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RESEARCH ARTICLE

Perceptions of hospital medical personnel on disaster preparedness [version 1; peer review: 3 approved with reservations]

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Abstract

Objective:

Natural disasters, domestic terrorism and other forms of catastrophe, though rare, pose a significant public health challenge when they do occur. Hospital personnel must have the appropriate training to identify, treat, and possibly even oversee local disaster preparedness initiatives. Insufficient resources have been placed on the education received by healthcare providers in tertiary medical institutions. We intended to assess the current state of knowledge and interest in disaster preparedness among different tiers of hospital staff and training levels in order to identify potential barriers and areas for further training.

Design:

A cross-sectional online survey was given to hospital attending physicians, subspecialty fellows, residents, nurses, physician assistants, and their respective students. The survey questions were disseminated throughout the Society of Critical Care Medicine (SCCM) Members and the North Shore Long Island Jewish (NSLIJ) hospital system via e-mail newsletters.

Main results:

A total of 572 individuals participated between October 2013 and May 2014. 85% of respondents expected to be dealing with a disaster during their career. 61.5% of respondents noted they would not feel comfortable leading and directing a local disaster management initiative. Yet 51.9% of respondents treated victims of natural disasters, 56.5% of transportation disasters and 34.8% of a structural collapse. When asked about level of formal disaster management training: 27.5% noted that no training was provided and 33% noted that they received 12 hours of training and only a quarter had more than 48 hours of formal training. 86.6% of respondents noted an interest in participating in a disaster management training workshop.

Open Peer Review

Approval Status ? ? ?

	1	2	3
version 1	?	?	?
09 Aug 2016	view	view	view
1. Amir Khorram-Manesh , Gothenburg University, Gothenburg, Sweden			
2. Jonathon R. Gray , Ko Awatea, Middlemore Hospital, Otahuhu, New Zealand			
Luis Villa , Ko Awatea, Middlemore Hospital, Otahuhu, New Zealand			
3. Pier Luigi Ingrassia , University of Eastern Piedmont Amedeo Avogadro, Novara, Italy			
Matteo Paganini , Università di Padova, Veneto, Italy			

Any reports and responses or comments on the article can be found at the end of the article.

Conclusions:

Many of our respondents had low level of disaster management training, did not feel comfortable leading a disaster initiative, however many have had to take care of victims of disasters. Based on our findings, hospital professionals feel under prepared for disaster management, and disaster preparedness should be considered an integral part of medical training.

Keywords

Disaster management, ebola virus

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Competing interests: No competing interests were disclosed.

Grant information: This work was funded by the Critical Care Department of Lenox Hill Hospital.

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Introduction

“There’s no harm in hoping for the best as long as you’re prepared for the worst.” – Stephen King.

The World Health Organization defines a disaster as “A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources”¹.

Terrorist attacks, natural catastrophes, infectious epidemics, and other forms of disasters, though rare, pose a significant public health challenge when they do occur. Healthcare providers are the receiving end of casualties from a disaster in the community, and they must ensure the necessary training to lead disaster preparedness initiatives in the scenario that one does occur.

Instances such as the 2001 New York City September 11th terrorist attacks, the 2005 New Orleans Hurricane Katrina, the 2010 Haiti Earthquake, the 2011 Tohoku Earthquake and Tsunami, the 2012 Hurricane Sandy, and more recently the 2014 Ebola Virus outbreak, all reveal that mass casualties do not enter the hospital all at once. Rather, most of these victims entered over a protracted period of time ranging from acute traumas within hours of the event to symptoms of post-traumatic stress disorder presenting months to years after. This can tremendously exhaust understaffed and undertrained hospital personnel.

Disaster management initiatives have more often emphasized pre-hospital protocols and personnel preparation while insufficient resources have been placed on the education and training of the healthcare providers in tertiary medical institutions that receive disaster victims. This has been previously termed “ambulances to nowhere”^{2,3}. Disaster training is rarely incorporated in neither undergraduate nor graduate medical education.

We intend to assess the current state of knowledge and interest in disaster preparedness among different tiers of hospital staff and training levels in order to identify potential barriers and areas for further training.

Materials and Methods

A cross-sectional online survey was given to hospital attending physicians, subspecialty fellows, residents, nurses, physician assistants, respiratory therapists and their respective students. The survey questions were disseminated using a cloud based company, Monkey Survey, throughout the Society of Critical Care Medicine (SCCM) Members and the North Shore Long Island Jewish (NSLIJ) hospital system e-mail newsletters in October 2013. Participants were given an explanation of the intentions of the survey, which included agreement to the publication of the data. All project expenses were funded by Lenox Hill Hospital, a part of the NSLIJ health system.

There is no standardized test for preparedness. The survey questions were designed to assess the current level of medical training of the participants in their respective fields and asked about their perception of disasters occurring in their healthcare system (Dataset 1). Specifically, participants were asked if they had to

deal with a disaster in the past or thought they would have to deal with a disaster in the future and which disaster they thought would be likely to occur. The survey also assessed for the participants’ current level of disaster management training, in what form they had received it, and if they would feel comfortable being involved in a disaster management scenario. The survey then further evaluated if the participants would like additional training for disaster management and gauged what type of training they would find most effective. Finally the survey assessed for any barriers to achieving this training.

The responses to the survey were electronically collected from October 2013 to May 2014. The results were generated in percentages and analyzed by the authors of the study and the Monkey Survey Company.

Results

Survey demographics

A total of 572 individuals participated between October 2013 and May 2014. Over 83% of respondents were not NSLIJ employees and over 60% were physicians, of which 83% identified themselves as attending physicians. 62% of attending physicians identified themselves as critical care physicians. The remainder of participants consisted of 79 nurses (two of which were students), 25 physician assistants, and eight respiratory therapists (one of which was a student) (Table 1). Greater than 90% of respondents identified their current or planned future practice locale as urban or suburban (Figure 1).

Experience and perceptions

A vast majority of participants had managed victims of disaster situations in the past. Just over half of participants (52%) stated they had treated victims of natural disasters; 57% had treated victims of transportation disasters; 35% - of structural collapses; 28% - of industrial catastrophes; 15% - of terrorist attacks and 16% had treated victims of warfare (Figure 2). When asked of future expectations, 85% of respondents expected to deal with a disaster during their career, choosing natural disasters as the most likely expected culprit (3.69 on a scale of 0–5, with 5 being most likely). This was followed by industrial catastrophes at 3.16 and terrorist attacks at 2.66 (Figure 3a and 3b). When considering terrorist threats, most participants believed explosives (2.87 on a scale of 0–5, with 5 being most likely) were most likely to be the cause of harm in their areas, followed by biological weapons (2.39), chemical weapons (2.35) and nuclear radiation (2.15).

Training

When asked about level of formal disaster management training, 28% of participants noted they received no training, 33% noted they received 12 hours of training or less, 10% had a training of at least 24 hours, 5% noted up to 48 hours of training, and 25% had more than 48 hours of formal training. Of those who had received training, 41% were offered lectures and hands-on scenario exercises, 34% attended a separate disaster management seminar, 30% felt that part of their training came from real life experience, 21% had had individual study, and for 13%, the training was part of a graduate curriculum. When asked where this training was offered, 35% of respondents stated they were offered a separate training course, 6% said that training was part of a residency program,

Table 1. Responders location of work by profession. Responders were able to select more than one location of work.

Location of work	Profession					
	Nurse		Physician Assistant		Respiratory Therapist	
	Certified	Student	Certified	Student	Certified	Student
	77	2	25	0	7	1
Emergency	10		4		6	
Regional	4		4		6	
Step Down	1		0		2	
ICU/CCU	36		12		16	
OR	0		1		3	
Other	35		8		7	

Location of Work	Physician			
	Attending	Fellow	Resident	Student
	291	33	22	3
Emergency	11		0	
Internal Medicine	9		20	
OB/GYN	1		0	
Surgery (CTS, Vasc, Gen)	17		2	
Cardiology	1	1		
Critical Care	158	21		
Endocrine	0	0		
GI	0	0		
Heme/Onc	1	0		
ID	0	0		
Nephrology	1	0		
Pulm/Crit	22	11		
Pulmonary	1	0		
Other		69		

6% said it was part of a fellowship program, 4% were trained at a graduate school and 19% stated that training was offered via other methods.

Preparedness

Of the surveyed participants, only 38% felt comfortable leading and directing a local disaster management initiative; however nearly all participants (90%) felt they would be able to participate in a disaster management scenario. A large majority of respondents (87%) expressed their interest in participating in a disaster management-training workshop. Of these, 78% were interested in learning focused ultrasound exams, 92% wanted to learn procedures that may be needed during a disaster and 92% wished to participate in simulation training (Figure 4). The major identified

barrier to training was lack of time (80% of respondents), followed by availability of resources (63%), access to experts (45%), obtaining scenario exercises (36%) and lack of interest (22%). The preferred methods of training were *via* live lectures with accompanied scenario exercises (66%), on-line courses (24%) and live lectures only (3%); 6% of participants were not interested in a training workshop.

Dataset 1. Assessing perceptions of disaster preparedness survey

<http://dx.doi.org/10.5256/f1000research.8738.d130234>

Survey questions distributed to each participant are provided.

Figure 1. Respondents location of Practice, both current and future.

Figure 2. Respondents experience of having to treat patients of disasters by type.

Figure 3. (a) Types of disasters expected to be encountered on a scale of 1 (least likely) to 5 (most likely). **(b)** Do hospital personnel expect to treat patients of disasters?

Figure 4. Comfort and interest in participation in disaster management trainings.

Discussion

Disaster medical training of hospital personnel is known to be inadequate and prior disasters have highlighted this issue⁴. Most of our respondents worked in critical care settings, over a quarter had no disaster management training and most of them did not feel comfortable leading a disaster initiative; however, many have had to take care of victims of disasters, with greater than 85% of respondents expecting to deal with a disaster during their career. Despite time being the number one barrier to further training, the overwhelming majority of participants (87%) noted an interest in participating in a disaster management-training workshop. Most of our respondents would like to receive further training in the form of live lectures and scenarios with the use of ultrasound machines, common procedures and simulations.

Of note, availability of resources and access to experts were both identified as barriers to training, partially due to lack of awareness of available resources.

Disasters cannot always be predicted, nonetheless, they can and need to be prepared for. This preparation can likely be addressed with adequate funding and allocation of time during formal training of all relevant professions. Although not ideal, there are currently online resources and courses available, free of charge, as listed in the “Compendium of Disaster Health Courses” drafted by the National Center for Disaster Medicine and Public Health ([https://](https://ncdmph.usuhs.edu/Documents/NCDMPH_Compndium_V1.pdf)

ncdmph.usuhs.edu/Documents/NCDMPH_Compndium_V1.pdf). Hands-on training in the form of drills and simulation seem to be the way forward for preparedness; however, these are not yet readily available. The Canadian Forces Medical Service have training rotations involving all levels of hospital personnel, including administrators a form of training that dates back over 100 years and had helped prepare for World War One⁵. In 2002, the Society of Critical Care Medicine (SCCM) set up a program called Fundamentals of Disaster Management (FDM), a one-day course directed to healthcare professionals to treat victims of mass casualty events. Such training seems almost crucial for preparedness with disasters becoming more frequently encountered by healthcare providers.

“Chance favors the prepared mind.” – Louis Pasteur

With regard to Ebola preparedness, Governor Andrew M. Cuomo of New York State had designated eight hospitals statewide to treat patients with Ebola. Protocols for identifying, evaluating and isolating patients who require care were created and sent to all hospitals, diagnostic and treatment centers and ambulance services. The Port Authority ensured that proper training was in place for all airport personnel, as well as ensuring deployment of two ambulances at each airport, aimed to safely transport potential patients with Ebola. In addition, the Metropolitan Transport Authority (MTA) worked to make sure that their employees had necessary equipment and training to protect themselves. Personnel

from the Centers for Disease Control and prevention (CDC), Customs and Border Protection, and the US Public Health Service, had practice drills with scenarios in dealing with passengers who may have been infected with the virus at John F. Kennedy International airport in New York. There were screening questionnaires for passengers from West African nations⁶. These measures indicate preparedness for Ebola have been taken seriously to both pre-hospital and hospital levels.

Conclusions

Disaster preparedness integrates a number of elements. In the recent cases of Ebola, for example, these include airport and airline personnel, transport services, emergency services and hospital personnel. At the hospital level, our survey suggests that staff are unprepared for a disaster and are not comfortable leading a disaster initiative, yet they are interested in further training. The lack of availability of training remains a large deterrent. Based on our survey results, we recommend that incorporating lectures, accompanied by scenario-based disaster preparedness should be considered as an integral part of medical training.

Data availability

F1000Research: Dataset 1. Assessing perceptions of disaster preparedness survey, [10.5256/f1000research.8738.d130234](https://doi.org/10.5256/f1000research.8738.d130234)⁷

Author contributions

Maciej Walczyszyn MD – Survey design and data collection.

Shalin Patel MD – Data collection, data analysis and writing the manuscript.

Maly Oron MD – Writing the manuscript.

Bushra Mina MD – Research mentor.

Competing interests

No competing interests were disclosed.

Grant information

This work was funded by the Critical Care Department of Lenox Hill Hospital.

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Open Peer Review

Current Peer Review Status: ? ? ?

Version 1

Reviewer Report 01 August 2017

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Thanks for submitting this paper which attempts to assess the current state of knowledge and interest in disaster preparedness among different tiers of hospital staff and training levels in order to identify potential barriers and areas for further training. Hospital disaster preparedness is one of the pillars of a good health system. The topic is therefore of relevant interest. Nevertheless, the level of novelty is quite questionable since literature offers a variety of other published researches with similar results.

The manuscript is easy to read, comprehensive and well managed. Clearly, lots of work has been done by all the authors. Nevertheless, many improvements are warranted.

Abstract

The abstract provides a concise summary of the content of the article. It describes adequately the objective, design, results and conclusions of the study. In the *objective* a more concise statement about the aim of the work would be more appropriate for the scope of the paragraph.

Introduction

Although the rationale of the study and the significance of the problem are well explained, more emphasis about disaster preparedness at hospital level and the lack of personnel training would be very appreciated for the benefit of such study.

In the statement "... they must ensure the necessary training to lead disaster preparedness initiatives in the scenario that one does occur" it is not clear who might ensure the necessary training. A deeper description and a citation would strengthen the concept.

Materials and Methods

The method are well described but it is unclear how the survey instrument was designed and whether it was validated. In addition, a description of the questionnaire should be added to the manuscript. Being the study grounded on survey tool the authors would pay more attention to these aspects. A major intervention is therefore strongly required.

The authors invited participants throughout the Society of Critical Care Medicine (SCCM) Member list and the North Shore Long Island Jewish (NSLIJ) hospital system e-mail newsletters in October 2013. It would be helpful to quantify the entire population, whether possible, in order to figure out the response rate.

Authors collected the level of trainers of respondents but results are not reported and not used for deeper analysis (i.e. differences in perception amongst different levels of training). Authors should also justify why respondents were asked about which disaster they thought would be likely to occur. It seems not in line with the study objective.

Results

The results are consistent but sometime redundant with the figures. Figure 2, for example, reports all the figures described in subparagraph Experience and perception making the reading not fluent and more difficult. Authors are also invited to include in this section precise data not approximations.

Figure 1 reports demographic data that can be included in the table 1.

Discussion

This sections results quite weak.

The authors report a list of training initiatives delivered by well known Institutions and Agencies. The authors are invited to better explain the meaning of the findings and why they are important, considering all possible explanations for the study results.

Authors should also relate study findings to those of other studies. Literature offers a variety of other published researches with similar results. Please consider the Mortelmans LJ et al. 2016¹ and Lim GH et al. 2013² as examples. In addition, the authors mention the “ambulance to nowhere” case. Questions raised by this case may have served as the motivation for authors’ study and deeper considerations could be presented.

Study limitations were not addressed by the authors. Authors are asked to elicited them.

Conclusion

The Conclusions is a bit blurry. In our opinion authors have demonstrated that many of the respondents had low level of disaster management training and feel underprepared for disaster management. The lack of availability of training is reports to be the main deterrent.

The Ebola case should be removed from this sections since it is not a conclusion derived from the study findings.

References

1. Mortelmans LJ, Maebe S, Dieltiens G, Anseeuw K, et al.: Are Tertiary Care Paediatricians Prepared for Disaster Situations?. *Prehosp Disaster Med.* 2016; **31** (2): 126-31 [PubMed Abstract](#) | [Publisher Full Text](#)
2. Lim GH, Lim BL, Vasu A: Survey of factors affecting health care workers' perception towards institutional and individual disaster preparedness. *Prehosp Disaster Med.* 2013; **28** (4): 353-8 [PubMed Abstract](#) | [Publisher Full Text](#)

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Reviewer Report 02 December 2016

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Thank you for the opportunity to review this article. We want to compliment the authors on tackling such an important subject. Overall we approve this article, but we have some comments that the authors could address.

General comments

The article could be improved by broadening the context for the reader and potentially adding to the survey questions.

To broaden the readers understanding of context, we would have liked to see a more comprehensive literature review. We would also suggest that the researchers could interview or send another questionnaire to hospital managers to explore the issues from both sides. Training is important, but perhaps more important is a culture of regular practice. This will ensure that, for example, materials are in the right place, staff know where they are and how to use them. Linked to this we would be interested in whether staff have assigned roles in any emergency. Both these related points could have been explored in the survey with simple questions about response planning, practice and roles assigned to respondents?

Specific points to address

Grammatical issues:

"Infectious epidemics": "epidemics" is sufficient, as by definition an epidemic is caused by an infectious agent

"choosing natural disasters as the most likely expected culprit..." This doesn't read well.

In Materials & Methods, "Monkey survey" should be "survey monkey".

Study context:

A brief description of hospital size would be valuable. Is it a general hospital? What population/area does it serve?

Specificity of language:

In Results the authors' say, "572 individuals participated". We are not clear if that means 572 responded to the survey? This should be clear because sometimes to hide a low response rate people will mention the number that were invited to respond as "participants". We suspect 572 were responses, but it would be helpful if that was made clear.

The authors mention the types of doctors and nurses that responded but not where they work. The speciality/department could be very relevant.

"Over 83%...": "over" and a percentage is OK for a summary but in full text the authors should provide the exact figure. What does "over" mean? It could be anything between 83 and 100%.

"Greater than 90% respondents..." Authors should provide the exact percentage.

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

No

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Reviewer Report 03 October 2016

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Amir Khorram-Manesh

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This article aims to report the current state of knowledge and interest in disaster preparedness among different tiers of hospital staff and training levels in order to identify potential barriers and areas for further training.

1. There is nothing new about the conclusion. "At the hospital level staff are unprepared for a disaster and are not comfortable leading a disaster initiative, yet they are interested in further training". This has been reported earlier and does not add anything new to the global knowledge. What is new in your report? Have you compared your data with other hospitals?
2. Which are the potential barriers for further training? Point them out and discuss.
3. Different tiers of hospital staff cannot be limited to attending physicians, subspecialty fellows, residents, nurses, physician assistants, respiratory therapists and their respective students. Why and how were these participants chosen?

4. Disaster preparedness knowledge consists of many factors such as knowledge about risk and vulnerability analysis, organizational belonging, how to initiate a disaster plan etc. Have you investigated all components included in disaster preparedness? Simply asked how many have read the disaster plan?
5. Training is one way to standardize the multidisciplinary management of and preparedness for a disaster or a major incident. The authors write about different type of training. What kinds of training are these? Are these evaluated? Do we know how much and how long training is needed? What is acceptable preparedness? I am not sure whether you talk about individual training or multidisciplinary training? Training on a "patient" or mass casualty training.
6. When using surveys, you may end up with some problems. What are the pros and cons with your method?
7. One of the conclusions is that incorporating lectures, accompanied by scenario-based disaster preparedness, should be considered as an integral part of medical training. In which perspective and why? How about other healthcare categories? Do you mean medical training at medical school or at the hospital?
8. The lack of availability of training remains a large deterrent. What is lacking; time for training, economic support for training, or a validated training model?

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

No

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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