
PREHOSPITAL HEALTHCARE FLOOD RELATED CHALLENGES 2022 FLOODING LESSONS LEARNT

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Abstract: On Second September 2022 several villages in Karlovo municipality were affected by heavy, torrential rains. The rain lasted above 8 hours. The extreme rainfall of average 191 l/m² resulted in flooding of 8 villages, three of them were devastated by the tidal water wave above two meters. Majority of the infrastructure – roads, bridges, houses were heavily affected. Parts of the villages were inaccessible. Electricity and water distribution systems were damaged and nonoperational. Above two hundred homes were buried along the streets and administrative buildings under meters of mud, timber and other river sediment waste. Many families remained homeless and required urgent evacuation and shelter. From the beginning of the disaster relief operation various structures and agencies were involved. The coordinated efforts of the Karlovo municipal and Plovdiv provincial administration authorities were enhanced by several units of the Bulgarian armed forces and the Sofia Directorate Fire Safety and Civil Protection. Great number of voluntaries, into the weekends their number exceeded even 2000, also supported the recovery operations into the area damaged by the waters. The main priority was assuring the life and health safety of the affected population, but this required rapid recovery of the critical infrastructure and unified efforts at national level. The objective of this study is to analyze and present the challenges faced by the healthcare authorities into provision of the medical support to affected by the flooding population and maintain the healthcare provision within the area of flood damage during the long lasting period of recovery operations.

In order to achieve the set objective a thoroughly analyses of all the reports and media coverages were performed. Means of the descriptive and comparative method were applied for revealing the main groups of challenges that arose during the disaster response and recovery phases.

Based on the results of the performed analyses several groups of challenges related to the prehospital medical care were noted. The flood has resulted with no fatalities, but a lot of difficulties into medical information exchange, triage and evacuation at the response phase have to be highlighted. Most of the patients on long-term treatment and patients with exacerbated by the disaster occurrence chronic diseases were evacuated without medical monitoring on board of the available, not sanitary, vehicles. In the aftermath of the disaster the distribution of drugs and pharmaceutical products was significantly jeopardized, as well as the medical support to the citizens, the search and rescue teams and voluntaries in the flooded area.

The recorded shortfalls into medical support have to be more precisely examined and respective changes into the planning for medical aid provision to the regions prone to floods have to be implemented.

Keywords: Flood, prehospital medical healthcare, disaster relief operations, disaster medical support

1. INTRODUCTION

On Second September 2022 several villages in Karlovo municipality were affected by heavy, torrential rains. The rain lasted above 8 hours. The extreme rainfall of average 191 l/m² resulted in flash flooding of 8 villages, three of them were devastated by the tidal water wave above two meters. The Bulgarian National Institute of Meteorology and Hydrology provided the following information about the place and time of the flood: Affected by the flash flooding were the villages of Rozino, Slatina, Stoletovo, Bogdan, Karavelovo, Dabene and Voinyagovo in the municipality of Karlovo. They are located in the watershed of the Stryama River, Eastern White Sea Basin (Fig. 1). The flood that was recorded in the morning hours of 09/02/2022 is a phenomenon defined as a flash flood. As a result of intense rainfall on 09/01/2022 and 09/02/2022, in the early morning hours of the second day the water levels in the ravines and rivers passing through the above mentioned villages rose sharply, the water came out of the troughs and flooded streets and private properties in the villages. A state of partial emergency has been declared in the municipality of Karlovo. There were a large number of people evacuated from the villages. The basic information and data about the flood provided by the Bulgarian National Institute of Meteorology and Hydrology included thoroughly analysis of synoptic information at the beginning of the hydrological disaster. A baric valley has descended high above the Balkan Peninsula from the northwest and resulted in formation of a shallow cyclone in the Central Mediterranean, which slowly moved eastwards through the southern part of the Balkan Peninsula and

then northwards towards the Black Sea, filling up. In the northwestern part of the country, the ground wind was from the northwest, and in the rest, in the periphery of the ground vortex, from the east-northeast. In combination with the extensibility in the flow field at 200 hPa and 300 hPa, perfect conditions were created for powerful convection in Central Bulgaria and especially in the Karlovy Valley.

Figure 2 Stryma river watershed (1)

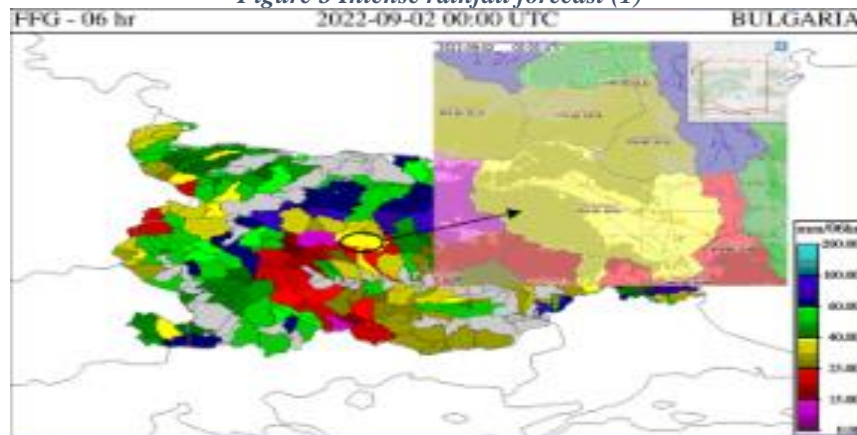


Source: (1) Национален институт по метеорология и хидрология. НИМХ. (2022)

Intense precipitation started in the late afternoon of 09/01/2022 and towards midnight on 1-st vs. 2-nd September become extremely active, until around 9 am on 09/02/2022 started to weaken, but still continued until 5-6 pm. Hydrological analysis of the situation undoubtedly proved that the intense rainfall was one of the main prerequisites for the occurrence of the flash flooding.

Has to be noted that in the area of the flood, the intense rainfall has been predicted in the early hours of 09/02/2022. A hydrological forecast has been prepared by the ALADIN Bulgaria modelling and simulation system based on analyzed synoptic and hydrological information, from the previous day and the prognostic data for intense rainfall. The hydrological forecast for this day included a description of the areas at risk of torrential flooding, including the catchment area of the Stryama River: “As a result of intense rainfall, there is a possibility of flash floods as follows: In the afternoon and evening hours of 01.09. 2022 and on the night of September 2, 2022. in the upper part of the Tundzha River and in the upper part of the Maritsa River (Topolnitsa River, Stryama River, Byala River...)”. (Fig. 2)

Figure 3 Intense rainfall forecast (1)



Source: (1) Национален институт по метеорология и хидрология. НИМХ. (2022)

Majority of the infrastructure – roads, bridges, houses were heavily affected. Parts of the villages were inaccessible. Electricity and water distribution systems were damaged and nonoperational. Above two hundred homes were buried along the streets and administrative buildings under meters of mud, timber and other river sediment waste. Many families remained homeless and required urgent evacuation and shelter. From the beginning of the disaster relief operation various structures and agencies were involved. The coordinated efforts of the Karlovo municipal and Plovdiv provincial administration authorities were enhanced by several units of the Bulgarian armed forces and the Sofia Directorate Fire Safety and Civil Protection. Great number of voluntaries, into the weekends their number exceeded even 2000, also supported the recovery operations into the area damaged by the waters. The main priority was assuring the life and health safety of the affected population, but this required rapid recovery of the critical infrastructure and unified efforts at national level.

The objective of this study is to analyze and present the challenges faced by the healthcare authorities into provision of the medical support to affected by the flooding population and maintain the healthcare provision within the area of flood damage during the long-lasting period of recovery operations.

2. MATERIALS AND METHODS

In order to achieve the set objective a thoroughly analyses of all the reports and media coverages were performed. Means of the descriptive and comparative method were applied for revealing the main groups of challenges that arose during the disaster response and recovery phases.

3. RESULTS AND DISCUSSION

Majority of the researches analyzing the sources for flash flooding have noted that apart of the heavy and intense precipitation a lot of other factors have to be taken into consideration – deforestation, slopes, tiny riverbeds, dikes' construction, maintaining and current status and infrastructure, location of the villages, population density and economic status, etc. (2-16)

Analyzing the Stryama river watershed at the Karlovo Valley the experts noted that almost all of the most significant prerequisites for the flash flood occurrence were present at the affected area. The administration authorities have reported the urgent need for reconstruction and recovery of the dikes across the Stryama river and its tributaries. More than decade has passed from the last general repair and maintenance activities of the dikes. Several reports have been sent regarding the uncontrolled logging and storage of timber in the catchment area of the river, but there were no activities from the respective agencies. As a result, more than 6000 cubic meters of timber were found and collected from the devastated villages. These timber and the mud river sediments led to extremely severe consequences for the critical infrastructure. The water and electricity distribution systems were damaged and required repair that led to water shortage and blackout for several days. Several bridges collapsed or were destructed by the water resulting in jeopardized to impossible reaching a large number of inhabited houses. Those people leaving in remote and inaccessible areas of the villages required urgent evacuation, because some of their homes were destructed beyond repair or were filled by mud and other riverine sediments.

The sanitary and hygiene situation was deteriorating every hour – the muddy waters and sediments covering the streets, houses, yards were becoming sources for spreading pathogens. The mold of the wetted walls and rooms, the rooting vegetation, the corpses of the drawn animals and insects were presenting a real threat for the health of the affected population.

Another health threat was related to the age and health status of the population at risk. More than 100 patients with chronic diseases and impeded movement were evacuated by the search and rescue teams of the General Directorate Fire Safety and Civil Protection that were supported by the Bulgarian Armed Forces. The military servicemen started urgent emergency restoration works – setting condition to reach and evacuate those in need, into the very first hours of disaster. Their activities were timely divided into three groups – saving and evacuation of the citizens at higher life and health risk; second group activities was related to the logistics – provision and distribution of safety, clean water, food and primary goods and third group was to support the repair and recovery activities.

As the result of the analyses the established post disaster general situation in the flooded area the health hazards could be grouped in the following categories:

- Hazards related to the disastrous event – psychological stress and distress related to the loss of property, destruction, disbelief into support provision etc.
- Hazards related to the deteriorated sanitary and hygiene conditions.
- Hazards related to the flooded houses and covered by mud and timber villages.
- Hazards related to injuries due to the water movement or injuries received throughout repair and recovery activities.
- Hazards related medical assistance scarcity.

From the very first day 09/02/2022, the Regional Health Inspection, Plovdiv initiated and led the disaster medical support activities. The main objective was set as to evacuate all those in need of constant medical care – more than 100 elderly and patients on long-term treatment were evacuated from the flooded area and directed for medical examination into the closest hospitals in the cities of Karlovo and Sopot.

Second activity of the medical support was related to the monitoring of the water quality. On second September corresponding to the requirements of Ordinance No. 9 on the quality of water intended for drinking and domestic purposes, were sent instructions to prohibit the usage of tap water for drinking and cooking in the affected areas, as well as the water extracted from wells and boreholes on the territory of private properties also not to be used for drinking and cooking. 102 water samples from flood-affected areas for laboratory testing were taken to verify the results of the water distribution system repair activities. Instructions were sent for the collections and managing the corpses of the drawn domestic animals in the flooded villages and their surroundings. (17) Safety clean and bottled water distribution was organized, along with safe and canned food distribution.

The main challenge related to the disaster medical support was the medical care provision to the citizens of the affected villages and to the search and rescue team members, as well to the thousands of the voluntaries, who have gathered for repair and recovery activities lasting over than two months. Even prior the disaster some of the villages experienced medical coverage shortages – Bogdan was without any general medicine practice and in Rosino only one of three required was present.

After the water wave has devastated the villages the result was that no one of the established practices for family medicine was operational. Most of them were inaccessible due to the collapsed bridges, damaged streets or mud sediments. All of them were without electricity and water. These led to severe shortage of medical capacities into affected villages. What were the mitigation measures directed by the Ministry of Health, Regional Health Inspection and the Bulgarian Medical Association? Two teams of the Center for Emergency Medical Aid Plovdiv were dispatched for medical assistance during the first days, but due to the scarcity of teams they were returned back to their station. The daily medical healthcare was covered by two medical teams and two ambulances voluntary offered by the Specialized Cardiology Hospital “St. Ekaterina” Sofia. These teams were supported into psychological support and stress prevention by the voluntaries from the Bulgarian Red Cross. Two teams for testing and immunization against COVID-19 were sent during the weekends by the Regional Health Inspection Plovdiv. Severe shortage of the vaccines for tetanus prophylaxis was reported that led to urgent decision from the Municipal Crisis Headquarters. The Headquarters sent 200 doses of the vaccine against Pertussis, Diphtheria and Tetanus that were available in the municipality. Taken into consideration the great number of voluntaries – in the weekends they exceeded 1000 the number of available vaccines was extremely low. As the first repair activities were focused on securing the dikes and riverbeds, as well cleaning and opening the main roads for accessing the households of the villages for more than two weeks the practices remained nonoperational that dramatically impact the prehospital healthcare, patients monitoring and treatment.

3. CONCLUSION

Based on the results of the performed research and analyses on medical support to the population living in the flood affected villages has to be noted that the pre-hospital healthcare system was severely damaged and non-operative. The population has to rely on voluntaries for coping with the stress and for receiving the basic medical assistance. The system was not prepared for covering the medical needs of voluntaries and teams for repair and recovery.

The authors do expect that these lessons will be thoroughly analyzed, the possible mitigation measures will be examined and respective measures will be planned and implemented.

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