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Current state of knowledge and concerns regarding cardiopulmonary resuscitation performed in the setting of out-of-hospital sudden cardiac arrest among adult, non-medical rural residents

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Abstract

INTRODUCTION Every year in Poland 56,000 outside the hospital there is a sudden cardiac arrest.

OBJECTIVES The aim of the study was to determine the level of knowledge of basic life support undertaken in prehospital management in rural areas. The second objective of the study was to assess needs for cardiopulmonary resuscitation(CPR) training among adults in rural areas.

MATERIAL AND METHODS The study was carried out with the use of an original questionnaire based on the review of literature and guidelines of the European Resuscitation Council. The questionnaire was shared by social media. The questionnaire consisted of the following parts: metric, experience of previous CPR, knowledge about CPR, assessment of demand and interest in expanding knowledge and skills in CPR. A total of 501 responses were collected, of which 316 from adult, non-medical rural residents were analyzed.

RESULTS Over 85% of respondents knew how to assess consciousness of the victim, 95% of respondents knew when to start CPR. About 33% of the respondents did not know the correct location of chest compressions. Moreover 65% of them could not identify the correct

frequency of compressions. Although rib fracture was one of the most commonly cited concerns, it was a potential reason to discontinue CPR only for 4.5% of respondents.

CONCLUSIONS It was observed that there is a need for additional CPR training among rural adult residents. The information collected in this study may allow for the planning of appropriate educational activities to increase the level of knowledge about CPR in heart accidents.

KEY WORDS: CPR, Out-of-Hospital Heart Arrest, Rural Population

Introduction

According to the report of the National Institute of Public Health - National Hygiene Institute "Health situation of the Polish population and its determinants" from 2018, cardiovascular diseases are one of the most common causes of death in Poland. According to the standardised death rate by sex, place of residence and selected causes in 2016 (per 100 thousand population) included in the above-mentioned report, cardiovascular diseases have the highest value among causes of death. This indicator compared to the urban areas (254.9) is higher among inhabitants of rural areas (302.9) [1].

According to the statistics of the European Resuscitation Council, cardiac arrest in Poland occurs in 146/100,000 inhabitants per year and cardiopulmonary resuscitation (CPR) is undertaken in only half of the cases (70/100,000 inhabitants per year) [2].

Most cases of out-of-hospital sudden cardiac arrest in adults are associated with cardiac aetiology [3]. The survival of such incidents is influenced by the presence or absence of first aid (cardiopulmonary resuscitation) provided by a witness to the event. According to the principles of the chain of survival, the first minutes are crucial, in which the appropriate course of action will be to successfully alert the ambulance service and initiate chest compressions [4].

The time of arrival of medical rescue teams to cases in rural areas is longer than in urban areas [5]. Thus, the knowledge and skills of a witness to an incident in dealing with a victim in sudden cardiac arrest will have an important impact on the survival rate of a person in a cardiovascular incident. The detection and identification of potential knowledge and practical skill deficits will outline the course of action for medical education units to train the public.

The sense of obligation to provide first aid was observed to be greater among inhabitants of rural than urban areas due to less anonymity and awareness of longer waiting time for professional medical assistance. Nevertheless, rural residents have lower health awareness, so it is important to take actions to increase it [6]. Rural residents form communities and this would have a positive impact on the safety of the inhabitants of such areas [7]. Training should be preceded by a careful diagnosis of the level of knowledge and skills in cardiopulmonary resuscitation.

Aim of the study

The aim of the study was to determine the level of knowledge, training experience and concerns regarding the performance of CPR presented by adults living in rural areas and the potential demand for training in basic life-saving actions. For this purpose, the following research problems were posed: what is the level of knowledge presented by the respondents about giving first aid to an unconscious, non-breathing person - performing CPR and whether there is a demand for additional training in basic life-saving actions among rural residents.

The second objective of the study was to assess needs for cardiopulmonary resuscitation training among adults in rural areas.

Material and methods

The study began with literature review. The database analysis was based on the BEME Guide No. 3: Systematic searching for evidence in medical education (Alex Heig, Marshall Dozier) [8]. The literature review was carried out on the basis of three databases. The searches were limited to english language, free full text and 5 years. Inclusion criteria were: rural residents, research of knowledge and skills regarding CPR. Exclusion criteria were: only urban residents described in the article or knowledge of students or health care professionals Table 1.

DATABASES	OVID Medline	PUBMED
SCREENING		
Resuscitation OR Cardiopulmonary Resuscitation OR Heart Massage OR Out-of- Hospital Heart Arrest	6434	17608
ELIGIBILITY		
Rural population	31	9
INCLUDED		
Met all criteria	4	2
	6	

Table 1. Literature review

After reviewing the available literature, the need for further research into the level of knowledge about cardiopulmonary resuscitation among the general population was identified. Based on the review and guidelines of the European Resuscitation Council, the proprietary questionnaire was designed as a research tool. The questionnaire was submitted to the Bioethics Committee at the Medical University of Lublin (Approval no. KE-0254/160/2020). The questionnaire was shared by social media. Collected respondents' answers (501 participants) were analysed in detail.

The tool used in the study was a proprietary questionnaire consisting of the following sections: part I - Metrics, part II - Previous experiences regarding CPR , part III - Sources of knowledge and experience regarding first aid (cardiopulmonary resuscitation first aid (cardiopulmonary resuscitation), part IV - Concerns and legal implications related to providing first aid (cardiopulmonary resuscitation), part V - Assessing the need for first aid (cardiopulmonary resuscitation) training. The questionnaire contained 37 questions: closed single- and multiple-choice (30) and open questions (7).

The metric included questions about basic demographic data. The section was expanded to include questions about the respondent's family and housing situation (number of children and number of generations comprising the household). It was noted in the available literature that a potential first aid course participant (family representative) can pass on the knowledge and skills gained to family members living with them.

Questions in Parts II and IV addressed the respondent's experiences, beliefs and sources of knowledge related to first aid and CPR.

Part III consisted of a set of questions that tested the knowledge of the CPR scheme according to the 2015 European Resuscitation Council guidelines. The questions and answers were developed based on the above guidelines, literature review and the experience of the researchers.

The last part of the questionnaire assessed the need for and interest in increasing knowledge and skills in CPR. The questionnaire was consulted for content validity by a physician, paramedic, psychologist and statistician.

The target population for the survey was rural residents. Physical distribution of the survey form sheets was not possible due to COVID-19 pandemic restrictions.

An alternative option to collect survey responses was a social media distributed Google Form. Facebook was chosen as a popular social media site. The questionnaires were made available on commune websites, villagers' groups, spotted websites and the like. Dissemination of the survey started on 18.08.2020 and continued until 27.10.2020. A total of 386 requests to share/join groups were sent, with a final total of about 70 links shared in posts on Facebook pages/groups. Most responses came from 'spotted' pages.

The study group consisted of adult women and men living in rural areas of Lubelskie Voivodeship. The questionnaire was completed by 501 persons (348 women and 153 men). The exclusion criterion was the age below 18 years (17 participants). In Poland a person over 18 years of age is considered an adult). Inhabitants of areas, which in the administrative division of Lubelskie Voivodeship are rural gminas and urban-rural gminas, were included in the study (339 participants) In Lubelskie Voivodeship there are 193 such gminas altogether [9]. There is no specific definition of a rural area in Polish law [10].

The exclusion criteria were practicing medical profession in the meaning of the The Act of 15 April 2011 on the healing activity as "a person authorized under separate regulations to provide health services and a person who has acquired professional qualifications to provide health services in a specific scope or in a specific field of medicine" (art. 2 clause 1 point 2) as well as studying medical faculties preparing to practice medical professions [11]. Finally, 316 respondents were included in the study Print 1.



Print 1. Selection of respondents.

Participation in the study was voluntary. Each respondent gave informed consent to participate before answering the questions. The survey was anonymous, none of the participants gave their personal data. It was possible to withdraw from participation in the study at any time. Consent for the study was issued by the Bioethics Committee at the Medical University of Lublin.

Results

According to the inclusion and exclusion criteria described in the Materials and Methods section, the following results were obtained. A total of 501 responses were collected, of which 316 (239 woman, 77 man) from adult, non-medical rural residents were analyzed. The youngest respondent was 18 years old and the oldest was 70 years old. The median age was 29,5 years old. A similar proportion were those with tertiary education (139) and secondary education (144 participants). Only 6,3% (20 participants) of the respondents reported basic vocational education and 4,1 % (13 participants) reported primary education Table 2.

Education of respondents	Number of people	%
compulsory	13	4,1
secondary	144	45,6
tertiary	139	44
Basic vocational school	20	6,3

Table 2. Education of respondents.

The largest number of responses (203 participants) was obtained from residents of small villages - up to 1000 inhabitants. More than 50% (161 participants) lived in two generational households (children + parents) and more than 30 % (99 participants) in three generational households (children + parents + grandparents).

CPR knowledge

The level of knowledge about CPR was measured by a test based on ERC guidelines. Respondents were asked how they would act if they noticed an unconscious adult person lying on the street. Own safety would check 80% (253 participants) of respondents before approaching the victim. Over 85% of respondents know how to assess consciousness of the victim. The correct answer based on the guidelines was: "I would call the victim and shake him by the shoulder". Almost all respondents (299 participants) know when to start CPR. However 26% (81 participants) would check the victim's breath the incorrect way - by putting the phone screen or mirror near the victim's face to see the presence or absence of the steam. Only 68% (n = 216) can check the breath the proper way. Emergency numbers 112 and/or 999 are known for 95% of respondents (300 participants).

Sufficient knowledge of CPR is reported by 65% of respondents and 69% claims that they would know how to give first aid to the unconscious, non-breathing victim. The most frequently mentioned source of knowledge was the internet, school and first aid course. Only 0,2 % of the respondents mentioned primary care physicians. Table 3.

Sources of knowledge about CPR		
Answers	Number of respondents	%
internet	191	60,4
school	154	48,7
First aid course	134	42,4
television	84	26,6
friends	25	7,9
family	24	7,6
radio	9	2,8
training/work	8	2,5
GP	6	1,8

Table 3. Sources of knowledge about CPR. The GP role of spreading knowledge regarding CPR was minor.

Training experience

Almost half of those surveyed (155 participants) of the respondents took part in a first aid course which consisted of practical and theoretical parts and 15% (48 participants) took part in a course which covered only theory about CPR. However 36% (113 participants) never took part in first aid training. Of the 204 people who declared participation in the first aid course, 20% (41/204) participated last year, 35% (71/204) have participated in the course in the last three years and 45% of people from this group (92/204) participated in the training more than 3 years ago.

The overall scheme of 30 chest compressions and 2 breaths was known. The majority of mistakes were associated with the location and frequency of chest compressions. One in three respondents (105 participants) did not know the correct frequency of chest compressions. The most frequently chosen wrong answer was that the chest compressions should be at the nipple level (29%). 67% (211 participants) of people chose the answer "in the center of the chest" and 64,5% (204 participants) of the respondents didn't know the proper frequency of chest compressions, 47.5% (150 participants) considered the frequency of compressions 40-60 / min to be correct, and as many as 16% (51 participants) chose the frequency of 10-20 / min. Only 35% (112 participants) know the correct frequency of compressions - 100-120/min, and only 62% (197 participants) are aware that it is possible to perform compressions alone without inhalation. Almost everyone (310 participants) believe that assistance to an unconscious, non-breathing person should be provided by anyone who witnesses such an event. However 21% (67 participants) do not know or believe that there is no legal consequence for not providing first aid.

A multiple-choice closed question on CPR concerns identified abnormal chest compressions as the most common. The second most common concern was a rib break. One in three subjects feared being infected with an infectious disease while inhaling. This may be due to the current epidemiological situation (COVID-19) Table 4.

Concerns associated with performing CPR		
Answers	Number of respondents	%
Incorrect chest compressions	139	44
rib fracture	116	36,7
to be infected with infectious diseases	103	32,6
intervention will worsen the condition	80	25,3
criminal responsibility	78	24,7
no concerns	65	20,6
mean comments of the witnesses of the event	20	6,3
to be accused of harassment	11	3,5

Table 4. Concerns associated with performing CPR. More than 30% feared being infected with infectious disease. This may be due to COVID-19 pandemic.

In the next multiple-choice closed question respondents were asked to choose situations where CPR can be discontinued. The vast majority of respondents pointed to two following situations: the taking over of resuscitation by another person and when the person to whom the assistance is provided regains consciousness. Only one in three respondents said that they may stop helping when they become exhausted. Although rib fracture was one of the most frequently mentioned concerns, only 4.5% of those surveyed had a potential cause to stop CPR Table 5.

You can stop performing CPR...		
Answers	Number of respondents	%
When someone takes over CPR	272	86,1
When the victim regains consciousness	264	83,5
When I lose my strength	90	28,5
When I observe a single breath	51	16,1
You can't stop the CPR	21	6,6
When CPR takes more than 15 minutes	16	5,1
When I observe a rib fracture due to chest compressions	14	4,4
When I hear the ambulance signal	10	3,2
I don't know	10	3,2

Table 5. Situation, when you can stop performing CPR. Although rib fracture was one of the most frequently mentioned concerns, only 4.5% of those surveyed had it as a potential cause to stop CPR.

The study participants expressed a desire for further education. The survey questionnaire asked respondents if they wanted to take a free first aid course at their place of residence. As many as 76% (239) of study participants expressed a desire to take part in such training. In the next multiple-choice closed question residents of rural areas declared the greatest availability during the winter months (156/239). In a group of those 239 participants, who expressed the will to take part in training: 96 people chose spring, 113 summer and 97 autumn months. In an open-ended question, the respondents answered how long should the first aid course last and how often should it be repeated. The optimal training time indicated by the residents was from 5 - 10 clock hours (50/239) or 2 - 5 clock hours (41/239). The course should be repeated every 1-2 years (55/239).

Discussion

According to Cebula GM et al. study, time of the ambulance approach is not the most important factor influencing the rate of OHCA survival in rural areas. In that study the survival rate was similar in both urban and rural areas. As the authors said the reason behind it would be the readiness of rural residents for performing CPR, thus expanding their knowledge should become a focus for medical education [5]. In our study it was also observed that rural residents present the readiness to perform first aid. In the same German study respondents were asked to choose a proper emergency number for such accidents. Only 29,5% respondents choose the proper, actual number. In our study the rate was 95%. It suggests that Polish citizens are more aware of the proper way of alarming emergency services than German citizens. Similar results were observed in sources of information about dealing with SCA. In German as well as in our study the role of family physicians was minor[12]. It suggests that the potential of primary health care in spreading knowledge about first aid in cardiovascular incidents should be developed.

Respondents have knowledge about the basic principles of first aid. They know when to start CPR and which number to call for a medical emergency team. However, the technique that is most important leaves much to be desired. Responders need to have their knowledge expanded and systematized by more people with expertise and skills in performing CPR in a sudden cardiac arrest situation. For the development of practical skills it may be useful to broaden the courses to include the opportunity to participate in a medical simulation of helping an unconscious, non-breathing person.

The main concerns about performing first aid are related with the lack of confidence in their own sufficient knowledge and practical skills. Not all respondents are aware that proper first aid (correct depth and frequency of chest compressions) involves a lot of effort. A single rescuer may not be able to cope with it, lose strength and stop.

The vast majority of respondents is interested in attending a first aid course in their place of residence. Rural adults declared comparable availability to take a part in the training throughout the year, but the winter months were most frequently indicated. According to the respondents in order to achieve lasting effects of the training it should be repeated every 1-2 years.

The study has following limitations. Physical distribution of the survey form sheets was not possible due to the restrictions associated with the COVID-19 pandemic. The questionnaire did not cover the prehospital use of AED which is a crucial step in first aid in cardiovascular incidents. The study assessed only the level of knowledge. Practical skills were not analyzed during study. Moreover it was noticed that only 25% responses were obtained from male rural residents.

Conclusions

The majority of participants of the study know how to react, when they noticed an unconscious, adult person lying on the street. The lack of knowledge was mostly noted in the technique of performing chest compressions, which could be improved by training and tutoring lessons with professionals. The study participants expressed a desire for further education. The information collected in this study may allow for the planning of appropriate educational activities for rural adults tailored to their individual needs, which would potentially increase the willingness to participate in CPR training. Most desirable result of those actions will be that a rural resident suffering from out of hospital cardiac arrest will have a higher chance for survival.

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