

FIRST AID IN EDUCATION

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Abstract: This article aimed to analyse, through a questionnaire, teachers' knowledge and opinions regarding basic first aid. Teachers (N=382) from South Bohemia (municipalities with different populations and, with regard to the gender ratio in staff, mostly women) filled out questionnaires between 2017 and 2020. They also mentioned changes in pupils' health conditions, and these data were compared with anonymized statistical data of the Emergency Medical Service in the same region of the Czech Republic (6% of the Czech Republic's population, data from August 2018 to June 2019). One third to half of all teachers stated that some health crisis required first aid at school and/or outside school. Teachers caring for older children and adolescents report a lower incidence of cases than pre-primary teachers. Through the questionnaire survey we found (a) significant differences in the mean values of knowledge of first aid in total between all subgroups of teachers ($p < 0.05$) and (b) in the level of knowledge of first aid for traumas and acute conditions of chronic diseases ($p < 0.05$; in favour of the non-traumatic acute conditions). But overall, the level of knowledge was insufficient (mean values between 69% in pre-primary and 84% in elementary-school teachers in a standard first-aid test). Results show the importance of the inclusion of first aid in the training of teachers in pre-primary, primary, and lower and higher secondary schools. A majority of teachers feel it would be appropriate to provide training in first aid in both traumatic and non-traumatic acute conditions once every two years, predominantly using simulations.

Keywords: first aid, education, teachers, schools, trauma, acute condition, social science

1 Introduction

First pre-medical aid is defined as the first and immediate assistance given to any person with either a minor or serious illness or injury, with care provided (a) to preserve life, (b) prevent the condition from worsening (e.g. circulatory failures), or (c) to promote recovery. It includes initial intervention before professional medical help is available, such as stopping massive bleeding, helping during choking, and if necessary performing cardiopulmonary resuscitation (CPR) while waiting for an ambulance, as well as the complete treatment of minor conditions, such as applying disinfectant and a plaster to a cut. First aid is generally performed by someone with basic medical training, who must consider also his or her own safety and the safety of other people present (FAM, 2021; Kelnarová, Toufarová, Váňová, & Číková, 2012).

Any human being is always expected to provide basic assistance, especially in case of emergency. That is not just a moral obligation, but also a legal requirement, which includes calling the Emergency Medical Service (in the Czech Republic 155) for professional help (§ 150, No. 40/2009 Coll.). In addition, teachers are obliged to protect the safety and health of all pupils (§ 22b, No. 561/2004 Coll.). Also school administration has an obligation (a) to guarantee first aid to pupils and employees and (b) to educate pupils and staff about first aid (§ 102 and § 103, No. 262/2006 Coll.), although it is expressed widely as an obligation of the employer's management in relation to employees.

In the field of first-aid education, the most relevant source is the European Resuscitation Council (ERC Guidelines 2015, 2021). These guidelines are updated usually every five years and reflect the latest scientific findings in the field of first aid. Other publications and projects subsequently build on these findings (e.g. British Red Cross, 2022; Truhlář et al., 2021; SBR Project, 2022).

The aim of our research was to evaluate differences in the knowledge of first aid among subgroups of teachers. Based on the description of health conditions of children and adolescents in schools, the importance of targeted, regular first-aid training for teachers was highlighted.

2 Material and methods

The study was conducted between October 2017 and June 2020 at 85 randomly selected schools in South Bohemia (Czech Republic). Teachers were contacted personally and via email. They were informed about the objective and methodology of the study and were asked to provide express written consent to use their anonymized data.

The subgroup "Teaching children 3-7 years old" includes teachers at pre-primary schools, the subgroup "Teaching children 7-15 years old" teachers at primary and lower secondary schools (i.e. elementary schools grades 1 to 9), and the subgroup "Teaching adolescents 15-19 years old" includes teachers at higher secondary schools. Table 1 shows numbers of teachers.

Table 1: Numbers of teachers

	0-10 years*	11-20 years**	21+ years***	In total
Teaching children 3-7 years old	59	25	60	144
Teaching children 7-15 years old	38	40	50	128
Teaching adolescents 15-19 years old	38	31	41	110

Note: * Teaching 0-10 years, **Teaching 11-20 years, ***Teaching 21+ years.

Source: Authors.

The data were collected using a questionnaire in written and electronic form. The questionnaire contains questions about the first-aid procedures recommended at the time of data collection (i.e. ERC Guidelines, 2015) and questions for expressing cases with changes in health conditions and the respondent's own opinions. The anonymized data on cases that happened during school hours were collected between September 2018 and June 2019 by the Emergency Medical Service.

Fundamental statistical values (mean values and standard deviations) are presented in the tables. Our data were compared (Statistica version 12) in view of Shapiro-Wilk test results using parametric Student's t-test: $\alpha = 0.05$ ($p < 0.05$).

3 Results

3.1 Some teachers stated None with regard to a first-aid course

In our questionnaire 4 pre-primary teachers (3% of the group), none among the elementary-school teachers (grades 1 to 9; 0% of the group), and 8 higher secondary-school teachers (6% of the group) expressed that they had not passed any first-aid course.

3.2 Providing first aid at school and outside school is not unique (excluding minor superficial injuries)

Teachers stated in the questionnaire whether they provided first aid at school and outside of school. The frequency of affirmative answers in percentage is shown in Table 2 (below).

In this questionnaire item minor superficial injuries were excluded. The comparison of health failures at schools shows that the older the children, the less often teachers reported providing first aid. The longer the teacher's practice, the greater the number of teachers reporting that they provided first aid at school. Outside schools, around one-third of all teachers stated that some health failure required first aid.

Table 2: Questionnaire – teachers providing first aid^o (affirmative answers in percentage)

		0-10 years*	11-20 years**
Teaching children 3-7 years old	at school	34	56
	outside school	30	44
Teaching children 7-15 years old	at school	21	33
	outside school	25	30
Teaching adolescents 15-19 years old	at school	18	39
	outside school	42	45

		21+ years***	In total
Teaching children 3-7 years old	at school	62	51
	outside school	27	34
Teaching children 7-15 years old	at school	70	41
	outside school	56	37
Teaching adolescents 15-19 years old	at school	39	32
	outside school	17	35

Note: ^o Minor superficial injuries are excluded.,
 * Teaching 0-10 years, **Teaching 11-20 years,
 ***Teaching 21+ years.
 Source: Authors.

3.3 Balanced incidence of trauma and acute conditions of chronic diseases

The ratio of the incidence at schools for traumas (55%) and acute conditions of chronic diseases (45%) is almost identical for traumas and non-traumatic acute conditions outside schools (52%: 48%). These ratios include a higher incidence of specific conditions such as musculoskeletal traumas and allergy symptoms in childhood (predominantly at schools) and circulatory failures in the elderly population (predominantly outside schools).

3.4 Level of knowledge of first aid among groups of teachers

The level of knowledge of first-aid procedures was assessed through standard first-aid questions in one part of the questionnaire. Each first-aid item (as shown below in Tables 5, 6, and 8) was worth 1 point for one correct answer. Means and standard deviations (SD) are presented in Table 3 (below).

In the knowledge part of the questionnaire, the highest mean values were calculated for elementary-school teachers, the lowest mean values for pre-primary school teachers. As shown below, the ratio of correct answers varies considerably, and the success of subgroups also depends on the specific question of the questionnaire (probably influenced by the content of the first-aid courses).

Table 3: Questionnaire – level of knowledge of first aid (correct answers in percentage)

	0-10 years*	11-20 years**	21+ years***	In total
Teaching children 3-7 years old	71.1 (21.1)	69.7 (26.1)	65.4 (25.8)	68.7 (23.8)
Teaching children 7-15 years old	75.9 (26.3)	85.5 (13.9)	90.9 (6.8)	84.1 (18.2)
Teaching adolescents	69.5	78.9	73.7	74.0

15-19 years old	(16.2)	(12.1)	(12.7)	(13.9)
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Note: * Teaching 0-10 years: Mean (SD),
 **Teaching 11-20 years: Mean (SD),
 ***Teaching 21+ years: Mean (SD).
 Source: Authors.

The differences in the mean values of knowledge of first aid in total between all subgroups of teachers were significant. The difference in the mean values of pre-primary teachers and elementary-school teachers (p=0.000), the difference in the mean values of elementary-school teachers and higher secondary-school teachers (p=0.000), and the difference in the mean values of pre-primary teachers and higher secondary school teachers (p=0.039) were calculated.

3.5 Level of knowledge of first aid divided into trauma and non-traumatic acute conditions

As traumas the following were included: control of consciousness and breathing, cardiopulmonary resuscitation, choking, massive bleeding, falls from a height, concussion, and epistaxis. As non-traumatic acute conditions the following were included: asthma attack, convulsive state/epilepsy, hypoglycaemia/diabetes mellitus, and anaphylaxis.

Mean values, standard deviations (SD), and p-values of Student’s t-test are presented in Table 4 (below).

The differences in the mean values trauma and non-traumatic acute conditions within all pre-primary school teachers, all elementary-school teachers, and all higher secondary-school teachers were significant. Higher mean values were calculated in almost all subgroups in questions focused on non-traumatic acute conditions than in questions focused on traumas. As shown below, the rate of correct answers with regard to specific health conditions varies considerably (probably influenced by the content of the first-aid courses).

Table 4: Questionnaire – level of knowledge of first aid (correct answers in percentage)

		0-10 years*	11-20 years**
Teaching children 3-7 years old	trauma	67.1 (25.2)	65.6 (29.6)
	non-trauma ^o	78.0 (10.8)	77.0 (20.2)
Teaching children 7-15 years old	trauma	68.1 (30.1)	86.1 (7.1)
	non-trauma ^o	89.5 (10.5)	84.5 (23.2)
Teaching adolescents 15-19 years old	trauma	67.7 (18.0)	77.6 (12.0)
	non-trauma ^o	72.5 (14.2)	81.3 (13.8)

		21+ years***	In total
Teaching children 3-7 years old	trauma	65.0 (30.1)	65.9 (26.9)
	non-trauma ^o	66.0 (20.1)	73.7 (16.9)
Teaching children 7-15 years old	trauma	90.9 (7.0)	81.7 (20.0)
	non-trauma ^o	91.0 (7.4)	88.3 (14.1)
Teaching adolescents 15-19 years old	trauma	71.9 (10.8)	72.4 (13.9)
	non-trauma ^o	77.0 (16.9)	76.9 (14.1)

		t-test (p)
Teaching children 3-7 years old	trauma	0.004
	non-trauma ^o	p<0.01

Teaching children 7-15 years old	trauma	0.003
	non-trauma ^o	p<0.01
Teaching adolescents 15-19 years old	trauma	0.018
	non-trauma ^o	p<0.05

Note: ^oNon-traumatic acute conditions,

* Teaching 0-10 years: Mean (SD),

**Teaching 11-20 years: Mean (SD),

***Teaching 21+ years: Mean (SD).

Source: Authors.

3.6 Level of knowledge of first aid – resuscitation

Mean values of correct answers in percentage are presented in Table 5.

Table 5: Questionnaire – knowledge of first aid – resuscitation (correct answers in percentage)

		0-10 years*	11-20 years**
Teaching children 3-7 years old	control of consciousness and breathing	41	20
	cardiopulmonary resuscitation	41	40
Teaching children 7-15 years old	control of consciousness and breathing	100	93
	cardiopulmonary resuscitation	55	93
Teaching adolescents 15-19 years old	control of consciousness and breathing	87	87
	cardiopulmonary resuscitation	53	74

		21+ years***	In total
Teaching children 3-7 years old	control of consciousness and breathing	18	26
	cardiopulmonary resuscitation	32	38
Teaching children 7-15 years old	control of consciousness and breathing	94	96
	cardiopulmonary resuscitation	100	83
Teaching adolescents 15-19 years old	control of consciousness and breathing	63	79
	cardiopulmonary resuscitation	76	68

Note: * Teaching 0-10 years, **Teaching 11-20 years,

***Teaching 21+ years.

Source:

Authors.

The comparison of fundamental first-aid items (control of consciousness and breathing and process of cardiopulmonary resuscitation) among the groups of teachers shows the highest mean values in elementary-school teachers.

It is well known that choking is a quite frequent reason for resuscitation in young children. For this reason, it is unflattering for the administration of pre-primary schools that teachers caring for young children had the lowest mean values of correct answers, especially the subgroup with the longest practice. It is necessary to appeal especially to pre-primary school administration in order to prevent any tragedies and to ensure first-aid training for all teachers.

3.7 Level of knowledge of first aid – other traumas

Traumas are ubiquitous. Their frequency at schools is influenced by the prevention rules, but partly they are the result of coincidence.

Mean values of correct answers in percentage are presented in Table 6.

Table 6: Questionnaire – knowledge of first aid – other traumas (correct answers in percentage)

<i>Choking</i>		0-10 years*	11-20 years**
Teaching children 3-7 years old		97	96
Teaching children 7-15 years old		84	88
Teaching adolescents 15-19 years old		87	97

<i>Choking</i>		21+ years***	In total
Teaching children 3-7 years old		93	95
Teaching children 7-15 years old		86	86

<i>Massive bleeding</i>		0-10 years*	11-20 years**
Teaching children 3-7 years old		64	56
Teaching children 7-15 years old		95	90
Teaching adolescents 15-19 years old		74	81

<i>Massive bleeding</i>		21+ years***	In total
Teaching children 3-7 years old		70	63
Teaching children 7-15 years old		94	93
Teaching adolescents 15-19 years old		76	77

<i>Falls from a height</i>		0-10 years*	11-20 years**
Teaching children 3-7 years old		97	100
Teaching children 7-15 years old		75	83
Teaching adolescents 15-19 years old		70	75

<i>Falls from a height</i>		21+ years***	In total
Teaching children 3-7 years old		100	99
Teaching children 7-15 years old		96	85
Teaching adolescents 15-19 years old		68	71

<i>Concussion</i>		0-10 years*	11-20 years**
Teaching children 3-7 years old		83	83
Teaching children 7-15 years old		55	73
Teaching adolescents 15-19 years old		66	68

<i>Concussion</i>		21+ years***	In total
Teaching children 3-7 years old		75	80
Teaching children 7-15 years old		86	71
Teaching adolescents 15-19 years old		83	72

<i>Nosebleed/epistaxis</i>	0-10 years*	11-20 years**
Teaching children 3-7 years old	47	64
Teaching children 7-15 years old	13	83
Teaching adolescents 15-19 years old	37	61

<i>Nosebleed/epistaxis</i>	21+ years***	In total
Teaching children 3-7 years old	67	59
Teaching children 7-15 years old	80	59
Teaching adolescents 15-19 years old	54	51

Note: * Teaching 0-10 years, **Teaching 11-20 years,

***Teaching 21+ years.

Source: Authors.

Sufficient results can be seen for choking and falls from a height among all teachers, and massive bleeding among elementary-school teachers. With the exception of almost all cases of epistaxis, the table shows traumas that are associated with a significant risk of loss of life. The overall results are unacceptable, especially when we consider that providing help when confronted by these traumas is the usual content of any basic first-aid course.

3.8 Teachers interact with children and adolescents with chronic diseases at school

While traumas can happen in every class, teachers usually have the opportunity to share information about chronic diseases in children and adolescents attending school. Food allergies or intolerance to food (dairy products, chocolate, gluten and citrus) were the most frequent chronic diseases mentioned in questionnaires. In recent decades the trend of a higher incidence of allergies and food intolerance has been stated across the whole Czech Republic (Fuchs, 2011; UZIS, 2021). Also pollen allergy, chronic rhinitis (with epistaxes), epilepsy, bronchial asthma, diabetes mellitus, and allergy to insect bites were expressed.

Teachers stated in the questionnaire whether they interacted with pupils with chronic diseases at school. The frequency of affirmative answers in percentage is shown in Table 7.

Table 7: Questionnaire – teachers interact pupils with chronic diseases (affirmative answers in percentage)

	0-10 years*	11-20 years**
Teaching children 3-7 years old	76	88
Teaching children 7-15 years old	48	55
Teaching adolescents 15-19 years old	53	68
	21+ years***	In total
Teaching children 3-7 years old	93	86
Teaching children 7-15 years old	72	58
Teaching adolescents 15-19 years old	83	68

Note: * Teaching 0-10 years, **Teaching 11-20 years,

***Teaching 21+ years.

Source: Authors.

Teachers of three- to seven-year-old children stated more interactions with pupils suffering from chronic disease than other teachers. This result corresponds to the closer relations between pre-primary school teachers and children.

3.9 Level of knowledge of first aid – acute conditions of chronic diseases

Mean values of correct answers in percentage are presented in Table 8.

Table 8: Questionnaire – knowledge of first aid – acute condition/chronic diseases (correct answers in percentage)

<i>Asthma attack</i>	0-10 years*	11-20 years**
Teaching children 3-7 years old	73	72
Teaching children 7-15 years old	87	93
Teaching adolescents 15-19 years old	74	90
	21+ years***	In total
Teaching children 3-7 years old	63	69
Teaching children 7-15 years old	94	91
Teaching adolescents 15-19 years old	98	87
	0-10 years* <td>11-20 years**</td>	11-20 years**
<i>Convulsive state/epilepsy</i>		
Teaching children 3-7 years old	78	84
Teaching children 7-15 years old	100	95
Teaching adolescents 15-19 years old	63	84
	21+ years***	In total
<i>Convulsive state/epilepsy</i>		
Teaching children 3-7 years old	73	78
Teaching children 7-15 years old	96	97
Teaching adolescents 15-19 years old	66	71
	0-10 years* <td>11-20 years**</td>	11-20 years**
<i>Hypoglycemia/diabetes mellitus</i>		
Teaching children 3-7 years old	68	52
Teaching children 7-15 years old	76	50
Teaching adolescents 15-19 years old	61	61
	21+ years***	In total
<i>Hypoglycemia/diabetes mellitus</i>		
Teaching children 3-7 years old	40	53
Teaching children 7-15 years old	80	69
Teaching adolescents 15-19 years old	61	61
	0-10 years* <td>11-20 years**</td>	11-20 years**
<i>Anaphylaxis/allergies</i>		
Teaching children 3-7 years old	93	100
Teaching children 7-15 years old	95	100
Teaching adolescents 15-19 years old	92	90
	21+ years***	In total
<i>Anaphylaxis/allergies</i>		
Teaching children 3-7 years old	88	94

Teaching children 7-15 years old	94	96
Teaching adolescents 15-19 years old	83	88

Note: * Teaching 0-10 years, **Teaching 11-20 years, ***Teaching 21+ years.

Source: Authors.

Laudable results can be seen in first aid (a) for anaphylaxis (extreme allergy symptom) among all teachers, (b) for asthma attack among teachers of children and adolescents 7-19 years old and (c) for convulsive state (in many cases this is a symptom of epilepsy) among elementary-school teachers.

The table shows non-traumatic acute conditions that are associated with a significant risk of loss of life. As reported in results for other traumas, the overall results are unacceptable, especially when we consider that helping with these acute conditions of chronic diseases is the usual content of any basic first-aid course.

3.10 Changes in the health status of children and adolescents managed by a teacher

Teachers mentioned subsequent changes in the health status of the child (listed from the most frequent to rare in the questionnaires): nausea, headaches, elevated temperatures or fevers, abrasions and lacerations, fractures caused by the child falling, complications of allergies (pollen, mites, food, insect bites) and food intolerance, removing a tick, asthma, convulsive state/epilepsy, hypoglycaemia/diabetes mellitus, concussion, nosebleeds, faint, the child getting the wind knocked out of him/her, suffocation, a knocked-out tooth, scalding, anaphylaxis, burns and scalds, panic attack, a foreign body being embedded in the wound, or swallowing an object. First aid in all these conditions can and ought to be explained through a first-aid course for teachers.

3.11 Frequency and methods in first-aid courses for teachers

The questionnaire also included the question of what frequency and methods of education in this field teachers preferred. Answers like "I do not want to take another first-aid course" or "A first-aid course is suitable only for physical-education teachers" etc. (27 teachers; 7% in our file) were set aside. The remaining teachers expressed their wish to take a first-aid course once every year or every two years (71%), predominantly using simulations (93%).

3.12 Teachers claimed ability to provide appropriate first aid

The frequency of affirmative answers in percentage is shown in Table 9 (below).

Except for teachers of children aged 7-15 years, the teachers expressed a considerable degree of uncertainty in their ability to provide appropriate first aid.

Table 9: Questionnaire – teachers claimed ability to provide appropriate first aid (affirmative answers in percentage)

	0-10 years*	11-20 years**
Teaching children 3-7 years old	72	69
Teaching children 7-15 years old	89	100
Teaching adolescents 15-19 years old	55	61
	21+ years***	In total
Teaching children 3-7 years old	64	68
Teaching children 7-15 years old	96	95
Teaching adolescents 15-19 years old	44	53

Note: * Teaching 0-10 years, **Teaching 11-20 years, ***Teaching 21+ years.

Source: Authors.

4 Discussion

Some teachers (3% of all teachers) stated None with regard to a first-aid course. According to Czech law and from the point of view of pupils and their parents, it seems impossible for children and adolescents to be under the charge of someone who has not passed any first-aid course. Also Palasová (2015) mentioned that 5% of preschool educators had not completed any first-aid course, Tajovská (2010) stated the shocking figure of 32% of pre-school teachers who had not completed any first-aid course, and only 21% of the Greek higher secondary school teachers had ever participated in life-support courses (Patsaki et al., 2012). Anyway, a lack of knowledge of first aid can have serious consequences for a particular teacher.

Our teachers report at school a higher frequency of acute conditions compared to Pachulová (2012; 26% of elementary and higher secondary-school teachers) or a lower frequency compared to Filip (2018; 51% of elementary teachers, the file contains more physical-education teachers than would correspond to a random sample). Not only physical-education teachers but any teacher should know first aid. It is necessary to understand that the health status of any student can change during any lesson. Should it be necessary to add other reasons why knowledge of first aid is necessary, all relevant medical statistics on Czech children and adolescents are provided by UZIS (2022).

The level of knowledge of basic first aid was insufficient (mean values between 69% in pre-primary and 84% in elementary-school teachers in standard first-aid test). Unflattering results in first-aid tests were also stated for secondary-school teachers in Poland (Bakalarski, 2020; Sosada, Zurawiński, Stepień, Makarska, & Myrcik, 2002), Turkish primary-school teachers (Başer, Coban, Taşci, Sungur, & Bayat, 2007), etc. The result among elementary-school teachers for massive bleeding (93%) in our file is in accordance with the adequate test item in the reference file (Hladíková, 2008; 96%), but the mean values for epistaxis differ (59% in our file vs 75% in reference file). The mean value for convulsive state/epilepsy among elementary-school teachers in our file (97%) was considerably higher than the value in the file of Hladíková (2008; 46%).

As teachers mentioned changes in the health status of the child, our findings mostly correspond to the data of the Emergency Medical Service (Hrušková et al., in press) and the results of Tajovská (2010). The statistics of the Emergency Medical Service (Hrušková et al., in press) also mentioned drowning, intoxication, or unspecified psychotic/behavioral disorders. First aid in all these conditions can and ought to be explained during a first-aid course for teachers.

Except for teachers of children aged 7-15 years, the teachers expressed a considerable degree of uncertainty in their ability to provide appropriate first aid. Similarly e.g. 50% of Flemish teachers felt that they lacked knowledge of first aid (Mpotos, Vekeman, Monsieurs, Derese, & Valcke, 2013). It can be recommended that a higher frequency and targeting of first-aid courses should be provided to everyone (e.g. passing a first-aid course containing possible health conditions using simulations once every two years).

5 Conclusion

Teachers filled out a questionnaire that contained first-aid test questions as well as questions about pupils' health complications and the teacher's preference for first-aid courses and other opinions. The level of knowledge of first aid is higher among elementary-school teachers (grades 1 to 9), but the overall results are unacceptable, especially when we consider that we tested the usual content of any basic first-aid course for teachers (mean

values between 69% in pre-primary and 84% in elementary-school teachers in a standard first-aid test). Training in first aid be provided using both traumatic and non-traumatic acute conditions once per one year or once every two years using simulations was preferred by our teachers.

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Primary Paper Section: A

Secondary Paper Section: AM, AQ, FQ