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# 'The year of first aid': effectiveness of a 3-day first aid programme for 7-14-year-old primary school children

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## ABSTRACT

**Aim of the study** Bystanders can play an important role in the event of sudden injury or illness. Our aim was to evaluate the effects of a 3-day first aid course for all primary school age groups (7–14 years old).

**Methods** 582 school children were involved in the study. Training consisted of three sessions with transfer of theoretical knowledge and practical skills about first aid. The following most urgent situations were addressed in our study: adult basic life support (BLS), using an automated external defibrillator (AED), handling an unconscious patient, managing bleeding and calling the ambulance. Data collection was made with a questionnaire developed for the study and observation. Students were tested before, immediately after and 4 months after training. Results were considered significant in case of  $p < 0.05$ .

**Results** Prior to training there was a low level of knowledge and skills on BLS, management of the unconscious patient, use of an AED and management of bleeding. Knowledge and skills improved significantly in all of these categories ( $p < 0.01$ ) and remained significantly higher than the pre-test level at 4 months after training ( $p < 0.01$ ). Younger children overall performed less well than older children, but significantly improved over the pre-test level both immediately and 4 months after training ( $p < 0.01$ ). Prior first aid training was associated with knowledge of the correct ambulance number ( $p = 0.015$ ) and management of bleeding ( $p = 0.041$ ). Prior to training, age was associated with pre-test knowledge and skills of all topics ( $p < 0.01$ ); after training, it was only associated with AED use ( $p < 0.001$ ). There was a significant correlation between the depth of chest compression and children's age, weight, height and body mass index ( $p < 0.001$ ). Ventilation depended on the same factors ( $p < 0.001$ ).

**Conclusion** Children aged 7–14 years are able to perform basic life-saving skills. Knowledge retention after 4 months is good for skills, but thinking in algorithms is difficult for these children.

## INTRODUCTION

Bystanders can play an important role in the event of sudden injury or illness before professional help arrives. The willingness, frequency and quality of first aid provision is low worldwide but can be increased with effective training.<sup>1–3</sup> After being alerted to a situation where first aid is required, the emergency call dispatcher can encourage bystanders to act on their prior knowledge.<sup>4</sup>

Sometimes children are the first people to the scene of an emergency situation. According to a statement by the American Heart Association,

## Key messages

### What is already known on this subject?

- Quick first aid can be life-saving by laypersons.
- School children are able to learn some aspects of first aid.
- Beginning first aid education in primary schools has been recommended.

### What this study adds?

- A 3-day training programme for children 7 years and older in Hungary was developed and evaluated. Children were tested prior to training, immediately after and at 4 months for knowledge and practical skills.
- Children as young as 7 years are able to learn the theoretical basics of basic life support and can effectively carry out calling the ambulance service, using an automated external defibrillator, placing a patient in the correct recovery position and managing severe bleeding.

cardiopulmonary resuscitation (CPR) training for school children is mandatory in the USA.<sup>5</sup> Cardiopulmonary resuscitation training for school children was endorsed in 2015 by the World Health Organization.<sup>6</sup> A published systematic review in 2013 collated the most effective methods for teaching CPR to children.<sup>7</sup>

According to De Buck *et al*, first aid education is broader than CPR training alone.<sup>8</sup> First aid training in early childhood can improve an individual's knowledge, skills and willingness to perform first aid in an emergency situation.<sup>9</sup> Eisenburger and Safar recommended that everybody, including children, should learn life-supporting first aid.<sup>10</sup> Children are able to call for help and give basic first aid after training.<sup>11 12</sup> However, it is unclear at what age students can learn the different aspects of first aid (including resuscitation).<sup>13 14</sup>

Commencing first aid education in early childhood can be beneficial even if intellectual and physical abilities usually present as a barrier to learning. Early training provides the basis for future training opportunities. The aim of the current study was to evaluate the effects of a 3-day first aid course for all primary school age groups (7–14 years). Our aim was to measure the children's first aid knowledge and skills before, immediately after and 4 months after training.



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## METHODS

In this longitudinal cohort study we investigated the effectiveness of our first aid teaching programme.

### Participants

The first aid programme was delivered within the framework of 'The year of first aid'. All students (first to eighth grades) were required to participate in a 3-day training programme which was held between September 2015 and June 2016. After training, the children received a poster which summarised the tasks learnt. Children in this study were from an inner-city primary school located in Pécs, Hungary. Children who had not attended all three lessons or did not pass any of the tests were excluded from the study.

### Training programme

Training consisted of three sessions (45 min each) on three consecutive weeks (one per week) with transfer of theoretical knowledge and practical skills about first aid. The following most urgent situations were addressed in the study: adult basic life support (BLS), using an automated external defibrillator (AED), handling an unconscious patient, managing severe bleeding and calling the ambulance. For this latter point, we measured children's ability to recall the correct telephone number of the local ambulance service (104 or 112 in Hungary) and to give necessary relevant information (location, nature of the emergency, number of victims, own telephone number). To test this as part of practical skills we described emergency situations and, for each of these situations, the children had to decide whether it was necessary to call the ambulance service (eg, mild nose bleeding vs unconscious patient). The teaching programme was adapted to the needs and abilities of all age groups. All of the instructors were paramedics. The training programme contained theoretical and 'hands-on training' components. The curriculum and the checklists are shown in online supplementary appendix A.

### Measurements

We administered a questionnaire to the students before, immediately after and 4 months after the training course. The questionnaire used open-ended questions because we believe the answers to open questions better reveal actual knowledge than the results of multiple-choice tests (see online supplementary appendix B). Questionnaires in earlier studies contained only multiple-choice items and thus we developed the questionnaire ourselves. Children with lower levels of cognitive status (first and second graders) could receive questions aurally and give answers orally. In addition, children were tested in first aid scenarios before and immediately after teaching, and then re-tested 4 months later. We therefore measured both knowledge and practical skills. Completion of the questionnaire and practical measurements were performed on the same days.

The sex, age, body height and weight of all children were recorded and their body mass index (BMI) calculated. Children used a 'code word' when they were measured so we could follow them anonymously for the entire programme duration (pre- and post-test). Based on the questionnaire, we documented whether participants had experienced previous first aid training.

To evaluate the CPR performance we used an AMBU Man W model with AMBU CPR Software (AMBU A/S, Baltorpbakken 13, DK 2750 Ballerup, Denmark). The programme recorded chest compression depth, frequency and rate, hand position, chest compression-ventilation rate, ventilation volumes and frequency, compression-relaxation rate and pause between

each compression round during a continuous CPR scenario of 2 min duration. To teach and practice handling of the AED, we used a Lifepak1000 AED Trainer. 'Self-made wounds' (artificial wounds made using materials such as makeup and syrup) were made to simulate severe bleeding. The victims were other children or adult imitators in the scenarios.

Measurements were conducted in a private classroom. Other participants waited in another room.

First aid skills were scored by an instructor using checklists that were developed according to European Resuscitation Council (ERC) guidelines.<sup>15 16</sup>

### Statistical analysis

Statistical analysis was conducted using SPSS 22.0 (Statistics Package for Social Sciences, Chicago, IL, USA) statistical software. Descriptive statistics were performed (percentages, mean, SD). Categorical variables were presented as number (%) and were compared using the  $\chi^2$  test or Fisher's exact test as appropriate. One-way ANOVA and t-test was applied to test the association between knowledge, skills (pre-test, post-test and after 4 months) and demographic characteristics (age, body weight and height, BMI, previous first aid experience). Pearson correlation analysis was applied to test CPR quality (chest compression depth and ventilation volume vs age, BMI, body weight and height). A p value of <0.05 was considered to be statistically significant.

### Ethical considerations

Since this survey evaluated a first aid teaching programme, it did not lie within the mandate of the research ethics committees in Hungary and therefore no approval was needed according to Hungarian law and regulations. The participants, their parents and teachers received written and oral information prior to study commencement. They were informed of their right to withdraw at any time with no personal consequences. The children's parents gave written informed consent before their child entered the study.

## RESULTS

We recruited 607 children. Of these, 25 were excluded from the study because they did not attend all three lessons (13 children) or they did not pass at least one of the tests (12 children). There were therefore 582 study participants, between 7 and 14 years old, comprising 317 girls (54.5%) and 265 boys (45.5%); 75 (12.9%) of these students had previously attended first aid training. Demographic data are displayed in [table 1](#).

### THEORETICAL KNOWLEDGE

In almost all of the children the theoretical knowledge after training and at 4 months was significantly higher than pre-test ([table 2](#)).

Our results showed that some children without previous first aid training had preliminary first aid knowledge from different sources (eg, media, parents).

The majority of children were able to give the correct ambulance phone number and location and type of emergency prior to training; the proportion improved immediately after the course and remained high at 4 months. The ability to perform the steps of BLS was very low (<20%) prior to the course and improved significantly after the course. After 4 months this knowledge declined somewhat but remained significantly higher than the pre-test level. Theoretical knowledge about AED was low overall (14%) but improved post-test and remained significantly better at 4 months compared with

**Table 1** Demographic data of the children (n=582)

Class in school	1st	2nd	3rd	4th	5th	6th	7th	8th
Participants (n)	84	81	82	73	80	69	55	58
Previous first aid course (n)	6	5	14	10	12	20	2	6
Mean age (years)	7 (7–8)	8 (8–9)	9 (9–10)	10 (10–11)	11 (11–12)	12 (12–13)	13 (13–14)	14 (14–15)
Mean body weight (kg)	27 (17–45)	31 (19–47)	30 (20–47)	36 (25–46)	42 (26–60)	45 (30–65)	50 (33–70)	59 (35–76)
Mean body height (cm)	128 (120–156)	135 (122–155)	139 (124–156)	145 (140–159)	153 (140–165)	157 (140–178)	163 (145–179)	169 (144–184)
Mean body mass index	16 (11–19.2)	17 (11–19)	16 (11.8–23)	17 (12–19.7)	18 (12–23.6)	18 (13.3–23)	19 (15–23.1)	21 (15.7–25)

Range give in parentheses. Data are normally distributed.

the pre-test level. The proportion of children who knew how to approach an unconscious patient was 12% and rose after training (77%) and remained significantly higher at 4 months (66%). Management of bleeding also rose significantly after training and some aspects improved further at 4 months.

### PRACTICAL SKILLS

In almost all of the practical skills the ability immediately after training and at 4 months was significantly higher than pre-test (table 3).

In the facilitated situation game, the number of participants who could decide whether it was necessary to call the ambulance before training, immediately after training and 4 months after training were 285 (49%), 530 (91%) and 512 (88%), respectively.

Correct use of an AED was not difficult for most of the children. Only a little more than 10% of the participants knew the function of an AED before training. However, approximately one-third of the participants knew the correct electrode position, followed the instructions correctly and could deliver a safety shock before training. AED ability rose from 35% pre-test to >90% for the tested aspects after instruction and remained significantly higher than pre-test at 4 months.

Management of the unconscious patient rose substantially. Prior to training only 2% of participants could identify if a patient was breathing correctly; after training and at 4 months 83% and 74%, respectively, of the children could determine whether the patient did or did not have normal breathing. Children assessed the breathing of an unconscious patient more

often than they did in the BLS scenario immediately after and 4 months after training. The reason for the greater willingness to assess breathing could be that the patient in the BLS scenario was a manikin whereas another child played the victim in the situation with the unconscious patient.

Management of bleeding also significantly improved after training and remained significantly higher than the pre-test level at 4 months.

Table 4 shows the main results of practical skills in different age groups.

Only a few children from the 13–14-year-old age group could assess breathing correctly before training but approximately one-half and one-third of all age groups could assess breathing correctly immediately after and 4 months after training, respectively.

Only a few children from the 13–14-year old age group were able to place the patient in the recovery position before training. Approximately three-quarters of the children were able to establish the correct recovery position immediately after training and 4 months after training (more than half of the 7-year-old children). Only children >10 years of age could place the adult patient in the recovery position alone after the test and 4 months later (because of their better physical abilities). Other children solved the problem by working in groups.

### EFFECT OF AGE, SEX AND PRIOR TRAINING

The effect of predictor variables are displayed in table 5.

The children's sex was not associated with any of the pre-test results. However, age was associated with knowledge of correct

**Table 2** Success rate (%) of correct answers of the theoretical measurements (based on the result of the questionnaire) (n=582)

Topic	Activity	Pre-test (% success rate)	Post-test (% success rate)	After 4 months (% success rate)
Call the ambulance	Correct telephone number	79	98*	87
	Give the location	75	99*	94*
	Nature of the emergency	73	98*	94*
	Give the number of victims	5	42*	11
	Give their own phone number	3	99*	22*
Basic life support (BLS)	Correct examination time of breathing (10 s)	17	66*	40*
	Correct chest compression frequency	17	97*	74*
	Correct chest compression rate	7	73*	46*
	Correct chest compression depth	7	73*	54*
	Correct ventilation frequency	12	97*	61*
Automated external defibrillator (AED)	What is function of an AED?	14	97*	75*
Unconscious patient	Why necessary to examine unconscious patient before recovery position?	12	77*	66*
Manage bleeding	Lay the patient	1	51*	86*
	Direct pressure to the wound	1	52*	85*
	Raise the injured extremity	29	98*	84*
	Call the ambulance service	30	98*	47

\*p<0.01 compared with the pre-test ( $\chi^2$  test).

emergency number, correct assessment of breathing, correct recovery position, correct use of the AED and managing severe bleeding, and previous training was associated with knowledge of the correct emergency number and bleeding management (raising the injured extremity, applying direct pressure to the wound) in the pre-test. Immediately after and 4 months after training none of these variables remained associated, except the knowledge about AED (13–14 years vs younger children;  $p < 0.001$ ) and the correct practical use of the AED (7–8 years vs older children;  $p < 0.001$ ).

### Effectiveness of CPR

The effectiveness of CPR (chest compression and ventilation) in different age groups with AMBU CPR Software was only detected once, immediately after training (table 6).

There was a significant correlation between chest compression depth and children's age ( $r = 0.604$ ;  $p < 0.001$ ), body weight ( $r = 0.645$ ;  $p < 0.001$ ), body height ( $r = 0.605$ ;  $p < 0.001$ ) and BMI ( $r = 0.373$ ;  $p < 0.001$ ). Children in the 12–14-year-old age group performed significantly better chest compressions than younger children ( $p < 0.001$ ). Ventilation volume correlated significantly with children's age ( $r = 0.395$ ;  $p < 0.001$ ), body weight ( $r = 0.374$ ;  $p < 0.001$ ), body height ( $r = 0.372$ ;  $p < 0.001$ ) and BMI ( $r = 0.18$ ;  $p = 0.002$ ). There was no significant correlation between chest compression depth ( $p = 0.1$ ), ventilation volume ( $p = 0.618$ ) and children's sex. Correct hand position was not dependent on BMI ( $p = 0.368$ ), age ( $p = 0.213$ ) and sex ( $p = 0.17$ ). The compression-ventilation ratio was also not dependent on BMI ( $p = 0.923$ ), age ( $p = 0.06$ ) and sex ( $p = 0.584$ ). Children who previously learnt first aid compressed the chest significantly deeper ( $p = 0.018$ ) but ventilated the manikin to a similar volume as the group without previous first aid training ( $p = 0.308$ ).

The applied compression-ventilation ratio was independent of previous first aid training ( $p = 0.619$ ).

### DISCUSSION

The main result of our study is that children as young as 7 years are able to learn basic first aid activities including calling the ambulance service, starting CPR, using an AED, handling an unconscious patient and managing severe bleeding. After the 3-day first aid programme and 4 months after training, most of the skills were significantly better than before training in all age groups.

In our study, children aged 7 years performed worse than older children, but their scores increased significantly immediately after and 4 months after training compared with the pre-test. Overall, more than half of the 7-year-old children correctly performed all of the topics (except correct assessment of breathing) immediately after training.

Only children  $> 10$  years of age could place the adult patient in the recovery position alone because of their better physical abilities. Only a few children in the 13–14-year-old age group were able to assess breathing correctly and place the patient in the recovery position before training. These scores were significantly better immediately after and 4 months after training.

We measured both CPR knowledge and CPR practical skills of all participants. A significant correlation was found between chest compression depth and children's age, weight, height and BMI. Only one-tenth of participants were able to effectively ventilate the patient. The quality of ventilation correlated significantly with the children's age, weight, height and BMI. Children aged  $< 10$  years could not perform effective CPR because of their physical abilities but were able to learn the cognitive parts of BLS as well as older children. BMI and other physical factors

**Table 3** Success rate (%) of correct answers of the practical measurements (based on the scenarios) (n=582)

Topic	Activity	Pre-test (% success rate)	Post-test (% success rate)	After 4 months (% success rate)
Call the ambulance	Correct telephone number	79	98*	88
	Give the location	75	98*	94*
	Nature of the emergency	73	98*	93*
	Give the number of victims	5	42*	11
	Give their own phone number	3	99*	22*
Basic life support (BLS)	Correct assessment of responsiveness	2	59*	36*
	Shout for help	0	46*	23*
	Correct assessment of breathing	1	52*	38*
	Call the ambulance	6	71*	53*
	Correct hand position	2	90*	72*
	Correct compression-ventilation rate (30:2)	0	86*	68*
Automated external defibrillator (AED)	Correct ventilation technique	0	50*	34*
	Correct electrode position	35	92*	75*
	Follow the instructions	34	98*	70*
Unconscious patient	Deliver safety shock	36	92*	76*
	Correct assessment of consciousness	3	55*	43*
	Correct assessment of breathing	2	68*	68*
	Correct recovery position	1	74*	75*
	Examination before recovery position	0	57*	40*
Manage bleeding	Call the ambulance	9	82*	60*
	Lay the patient	1	59*	32*
	Direct pressure to the wound	3	74*	46*
	Raise the injured extremity	0	66*	36*
	Call the ambulance	15	77*	58*

\* $p < 0.01$  compared with the pre-test ( $\chi^2$  test).

**Table 4** Success rate (%) of practical skills in different age groups of children in the pre-test, post-test and 4 months later (n=582)

Children's age (years)		7	8	9	10	11	12	13	14
Knowledge of emergency number	Pre-test	46	58	88	88	92	92	81	97
	Post-test	92*	98*	100*	100*	100*	100*	100*	100
	4 months after test	85*	89*	81*	89	80*	92	98*	98
Call the ambulance scenario (necessary or not)	Pre-test	81	75	91	93	95	94	98	97
	Post-test	81	79	94	96	95	96	100	97
	4 months after test	81	78	90	86	92	89	100	97
Correct assessment of breathing	Pre-test	0	0	0	0	0	0	4	7
	Post-test	43*	49*	49*	58*	53*	58*	60*	57*
	4 months after test	37*	49*	32*	27*	31*	41*	44*	48*
Assessment of breathing scenario (recognise normal, abnormal or no breathing)	Pre-test	41	46	43	62	74	74	81	83
	Post-test	73*	77*	84*	82*	85	88*	88	93*
	4 months after test	60*	70*	66*	73	80	89*	90	76
Correct recovery position	Pre-test	0	0	0	0	0	0	3	7
	Post-test	56*	70*	77*	80*	72*	85*	83*	85*
	4 months after test	55*	67*	72*	64*	87*	90*	85*	97*
Correct AED electrode position	Pre-test	18	16	19	27	31	51	53	64
	Post-test	74*	86*	96*	99*	97*	99*	98*	98*
	4 months after test	62*	67*	71*	77*	81*	83*	90*	85*
Follow the instructions of the AED	Pre-test	15	19	17	29	35	53	53	65
	Post-test	94*	93*	100*	100*	100*	100*	100*	98*
	4 months after test	61*	52*	61*	76*	76*	79*	81*	91*
Deliver safety shock with the AED	Pre-test	18	19	17	29	35	53	53	65
	Post-test	86*	88*	92*	96*	93*	93*	96*	97*
	4 months after test	64*	67*	77*	71*	77*	85*	83*	93*
Direct pressure to the wound to manage severe bleeding	Pre-test	0	0	1	3	3	7	5	9
	Post-test	100*	100*	100*	100*	99*	100*	100*	100*
	4 months after test	80*	82*	77*	71*	66*	61*	77*	88*

\*p<0.01 compared with pre-test within age groups ( $\chi^2$  test).

did not influence knowledge and cognitive skills. Completely following the guidelines is difficult for these children (eg, the full process of BLS).

The main benefit of this study was that all age groups of primary school children (7–14 years) were tested before, immediately after and 4 months after training. Some previous studies

**Table 5** Effect of age, sex and prior training

Topic	Test	Age (p values)		Sex (p values)		Prior training (p values)	
		Theoretical knowledge	Practical skills	Theoretical knowledge	Practical skills	Theoretical knowledge	Practical skills
Call the correct ambulance number	Pre-test	<0.001*	<0.001*	0.555	0.852	0.015‡	0.023‡
	Post-test	0.092	0.075	0.459	0.947	0.873	0.476
	4 months after test	0.123	0.224	0.416	0.803	0.203	0.171
Correct assessment of breathing	Pre-test	<0.001*	<0.001†	0.918	0.413	0.488	0.582
	Post-test	0.163	0.392	0.746	0.252	0.899	0.863
	4 months after test	0.421	0.376	0.095	0.733	0.120	0.773
Correct recovery position	Pre-test	0.03*	<0.001†	0.122	0.478	0.927	0.384
	Post-test	0.206	0.374	0.062	0.692	0.482	0.402
	4 months after test	0.708	0.289	0.991	0.127	0.644	0.902
Automated external defibrillator (AED)	Pre-test	<0.001†	<0.001*	0.067	0.567	0.122	0.915
	Post-test	<0.001†	0.432	0.107	0.786	0.382	0.634
	4 months after test	<0.001†	<0.001*	0.997	0.385	0.292	0.701
Manage severe bleeding	Pre-test	<0.001*	<0.001*	0.466	0.312	0.041‡	0.121
	Post-test	0.211	0.444	0.947	0.274	0.245	0.700
	4 months after test	0.158	0.137	0.205	0.285	0.312	0.302

Sex and prior training were compared with correct answers using the  $\chi^2$  test. Ages were compared with correct answers using ANOVA and t-test.

\*Statistically significant difference between 7–8-year-olds and older children (ANOVA and t-test).

†Statistically significant difference between 13–14-year-olds and younger children (ANOVA and t-test).

‡Statistically significant difference between children with and without prior training ( $\chi^2$  test).

**Table 6** Effectiveness of chest compression and ventilation measured with AMBU CPR Software (n=582)

Children's age (years)	7	8	9	10	11	12	13	14
Participants (n)	84	81	82	73	80	69	55	58
Mean depth of chest compression (mm)	22 (12–56)	26 (12–56)	36 (12–68)	44 (30–59)	41 (25–52)	51 (29–71)	55 (35–71)	58 (38–75)
Correct depth of chest compression (%)	7	11	15	42	39	68	68	74
Mean frequency of chest compression/min	122 (59–158)	121 (59–158)	121 (58–158)	132 (96–155)	127 (110–153)	128 (97–163)	139 (98–159)	123 (99–151)
Correct frequency of chest compression (%)	28	27	29	10	33	28	35	42
Correct compression-relaxation rate (%)	9	17	17	20	22	37	58	68
Correct hand position of chest compression (%)	62	65	69.3	90	78	79	71	86
Compression pause (s)	11 (0–12)	9 (0–13)	4 (0–30)	10 (0–20)	8 (0–26)	9 (0–22)	11 (7–21)	8 (7–19)
Correct compression-ventilation rate (%)	23	25	37	55	54	62	76	81
Mean ventilation volume (L)	0	0	0.05 (0–1)	0.23 (0–0.8)	0.02 (0–0.3)	0.3 (0–1.2)	0.3 (0–1)	0.4 (0–1.5)
Correct ventilation volume (%)	0	0	1.7	30	0	21	26	34

Range given in parentheses. Data are normally distributed.

used questionnaires to evaluate the level of knowledge<sup>17–19</sup> and other studies measured practical skills through observation.<sup>11–14</sup> We used both of these methods. A 6-year longitudinal study used multiple-choice tests and observation but measured only children's CPR skills.<sup>20</sup>

Previous studies showed that young primary school children are able to call for help and give basic first aid.<sup>11–19</sup> In a previous study, nearly 50% of 12–14-year-old children could use the AED without formal training.<sup>21</sup> Our results were similar. Belgian Red Cross-Flanders evidence-based recommendation supports AED training for children.<sup>22</sup> Previous studies showed similar outcomes for handling an unconscious patient: 86% of 6–7-year-old children and 40% of 4–5-year-old children performed a correct recovery position after training.<sup>11–14</sup>

In our study the effectiveness and properties of chest compression and ventilation were similar to those of previous studies.<sup>12–13–23–24</sup> Teaching ventilation to children is difficult. However, the most important part of CPR is continuous chest compression. The ERC resuscitation guidelines suggest that, if bystanders are untrained or unable to perform rescue breathing, they should give chest compression only.<sup>15</sup> According to previous studies, CPR training should start at the age of 10 years.<sup>10–12–13</sup> Based on our results, we believe that teaching BLS under the age of 10 years can be useful. The majority of these children cannot perform effective CPR but they can learn some aspects of resuscitation (eg, assessment of breathing, correct hand position).

## LIMITATIONS

Our study might not be representative of the whole population of primary school children in Hungary. Children were re-tested after 4 months of training, but we do not know the longer-lasting effects of training. A follow-up study in the future could help to measure long-term knowledge and skill retention. The actual reaction of these children in a possible real emergency situation remains unknown. Despite these limitations, the results from our study are promising.

## CONCLUSIONS

Many people requiring medical aid in emergency situations die because first aid is not performed. The main reason given by

people for 'doing nothing' is the preconceived notion that they will make mistakes if trying to help in such situations.

Beginning first aid education in the first grade of primary school (7 years of age) should be mandatory. These children can learn the basic aspects of first aid. The first aid teaching programme should include the transfer of knowledge and should also motivate children to perform first aid and develop their helping aptitude.

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