, Tohma K, Nukiwa-Soma N, Otani K, Oshitani H. Investigation of an Influenza A (H3N2) outbreak in evacuation centres following the Great East Japan earthquake, 2011. *BMC Public Health* 2014; **14**: 34.
- [29] Tohma K, Suzuki A, Otani K, Okamoto M, Nukiwa N, Kamigaki T, et al. Monitoring of influenza viruses in the aftermath of the Great East Japan earthquake. *Jpn J Infect Dis* 2012; **65**(6): 542-4.
- [30] Nepalese nurse association appeals for donations to support earthquake fund. *Nurs Stand* 2015; **29**(36): 8.
- [31] Pradhan RL. Earthquake preparedness plans -- building up capacity and readiness. *JNMA J Nepal Med Assoc* 2012; **52**(185): I-II.
- [32] Nepal (country/area statements). *Asian Pac Popul Programme News* 1985; **14**(3): 19-20.