

Effect of Mass Casualty Training on Prehospital Care Providers in Kuwait

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Abstract

Background: Prehospital providers, both emergency medical technicians and paramedics need appropriate training to deal with major incidents. Despite the fact that Kuwait has experienced many major incidents and located into a politically conflict zone, there is no standardized preparedness training for prehospital care providers to disasters or major incidents. This study aimed to assess the effect of a training intervention in improving the knowledge and awareness of EMTs and paramedics in the Kuwait Emergency Medical Service (KEMS).

Methods: Thirty-one participants from different ambulance districts in Kuwait were invited to participate voluntarily in disaster management training at Kuwait EMS Department.

Results: The mean score of knowledge was significantly higher immediately after first training program [18.2; standard error (SD):1.9] than before (12.4; SD: 2.8) ($P<0.001$). The mean score three months later was significantly higher (19.8; SD: 0.5) immediately after the intervention program ($P<0.001$).

Conclusion: The primary aim of improving preparedness among prehospital care providers was been achieved through the training program. The tests results showed an improvement in score achieved by the participating prehospital care providers. This type of training courses would increase the competency and the confidence of prehospital care providers in providing emergency services.

Keywords: Training program; Emergency; Mass casualty; Prehospital; Kuwait

Introduction

Emergency Medical Services (EMS) plays a pivotal role in disaster planning, response and recovery. Prehospital care agencies take the primary responsibility in dealing with disasters and major incidents. Their role during disasters exceed that in normal every day single emergencies. They will be first responders who deal with stressful and disturbance situations with maybe or without risky weather hazardous conditions [1]. There is a consensus that prehospital providers should be trained to response appropriately using a formal major incident management command system [2].

The evidence indicates that the health care sector needs to be involved in a periodic and systematic preparedness training to be able to reach required standards to enable them to have the competencies to swiftly and effectively manage any major incidents. This generally includes both didactic training and simulated disaster exercises, with the latter including extensive exercises or more economical table-top exercises [1]. Addressing emergency medical readiness and developing a way to measure its level of preparedness is a fundamental step to enhance and strength emergency medical preparedness [3]. Indeed, EMS is the first line in any emergency management activities and an essential component of medical readiness and hence, improving preparedness in EMS will support the national preparedness efforts. This is despite the clear need for prehospital training in a high-risk setting [1].

Appropriate training will improve knowledge, skills, confidence and awareness and most importantly the adaptive and psychological preparedness capabilities to manage high magnitude events. Studies indicate that prehospital staff, emergency medical technicians (EMTs) and paramedics need appropriate training to deal with major incidents especially those that involve chemical and biological agents [4]. When quality training is provided preparedness and willingness to respond to MCIs is enhanced [5]. If the prehospital providers are not well trained they will be hesitant and unwilling to participate in such events [6]. This reluctance affects negatively on the overall health care system's ability to cope with the surge volume of these incidents [7].

While the education and training for mass casualty events is growing in both entry-level and post-graduate education, there is no universal consensus on the validation of program content [8-10]. Additionally, there is no any consistency in the types of interventions used to improve response competency [11]. Although a variety of training courses are offered in different regions worldwide, the validity and effectiveness of this training is not satisfactorily measured [8]. This research demonstrates that the training will have limited value unless it is consistent and standardized. One of the most common problems is that only small portion of prehospital providers have the opportunity to join mass casualty training exercises and therefore lose the opportunity to gain knowledge and expertise in this field [9,12-14]. The primary focus of this study is the implementation of a training intervention to improve the knowledge and awareness of EMTs and paramedics in the Kuwait Emergency Medical Service (KEMS).

Methods

The Kuwait EMTs and paramedics participated in a KEMS department-sponsored mass casualty education program. The participants were asked to complete anonymous pre-/post-test questionnaires as a means of measuring the outcomes of the intervention. Thirty one participants exposed twice to training programs. Wherein the first training program they attend the experimental one day training course. After the reflection stage on the first training, they were again attended the two days developed training program after three months.

The study was conducted in Kuwait Emergency Medical Services (KEMS). All participants undertaking an innovative major incident management course (the intervention) were paramedics employed by

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the Kuwait Emergency Medical Service (KEMS). In the first training program they attend the experimental one day training course on the 27th of January 2017. After the reflection stage on the first training they had, they were again attended the two days developed training program. The second intervention was conducted on 24-25th of April 2017. A structured questionnaire was used that included six demographic questions and 20 multiple-choice knowledge questions adapted from different resources. Its purpose was to test basic knowledge of the Mass Casualty Incidents (MCI) plan and its associated procedures and to develop a new Mass Casualty training program. All the questionnaires (pre-test, post-test) included the same questions with a different order each time. Additionally, in the post intervention questionnaire, participants were asked to describe the impact of the training on their personal disaster preparedness, the usefulness of the training and its content, and the quality of the instructor. The first intervention was conducted at the EMS department training centre on 27th of January 2017. The training program was run over five hours from 0800 h until 1300 h. The curriculum was extracted and modified from a standardized text books; Medical response to major incidents and disasters: A practical guide for all medical staff [1] and Major incident medical management and support: The practical approach at the scene [15]. At completion of the training course, the students were expected to be able to perform the following:

- To define mass casualty incident.
- To recognize the different levels of mass casualty incidents.
- To describe the initial response actions to mass casualty incidents.
- To understand the levels of command used at mass casualty incidents.
- To triage simulated patients correctly using Sieve and Sort algorithm.
- To illustrate scene management activities through simulated accident field.

This classroom-based training and out classroom training had incorporated multiple models of training tools and sequenced as following:

- Lectures on mass casualty and disasters definitions, nature and Levels.
- Lecture on initial response activities during mass casualty incidents.
- Lecture triaging method using sieve and sort method.
- Video recording of past mass casualty incidents.
- Table top exercise for terrorist bombing incidents in Salmia city.
- Outdoor training.
- Post training Examination and feedback session.

At the beginning of the training, all participants were informed in both verbal and written form about purpose of the study. After completing the survey and the pretest, the participants commenced training course with a series of presentations covering topics that included the definition and the nature of mass casualty incidents and the different classifications levels. Students were asked to identify the role of EMS during mass casualty incidents and understand common communication techniques including “METHANE” message (Figure

1) as well as the chain of command and control according to KEMS National response plan [1].

A triage and treatment lecture was introduced and followed by a triage quiz at the end of the lecture where participants were challenged to correctly identify color categorization according to victim characteristics.

The colors coding used by KEMS are:

- Red color tag for immediate cases and those are priority one and should be treated first and move to nearest hospital.
- Yellow tag for cases can wait for one or two hours and they are priority two and will be transferred after those priority one.
- Green tag color for minimal injuries (walking patients), and those will be mostly kept until those priorities one and two transferred.
- Black for dead victims and those are the deceased or dead victims.

Data were analysed using SPSS software edition 22 and includes the performance of a dependent t-test to examine the knowledge scale mean difference between pre-/immediate post-tests, and delayed post-tests scores. Means and standard deviations were used to describe participant responses to pre training and post training survey where p value of < 0.001 was considered significant. Repeated measures analysis of variance (ANOVA), t-test, and one-way ANOVA test were used to analyse the data.

Ethical approval was conducted from the La Trobe University Human Ethics Committee, Kuwait Emergency Medical Services (KEMS) and the Kuwait Ministry of Health. All participants were informed in both verbal and written form about purpose of the study. The confidentiality aspect in this research ensured that all the 31 participants' information was not reflected anywhere in their response and out interaction with them.

Results

A total of 31 paramedics working in Kuwait Emergency Medical Services Department participated in this study. The demographic characteristics of the participants are shown in Table 1. All of the

METHANS MESSAGE

M -Major Incident Declared

E - Exact location

T - Type of incident

H- Hazards

A- Access

N – The number of patients

Figure 1: Methane message.

participants were males. The participants were categorized into four age groups. Most of the participants (N=20; 64.52%) were young aged (25-34) years. The study showed that the majority of the participants (N=25; 80.65%) were non-Kuwaiti nationality. The highest participation rates were elicited from married paramedics who represented two third of the participants (N=21; 67.74%). The majority of the participants (N=19; 61.29) had more than five years work experience in ambulance services. Results show that most of participants graduated from paramedic school (N=19;51%) and (N=12; 38.71%) were nurses who joined ambulance services after basic ambulance training.

Results of the 20 multiple-choice knowledge questions before and after the intervention showed that the minimum score was 6 in the pretest, after the first intervention the score was 14 and the maximum score was 18 after the second intervention, as shown in Table 2. The result showed that changes in knowledge at the mean score was significantly higher immediately after the first intervention, $t(30)=-15.3, p<0.01$. Of the 20 multi-choice questions the participants mean score was (12.35) in the pretest comparing to the mean score (18.19) in the post-test. While the lowest mark was 6 in the pre-intervention, it increased to be 14 in the post-test, and many scored 20 (100%) in the post-test, which indicate that the training was very effective to improve participants knowledge about MCIs management.

The second intervention was taken place three months later of the primary intervention during. The participants were given the test at the end of the training. The significant differences can be seen in the knowledge assessment scores of the three occasions (pre and post-test and 3 months post-intervention in Table 2. The mean score significantly elevated to 19.80 after the second training course. The results showed that there is a significant different in three tests attempts p value <0.01 . Significant improvement in post-test 1 and post-test 2 scores, $t(30)=-$

5.1, $p<0.001$.

Discussion

In current study more interactive instructions and teaching methods used to engage the participant, besides using of both formative assessment and summative assessment to ensure that learning have taking place. The participants were able to answer the questions correctly and did improved significantly from the first intervention to the second. We found that participants who were taught the basics of MCI management through a short training course using lectures, table top, role play, and a drill without victims, made a significant improvement when comparing pre-test scores with post-tests scores. This indicates that short duration training of one or two days is sufficient for participants to understand the fundamentals of MCIs response competencies. This finding is consistent with a number of previous studies [16-19].

In our study, the results showed that participants had relatively low pre-test scores. This is similar to other studies that found that the majority of participants demonstrated low baseline knowledge scores before training [19-26]. There are some studies results where the participants scored high before the intervention [21,27,28]. One of this studies used comparison of two teaching methodologies; computer based learning versus instructor based training to compare participants outcomes [27]. However, this study did not clarified to how much the previous knowledge and participants educational level have affected the results [27,29] reported in their study in the United States that; the high score and preexisting knowledge maybe not unexpected as that this agency is one of the largest and oldest departments of health in the United States and has experienced different types of public health emergencies.

Characteristics	Frequency	Percent
Age groups:		
Under 25	1	3.23%
26-34	20	64.52%
35-45	4	12.90%
46-55	6	19.35%
Nationality:		
Kuwaiti	6	19.35%
Non-Kuwaiti	25	80.65%
Marital status:		
Married	21	67.74%
Non-married	10	32.26%
Educational level:		
Bachelor degree in paramedics	1	3.23 %
Diploma in EMS	13	41.94 %
Diploma+Advanced certificate	5	16.13 %
Bachelor in nursing+Basic EMS training	12	38.71 %
Years of experience:		
1-3 years	5	16.13%
3-5 years	6	19.35%
More than 5 years	19	61.29%

Table 1: Demographic data of the participants (n=31).

Results	Minimum	Maximum	Mean	SD
Pretest results	6	18	12.35	2.8
Results after the first training	14	20	18.19	1.9
Results after the second training	18	20	19.8	0.5

Table 2: Results before and after the first and the second interventions (n=31).

The low score of the participants in the pre-test confirmed the need to have this preparedness training, and acknowledged the inadequate prehospital care providers awareness about the KEMS national mass casualty management plan. Our study resembles other studies that improved prehospital care providers' limited knowledge using short time training courses from low score in the pre-intervention to high score in the after intervention [16,19,25]. It is noteworthy that our study, like previous studies have used non-randomized intervention trials and similarly followed a pre- and post-test design [19-28].

In our study as many other studies showed that even with different participants demographic, educational and professional categories significant improvement from pre- to post-test results [30,31]. Wherein this study the participants came from different professions as some nurses and others paramedics working in KEMS. It appear that no significant different between the score of both group as they all achieve well in the post-tests. One study examined 81 undergraduates' multidisciplinary students after both dedicated and simulated training to manage disaster, found that they score high after the intervention [31].

The participants received the training three months later which give power to this study as participants' information is still retained. The high score of post-tests results scores of the immediate post intervention compared with the second post intervention suggest that the second training work as a reinforcement activity that help to improve and stabilize previously gained knowledge. The findings from this study suggest MCIs preparedness training can significantly improve knowledge, skills and attitude of prehospital care providers. These results were consistent with other studies [9,21,25,31] proved the importance of MCIs training for prehospital care providers.

Conclusion

Participants who had attended the training interventions have significantly had better scores in all post-tests. This statistically significant difference in pre-test comparing to post-tests results revealed that such training was very effective in improving prehospital care providers' knowledge, skills, perceptions, and therefore their preparedness for handling disasters or MCI events. Further training programs to enhance the awareness and knowledge of the prehospital care providers' might be needed.

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References

1. Lennquist S (2012) Medical response to major incidents and disasters: A practical guide for all medical staff. Springer Science & Business Media.
2. Organization WH (2007) Mass casualty management systems: Strategies and guidelines for building health sector capacity.
3. Catlett CL, Jenkins JL, Millin MG (2011) Role of emergency medical services in disaster response: Resource document for the National Association of EMS Physicians position statement. *Prehosp Emerg Care* 15: 420-425.
4. Stevens G, Jones A, Smith G, Nelson J, Agho K, et al. (2010) Determinants of paramedic response readiness for CBRNE threats. *Biosecur Bioterror* 8: 193-202.
5. Reilly MJ, Markenson D, DiMaggio C (2007) Comfort level of emergency medical service providers in responding to weapons of mass destruction events: Impact of training and equipment. *Prehosp Disaster Med* 22: 297-303.
6. Chaffee M (2009) Willingness of health care personnel to work in a disaster: An integrative review of the literature. *Disaster Med Public Health Prep* 3: 42-56.
7. Hick JL, Barbera JA, Kelen GD (2009) Refining surge capacity: Conventional, contingency and crisis capacity. *Disaster Med Public Health Prep* 3: S59-S67.
8. Lennquist S (2011) Medical Response to Major Incidents and Disasters: A Practical Guide for All Medical Staff. Springer Berlin Heidelberg, Berlin.
9. Hsu EB, Thomas TL, Bass EB, Whyne D, Kelen GD, et al. (2006) Healthcare worker competencies for disaster training. *BMC Med Educ* 6: 19.
10. Hsu EB, Jenckes MW, Catlett CL, Robinson KA, Feuerstein C, et al. (2004) Effectiveness of hospital staff mass-casualty incident training methods: A systematic literature review. *Prehosp Disaster Med* 19: 191-199.
11. Williams J, Nocera M, Casteel C (2008) The effectiveness of disaster training for health care workers: A systematic review. *Ann Emerg Med* 52: 211-222.e1-2.
12. Hubloue I, Debacker M (2010) Education and research in disaster medicine and management: Inextricably bound up with each other. *Eur J Emerg Med* 17: 129-230.
13. Born CT, Briggs SM, Ciraulo DL, Frykberg ER, Hammond JS, et al. (2007) Disasters and mass casualties: I. General principles of response and management. *J Am Acad Orthop Surg* 15: 388-396.
14. Lennquist S (2005) Education and training in disaster medicine. *Scand J Surg* 94: 300-310.
15. Deluhery MR, Lerner EB, Pirralo RG, Schwartz RB (2011) Paramedic accuracy using SALT triage after a brief initial training. *Prehosp Emerg Care* 15: 526-532.
16. Sapp RF, Brice JH, Myers JB, Hinchey P (2010) Triage performance of first-year medical students using a multiple-casualty scenario, paper exercise. *Prehosp Disaster Med* 25: 239-245.
17. Nilsson A, Aslund K, Lampi M, Nilsson H, Jonson CO (2015) Improved and sustained triage skills in firemen after a short training intervention. *Scand J Trauma Resusc Emerg Med* 23: 81.
18. Idrose AM, Adnan WA, Villa GF, Abdullah AH (2007) The use of classroom training and simulation in the training of medical responders for airport disaster. *Emerg Med J* 24: 7-11.
19. Wang C, Wei S, Xiang H, Xu Y, Han S, et al. (2008) Evaluating the effectiveness of an emergency preparedness training programme for public health staff in China. *Public Health* 122: 471-477.
20. Qureshi KA, Gershon RR, Merrill JA, Calero-Breckheimer A, Murrman M, et al. (2004) Effectiveness of an emergency preparedness training program for public health nurses in New York City. *Fam Community Health* 27: 242-249.
21. Bartley BH, Stella JB, Walsh LD (2006) What a disaster! Assessing utility of simulated disaster exercise and educational process for improving hospital preparedness. *Prehosp Disaster Med* 21: 249-55.
22. Miller GT, Scott JA, Issenberg SB, Petrusa ER, Brotons AA, et al. (2006) Development, implementation and outcomes of a training program for responders to acts of terrorism. *Prehosp Emerg Care* 10: 239-246.
23. Cicero MX, Blake E, Gallant N, Chen L, Esposito L, et al. (2009) Impact of an educational intervention on residents' knowledge of pediatric disaster medicine. *Pediatr Emerg Care* 25: 447-451.
24. Risavi BL, Salen PN, Heller MB, Arcona S (2001) A two-hour intervention using START improves prehospital triage of mass casualty incidents. *Prehosp Emerg Care* 5: 197-199.
25. Pryor E, Heck E, Norman L, Weiner B, Mathews R, et al. (2006) Integrated decision-making in response to weapons of mass destruction incidents: Development and initial evaluation of a course for healthcare professionals. *Prehospital and Disaster Medicine* 21: 24-30.
26. Harrington SS, Walker BL (2003) Is computer-based instruction an effective way to present fire safety training to long-term care staff? *J Nurses Staff Dev* 19: 147-154.
27. Collander B, Green B, Millo Y, Shamloo C, Donnellan J, et al. (2008) Development of an "all-hazards" hospital disaster preparedness training course utilizing multi-modality teaching. *Prehosp Disaster Med* 23: 63-67.
28. Qureshi KA, Gershon RR, Merrill JA, Calero-Breckheimer A, Murrman M, et al. (2004) Effectiveness of an emergency preparedness training program for public health nurses in New York City. *Fam Community Health* 27: 242-249.
29. Hutchinson SW, Haynes S, Parker P, Dennis B, McLIN C, et al. (2011) Implementing a multidisciplinary disaster simulation for undergraduate nursing

-
- students. *Nurs Educ Perspect* 32: 240-243.
30. Zinan N, Puia D, Kinsley T (2015) Results of a mass casualty incident simulation in an undergraduate nursing program. *Journal of Nursing Education and Practice* 5: 71.
31. Risavi BL, Terrell MA, Lee W, Holsten DL Jr (2013) Prehospital mass-casualty triage training-written versus moulage scenarios: How much do EMS providers retain? *Prehosp Disaster Med* 28: 251-256.