

Life support training: Looking for target audience (a pilot study)

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For citation: Arshukova I.L., Dugina T.A., Akulin I.M., Dobretsova E.A. Life support training: Looking for target audience (a pilot study). *Vestnik of Saint Petersburg University. Medicine*, 2021, vol. 16, issue 4, pp. 290–297. <https://doi.org/10.21638/spbu11.2021.407>

There are many different emergency cases (besides road traffic incidents) in which the outcome for the affected person depends on the timing of the relevant first aid. One of the possibilities to improve the situation is to train a certain population of first aid skills. Identify the audience which is more appropriate to teach first aid skills to be able early to recognize a medical emergency and provide first aid correctly. First aid knowledge and skills of the participants were detected by a questionnaire in 2020. Data were analyzed using SPSS Version 22, $p < 0.05$. Four hundred and thirty loyal citizens of Krasnoyarsk, Russia, participated in classes. The training led to the significant improvement in the first aid knowledge and skills of the participants (before-and-after study). The citizens who have already witnessed an emergency case realize the opportunity of the emergency situation and their responsibility for the outcome better than the others. The regular first aid classes conducted by the medical community members for people of 30–45 years old with a higher educational level can significantly influence the number of favorable outcomes of emergency out-of-hospital cases.

Keywords: first aid, CPR training, essential life support, medical community, out-of-hospital cases.

Introduction

A problem of the high death rate among seriously injured patients exists in low- and middle-income countries [1]. The majority of deaths are connected with the pre-hospital phase [2]. Being one of the middle-income countries, Russia is no exception. Non-fatal injuries have a significant impact on disability, productivity, cost of treatment, and rehabilitation [3]. Particularly road traffic incidents (RTI) cause significant socioeconomic costs resulting from deaths, injuries, and serious disabilities [4]. According to the World Health Organization, the economic loss due to RTI is estimated to cost 1.9% of the total Gross Domestic Product per year in Russia [5]. Furthermore, all over the world one-third of deaths each year are caused by cardiovascular diseases including cardiac arrest [6]. Timely first aid may reduce the severity of disabilities, a time length of hospitalization and recovery time, improve survival, patient outcomes, and resource utilization [7; 8]. By making first aid training widely available, pre-hospital mortality may be reduced [7; 9]. According to the Russian Federal State Statistics Service, ambulance crew arrival time is more than

20 minutes already in 38.9 % of cases [10]. In addition, there are no paramedical services in Russia. Delays in responding to victims at the scene and getting them to hospitals can aggravate the consequences of the injuries [1]. It is also reported that injuries and deaths due to RTI in many low- and middle-income countries will continue to rise if some measures are not taken to curtail this trend [4]. The measures may include developing effective training in identifying risk for life-threatening emergencies, training in first aid and CPR, etc. [11]. Training in CPR may improve survival rates for out-of-hospital emergencies because bystanders are more likely to know CPR and can perform it immediately [4; 12].

One of the largest studies in Bangladesh, covering more than one million people, showed that first aid treatment from trained providers increased chances of recovery among severely injured individuals and hospitalized patients implying the importance of appropriate or correct first aid. There was poor knowledge on appropriate first aid that was also evident in studies conducted in developed countries [3]. Common barriers to applying life-saving skills were lack of knowledge, fear to make mistakes and doing harm, and lack of confidence [13; 14]. It might be important to train an audience that is truly interested in first aid skills. National population-based survey in Singapore found that respondents mostly believed that adults should be trained in first aid, cardiopulmonary resuscitation (CPR), and automated external defibrillators [14]. Children aged 7–14 years are able to perform basic life-saving skills, but thinking in algorithms is difficult for them, furthermore, the depth of chest compression and ventilation depended on the children's age, weight, height, and body mass index, that could be an issue for them to provide first aid properly [13].

Nigerian commercial drivers' training in first aid results showed significant improvement in first aid knowledge and skills of intervention as well as periodic refresher training necessity [4]. The available evidence suggests that life-support knowledge and skills decay by six months to one year after training and that skills decay faster than knowledge [15; 16]. A short-time refresher-training program six months after the initial training may be considered to maintain knowledge and improve skill retention [7; 17; 18].

There are modern life-support training methods in developed countries. Simulation-based training for resuscitation is highly effective. The training events increased the trainees' knowledge and practical skills; feedback is vital for the effective delivery of skills-based education and improves outcomes [15; 19–24]. Together with face-to-face basic life support training, e-Learning offers such benefits as increased candidate autonomy, cost-effectiveness, decreased instructor burden, and improved standardization of course material [25]. An interactive game “Lifesaver” can be considered where resources or time does not permit formal face-to-face training sessions or while lockdown [26]. The addition of virtual reality to traditional medical training may improve the sense of presence and diagnostic orientation [27].

Thus, both existing and novel CPR training programs significantly improve trainees' skills [6; 28; 29]. Activities that allow the trainees to explore and discuss behavior in an emergency can effectively increase the trainees' propensity to act [2]. The first aid curriculum must be broader than CPR training alone [30]. The problem in which age group first aid and basic life support training should be implemented is widely discussed [7].

The purpose of this pilot study is to identify the characteristics of the audience which is loyal and more appropriate for regular life support trainings: most motivated to obtain life-supporting first aid skills and most productive in the education.

Methods

The pilot study was conducted in Krasnoyarsk which is the administrative center of the second largest region of the Russian Federation named Krasnoyarsk Territory (also known as Krasnoyarsk Krai). The first aid classes were organized by senior medical students of the Krasnoyarsk State Medical University certified by the European Resuscitation Council as Basic Life Support (BLS) providers. To attract the general population to participate in life-supporting first aid training, we did not follow any theory or marketing practice but have developed a relatively simple advertising program. It includes the creation of promotion street posters and booklets about the nearest classes with the program of training and QR-code, where the link to the community in the social network vk.com was encrypted. Also, the advertising was organized via the Internet. In the vk.com community, the most detailed information about the training program and the nearest classes was announced. In addition, the citizens were attracted with the help of Krasnoyarsk media and the local TV channel. All our classes were absolutely free to attend. So, everyone who was really interested in first aid skills could take part in the training.

The program of the classes was specially designed. It includes a presentation and practices with training mannequins, all offered face-to-face only. The presentation was about early recognition of the critical states and correct actions in such cases as angina pectoris, hypertensive crisis, an acute cerebral circulation disorder, diabetic coma, epilepsy, asthma attack, poisoning, pulmonary embolism, syncopal states, and clinical death as well as emergency cases because of external factors such as wounds and bleeding, fractures and dislocations, thermal and solar shock, burns and frostbite, drowning, and foreign body inside the upper airways. The practice includes actions in a case of bleedings and fractures, cardiopulmonary resuscitation, the removal of the foreign body from the upper airways, placing a patient in the recovery position.

Also, a questionnaire was designed to detect first aid knowledge and skills of the participants before and after their training. The part of the questionnaire was filled out before the class and another part was filled out after. We considered that free participation in our courses could attract not only those who are truly interested in obtaining first aid skills but also just curious ones. Thus, the questionnaire was intended to distinguish one from another.

There were 22 classes held for 456 citizens of Krasnoyarsk. The classes were offered from May to November on different days of the week in the evenings. The questionnaire response rate was 94.3% (95%CI: 93.2% — 95.4%). So, the responses of 430 participants aged 17 to 84 years old were included in the investigation.

The statistical analysis of data was carried out with the usage of the licensed IBM SPSS Statistics 22 program. The following methods were used: McNemar test, Spearman correlation coefficient, Ward clustering algorithm, decision trees analysis. Statistical significance was set at $p < 0.05$.

Results

To analyze the peculiarities of the citizens who are interested in emergency classes the main characteristics of the involved participants were investigated at the beginning. The descriptive statistics are reported in Figure 1. More than a half of the participants

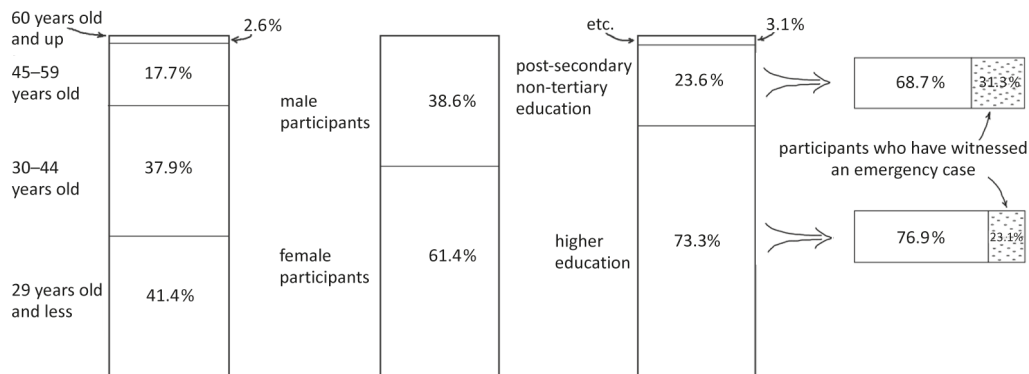


Figure 1. The peculiarities of the participants who were involved into the life supporting first aid trainings

were women: 61.4% (95%CI: 56.8% — 66.0%), the majority was younger than 45 years old: 79.7% (95%CI: 75.9% — 83.5%) that corresponds to the current sex-age structure of the population in Russia [31]. The main part of the participants had higher non-medical education: 73.3% (95%CI: 68.9% — 77.7%).

Analyzing the structure of the participants' education, we can see that only 1.4% (95%CI: 0.6% — 2.2%) had medical education, 96.9% (95%CI: 93.7% — 98.5%) of the involved population had higher non-medical education or post-secondary non-tertiary non-medical education. The fraction of the participants who have already witnessed an emergency case is significantly higher for those with post-secondary non-tertiary non-medical education than for those with higher non-medical education (Fig. 1). So, we can conclude that the citizens with the higher educational level who have not already witnessed an emergency case are more interested in emergency classes than the same citizens with post-secondary non-tertiary education.

In the next step, the peculiarities of the citizens with and without mobile medical kit were investigated (Fig. 2). It was detected that its presence or absence depends on a fact whether a person has already witnessed an emergency case or not. So, 59.3% (95%CI: 54.6% — 64.0%) of the citizens have a mobile medical kit among the participants who have already witnessed an emergency case, but among the participants who haven't witnessed an emergency case only 36% (95%CI: 31.6% — 40.4%) have this kit with themselves.

Although 70.0% (95%CI: 67.8%–72.2%) of the participants correspond that they have taken part in emergency classes before, the initial knowledge about first aid cases does not depend on this fact.

As it was mentioned above, a questionnaire was designed to detect the knowledge of the participants about emergency care before and after training (the part of the questionnaire was filled out before the class and another part — after it). The comparison of the obtained data (before and after a class) revealed a significant increase in the correct answers to similar questions.

Three main specific groups were highlighted by the usage of clustering analysis. The results obtained by Between-groups linkage, K-means, and Ward clustering algorithm were consistent. The first group included people 60 years old and older. They had rather low level of initial knowledge about the emergency cases but also, they had the highest in

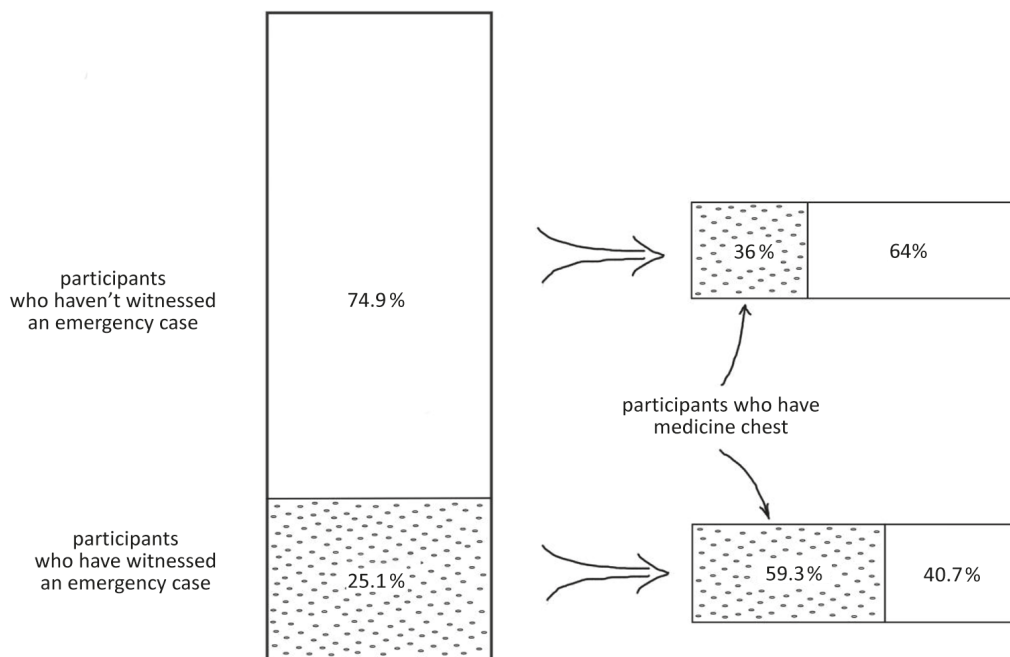


Figure 2. The characteristics of the participants who have already witnessed an emergency case and those who have never got into such situation

crease of the correct answers after the class. The second group included citizens of 30 years old and older (till 60). Their initial knowledge was higher, but they had an average increase of the correct answers. The third group (29 years old and younger) showed the same initial knowledge about the emergency cases as the second group but had a minimum increase of skills during the emergency class.

Discussion

During our project 22 classes in life-supporting, first aid skills were held. The courses were widely announced on the streets, on the Internet, and media. They attracted 456 citizens of Krasnoyarsk, and among them, 430 members aged 17 to 84 years old gave questionnaire responses.

Characteristics of the participants reflect the peculiarities of the citizens who are interested in life-supporting first aid trainings. We can conclude that these citizens are mainly younger than 45 years old and they have higher education as a rule.

At the planning stage and based on the results of the study conducted among kindergarten teachers [32], we supposed that most part of the citizens who were interested in such life-supporting first aid trainings would consist of the people who had already witnessed an emergency case. In fact, it turned out that it was only a quarter of such participants. Among the participants with a higher educational level the fraction of the citizens who have already witnessed an emergency case is significantly lower than the same fraction of the participants with post-secondary non-tertiary education. Perhaps this fact indicates that people with higher education attach more importance to the correct actions in emergency situations.

Also, it is important that the fraction of the citizens who have a mobile medical kit among the participants who have already witnessed an emergency case is practically two times higher than the same fraction among the participants who have never got in such a situation.

So, we can conclude that people with higher education and also citizens who have already witnessed an emergency case realize better than the others the opportunity of the emergency situation, the responsibility for the outcome, and their ability to improve it.

The training has led to the significant improvement in the first aid knowledge and skills of the participants. Assimilation and survival of knowledge are greatest in the middle age: from 30 till 60 years old. The low level of the initial first aid knowledge among the citizens of 60 years old and older reveals probably that the obtained knowledge is short-lived in this age group. Recognizing the characteristics of the participants, we suppose that division of classes into similar topics (e. g. injuries, cardiovascular accidents, etc.) and paying more attention to mobile-first aid kit is necessary as well as repeating the classes periodically (every six months).

Given the fact that there is a prevalence of 25–45 years old people in the general population in Krasnoyarsk (about 34% of the general population)³³, the regular first aid training for a group of people aged 30–45 years mostly with higher education can significantly influence the number of favorable outcomes of emergency out-of-hospital cases. Based on our pilot study, it is possible to conduct a full-scale study across the country with the involvement of the identified target audience and evaluate the long-term results of its training. Further results can be useful for the Ministry of Education and the Ministry of Health in order to select the most loyal and appropriate audience for governmental first aid training schools that could be constituted in Russia. The schools should be established at medical universities or hospitals so that members of the medical community can conduct lessons there. To reach the target population for participating in public (governmental) first aid classes that could be launched internationally, some health or state benefits or tax privileges could be offered to them. It will also be possible to assess how to further close interaction between the government, the medical community, and the target audience will strengthen their relationship and contribute to the strengthening of public health, as well as increase the level of favorable outcomes of out-of-hospital cases.

Acknowledgements

The authors wish to thank the students of Krasnoyarsk State Medical University for first aid classes organizing and providing.

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Received: November 30, 2021

Accepted: December 16, 2021

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