

**INFORMATION TECHNOLOGIES INTO POPULATION DISASTER MEDICAL
EDUCATION**

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Abstract: Last decades the Information Technologies development has reached unimaginable levels. Nowadays there is almost no human activity that is not dependable of the Information Technologies. On the other hand, records are revealing steady increase in both disaster frequency and severity. As the first minutes to first hour are most important for life and health saving, it is of utmost importance to better prepare every potential casualty on medical support basics.

The aim of this study is to analyse the capabilities of the modern Information Technologies for population disaster medical education.

Materials and Methods: By the means of descriptive and comparative methods the Information Technologies applicable for disaster medical education are listed. Deductive and cluster analyses are applied in order to note the available for free Information Technologies possibilities to be in use for population disaster medical education.

Results and discussion: The performed analyses highlighted the capabilities of the social networks (Facebook), Internet sharing platforms (Youtube) and Mobile Application. It is noted that their capacities for education are at extremely low level utilize for population disaster medical education.

As conclusion a template for population education on medical basic knowledge and skills for healthy behavior in case of disasters is proposed.

Keywords: Disaster medical education, Information Technologies, Healthy Behavior, Disaster medical education, First Aid

INTRODUCTION

A lot of articles and studies have been published recently regarding the recorded steady trend in disasters frequency increase. (1, 2, 3) Researches are still trying to reach consensus on what are the routes of this unprecedented increase in the both disastrous events and the severity of their consequences. As the number of climate related natural calamities has shown the greatest increase most of the authors are incline to link the both phenomena. Therefore, the processes related to our modern society development could be discussed as the main triggers for the disasters increase, because their impact on climate is without any doubt accepted. () The processes are the well known industrialization, urbanization and globalization.

There is no need to describe in deep the process of industrialization to reveal its negative impact on environment. In summary, industrialization is leading to increase of the industrial facilities number. What is more the growth is observed not into the number but into their capacities. Increased number, size and largeness of the industries are requiring enormous amount of raw materials that are extracted by the earth via intensified mining. On the other hand great majority of the industrial processes have as a result not only the desired products, but great amount of side and waste products. These products have to be stored, transported and appropriately handled and/or destroyed. Unfortunately, most of these products are highly toxic and dangerous for the environment and plants, animals and humans, in case when they pollute air, soil or water. The raw materials mining, the environmental pollution, the impact of the pollution on the vegetation (deforestation, landslides, soil erosion, to mention just a few) and fauna leads changes into the climatic factors. Increased number of the industrial facilities all over the world leads to increased probability of industrial accidents. Depending on the scope of the incidents, as well as on the type and continuation of the toxic emissions, these accidents could develop into disasters. Related to the industrialization is the process of urbanization that is increasing the population at risk to be affected by the disasters. The need of more and more raw materials and the chase of bigger profits lead to exportation of the industries into developing and developing countries, where the risks for technological accidents and extreme environmental pollution are at highest possible levels, because of the non-developed work force and legislation. In other words the globalization is increasing the probability for disaster occurrence. (4, 5)

When disaster strikes, by definition, the available resources for providing prompt, adequate and efficient medical support to all those in need, are insufficient.

Throughout the disasters main concern is preserving the affected population life and health. In accordance to the Bulgarian legislation responsible for emergency medical aid provision are the Centers for Emergency Medical Aid (CEMA). (6) Performed analyses on the CEMA revealed a lot of challenges medical professionals have to resolve while planning and executing disaster medical support:

1. There is a steady trend to decrease the relative to the population needs number of medical specialists, very strong in terms of doctors. This tendency is directly related to the constantly increasing number of the population, which is a consequence of the running processes observed in the contemporary society; (7, 8)
2. The tendency for disproportionality in the distribution of medical professionals is also persistent, which leads to difficult access to medical assistance for parts of the population, even without the presence of calamities;
3. There is evidence of a reduction in the number of medical specialists in the areas related to emergency care that are required for disaster medical support; (9)
4. There is a continuing trend of reluctance among students to specialize in the above-mentioned specialties; (10)
5. The aging trend of medical professionals is also a long-lasting one, which should be taken into consideration, when planning their capabilities to meet the challenges related to the workload (physical and mental) of the disaster medical support (DMS);
6. An increasing trend of mobility (national and international migration) of medical staff has been identified, which makes planning for DMS difficult; (11, 12, 13)
7. In Bulgaria the Emergency Medical Assistance System is a core unit of the Unified Rescue System;
8. The system is experiencing a pronounced shortage of medical personnel, which are highly disproportional and unequally distributed throughout the country;
9. CEMA and its affiliates suffer from lack of specialist doctors;
10. The worsening age structure of those working in the emergency medical care system, as well as the high turnover of young doctors and specialist doctors, are becoming of the main CEMA characteristics;
11. Material, technical and transport equipment available in CEMA does not guarantee emergency assistance to all those in need within the 20-minute recommended call pick-up interval;
12. The available means of transport do not allow the provision of medical assistance in case of damage to the road infrastructure or the need for specialized medical (air, water, etc.) medical evacuation;
13. The information and communication system used could not assure the required level connectivity reliability and quality, both between the elements of the emergency care system itself and between the system and the other structures of the health system and the URS units, even in daily, routine, not disastrous events.

The mentioned above features are common for emergency medical services all over the world. (14)

All these challenges require that means for optimization of the first hour medical aid have to be established. But the main conclusion is that means for enhancing the population capabilities to remain safe and to support the injured till the CEMA teams' arrival should be found.

Based on the indisputable significance of the information exchange throughout every crisis and disaster (15, 16, 17) the hypothesis of the study is that implementation of the contemporary Information Technologies (IT) could be a possible solution for overcoming the above-mentioned challenges. The rationality of this hypothesis is related to the unprecedented development of the IT that has been recorded recently. Even the brief and not detailed analysis of the increasing and enhanced capacities of the modern IT is providing sufficient data for the its benefits for disaster relief, if be properly implemented.

The development of nanotechnologies, the Internet, and communication systems offers a vast, endless arsenal of resources that can and should be used. In general, the following three development patterns are with potential to directly ameliorate the population capabilities:

1. Development of communication tools;
2. Internet development;
3. Development of Early Warning and Crisis Communication Systems.

The aim of this study is to analyse the capabilities of the modern Information Technologies for population disaster medical education.

MATERIALS AND METHODS

By the means of descriptive and comparative methods the Information Technologies applicable for disaster medical education are listed. Deductive and cluster analyses are applied in order to note the available for free Information Technologies possibilities to be in use for population disaster medical education.

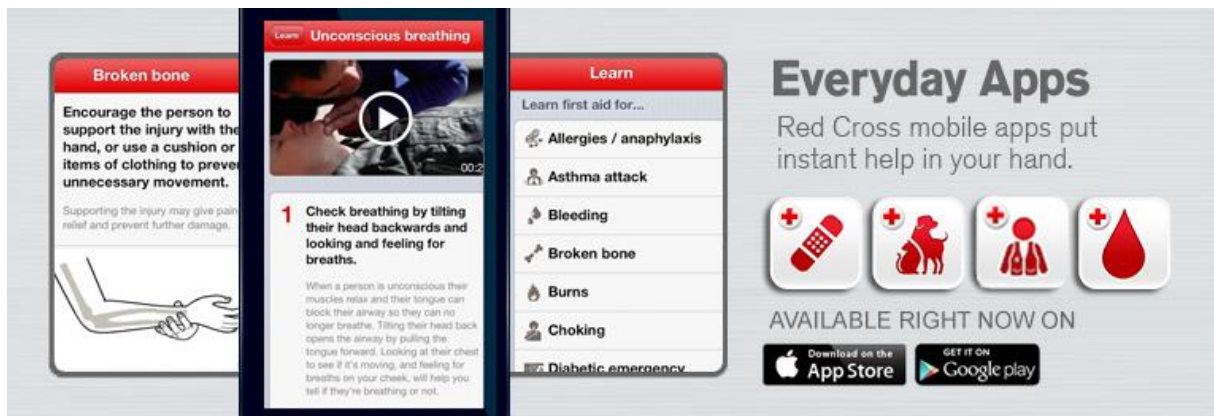
RESULTS AND DISCUSSION:

As the number of the IT means that could be implemented into disaster relief operations is an enormous one, the limitation for the purpose of this study is set – the analyses will be limited to one of the most frequently used, literally by almost everyone on his/her daily life activities – Mobile applications on the smartphones, Facebook as representative of the social networks and Youtube as one of the most utilized platforms for video and data sharing platform.

What are the capabilities of these three IT to enhance the population medical resilience in case of natural or man-made calamity?

Depending on the source statistic is providing information that more than two thirds of the population poses Smartphone. The percentage of the Smartphone owners is highest in Europe 86%, followed by North America 80% and Central Asia with 79%. (17) That means that more than 5 billion people around the globe could utilize this device in case of need. The unique function of the Smartphone regarding the disaster relief is related to its capabilities to provide advice and connectivity with the emergency centers even when the Internet connection is not available. Thousands of Mobile Applications are invented and established in different countries in order to support a casualty in need. The Federal Emergency Management Agency (FEMA) on its official website offers a downloadable smartphone and tablet application (18) containing instructions for disaster behavior, an interactive checklist for the required range of goods and equipment to meet the challenges of the disaster, as well as a constantly upgrading map of the location of the FEMA Disaster Recovery Centers, located at FEMA Disaster Recovery Centers. The app allows any user to share with the agency and other users GPS photo reports about emergencies or disasters they are witnessing. The Disaster Reporter option sends the sent report to a map that is shared with all users.

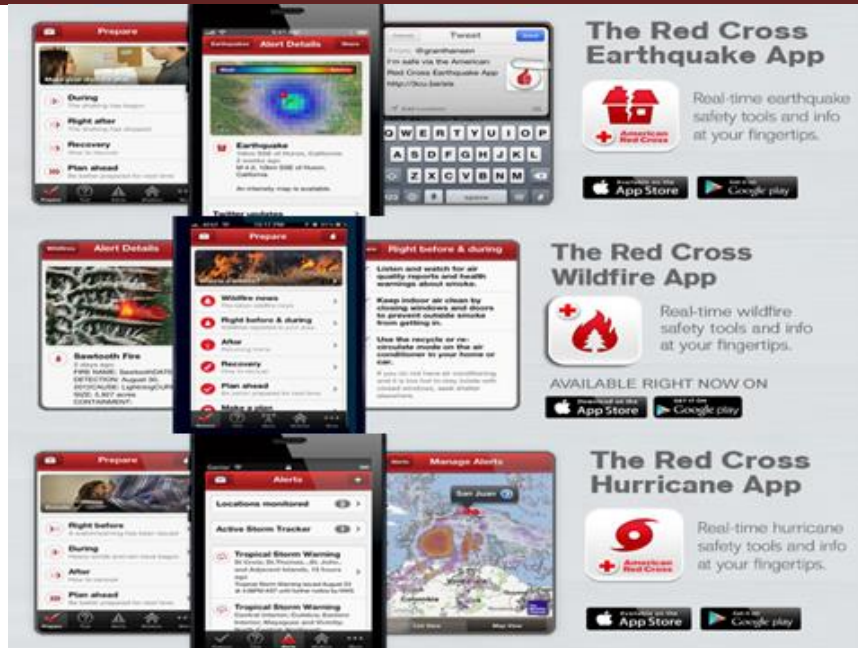
Another example fully dedicated on first aid provision is created by the American Red Cross First Aid app. (fig. 1) (19)



[1] Figure 1. First Aid App

This app in details describes and illustrates the principles and steps of first aid in various life-threatening conditions. What is more, its capabilities are enhanced by adding a mobile application for action and preservation of life and health at different calamities - earthquakes, floods, hurricanes, forest fires and others. These sections contain sub sections describing the actions that each citizen must take during the preparatory period, in the prodromal phase, during the impact phase, the response phase and the recovery. (fig. 2)

Special sections are dedicated to monitoring the hazard as well as tracking the development of the disaster (particularly relevant for hurricanes and forest fires). In the preparatory phase section, particular attention is paid to the preparation of an individual action plan for the particular disaster and guidance is given on what preventive measures can and should be taken to reduce vulnerability - buying food, goods from essential necessities, medical and sanitary means, individual protective means, information on the location of collective protective devices, medical trainings and other rescue forces and means.



[2] Figure 2 Apps for particular disasters

A special section turns the smartphone into a flashlight, a flashing light or a warning signaling device to alert savors.

Particularly useful are practical tips such as "All water sources during the disaster are considered dangerous and do not use for drinking purposes to study the water from the sanitary controls".

The number of created mobile application and their capabilities are countless. A few examples are listed just for presenting the benefit from advertising among the population utilization of the smartphones and their mobile application for disaster preparedness.

The PlerTs app (abbreviation for Personal Alerts) (20) is an add-on and improved version of the BuddyGuard created just before the Japanese earthquake (2011). It was created by security programmers Tony Alagna and Colin Anawaty in order to provide timely assistance, regardless of the type of emergency situation the user of the MA has suffered. As soon as it is turned on, the application starts recording images and sound from the vicinity of the mobile device on which it is installed. Recordings are repeated every 8-10 seconds. These data (audio and video) as well as GPS coordinates of the device are transmitted on PlerTs servers and recorded in the company-maintained cloud. The data (including the map being mapped to the location) is sent directly to the address list specified by the owner. (21) After sending the downloaded current data, an application automatically launches a conference call with the listed numbers to which it sends the voice message previously recorded by the user. These messages are recorded and sent as soon as the cellular connection is recovered (if it was out of order). For the first time, the application's capabilities have been tested in a real-life environment by journalists broadcasting from the earthquake-hit Japanese provinces. Due to the missing cellular mobile communication, the application was used by a satellite phone.

The PlerTs app also has an option for tracking the movement and position of the mobile device. When the movement stops or changes suddenly, it is capable of being switched on and started. In this way, MA creators cover cases of loss of consciousness of the user. The application has an option to send alerts directly to the International Emergency Response Coordination Center, which in turn alerts nearby rescue structures.

An application that directly supports the rescue of human life is the very popular US Pocket First Aid & CPR created by the American Heart Association. It uses the text, images and video to educate the user about life-saving techniques.

When discussing the IT capabilities into teaching the life saving procedures it is mandatory to describe just part of how YouTube could be and it is implemented.

YouTube is a platform for sharing video clips. Different users create their own interest groups in which they exchange video on particular subject. Creating a group to collect and present to other network users videos or videos focusing on disaster medicine will multiply the perception of medical communications. For example, cataloged YouTube first-aid clips (22) can be used to illustrate techniques and techniques when performing individual actions. In order to stimulate learners to better learn techniques, they may also use benchmarking - displaying video materials with first-aid mistakes, such as sequence or techniques, in comparison with those in

which the validated algorithm has been followed. (fig. 3) In order to make full use of the capabilities of this social network for first aid population training, it is appropriate that the practical exercises of each course be recorded on video that has to be kept in a restricted category. In this way, each of the students who have passed the course will be able to access at any given time the skills he/she has mastered to undertake a critical comparative analysis.



[3] Figure 3. YouTube as a tutorial

Also, for educational purposes, the available video reports on different disasters (earthquakes, nuclear power disasters, floods, etc.) could be collected and shared in order to illustrate the impacts of various disruptive factors and the consequences of calamities.

Based on the quoted comments on the impact of image and their value in the communication process, has to be noted that using YouTube's capabilities for theoretical and practical training is enormous, but still underestimated and fully utilized for DMS purposes.

Besides being a source of visual learning materials, social networks can also be used as a platform for gathering of up-to-date information. On the Internet, users share with their text or photo what they have been impressed by. Very often, without even realizing, they share valuable data for assessing the general and medical situation.

The FEMA in 2012, based on the experience of rescue efforts in Haiti 2010, urges citizens in the affected regions by the hurricane Sandy to use social networks to inform their relatives whether they have suffered or not. (23)

In response to the increasing global disasters, more and more social networks are introducing a mobile application, whereby entangled people can notify their loved ones and other members of their groups in the platform that they are alive, as well as for their exact location. A similar application (24) has been released by the largest social network Facebook (with over 1 billion users). The Safety Check application allows with one button press to post a notification that the user is safe or not in the disaster affected area. Platform engineers have expanded the features of this app, with the social network itself reporting to users in an affected area when a disaster occurs. The location of users will be determined according to their posts for the location, where they are or when Nearby Friends is activated. If the user is well or is not in the affected zone, he will be able to claim it at the touch of a button. The information will be immediately posted to his Facebook profile, while he will also receive notifications of his friends who have given a positive answer to the question. (25)

CONCLUSION

The performed analyses highlight the capabilities of the social networks (Facebook), Internet sharing platforms (Youtube) and Mobile Application for enhancing the population knowledge and skills regarding health risks and healthy behavior in case of disaster occurrence. (26, 27) Moreover, the IT have to be utilized as a tutorials into population preparation for medical support provision in case of calamity. Due to the characteristic of the disastrous event and the processes in the contemporary healthcare system, the first life and health support casualties will receive will be provided by self and buddy aid. The significance of the first 10, 30 and sixty minutes for the life-saving are undisputable. Therefore, every mean for enhancing the population awareness and readiness for first aid and medical support have to be explored and used.

From didactical point of view a campaign in Facebook regarding the advantages of first aid and healthy behavior in case of disasters have to be set. For multiplying the awareness capabilities of YouTube for video streams sharing have to be used.

Direct links to the most supportive Mobile Application has to be inserted at the end of every single Facebook and/or YouTube post.

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