

Preparedness of Students for Interventions in Disaster and Mass Accidents

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Abstract

The aim of our study was to compare the changes in the preparedness of students before and after completing theoretical and practical training. In our survey we used a questionnaire analyzed by Pearson Correlation. Questionnaire included 22 questions with scores using 5-point Likert scale. Research sample consisted of two subsets: 222 students in the first year and 173 students in the third year of study (Students of Paramedics Sciences and Public Health). The results show significant differences in preparedness of paramedic sciences students before and after completing of theoretical subjects at the level $p < 0.05$ and significant differences at the level $p < 0.01$ before and after completion of practical training. Significant difference at the level $p < 0.05$ was also confirmed in Public Health students. Qualitative improvement in preparedness, as proved by our research, can be achieved through a well-set training plan.

Keywords: Education, Disaster, Mass Casualty Event, Training, Preparedness

1. Introduction

The situation in health care provision requires changes in health professionals' education. Due to the trend of increasing occurrence of disasters and mass casualty events, whether for reasons of natural disasters or man-made events it has been necessary to establish good training and education plans and curriculums. According to EM-DAT (The International Disaster Database) in 2016 preliminary data indicates that 301 country level disasters occurred, affecting 102 countries. The impact reached up to a total of 7,628 deaths, 411 million affected people, and US\$97 billion of economic damages (Debarati, 2016). Particularly in professions of emergency health care - paramedics and public health is necessary to reinforce theoretical and practical training for intervention in time of disaster and mass casualty events. It does not mean that the students of other health care disciplines should not be ready for such situations. Preparedness of students means to incorporate knowledge in theoretical subjects, critical management, ethical issues and practical skills. Disaster represents a specific situation. When disaster occurs it encounters not just more patients, but more patients in a system with damaged infrastructure. Good preparedness has always been represented as the result of proper educational approaches. Frequent exercises are essential to test the plan, or elements of it, as well as provide the opportunity for both: to practice and test individual skills. While many different exercise classifications exist, a simple approach is to consider the following:

- Discussion Exercises – These are theoretical ‘talk throughs’ of the response to a particular scenario and useful as a preliminary activity.
- Tabletop Exercises (with or without props): These have additional information and inputs but are still usually a hypothetical activity.
- Functional Exercises: These test specific elements of the plan, such as the activation or call in procedures.
- Full Field Exercises: These involve mock patients but use real resources including staff, vehicles and other equipment including communications channels (Aitken & Leggat, 2012).

The time during disasters and mass casualty events, but also periods of emergency response has been a time of test not only for the general population, but also for rescue professionals. We observe the best and worst in human behavior during a disaster. Although we cannot predict all the hazards and events to come, we need to prepare ourselves in the best possible way to deal with them. Perhaps they hit us personally or they touch our friends and loved ones, but we have to help ourselves, others and the

community. It is important to distinguish between a disaster and an emergency including some mass casualty events. A disaster causes widespread disruption in the social order, as well as injury and loss of property. In other words, disasters have extensive social consequences. An emergency is a more geographically isolated event that can be handled by local emergency services, such as ambulances, the fire department or paramedics (Domres, Kees, Gromer, Braitmaier, & Granzow, 2010). In either case, to be prepared to cope with such situations is relevant. In our Faculty of health the disaster and mass casualty events training program includes both, theoretical and practical training. Theoretical training for Paramedics' students includes 60 teaching hours of Emergency Health Care - Mass Casualty Events in third semester and 48 teaching hours of Disaster Medicine in fifth semester of BSc study. Theoretical training for Public Health students consists of 24 teaching hours of Disaster Medicine and 24 teaching hours of Extraordinary Events in Public Health. Practical part of training at the Faculty of Health includes: In the first and second year of study obligatory 20 hours of simulation in real conditions each year taking part as a figurant during competition of rescue crews focused on interventions during disaster and mass casualty events. In the third year of study 24 hours of exercise in laboratory conditions and 30 hours of simulation in real conditions in Military training area Lešť. Practical training is compulsory for paramedic sciences students. Public health students have the opportunity to voluntarily participate in the exercises. For this reason, we didn't carry out survey and analysis of correlation among students of public health after completing practical exercises. The sample would be insufficient in size, and the results would be distorted. The results of our training are represented by obtaining several awards: 4 times 1st place in the competition of rescue crews focused on interventions in disaster and mass casualty events, 3 times 2nd place and 2 times 3rd place in the competition of rescue crews.

2. Aim

The aim of our study was to assess the changes achieved in the preparedness - qualitative improvement before and after completing the courses aimed at interventions during disasters and mass casualty events. We focused on both theoretical as well as practical training in these subjects and their influence on decision-making and actions during such situations. The study may indicate the potential necessity of changes in training of students in order to achieve better results in practice. Study was elaborated with financial support of the project KEGA No. 007KU-4/2018.

3. Characteristic of Respondents

Research sample consisted of two subsets: 222 students in the first year of BSc study (group A and B) and 173 students in the third year of BSc study (group C and D) in Paramedics Sciences and Public Health at the Faculty of Health in Ružomberok. Group A was composed of 157 paramedic sciences students (94 = 59.9 % male students and 63 = 40.1 % female students), group B of 65 public health students (8 = 12.3 % male students and 57 = 87.7 % female students), group C of 131 paramedic sciences students (89 = 67.9 % male students and 42 = 32.1 % female students), and group D of 42 public health students (6 = 14.3 % male students and 36 = 85.7 % female students). The average age of respondents in group A was 22.17 years (± 9.15), in group B was 20.26 years (± 1.09), in group C was 25.12 years (± 9.07), and in group D was 24.22 years (± 1.05).

4. Method

In our survey we used a non-standardized questionnaire analyzed by Pearson Correlations with levels of significance $p < 0.01$ and $p < 0.05$. Questionnaire included 22 questions and the scores were reported by use of a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). 222 questionnaires were distributed at the beginning of study (in 1st semester) and 173 questionnaires at the end of study (in 5th semester of study). The survey has been conducted during the years 2015 – 2019 at the Faculty of Health, Catholic University in Ružomberok.

We established 3 hypotheses:

H₁ We assume that there is significant difference between both groups of students of Paramedic Sciences in preparedness after completion of Disaster Medicine and Theoretical part of Emergency Health Care – Mass Casualty Events.

H₂ We assume that there is difference between both groups of students of Public Health in preparedness after completion of Disaster Medicine and Extraordinary events in public health.

H₃ We assume that there is significant difference between both groups of students of Paramedic Sciences in preparedness after completion of Practical part of Emergency Health Care – Mass Casualty Events.

5. Results

Cronbach’s alpha 0.918 confirms strong reliability of used evaluation tool. The results of our research show significant differences in preparedness of paramedic sciences students before and after completing of theoretical subjects Disaster Medicine and Theoretical part of Emergency Health Care – Mass Casualty Events at the level $p < 0.05$. Results are in table 1.

Tab. 1 The correlation between preparedness of paramedic sciences students – theoretical subjects

Hypothesis H ₁		Paramedic sciences students
Disaster Medicine	Pearson Correlation	0.112*
	Sig.(2-tailed)	0.045
Theoretical part of Emergency Health Care – Mass Casualty Events	Pearson Correlation	0.116*
	Sig.(2-tailed)	0.038

Pearson Correlation *significant correlations at the significance level 5% ($p < 0.05$)

Considering the results obtained in our survey, we can strongly underline the need for responsibility in teaching based on theoretical training of interventions during disasters and mass casualty events.

Significant difference in Pearson correlation at the significance level $p < 0.05$ was confirmed also in Public health students after completion of subjects: Disaster Medicine and Extraordinary Events in Public Health.

Tab. 2 The correlation between preparedness of public health students – theoretical subjects

Hypothesis H ₂		Public health students
Disaster Medicine	Pearson Correlation	0.114*
	Sig.(2-tailed)	0.041
Extraordinary Events in Public Health.	Pearson Correlation	0.129*
	Sig.(2-tailed)	0.020

Pearson Correlation *significant correlations at the significance level 5% ($p < 0.05$)

Public health students must be prepared for emergencies due to the fact that as public health officers they will be involved in coordination and preparation of subsequent epidemiological plans. The result of our research has shown the merits of preparation even on a theoretical level.

Highly significant differences at the level $p < 0.01$ were confirmed before and after completion of practical training of Emergency Health Care – Mass Casualty Events in paramedic sciences students.

Tab. 3 The correlation between preparedness of paramedic sciences students – practical training

Hypothesis H ₃		Paramedic sciences students
Practical training of Emergency Health Care – Mass Casualty Events	Pearson Correlation	0.149*
	Sig.(2-tailed)	0.007

Pearson Correlation *significant correlations at the significance level 1% ($p < 0,01$)

Using the 5 point Likert scale we achieved overall preparedness score 4.33 +/-0.67 SD after completion of theoretical and practical courses in Paramedics' students, which entitles us to say that the preparedness for disaster and mass casualty events is sufficient.

6. Discussion

Preparation at our Faculty of Health, CU Ružomberok includes both, disaster and mass casualty events solving. It is focused on skill building as well as on decision making, because providing sufficient support on educational (communication, stress and aggression management), psychological (feedback) and ethical level, is essential for realizing a clinical-ethical based process of triage planning (Aacharya, Gastmans, & Denier, 2011). High number of teaching hours concentrated on disaster and mass casualty events in study curriculum has a positive impact on the organization, ability acting, planning and communications in crisis situations. The National Disaster Health Consortium at the Wright State University by using of the Emergency Preparedness Information Questionnaire (EPIQ) pre/post training and participant performance held the research focused on evaluation of triage, re-triage, surge response, and sheltering in disaster and mass casualty events in 64 participants. The results showed the mean EPIQ pre-training score of 154 and mean post-training score of 81 (reverse-scored) which was found to be statistically significant by paired t-test $p < 0.001$ (Farra, Smith, & Bradshaw, 2016). In our research the significance has also been confirmed at the significance level

of 1% $p = 0.007$ after practical training. In 2014, the one-day disaster preparedness course in Lucknow, India at sample size of 48 participants detected a 20% change in mean knowledge score ($=0.05$; power=80%). Robustness of randomization was evaluated using X-2, anova, and t-tests. The results showed that case-based learning training resulted in a significant increase in relative knowledge scores at 20.8% ($p = 0.003$) and 10.3% ($p = 0.033$) in intergroup and intragroup analyses, respectively (Aluisio et al., 2016). Our courses were also case-based learning training on disaster and mass casualty events and results confirmed a significant differences between groups before and after completion of theoretical subjects: $p = 0.045$ and $p = 0.038$ in paramedics students as well as $p = 0.041$ and $p = 0.020$ in public health students. The result, that we achieved by obtaining overall preparedness score mean 4.33 ± 0.67 SD after completion, underlines the adequacy of selected teaching methods, their content and scope. Similar research carried out by Korea Disaster Relief Team showed that the overall preparedness score for international disasters was 3.5 ± 1.1 SD in 43 respondents, but 4.4 ± 0.6 SD in personnel who took on leadership roles in the team (Lee et al., 2016). Despite of good and decent skill and knowledge, we can be surprised by the circumstances, the size of impact, the number of people affected, or the proximity of danger and death. To certain situations we cannot be fully prepared. They come and hit our emotions. In such time the decision is hard and we need to have a well-prepared plan. The research designed in Jazan University Medical School in Saudi Arabia and held at the Research Center in Emergency and Disaster Medicine and Computer Sciences Applied to the Medical Practice in Novara, Italy, pointed out the importance of good disaster medicine curriculum to achieve efficacy in training. The overall mean score on a test given before the course was $41.0\% \pm 6.29$ SD and it increased to $67.7\% \pm 7.70$ SD on the post-test. Wilcoxon test for paired samples: $z = 4.71$, $p < 0.0001$ (Bajow et al., 2016). In general we can say that most of the authors dealing with preparedness would agree that good preparation is difficult, but necessary. Our results also clearly pointed out the fact that practical training plays more important role in preparedness of students than theoretical training. This correlates with results of a study conducted in Spain on a sample of 110 respondents in 2015. The results of the study have shown that theoretical training program significantly improved knowledge about the disaster preparedness, but no improvement was observed in the practical questions. Staff felt more prepared to face a disaster after the practical training program 15.5% vs. 41.8%, $p < 0.001$ (Cotanda, Martinez, De la Maza & Cubells, 2016). Good results in practice depend of good preparation. This has been confirmed in our survey.

An independent area of preparedness is related to the ethical and psychological issues. There is a significant gap in the literature on nurses' experience in ethical preparedness for managing public health emergencies and healthcare disasters, and the ethical quandaries they encounter during such events. This finding highlights the need for ethical considerations in emergency planning, preparedness, and response (Johnstone & Turale, 2014). The cardinal virtues of disaster response are prudence, courage, justice, stewardship, vigilance, resilience, self-effacing charity and communication. These eight virtues are not considered all inclusive, no more than Aristotle considered that his morals or virtues were all inclusive. Ongoing work in disaster management will help to ensure that such situations are managed in an ethical manner that respects the rights and privileges of all those involved (Geale, 2012).

7. Conclusion

Although various speculations related to preparedness of professionals arise, it is undeniable that good education and training of professional rescuers makes them effective, personally valuable and needed people in every society. No community may jeopardize the values of life, health, as well as the assets and property of its members. Good preparedness of professionals is an essential requirement for well-functioning society. But due to the trend of increasing occurrence of disasters and mass casualty events it is necessary to prepare not only students - particularly in professions of emergency health care and public health, but also other members of the society. Qualitative improvement of preparedness, as proved by our research, can be achieved through a well-set training plan.

8. Ethical aspects and conflict of interest

We confirm that there is no conflict of interest in writing and publishing this contribution, in carrying out of the study and work of all co-authors. According to the conviction we also confirm compliance with ethical principles of scientific and academic work of co-authors.

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