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EFFECTIVENESS OF SINGLE MEDICAL ADVICE ON EMERGENCY PHONE NUMBER KNOWLEDGE IN URBAN ADULT POPULATION - 'HEALTH, ALCOHOL AND PSYCHOSOCIAL FACTORS IN EASTERN EUROPE' SUB-STUDY

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ABSTRACT

INTRODUCTION. Early access to Emergency Medical Services determines survival in out-of-hospital cardiac arrest. However, a significant proportion of adults do not know the emergency phone number (EN) and no intervention has been proposed to improve it. Therefore, we aimed to assess prospectively the effectiveness of single advice from a physician on knowledge of the EN in adult population.
MATERIALS AND METHODS. The study was conducted among participants of "Health, Alcohol and Psychosocial Factors in Eastern Europe" study. A total of 942 persons (aged 48-82 years) randomly selected from an urban population registry were interviewed and then instructed about the correct EN (the intervention group). After 12 months knowledge of the EN was assessed in the intervention group (n= 716) and in matched control group (n= 435).
RESULTS. The correct EN was given by 498 (69.6%) participants at baseline and in 550 (76.8%) participants 12 months afterwards ($p<0.001$). At follow-up the knowledge of EN was higher by in intervention group than in controls (76.8% vs 70.6%, $p=0.02$). Factors associated with better educational effect were male sex (OR 1.49; 95% CI 1.04-2.1) and secondary or higher level of education (OR 1.44; 95% CI 1.08-1.91).
CONCLUSIONS. We concluded that a single instruction about the EN from a physician increases its long-term knowledge and should be offered during medical visits.

Key words: *emergency number, single advice, population intervention*

INTRODUCTION

Early access to Emergency Medical Services (EMS) system and initiation of life support techniques determine survival in out-of-hospital cardiac arrest (OOH-CA). Survival rate from OOH-CA is often used as a hallmark of the quality of EMS system (1). The American Heart Association has used the term "Chain of Survival" to describe the sequence of critical interventions in life threatening situations. If any link in the chain is inadequate, survival rate cannot be satisfactory. The primary role is assigned to initiation of the chain (2).

According to an Italian report on EMS, which assessed OOH-CA cases, most frequent diagnosis resulting in EMS system initiation was angina, arrhythmias, acute myocardial infarction (AMI) and acute heart failure. Prompt and specialized management resulted in return of spontaneous circulation in more than 50% of cases after cardiac arrest (3).

Despite the fact that the decision to call an ambulance may depend on a variety of circumstances, the awareness of emergency phone number is one of crucial conditions to initiate the chain of survival. A recently conducted survey among adults showed that 30% of

population at risk of AMI (aged 51 to 76 years old) did not know the correct emergency phone number (4). This cross sectional study suggested that physicians' advice may contribute to a better recognition of AMI symptoms and the emergency phone number.

In the present study of a prospective design we aimed to assess whether a single, pre-specified instruction from a physician about the emergency phone number can improve its long-term knowledge.

MATERIALS AND METHODS

Study population

The study was conducted among participants of the Polish part of the "Health, Alcohol and Psychosocial Factors in Eastern Europe" (HAPIEE) study. The original sample at baseline included men and women randomly selected from an urban population registry and was described elsewhere (4,5).

A number of 942 persons (intervention group) out of 1962 randomly selected participants of the HAPIEE population were contacted and agreed to participate in the study. They were invited for medical visit including interview, standard examination and additional tests such as measurement of intima media thickness of the carotid artery, aortic pulse wave velocity and echocardiography (the baseline visit) (6). A control group of 667 persons was also selected from the HAPIEE population to match the study group in terms of age, sex and level of education. The study flow-chart explaining selection of participants of the study and depicting the follow-up scenario is presented in Figure 1.

Measurements

In the intervention group an open question "Please let me know what the emergency phone number is" was asked by a trained physician to assess knowledge of the emergency phone number during the baseline visit. The same question was asked by the same physician at the follow-up visit 12 months after the baseline visit. The follow-up visit was made by phone and up to three attempts were made to contact each participant. Two emergency numbers available in Poland: 999 and 112 were considered to be correct.

During the baseline interview the information about sex, age and level of education were collected. Level of education was classified as primary, secondary, and university degree.

The contact with controls was made only once at the same time when we assessed the effect of education in the intervention group (see Figure 1). The controls were interviewed in the same way as the study group.

Intervention

In every participant in the intervention group, data gathering was followed by a pre-specified intervention involving education about correct emergency phone number. The education included the following instruction: "Please remember that the emergency phone number is 999 or 112." No contact was made with the control group at baseline. Intervention was considered successful when the participant remained or became aware of the emergency phone number at follow-up.

Statistics

Continuous variables were reported using means and standard deviations. Categorical variables were described as counts and percentages (n,%). Age was categorized into three groups based on quartile values. The chi square test was used to compare categorical variables. The number of participants who knew the emergency phone number before and after intervention was compared using chi square McNemar test. Logistic regression analysis was used to assess the effect of intervention. The independent variables included in the analysis were: age (0: 48 - 58 years, 1: 56-69 years, 2: 70-82 years), sex (0: female, 1: male), and level of education (0: primary, 1: secondary, 2: university). The dependent variable was knowledge of the emergency phone number 12 months number after intervention (0: does not know, 1: know). Only participants who fulfilled the protocol of the study and were contacted at the follow-up visit have been included into the final analysis.

All tests were two-sided and the significance level was set at $p<0.05$. Statistical analysis was performed with Statistica PL software [StatSoft, Inc. (2011) STATISTICA (data analysis software system), version 10.0, StatSoft, Inc. Tulsa, USA].

This study complies with the Declaration of Helsinki, the institutional ethics committee approved the study protocol, and informed consent was obtained from each participant.

RESULTS

Study group

A number of 942 participants (males n=345; 48%) aged 63.5±6.5 years (48-82) were examined during the baseline visit. Twelve months after completion of the last baseline visit we managed to contact 716 (76%) of them. At the same time we contacted 435 (65.2%) of 667 selected controls. As shown in Table 1 the intervention group and the control group were well matched as there were no differences in terms of age, sex and level of education between them.

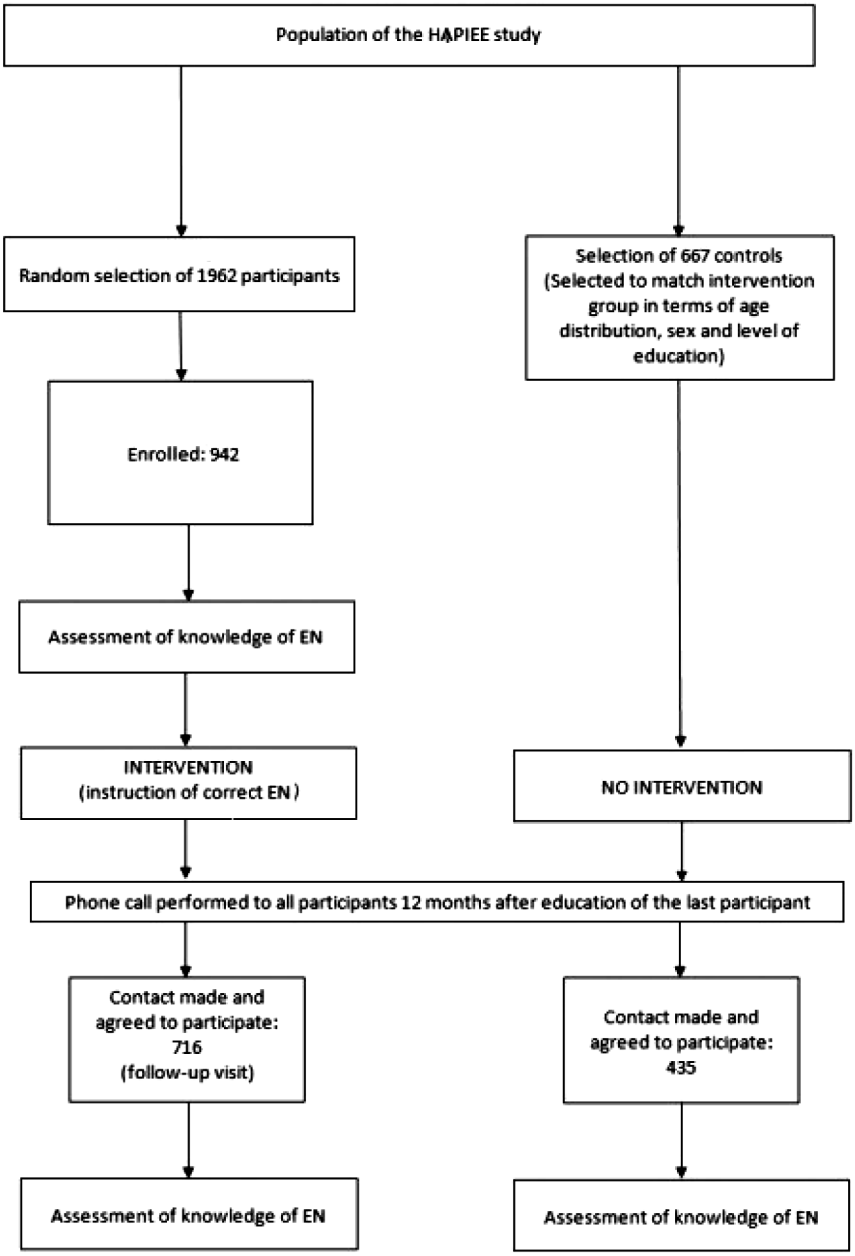

Fig.1. Flowchart representing the study protocol. EN - Emergency phone number, HAPIEE - Health, Alcohol, and Psychosocial factors in Eastern Europe.

Table 1. Baseline characteristics of the study group

Variables N (%)		Intervention group*, N=716	Control group, N=435	p
		N (%)		
Sex	Men	345 (48)	205 (47)	0.77
	Women	371 (52)	230 (53)	
Age (years)	48-58	191 (26)	108 (25)	0.55
	59-69	363 (51)	217 (50)	
	70-82	162 (23)	110 (25)	
Education level	Primary	67 (10)	35 (8)	0.5
	Secondary	395 (55)	221 (51)	
	University	254 (35)	179 (41)	

* Only participants who fulfilled the protocol of the study and were contacted at the follow-up visit have been analyzed

Knowledge of the emergency number at baseline

At the baseline visit the correct emergency phone number was given by 498 (69.6%) individuals in the intervention group. The proportion was similar in men and women (243; 70.5% vs 255; 68.7%, respectively; p = 0.88), participants aged 48-58 years, 59-69 years, and 70-82 years (110; 70.5% vs 250; 70.8% vs 138, 66.7%, respectively; p=0.72) and subjects with primary, secondary, and university level of education (44; 65.7% vs 270; 68.4% vs 184; 72.4%, respectively; p=0.58).

Effect of intervention

At follow-up visit the number of participants of the intervention group who knew the emergency phone number increased by 52 (10.4%), from 498 (69.6%) to 550 (76.8%); p<0.001. One hundred twenty (55%) out

of 218 respondents who did not know the emergency phone number at baseline were able to provide it during follow-up while sixty eight (13.7%) participants of those who initially knew the emergency phone number could not provide it during the follow-up visit despite the intervention.

The knowledge of the emergency phone number at the follow-up visit was higher in the intervention group than in the control group (550; 76.8% vs 307; 70.6%, p=0.02).

Univariate subgroup analysis revealed that males, subjects aged 59-69 years and with secondary or university education level were susceptible to the intervention (Table 2). However, logistic regression analysis revealed that only male sex (OR 1.49; 95% CI 1.04-2.1), and higher level of education (OR 1.44; 95% CI 1.08-1.91) but not age (OR 0.98; 95% CI 0.95-1.01) could predict the success of education.

DISCUSSION

In the present study we showed that a single instruction from a physician about the emergency phone number results in a significant improvement of its knowledge. The subgroups especially susceptible to education were males and persons with secondary or higher level of education.

Timing and Emergency Medical Service system

Immediate recognition of the emergency and EMS contact is an inseparable part of a chain of survival. In case of OOH-CA rapid defibrillation is often the only effective intervention (7). The leading part of all OOH-CA emergencies are consequences of coronary artery disease (3) which may require prompt intervention in facility specialized in acute coronary syndromes.

Second edition of the Euro Heart Survey in Europe and Mediterranean region showed that the average time from onset of AMI symptoms to balloon angioplasty in patients with ST elevation myocardial infarction (STEMI) was 215 minutes (8). According to registry data, estimated time between the onset of AMI symptoms and primary coronary angioplasty can reach 310 minutes, while 260 minutes accounts for pre-hospital phase of treatment (9). Additionally, the average time from AMI symptoms onset to first medical contact is longer than 2 hours (10). It should be noted that recommended action in suspected AMI is EMS contact within first 5 minutes (11). A delay makes therapeutic strategies less effective and diminishes benefits afforded by recent advances in treatment (12). Recent reports have not shown any improvement in this prehospital delay in last years (13,14).

Single advice in health care

The single educational intervention applied by the physician may be a cost-effective way to influence tar-

Table 2. The effect of education on knowledge of the emergency phone number stratified by sex, age, and level of education

Determinant		Knowledge of EN at baseline, n (%)	Knowledge of EN at follow-up, n (%)	Difference (%) [95% CI]	P
Sex	Men				
	know	243 (70.4%)	279 (80.9%)	10.4% [5.2 to 14.89]	0.0001
	do not know	102 (29.6%)	66 (19.1%)		
	Women				
	know	255 (68.7%)	271 (73%)	4.31% [-1.39 to 9.77]	0.15
	do not know	116 (31.3%)	100 (27%)		
Age (years)	48-58				
	know	110 (70.5%)	118 (75.6%)	5.1 [-3.99 to 13.57]	0.3
	do not know	46 (29.5%)	38 (24.4%)		
	59-69				
	know	250 (70.8%)	283 (80.2%)	9.4% [4.08 to 13.94]	0.0005
	do not know	103 (29.2%)	70 (19.8%)		
	70-82				
	know	138 (66.7%)	149 (72%)	5.3% [-2.3 to 12.36]	0.18
	do not know	69 (33.3%)	58 (28%)		
EL	Primary				
	know	44 (65.7%)	43 (64.2%)	1.49% [-11.26 to 13.71]	1
	do not know	23 (34.3%)	24 (35.8%)		
	Secondary				
	know	270 (68.4%)	300 (75.9%)	7.59% [2.23-12.53%]	0.005
	do not know	125 (31.6%)	95 (24.1%)		
	University				
	know	184 (72.4%)	207 (81.5%)	9.06% [2.63-14.59]	0.006
	do not know	70 (27.6%)	47 (18.5%)		

EL - education level, EN - emergency phone number

get population and to increase knowledge concerning important medical problem.

Recent systematic review of US trials concerning counseling in preventing cardiovascular disease (CVD) showed that behavioral intervention results in significant changes in adiposity, blood pressure and cholesterol level, as well as changes in self-reported dietary and physical activity behaviors. Most of these effects were evident in long time follow-up (more than one year) especially when high-intensity intervention was applied (15).

Single advice is often applied by primary care physicians in smoking population to achieve smoking cessation. One randomized clinical trial assessing advice on smoking cessation showed significant benefits in Belgian population. The education success rate in population willing to change smoking habits was 19% at one year follow-up. This effect was not further improved by providing the respondents with the result of their spirometry (16). Recently, it has been shown that media campaign has no significant effect on reducing pre-hospital time in AMI patients (17,14).

Demographic determinants of successful education

In our study the most beneficial were males and respondents with secondary or higher level of education. This indicates, that for females, and individuals with lower education level more complex approach may be required to achieve a satisfactory effect.

Education is considered to be one of the most important psycho-social determinants of health which affects mainly health literacy and self-reported health status (18). Numeracy and literacy are two basic skills needed for understanding and use of healthcare information to make appropriate health choices (19,20). They are also considered as factors limiting the effectiveness of public health education since understanding of information is strongly influenced by consumers' educational level and literacy/numeracy skills (21,22).

Recent analysis presented by Zwijnenberg showed that in contrast to the level of education sex was not a significant predictor for comprehension and use of comparative healthcare information (22).

The percentage of individuals who were successfully educated in our study was highest in the age group of 59-69 years. Importantly, people at this age are the most susceptible for cardiovascular emergencies such as myocardial infarction or stroke.

Strengths and limitations

This study has several strengths. To our knowledge, this is the first study assessing the effect of a single educational intervention on long term knowledge of the emergency phone number. The patients were randomly selected from the population registries. The controls were adequately chosen from the same population to match the intervention group in terms of age, sex and level of education.

Our study also has some limitations. We have not reached all individuals during follow-up despite 3 attempts of contact each time. However, our response rate was similar in intervention and control group and comparable to other studies with this kind of intervention (23). The control group was not interviewed at baseline but only during follow-up at the same time when we checked the long term results of education in the intervention group. However, the lack of contact with control group during baseline resulted from two reasons. Firstly, gathering information about knowledge of emergency number within the control group would act as an intervention itself. Secondly, we considered it unethical not to provide information about the correct emergency number to individuals lacking in such knowledge.

We used two different ways of gathering information: baseline face-to face interview and telephone follow-up call, which could potentially influence the rate of positive responses. However the intervention group was interviewed in the same way making the chance of influencing the results negligible.

CONCLUSIONS

Our study showed that a single instruction about the emergency phone number from a physician increased its knowledge in a random sample of citizens aged 48-82 years. Susceptible groups involved males and individuals with secondary or higher level of education. We suggest that this single cost-effective intervention applied by the physician should be considered as a routine during medical visits. More complex interventions may be required for females and individuals with lower level of education.

REFERENCES

1. Sayre MR, Travers AH, Daya M, et al. Measuring survival rates from sudden cardiac arrest: the elusive definition. Resuscitation 2004;62: 25-34.
2. Cummins RO, Chamberlain DA, Abramson NS, et al. Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: the Utstein Style. Task Force of the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, and the Australian Resuscitation Council. Ann Emerg Med 1991;20:861-874.
3. Casaccia M, Bertello F, Sicuro M, et al. Out-of-hospital cardiac arrest in an experimental model of the management of cardiologic emergencies in a metropolitan area. G Ital Cardiol 1995;25:127-137.

4. Kopec G, Sobien B, Podolec M, et al. Knowledge of a patient-dependant phase of acute myocardial infarction in Polish adults: the role of physician's advice. Eur J Public Health 2011;21:603-608.
5. Bobak M, Capkova N, Pajak A, et al. Workshop 25: The HAPIEE Study: a multi-centre study of determinants of cardiovascular diseases in Russia, Poland and the Czech Republic. Eur J Public Health 2003;13 37-39.
6. Kopeć G, Sobień B, Podolec M, et al. The prevalence of abnormal echocardiographic findings in a sample of urban adult population. Kardiol Pol 2014;72:42-9.
7. The American Heart Association in collaboration with the International Liaison Committee on Resuscitation. Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Part 12: from science to survival: strengthening the chain of survival in every community. Circulation 2000;102:I358-70.
8. Mandelzweig L, Battler A, Boyko V, et al. The second Euro Heart Survey on acute coronary syndromes: Characteristics, treatment, and outcome of patients with ACS in Europe and the Mediterranean Basin in 2004. Eur Heart J 2006;27:2285-2293.
9. Polonski L, Gasior M, Gierlotka M, et al. Polish Registry of Acute Coronary Syndromes (PL-ACS). Characteristics, treatments and outcomes of patients with acute coronary syndromes in Poland. Kardiol Pol 2007;65:861-72; discussion 873-4.
10. Walkiewicz M, Krowczynska D, Kuchta U, et al. Acute coronary syndrome--how to reduce the time from the onset of chest pain to treatment? Kardiol Pol 2008;66:1163-70; discussion 1171-2.
11. American College of Emergency Physicians, Society for Cardiovascular Angiography and Interventions, O'Gara PT, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol 2013;61:78-140.
12. Dracup K, Moser DK, Eisenberg M, et al. Causes of delay in seeking treatment for heart attack symptoms. Soc Sci Med 1995;40:379-392.
13. Jankowski P, Bednarek A, Surowiec S, et al. Half of coronary patients are not instructed how to respond to symptoms of a heart attack. Cardiol J. 2011;18(6):668-74.
14. Jankowski P, Bednarek A, Kawecka-Jaszcz K. The influence of educational media campaigns on reduction of prehospital delay in patients with acute coronary syndrome - a systematic review. Kardiol Pol. 2010 Mar;68(3):332-8.
15. Lin JS, O'Connor E, Whitlock EP, et al. Behavioral counseling to promote physical activity and a healthful diet to prevent cardiovascular disease in adults: a systematic review for the U.S. Preventive Services Task Force. Ann Intern Med 2010;153:736-750.
16. Buffels J, Degryse J, Decramer M, et al. Spirometry and smoking cessation advice in general practice: a randomised clinical trial. Respir Med 2006;100: 2012-2017.
17. van der Heide I, Wang J, Droomers M, et al. The relationship between health, education, and health literacy: results from the dutch adult literacy and life skills survey. J Health Commun 2013;18:172-184.
18. Tummala SR, Farshid A. Patients' Understanding of their Heart Attack and the Impact of Exposure to a Media Campaign on Pre-Hospital Time. Heart Lung Circ 2015;24:4-10.
19. Berkman ND, Sheridan SL, Donahue KE, et al. Low health literacy and health outcomes: an updated systematic review. Ann Intern Med 2011;155:97-107.
20. Hibbard JH, Peters E, Dixon A, et al. Consumer competencies and the use of comparative quality information: it isn't just about literacy. Med Care Res Rev2007;64:379-394.
21. Wee HL, Li SC. Sociodemographic factors influencing the effectiveness of public health education - a comparison of two studies in Singapore. Ann Acad Med Singapore 2007;36:958-961.
22. Zwijnenberg NC, Hendriks M, Damman OC, et al. Understanding and using comparative healthcare information; the effect of the amount of information and consumer characteristics and skills. BMC Med Inform Decis Mak 2012;12:101.
23. Kyle RG, Forbat L, Rauchhaus P, et al. Increased cancer awareness among British adolescents after a school-based educational intervention: a controlled before-and-after study with 6-month follow-up. BMC Public Health 2013;13:190.

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