



## Does hospital medical staff maintain hospital disaster resilience?

Da li je bolničko medicinsko osoblje sposobno da održava rezilijentnost bolnice na katastrofu?

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### Abstract

**Background/Aim.** In the event of a disaster, it is necessary for medical personnel to demonstrate the operational component of disaster resilience, which requires certain knowledge and skills regarding disaster medical response algorithms. The aim of this study was to analyze the preparedness of hospital's healthcare staff for maintaining hospital disaster resilience. **Methods.** An anonymous survey was conducted from July to September 2019 among 295 medical staff employed in hospitals in the territory of the city of Plovdiv, Bulgaria. Pearson's Chi-square test, Student's *t*-test, and graphical analysis were used in the statistical analysis. **Results.** Most of the medical staff, i.e., 85.8%, believed that disaster drills are not held regularly in hospitals, 30.8% thought that the training period was shorter than two years, and the majority, i.e., 86.1%, did not participate in exercises. **Conclusion.** Due to the irregular implementation of exercises and the small number of participants in them, the level of preparedness for responding to disasters is not maintained at a high level in hospitals in the Plovdiv region. Therefore, it is necessary to introduce a specific training program and exercise once a year, which should have a beneficial effect on increasing the preparedness of the medical staff for disasters and improving the operational resilience of the hospital.

### Key words:

bulgaria; disaster planning; hospitals; personnel, hospital; surveys and questionnaires.

### Apstrakt

**Uvod/Cilj.** U slučaju katastrofe, neophodno je da medicinsko osoblje pokaže operativnu komponentu rezilijentnosti na katastrofu, koja zahteva određeno znanje i veštine u vezi sa algoritmima medicinskog odgovora na katastrofe. Cilj rada bio je da se analizira pripremljenost zdravstvenih radnika bolnice za održavanje rezilijentnosti bolnica na katastrofe. **Metode.** U periodu od jula do septembra 2019. godine, sprovedeno je anonimno ispitivanje 295 zdravstvenih radnika, zaposlenih u bolnicama na teritoriji grada Plovdiva, Bugarska. U statističkoj analizi podataka korišćeni su Pearson-ov  $\chi^2$  test, Student-ov *t*-test i grafička analiza. **Rezultati.** Većina medicinskog osoblja, odnosno 85,8%, smatra da se vežbe vezane za slučaj katastrofe ne održavaju redovno u bolnicama, 30,8% smatra da je period obuke bio kraći od dve godine, a većina, odnosno 86,1%, nije učestvovala u vežbama. **Zaključak.** Zbog neredovnog izvođenja vežbi i malog broja učesnika u njima, nije održavan visok nivo pripremljenosti za odgovor na katastrofe u bolnicama na teritoriji regiona Plovdiva. Stoga je potrebno uvesti poseban program obuke i vežbi jednom godišnje, što bi trebalo da ima povoljan efekat na povećanje pripremljenosti zdravstvenog osoblja za katastrofe i poboljšanje operativne rezilijentnosti bolnice.

### Ključne reči:

bugarska; katastrofe, planiranje; bolnice; kadar bolnički; ankete i upitnici.

### Introduction

Hospital disaster readiness includes activities, programs, and systems aimed at providing the necessary medical care to the casualties and reducing the negative impact of disasters. The hospital's activities and programs consist of coordination, approved response procedures, and medical staff training<sup>1-5</sup>.

The planned and implemented training and drills have a significant impact on disaster response preparation and have a positive influence on human resources<sup>6-11</sup>. Insufficient drills are associated with slowing the reaction of medical personnel in case of a disaster and reducing the effectiveness of the disaster response, negatively affecting the operational component of disaster resilience<sup>12, 13</sup>. To increase knowledge and

skills regarding specific disaster medical response algorithms, drills must be conducted routinely<sup>14</sup>. In order to achieve this, the plan envisages the implementation of specific training for hospital employees and contains related regulations. A hospital headquarters task is to organize disaster drills with both managers and executive medical specialists<sup>2, 3, 7, 15-17</sup>. The aim of this study was to analyze the preparedness of hospital medical professionals in the Plovdiv region for maintaining hospital disaster resilience.

## Methods

An anonymous survey was conducted among hospital medical professionals in the Plovdiv region, Bulgaria. The study was conducted in two multidisciplinary hospitals for active treatment (MHAT) and one university multidisciplinary hospital for active treatment (UMHAT). The choice of MHAT to conduct the study is based on the role of this type of medical facility during disaster medical support. In case of a disaster, the casualties are evacuated to the nearest hospital, which can provide life-saving therapeutic and surgical assistance to casualties with multiple traumas. The hospitals listed below were included in the study: UMHAT "Plovdiv", Plovdiv; MHAT "Asenovgrad", Asenovgrad; MHAT "Dr. Kiro Popov", Karlovo. They were selected on a random (lottery) basis from a list of existing medical facilities for hospital care in the territory of the Plovdiv region. To conduct the study, written permissions were received from the heads of the hospitals: application with incoming number B-1024, dated August 6, 2019, from the executive director of UMHAT "Plovdiv", Plovdiv; application with incoming number II-800, dated July 6, 2019, from the executive director of the UMHAT "Plovdiv", Plovdiv; request with incoming number 1305, dated July 10, 2019, from the manager of MHAT "Asenovgrad", Asenovgrad; application with incoming number 748, dated July 9, 2019, from the manager of MHAT "Dr. Kiro Popov", Karlovo.

The survey was conducted from July to September 2019. The purpose of the survey and the survey card were presented to the medical personnel. After brief introductions by the interviewer, questionnaires were distributed to the medical persons who expressed willingness to participate in

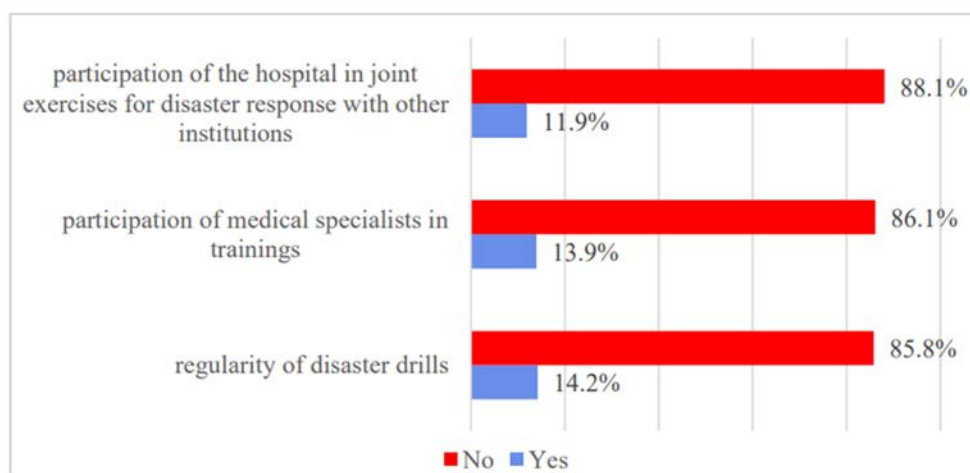
the study. The method of conducting was to fill in a paper form of the questionnaire. The questionnaire consisted of 55 questions. The survey was anonymous. The purpose of the conducted survey for each medical specialist was to self-determine, according to their qualification and position, the level of their awareness and medical readiness for responding in the conditions of disasters.

Stein's two-step method was used to determine the required number of observation units. In the first stage, a micro-survey was conducted on a sample of thirty medical specialists, and the age of the respondents was taken as an indicator for calculating the required standard deviation ( $S_x$ ). In the second stage, 287 units of observation were determined using the formula for calculating the required number of units of observation for variation signs, with  $\Delta = 0.5$  g,  $S_x = 4.32$ , and perceived usefulness  $[P(u)] = 0.95$  as the maximum permissible error. The number of medical professionals surveyed was 310, of which 15 were dropped due to incomplete and missing data in survey cards, leaving the actual number of work units at 295. The number of medical staff who participated in the study (295 in total) constitutes 8.6% of all medical personnel (general population) in the MHAT in the Plovdiv region, and is representative in relation to the general population.

Data processing and quantitative analysis were conducted using specialized software SPSS® 21.0 (IBM Corporation®, Armonk, New York, United States of America). Descriptive statistics was used to calculate the relative percentages. Pearson's Chi-square test and Spearman's correlation were used in testing hypotheses for a statistically significant relationship between the studied factorial and performance traits. Graphic analysis was used to illustrate processes and phenomena, certain regularities, or dependencies. Microsoft Office Excel 2013 was used for tabular and graphical analysis. For all analyses,  $p < 0.05$  was statistically significant.

## Results

The medical professionals of hospitals in the Plovdiv region believed that disaster drills were not conducted regularly – most [253 (85.8%)] of the respondents provided a negative response (Figure 1).



**Fig. 1 – Respondents' knowledge about the regularity of hospital disaster trainings and participation in drills.**

The highest percentage [9 (32.1%)] of medical specialists who believed drills to be common events was observed among managers ( $p = 0.018$ ;  $\chi^2 = 10.01$ ) (Figure 2).

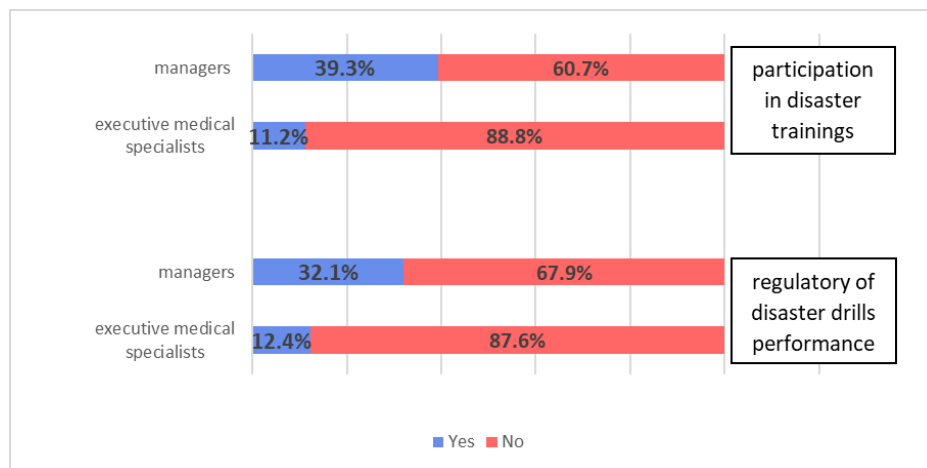
A small number [91 (30.8%)] of hospital medical professionals have indicated that the training event period was shorter than two years. More than half [165 (55.9%)] of the respondents stated that this period was longer than five years. The relative share of respondents who noted that the classes were held over a period of 4–5 years was 19 (6.4%), and 20 (6.8%) medical specialists believed that the training event period was 2–3 years (Figure 3).

Most [254 (86.1%)] hospital medical staff in the Plovdiv region did not participate in trainings (Figure 1). Managers participated more often [11 (39.3%)] in disaster response trainings out of all participants ( $p = 0.001$ ;  $\chi^2 = 22.64$ ) (Figure 2). Medical specialists working in a hospital were extremely unaware of the fact whether the hospital participated in joint exercises for disaster response with other institutions – 260 (88.1%) respondents provided a negative answer (Figure 1).

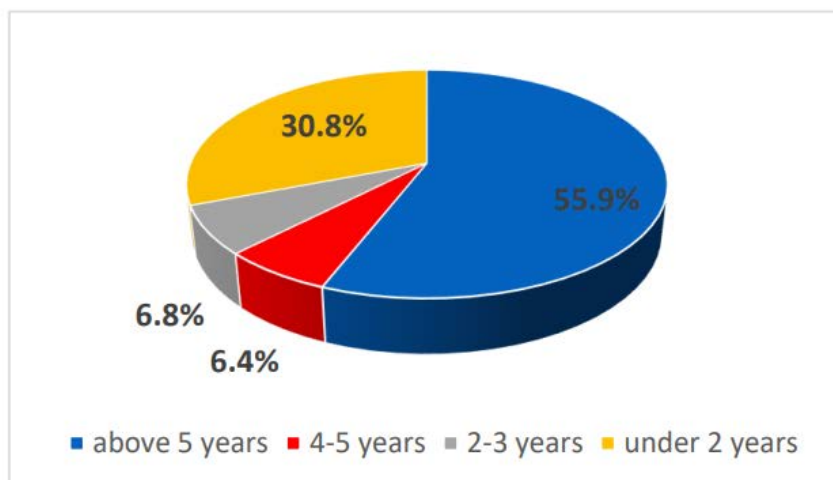
**Discussion**

Disaster medical support requires specific theoretical and practical training, as well as the acquisition of skills that differ from daily medical practice. Therefore, it is mandatory to put into practice what has been learned through regular disaster drills<sup>12</sup>. The hospital medical staff in the Plovdiv region stated that disaster drills are not conducted regularly. Chimenya<sup>15</sup> reported that almost all of the respondents (97.8%) stated that the hospital did not perform disaster-related trainings, which coincides with the results of our study.

Although the largest number of respondents who believe that drills take place often are among managers, there are too few of them in total. In a study by Chimenya<sup>15</sup>, only 3.0% of the superiors considered disaster trainings to be regular, which is even lower than the results in our study. Managers are responsible for planning and organizing disaster training activities. Negative statements from the hospital medical staff about training frequency indicate that the man-



**Fig. 2 – Respondents’ knowledge about the hospital disaster trainings and drills according to their position held.**



**Fig. 3 – Opinion of hospital medical professionals on the training period.**

agers need to consider the performance of their duties more precisely and arrange drills more frequently. Increasing drill reiteration will lead to better disaster preparedness among medical personnel and improve the operational resilience of the hospital.

Regarding regularity, according to the hospital disaster medical support plan, disaster drill performance should be held once a year. Less than 1/3 (30.8%) of medical professionals have answered that the training event period is shorter than two years. Kolev<sup>12</sup> reported results similar to our study. The findings of our study showed extremely unsatisfactory results and indicated that the number of conducted disaster drills by hospital medical professionals was less than it was supposed to be. As a result of the decreased frequency of the trainings, the automation and the speed of hospital staff's reactions in case of a disaster will also be decreased. This would have a negative impact on the disaster resilience of the hospital.

The hospital disaster medical support plan should include regulations for conducting disaster training and drills throughout the year. Staff disaster training is required to assess its readiness<sup>15</sup>. Most of the medical professionals working in hospitals in the Plovdiv region have not participated in the trainings. Managers participated more often in disaster response trainings than others. The results of this study are similar to others conducted worldwide. Chimanya<sup>15</sup> reported that 85.7% of medical professionals did not attend disaster-related training. In a study by Damete<sup>18</sup>, 3/4 (76.2%) of the medical staff did not receive disaster management training. Results from research done at Alexandria University Hospitals show that 71.9% of respondents did not attend disaster-related training<sup>19</sup>. According to another study conducted at Amhara Regional State Referral Hospitals, Ethiopia, 65.7% of medical staff did not receive training on disaster preparedness and management<sup>20</sup>.

Hospital staff's education and practical training on hospital disaster medical support are conducted jointly with the municipality and regional response forces of the Unified Rescue System and in accordance with the disaster medical support plan. Joint training with other structures is done to improve coordination and timing of the search, rescue, and medical activities during a disaster<sup>12</sup>. Hospital medical specialists are completely unaware of whether the hospital participates in joint exercises for disaster response with other institutions. To successfully deal with the challenge of disaster medical support, the Unified Rescue System elements are

necessary to organize and execute continuous training for responding to disasters in cooperation among them<sup>2, 21</sup>. Insufficient joint training is associated with a delay in disaster response and a reduction in response effectiveness, negatively impacting disaster resilience.

Daily work of healthcare workers is associated with an increased presence of different stressors that induce an increase in psychological pressure, leading to anxiety, depression, sleep disorders, and burnout. The stress levels increase throughout crises and disaster occurrences. Hospital resilience increases the mental and physiological stamina during disasters. Psychological resilience is defined as the ability of people to tolerate increased levels of stress more easily, function adequately, and be able to adapt in emergencies and maintain or restore their mental health. The ability to mentalize is an important characteristic of resilience and represents the human ability to understand one's own and the mental states of others, which affects the general resilience of the personality, i.e., the ability to adapt successfully to challenges and stress. The process of mentalization is expressed in the interdependence between the subjective understanding of the mental states of ourselves and others, which influences our behavior and allows us to feel in control of our thinking and the way we act, as well as the way we perceive, analyze, and interpret social information from our surroundings<sup>22-24</sup>.

Achieving higher resilience among medical specialists can be accomplished through appropriate training programs. The development of online interventions focusing on resilience and the availability of psychological support is needed to manage stress during a disaster and address the long-term consequences related to quality of life, personal functioning, and overall well-being<sup>22-24</sup>.

## Conclusion

Based on the results of the performed analyses, it must be noted that the level of preparedness for responding to disasters is not maintained at a high level in hospitals in the territory of the Plovdiv region due to the irregular implementation of exercises and the small number of participants in them. Therefore, it is necessary to introduce a specific training program and exercise once a year, which should have a beneficial effect on increasing the preparedness of the medical staff for disasters and improving the operational resilience of the hospital.

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