Research Article

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Readiness of Teachers of General Education Institutions to Perform Cardiopulmonary Resuscitation

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RELEVANCE The problem of sudden cardiac arrest and sudden death among the students of educational institutions is highly relevant for the Russian Federation. In order to plan interventions aimed at improving effectiveness of management and reducing mortality from cardiac arrest in educational institutions, a clear understanding of level of readiness and motivation of teachers to provide help to a cardiac arrest victim is necessary.

AIM OF STUDY To evaluate willingness of teachers of general education institutions to provide cardiopulmonary resuscitation (CPR) in cases of cardiac arrest, and to investigate factors and relationships that determine readiness of teachers to give help.

MATERIAL AND METHODS In February–March 2021, an online questionnaire survey of teaching staff of general education institutions was conducted in the Republic of Crimea. As part of the survey, respondents were asked to evaluate their willingness to attempt CPR on a loved one, a stranger or a pupil on a five-point Likert scale, and to indicate potential barriers for performing CPR. The survey was voluntary and anonymous.

RESULTS The questionnaire was completed by 5,921 teachers. Of all respondents, 9.2% were males, 31.6% — aged over 50 years, 32.3% — work in urban areas. The proportion of teachers who expressed absolute willingness to perform CPR on a loved one, a stranger or a pupil was 63.6% (n=3,766), 34.8% (2,058) and 41.0% (2,427), respectively. At the same time, 13.6% (804), 31.0% (1,836) and 30.6% (1,809), respectively, indicated that they would probably not or definitely not attempt CPR. A high readiness to perform resuscitation (4–5 points) was confirmed to be associated with previous CPR training ($p<0.001$) and with higher level of CPR knowledge ($p\leq0.006$). The main barriers to providing resuscitation were "lack of CPR knowledge and skills" (indicated by 31.4–36.3% of the respondents depending on the type of presumed cardiac arrest victim) and "fear of causing harm to a victim" (49.2–51.4%).

CONCLUSION Considerable portion of teachers of general education institutions demonstrate low level of readiness to provide life-saving help in case of cardiac arrest. Lack of CPR knowledge and skills constitute the main barrier to attempting resuscitation. In order to improve survival from cardiac arrest in educational institutions, comprehensive organisational interventions are required, which should primarily focus on ensuring full coverage of teachers with high-quality training and retraining in resuscitation.

Keywords: cardiac arrest, resuscitation, teacher, school, survey, training, motivation

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CPR – cardiopulmonary resuscitation
RF – Russian Federation

INTRODUCTION

Sudden cardiac arrest in schoolchildren and kindergarteners is a serious complex medical, social and organizational problem that requires increased attention from the scientific and medical community, but remains insufficiently studied and developed in the Russian Federation (RF).

The true indicators of the incidence of cardiac arrest and the effectiveness of providing care for this condition in students of educational institutions of the RF are unknown due to the lack of appropriate standardized mechanisms for epidemiological monitoring in the country [1, 2]. At the same time, domestic research works [2, 3] and media reports [4–6] indicate a high incidence of cardiac arrest in Russian schools, as well as a low probability of saving children's lives due to the inability of most eyewitnesses of the incident to timely and correctly provide first aid to victims - quickly recognize cardiac arrest, call for help and perform basic cardiopulmonary resuscitation (CPR) before the arrival of emergency medical personnel [7].

Teachers are the first link in the sequence of providing vital assistance in cases of cardiac arrest in students, and in order to plan measures aimed at improving the efficiency of first aid in educational institutions of the RF, it is important to have a clear idea of the motivation and readiness of teachers to provide first aid [8].

The aim of the study was to assess, at the level of a subject of the RF, the readiness of teachers of general education institutions to provide first aid in cases of cardiac arrest, as well as to study the factors and dependencies that determine the readiness of teachers to provide assistance.

MATERIAL AND METHODS

In February–March 2021, in the Republic of Crimea, a survey was conducted among pedagogical workers of general education organizations on the issues of providing first aid in case of cardiac arrest. As part of the questionnaire survey, respondents were asked to assess their own readiness for CPR performance in cases of cardiac arrest in a loved one, a stranger, and a student (at their school or kindergarten) on a five-point Likert scale [9] (from 1 - “I definitely won’t perform resuscitation” up to 5 - “I will absolutely perform resuscitation”), as well as indicate possible barriers to CPR in such situations and highlight the main obstacles. The survey was conducted online using the Google Forms service (Google LLC, USA). In order to attract respondents, a relevant request from the Ministry of Education, Science and Youth of the Republic of Crimea and a link to the online form of the questionnaire were sent to the heads of general education organizations of the republic. The participation of teachers in the survey was anonymous and voluntary.

Statistical analysis included descriptive statistics, assessment of relationship between categorical variables in contingency tables using Pearson's chi-square test, and comparison of ordinal variables of related samples using the Friedman test. Differences were considered statistically significant at a significance level of $p<0.05$. For statistical data processing, Microsoft Excel 2019 (Microsoft, USA) and IBM SPSS Statistics 23.0 (IBM Corporation, USA) software was used.

RESULTS

The analysis included questionnaires correctly completed by 5921 respondents. Thus, the survey covered 35.7% of the total contingent of teachers of general education organizations of the Republic of Crimea (n=16,575 - data from the Office of the Federal State Statistics Service for the Republic of Crimea and Sevastopol as of September 2020). Socio-demographic and professional data of survey participants are presented in Table. 1.

Table 1

General characteristics of the study sample and the relationship between the properties of the sample and the respondents' assessment of their own readiness for cardiopulmonary resuscitation (n=5921)

Indicators	Total, n (%)	High readiness* to provide CPR to a loved one, n (%)	p value	High readiness* to provide CPR to a stranger, n (%)	p value	High readiness* to provide CPR to a student,	p value
Gender			<0.001		0.001		<0.001
Male	547 (9.2)	392 (71.7)		227 (41.5)		272 (49.7)	
Female	5374 (90.8)	3374 (62.8)		1831 (34.1)		2155 (40.1)	
Age, years			<0.001		<0.001		<0.001
18–24	397 (6.7)	273 (68.8)		178 (44.8)		202 (50.9)	
25–29	588 (9.9)	400 (68.0)		212 (36.1)		270 (45.9)	
30–39	1674 (28.3)	1109 (66.2)		621 (37.1)		732 (43.7)	
40–49	1393 (23.5)	864 (62.0)		456 (32.7)		540 (38.8)	
50–59	1371 (23.2)	834 (60.8)		432 (31.5)		494 (36.0)	
60–69	463 (7.8)	268 (57.9)		152 (32.8)		175 (37.8)	
70 and older	35 (0.6)	18 (51.4)		7 (20.0)		14 (40.0)	
Place of work			0.311		0.019		0.001
Town	1911 (32.3)	1233 (64.5)		624 (32.7)		725 (37.9)	
Rural areas	4010 (67.7)	2533 (63.2)		1434 (35.8)		1702 (42.4)	
Personal education			0.017		0.212		0.846
Secondary vocational	657 (11.1)	390 (59.4)		214 (32.6)		267 (40.6)	
Higher professional	5264 (88.9)	3376 (64.1)		1844 (35.0)		2160 (41.0)	
Work experience as teacher, years			<0.001		<0.001		<0.001
0–9	2278 (38.5)	1538 (67.5)		898 (39.4)		1063 (46.7)	
10–19	1334 (22.5)	863 (64.7)		452 (33.9)		539 (40.4)	
20–29	1130 (19.1)	687 (60.8)		347 (30.7)		410 (36.3)	
30–39	861 (14.5)	501 (58.2)		261 (30.3)		299 (34.7)	
40 and more	298 (5.0)	169 (56.7)		92 (30.9)		110 (36.9)	
No answer	20 (0.3)	–		–		–	
Level of pedagogical activity			0.237		0.015		0.540
Preschool education	591 (10.0)	364 (61.6)		212 (35.9)		235 (39.8)	
Primary general education	1531 (25.9)	948 (61.9)		478 (31.2)		611 (39.9)	
Basic general education	1959 (33.1)	1274 (65.0)		697 (35.6)		799 (40.8)	
Secondary general education	1594 (26.9)	1028 (64.5)		587 (36.8)		674 (42.3)	
Additional education	246 (4.2)	152 (61.8)		84 (34.1)		108 (43.9)	
Prior CPR training			<0.001		<0.001		<0.001

Yes	3765 (63.6)	2636 (70.0)		1433 (38.1)		1701 (45.2)	
No	2156 (36.4)	1130 (52.4)		625 (29.0)		726 (33.7)	
Remoteness of CPR training			0.294		0.008		0.001
less than 6 months ago	416 (7.0)	311 (74.8)		190 (45.7)		229 (55.0)	
6 months to 1 year ago	835 (14.1)	608 (72.8)		340 (40.7)		401 (48.0)	
From 1 year to 5 years ago	1292 (21.8)	914 (70.7)		476 (36.8)		574 (44.4)	
Over 5 years ago	772 (13.0)	543 (70.3)		291 (37.7)		339 (43.9)	
Self-assessment of CPR knowledge			<0.001		<0.001		<0.001
Absent	557 (9.4)	183 (32.9)		109 (19.6)		119 (21.4)	
Poor	2640 (44.6)	1452 (55.0)		618 (23.4)		749 (28.4)	
Satisfactory	2236 (37.8)	1697 (75.9)		982 (43.9)		1189 (53.2)	
Good	463 (7.8)	411 (88.8)		333 (71.9)		351 (75.8)	
Very good	25 (0.4)	23 (92.0)		16 (64.0)		19 (76.0)	
Correct answer to the question about the hand position for chest compressions			<0.001		0.006		<0.001
Yes	3931 (66.4)	2639 (67.1)		1414 (36.0)		1686 (42.9)	
No	1990 (33.6)	1127 (56.6)		644 (32.4)		741 (37.2)	
Correct answer to the question about the rate of chest compressions			<0.001		<0.001		<0.001
Yes	970 (16.4)	678 (69.9)		385 (39.7)		463 (47.7)	
No	4951 (83.6)	3088 (62.4)		1673 (33.8)		1964 (39.7)	

Notes: * — 4–5 points on a five-point scale; СЛР — cardiopulmonary resuscitation

The results of assessment by teachers of their own readiness to perform CPR in cases of cardiac arrest are shown in Figure 1. The proportion of respondents indicated that they definitely would not perform resuscitation in case of cardiac arrest in a loved one, stranger or student was 3.7% (n=221), 10.6% (628) and 12.0% (710), respectively; and a high level of readiness to provide assistance (4–5 points) was expressed respectively by 63.6% (n=3766), 34.8% (2058) and 41.0% (2427) of the teachers surveyed.

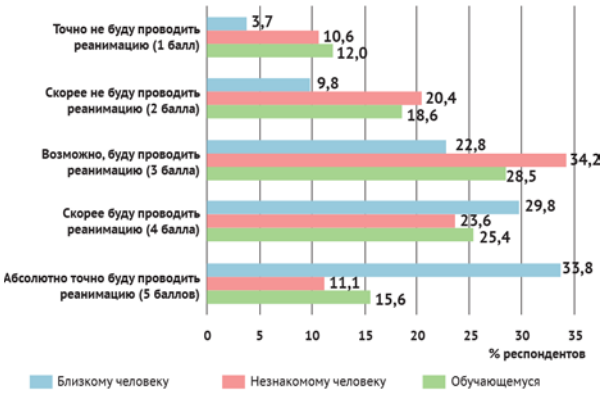

Fig. 1. Percentage of responses to the question about readiness to attempt cardiopulmonary resuscitation in case of cardiac arrest in a loved one, stranger or student

The average level of readiness for resuscitation in case of cardiac arrest in a loved one, stranger or student was 3.80 points (standard deviation = 1.12), 3.04 (1.14) and 3.14 (1.23) points, respectively. When comparing the mean values, their statistically significant difference was confirmed ($p<0.001$).

Regardless of who the alleged victim was (a loved one, stranger, or student), teachers who had previously trained in CPR, rated their own knowledge of resuscitation more highly and provided correct answers to control questions for assessing knowledge, as well as male respondents, younger ones and those with less work experience were significantly more likely to express a higher readiness to provide assistance (see Table 1). Men were significantly more likely to have been trained in CPR in the past (73.5% vs. 62.6% among women, $p < 0.001$), which may explain the higher prevalence of readiness for resuscitation among male teachers.

For the would-be cases of cardiac arrest in a stranger or student, in addition, the association of higher willingness of respondents to provide assistance with a less remoteness of CPR training and work in rural areas (as opposed to work in town) was confirmed, and for cases of cardiac arrest in a loved one - with the presence of higher education among teachers (in comparison with the presence of secondary vocational education) (see Table 1).

Figure 2 shows the distribution of factors identified by respondents as potential obstacles to perform CPR. If there were several barriers to CPR at the same time, "Fear of harming the victim" and "Lack of knowledge and skills in resuscitation" were most often indicated by survey participants as the main obstacles to providing assistance in case of cardiac arrest in a loved one (51.4% and 36.3% respectively), stranger (49.2 and 31.4%) and student (50.6 and 32.2%).

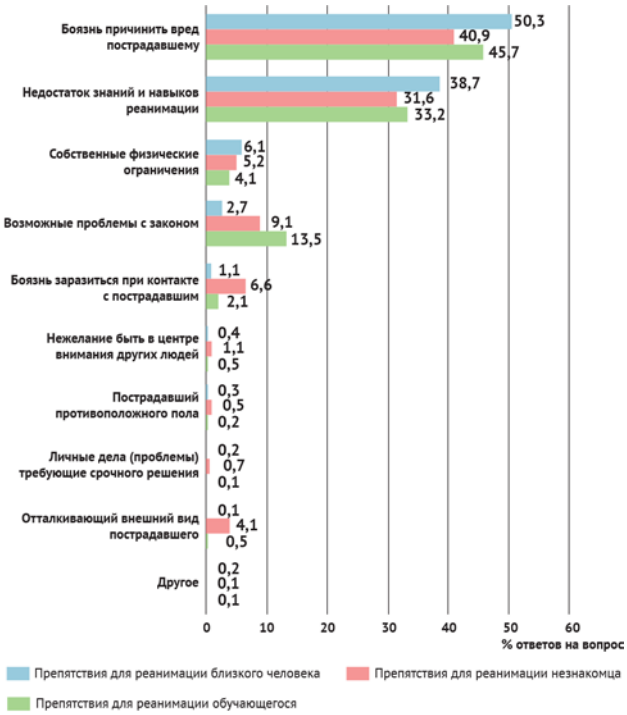

Fig. 2. Percentage distribution of answers to questions about potential barriers to CPR in case of cardiac arrest in a loved one, stranger or student (with the possibility of multiple choice of answers)

DISCUSSION

This study, for the first time at the level of a subject of the RF, made it possible to study the readiness and motivation of teachers of general education organizations to provide first aid in cases of cardiac arrest. It has been established that teachers are more motivated to help students than strangers, but only 41% of teachers express a high readiness to perform CPR in case of cardiac arrest in a student or pupil, and more than 30% of teachers either report a low probability of trying to provide assistance, or claim that they definitely will not carry out resuscitation.

Previous training in resuscitation is a key factor in determining the readiness of educators to provide care in cardiac arrest: teachers trained in CPR in the past and having a higher level of relevant knowledge are significantly more motivated to provide assistance. Lack of knowledge and skills in CPR, in contrast, is one of the two main barriers to perform resuscitation. The second common barrier - the fear of harming the victim - is obviously also associated with a lack of knowledge and skills in resuscitation and insufficient awareness of teachers that the risk of serious resuscitation complications is negligible compared to the absolute need to perform basic CPR to save a human life [10] .

The relationship between a greater readiness for resuscitation and experience of previous CPR training, and a younger age of respondents, as well as a greater readiness to provide assistance to a loved one than to a stranger, established during the survey of Crimean teachers, was shown in previous sociological studies performed in the general population [11–13], including when polling residents of the Crimean peninsula [14].

The low level of readiness of teachers of general education organizations of the RF to provide first aid was previously demonstrated in several works. I.V. Ryabova et al. (2017) when questioning employees of educational organizations in Moscow revealed their low competence in the provision of first aid and the fact that less than a third of teachers consider themselves capable of providing first aid to a child if necessary [15]. Executed by A.A. Kolodkin et al. (2017) a survey of teachers in preschool educational institutions, general education schools and institutions of additional education showed that for about half of the respondents, provision of first aid can be hampered by their lack of practical skills and psychological unpreparedness to provide first aid, and most of them have misconceptions about the principles of basic CPR [16]. The lack of knowledge necessary for the correct provision of first aid in case of cardiac arrest among the vast majority of teachers is confirmed by the results of several other domestic scientific works [17–19].

A number of foreign studies have been devoted to assessing the readiness of teachers to provide assistance in case of cardiac arrest. A survey of school teachers in the United States showed that most of them (74%) are ready to attempt CPR at school, and the most common barrier to resuscitation is the fear of incorrect CPR [20]. N. Mpotos et al. (2013) in a survey of teachers in Belgium found out that only 34% of the respondents felt able to attempt CPR, and the experience of previous resuscitation training was a factor in determining the confidence of teachers in their ability to help with cardiac arrest [21]. In another Belgian study, 85% of teachers expressed their readiness to perform CPR (with a proportion of CPR trained at 81%), and the main obstacles to providing care were the lack of knowledge and the fear of making a mistake during the process [22]. In a survey of schoolteachers conducted in Turkey [23], the proportion of educators who said they were able to provide resuscitation to a student was 62% among teachers who had received basic CPR training in the past and 48% among teachers who had never been trained in resuscitation.

Thus, the present study indicates the need to increase the motivation and readiness of teaching staff to provide first aid in case of cardiac arrest. Based on the results obtained, the priority direction for improvement in this area is to ensure the universal coverage of teachers with high-quality and regular training in the theoretical foundations and skills of basic CPR. Although the mandatory training of teachers in first aid skills is provided for by the federal legislation of the RF [24], and basic CPR is included in the list of first aid measures [25], more than a third of teachers have never been trained in resuscitation, many have not been trained for a long time. The revealed dependence of readiness to provide assistance on the remoteness of CPR training confirms the importance of systematic training, the frequency of which, according to modern concepts, should not exceed 12 months [26]. The organization of effective training of teachers in CPR requires complex norm-setting and organizational changes, which should be aimed at regulating a single procedure and conditions for training with the mandatory inclusion of basic CPR in the content of exemplary first aid training programs, adequate logistical, personnel and methodological support for the learning process, and also the establishment of procedures for ensuring the quality of training and monitoring the coverage of teachers with training.

Along with ineffective first aid training, the limited motivation of teachers to perform resuscitation is probably due to the imperfection of Russia's current system of regulatory and legal support in the field of incentives for first aid provision [8, 27]. In particular, the obligation to provide first aid, and, consequently, to conduct basic CPR, is not established by law for all teaching staff without exception. The only pedagogical workers who are obliged to provide first aid are physical education and labor instructors (in accordance with the "Qualification characteristics of the positions of educators", approved by Order of the Ministry of Health and Social Development of Russia dated August 26, 2010 No. 761n [28]), and teachers, on whom this duty may be

assigned at the discretion of the administration of the educational organization in accordance with the local regulation on the labor protection management system [29]. Other categories of pedagogical workers are persons who have the right to provide first aid if they have the appropriate training and (or) skills (part 4 of article 31 of the Federal Law "On the Basics of Protecting the Health of Citizens in the Russian Federation" dated November 21, 2011 No. 323-FZ [30]); and in general, the obligation to organize first aid provision is assigned to the educational organization as a legal entity [8] which may reduce the motivation of teachers to provide assistance.

In addition, the readiness of teaching staff to conduct CPR is limited by the fear of legal liability due to erroneous actions and possible harm to the health of the victim during the provision of assistance. In the context of a suspected student's cardiac arrest situation, "possible legal trouble" was the third most common deterrent among the respondents. To overcome this obstacle, it is necessary, on the one hand, to actively inform teachers about the existing mechanisms for protecting first aid providers from prosecution in the event of unintentional harm to the victim in accordance with the norm of "extreme necessity" provided for by the criminal (Article 39 of the "Criminal Code of the Russian Federation" dated June 13, 1996 No. 63-FZ [31]) and the administrative (Article 2.7 of the "Code of the Russian Federation on Administrative Offenses" dated December 30, 2001 No. 195-FZ [32]) law of the RF; on the other hand, to exclude the obligation to compensate for harm caused to the victim unintentionally while providing assistance from the norms of civil law (Article 1067 of the "Civil Code of the Russian Federation (Part Two)" dated January 26, 1996 No. 14-FZ [33]) [8, 27, 34].

In general, complex organizational changes aimed at ensuring the full coverage of teachers with high-quality and regular training in basic CPR, along with improving the mechanisms for legal incentives for teachers to provide first aid and popularizing knowledge about the legal aspects of providing assistance, should contribute to a significant increase in the motivation of teachers to provide first aid, in the number of cases of CPR before the arrival of medical help, and a decrease in mortality from cardiac arrest in educational institutions in Russia.

Limitations. Due to the methodological features of the study (a remote survey with anonymous and voluntary participation), the sampling was of a spontaneous (probabilistic) nature, which limits the representativeness of the obtained results relative to the general population. Despite the large number of participants, the sample cannot be considered representative of the entire population of teaching staff of general education organizations in Russia, since the survey was limited to the territory of the Republic of Crimea. It is impossible to exclude cases of multiple filling out of the questionnaire by the same respondent providing false and random answers to the questions. It should also be taken into account that the respondents' reported readiness to perform CPR may not correspond to the true likelihood of first aid provision and the ability to correctly perform resuscitation in a real case of cardiac arrest, as evidenced by the low level of relevant knowledge demonstrated by the study.

CONCLUSIONS

1. A high level of readiness to provide first aid in case of cardiac arrest in a student or pupil is expressed only by 41% of pedagogical workers of general education organizations.
2. The main obstacles for providing assistance in case of cardiac arrest in a student for teachers are "Fear of harming the victim" (51%) and "Lack of knowledge and skills in resuscitation" (32%).
3. Previous training in CPR is a key factor in determining the readiness of educators to provide care in cardiac arrest.

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