THE EFFECT OF THE INCLUSION OF FIRST AID IN TEACHER EDUCATION

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Abstract: This article aims to analyze, through a questionnaire, future teachers' knowledge and opinions regarding first aid, and to assess the inclusion of a mandatory first-aid course, the content of which was influenced by statistical data of the South Bohemian Emergency Medical Service and teachers' statistics (Hrušková et al., 2022). Students of the Faculty of Education (N=227) from South Bohemia (municipalities with different populations and, with regard to the gender ratio in students, mostly women) filled out questionnaires before and after a first-aid course in 2023. Through the questionnaire survey (a) significant differences were found in the mean values of knowledge of first aid in sum between all subgroups of students ($p \leq 0.05$), (b) in the level of knowledge of first aid for cardiopulmonary resuscitation (CPR), traumas, and acute conditions of chronic diseases ($p \leq 0.05$) , and (c) in the level of knowledge of each first-aid item individually ($p \leq 0.05$). In general, completing our first-aid course is essential for all our students ($p \leq 0.05$), even for those who have already completed some previous first-aid course.

Keywords: first aid, education, teachers, cardiopulmonary resuscitation, 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, et al., 2012; Hrušková & Gutvirth, 2010).

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. Greif et al., 2021; British Red Cross, 2022; Truhlář et al., 2021; SBR Project, 2022).

The importance of targeted, regular first-aid training for future teachers was highlighted from the perspective of Czech teachers (Kuba & Havlíková, 2023; Kuba et al., 2019), through the curriculum (Bakke et al., 2017), and professional methodology (Greif et al., 2021).

In the present circumstances, first-aid course is mandatory for students (future teachers in the pre-primary, primary, and secondary levels of education) at the Faculty of Education. The aim of our research was to analyze, through a questionnaire, the knowledge and opinions of students (future teachers) regarding first aid and to evaluate differences in the pre-course and post-course knowledge of first aid. Another aim of the study was to assess the inclusion of a mandatory first-aid course, the content of which was influenced by statistical data of the South Bohemian Emergency Medical Service and teachers' statistics (Hrušková et al., 2022).

2 Material and methods

The study was conducted in 2023 at Faculty of Education (University of South Bohemia) and between September 2018 and June 2019 (South Bohemian Emergency Rescue Service). Students (N=227) were contacted personally and via email. A one-day first-aid course led by Emergency Rescue Service medics is a mandatory part of the curriculum for future teachers at the Faculty of Education. Students are trained according to the current recommendations of the European Resuscitation Council for teaching first aid (Greif et al., 2021). Students learn theory and practical skills, including simulations. All participants filled out the same questionnaire within one week before (pre-test) and one week after the course (post-test). 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 data were collected using a questionnaire in written and electronic form.

The questionnaire contains 27 questions about the first-aid procedures recommended at the time of data collection (i.e. ERC Guidelines, 2021). With regard to the CPR theme, the following were included: performing CPR on children (control of consciousness and breathing, cardiopulmonary resuscitation, rescue breathing), massive bleeding, and choking. For the trauma theme the following were included: wrist/elbow/ankle/knee injuries, concussion, fractures caused by the child falling, burns and scalds, penetrating trauma associated with foreign bodies, nosebleed/epistaxis, the child getting the wind knocked out of him/her, abrasions and lacerations, and a knocked-out tooth. For the non-trauma theme the following were included: asthma attack, convulsive state/epilepsy, hypoglycaemia/diabetes mellitus, anaphylaxis, and hyperventilation/panic attack. With regard to other items, the following were included: nausea, headaches, syncope and collapse, fever, removing a tick, acute intoxication, drowning, and psychological support. Only one response was deemed correct, and marking such an item was evaluated with one point, while other response variants were graded as zero points. The questionnaire also contains items for expressing whether students provided first aid or whether students are/were in contact with current/former classmates or loved ones with chronic diseases.

The subgroup "Teaching children 3–6 years old" includes future teachers at pre-primary schools, the subgroup "Teaching children 7–11 years old" future teachers at primary schools (i.e. elementary school grades 1 to 5), and the subgroup "Teaching children 12–15 years old" includes future teachers at lower secondary schools (i.e. elementary school grades 6 to 9). Table 1 (below) shows numbers of students.

The group of students was divided into (a) a subgroup with no previous first-aid course (126 students, 56% of the group, "no pre-course") and (b) a subgroup who had undergone one or more previous first-aid courses (101 students, 44% of the group, "with pre-course").

The anonymized data (cases during school hours) were collected between September 2018 and June 2019 by the South Bohemian Emergency Medical Service.

Table 1: Numbers of students.

	No previous first-aid course	One or more previous first-aid courses	In total
Teaching children 3–6 years old	13 (56%)	10 (44%)	23 (100%)
Teaching children 7–11 years old	34 (57%)	26 (43%)	60 (100%)
Teaching adolescents 12–15years old	79 (55%)	65 (45%)	144 (100%)
In total	126 (56 %)	101 (44 %)	227 (100%)

Source: Authors.

The points scored in the pre-test and post-test in respect to the previous first-aid course (the subgroup "no pre-course" and the subgroup "with pre-course") were analysed using repeated-measures ANOVA (total points scores and separately points in different first-aid topics). Same method was used for analysis of the points scored in the hypoglycaemia item and the convulsive state item, but in respect to the subgroups with and without direct knowledge of people with diabetes/epilepsy). Because maximum points in those two items is low, the analysis of number of correct answers according to the direct knowledge of people with/out diabetes/epilepsy was also done by χ^2 test. All analyses were conducted in Statistica 14 (Tibco Software, CA, USA). The level of significance α was set as 0.05.

3 Results

3.1 Providing first aid is not unique (excluding minor superficial injuries)

Students stated in the questionnaire whether they provided first aid. The frequency of affirmative answers within each subgroup of future teachers of pre-primary, primary, and lower secondary schools in percentage is shown in Table 2 (below).

Table 2: Frequency of students provided first aid° (affirmative answers in percentage).

		No previous first-aid course	One or more previous first-aid courses
Teaching children 3–6 years old	trauma	0 (0%)	9 (39%)
	non-trauma°°	0 (0%)	4 (17%)
Teaching children 7–11 years old	trauma	5 (8%)	13 (22%)
	non-trauma°°	7 (12%)	9 (15%)
Teaching adolescents 12–15 years old	trauma	2 (1%)	7 (5%)
	non-trauma°°	4 (3%)	7 (5%)

Note: ° Minor superficial injuries are excluded., °°Non-traumatic acute conditions. Source: Authors.

In this questionnaire item minor superficial injuries were excluded. Students with previous first-aid training reported providing first aid more frequently than those who had not passed any first-aid course. Students with first-aid training could function as tutors at educational activities or camps, consequently they could provide first aid more frequently. Also, students with a first-aid course could be less afraid to help someone (Kuba & Havlíková, 2023).

3.2 Incidence of chronic diseases in current/former classmates or loved ones

Students reported in the questionnaire whether they are/were in contact with current/former classmates or loved ones with chronic diseases. The frequency of affirmative answers, expressed as percent, is shown in Table 3.

Table 3: Chronic diseases in current/former classmates or loved ones (affirmative answers in percentage).

	Teaching children 3–6 years old	Teaching children 7–11 years old	Teaching adolescents 12–15 years old
At least one chronic disease	100%	100%	100%
Food allergy	65%	66%	80%
Diabetes mellitus	45%	64%	66%
Nosebleed/epistaxis	50%	58%	57%
Allergy to insect bites	45%	42%	63%
Asthma	40%	46%	54%
Epilepsy	25%	36%	32%

Source: Authors.

All students are/were close with at least one chronic disease in current/former classmates or loved ones. Students reported in the questionnaire that they are/were close with the following selected chronic diseases (the frequency of affirmative answers of all students): food allergy (70%), diabetes mellitus (58%), nosebleed/epistaxis (55%), allergy to insect bites (50%), asthma (47%), and epilepsy (31%).

Future teachers at lower secondary schools reported all chronic diseases more often than future teachers at pre-primary and primary schools, but we could consider this phenomenon to be the result of coincidence.

3.3 Level of knowledge of first aid between subgroups of students and the effect of previous first-aid training

The level of knowledge of first-aid procedures was assessed through standard first-aid questions (27 items) in one part of the questionnaire. Each first-aid item was worth one point for one correct answer.

The level of knowledge of basic first aid before our first-aid course was insufficient (the mean value was 66%). The highest scores (mean values in percentage) were calculated for fall from a height (96%), suffocation (94%), fever (91%), headache (90%), and psychological support (90%). On the other hand, the lowest scores (mean values in percentage) were calculated for the CPR item (an alarming 16%), a knocked-out tooth (18%), shortness of breath (33%), nosebleed (41%), and panic attack (42%). The level of knowledge of basic first aid after our first-aid course was more sufficient (the mean value in percentage was 81%).

The differences in knowledge of first aid before and after the first-aid course was statistically significant when assessed for all students in the overall results ($p \leq 0.05$), for all subgroups ("Teaching children 3–6 years old", "Teaching children 7–11 years old", and "Teaching children 12–15 years old") in the overall results ($p \leq 0.05$ in all comparisons) as well as for all subgroups in individual items ($p \leq 0.05$ in all comparisons).

The differences in knowledge of first aid before our first-aid course were calculated for (a) a subgroup with no previous first-aid course (126 students, 56% of the group, "no pre-course") and (b) a subgroup with one or more previous first-aid courses (101 students, 44% of the group, "with pre-course"). Students with one or more previous first-aid courses scored higher, but the differences were not significant in all comparisons (the sum: t =

1.627, df = 225, p = 0.105; the CPR theme: t = 0.186, df = 225, p = 0.853; the trauma theme: t = 1.6, df = 225, p = 0.111; the non-trauma theme: t = 1.737, df = 225, p = 0.084).

An analysis of the results before and after our course in two subgroups divided according to the number of previous first-aid courses is presented below (Figure 1). The differences in knowledge of first aid before our first-aid course "pre-test (SUM1)" and after our first-aid course "post-test (SUM2)" were calculated for (a) a subgroup with no previous first-aid course (126 students, 56% of the group, "no pre-course") and (b) a subgroup with one or more previous first-aid courses (101 students, 44% of the group, "with pre-course").

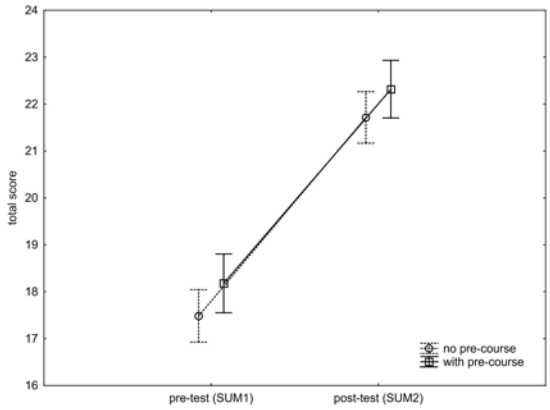

Figure 1: The effect of previous first-aid training. An attendance of the first-aid course increased significantly the total score in both research groups (details in text). Source: Authors.

In general, the effect of having completed our first-aid course is statistically highly significant ($F_{1, 225} = 258.13$; $p < 10^{-17}$). The increase did not differ depending on previously completed first-aid courses ($F_{1, 225} = 0.03$; $p = 0.86$).

3.4 Level of knowledge of first aid – the CPR theme, the trauma theme, and the non-trauma theme

The differences in knowledge of first aid before our first-aid course (pre-test) and after our first-aid course (post-test) were calculated for the CPR theme, the trauma theme, and the non-trauma theme between the subgroup with no previous first-aid training ("no pre-course") and with previous first-aid training ("with pre-course").

For the CPR theme (Figure 2) the following were included: CPR in children (control of consciousness and breathing, cardiopulmonary resuscitation, rescue breathing), massive bleeding, and choking (a quite frequent reason for resuscitation in young children).

An analysis of the results for the CPR theme ("pre-test (CPR1)" and "post-test (CPR2)") in two subgroups divided according to the number of previous first-aid courses ("no pre-course" and "with pre-course"), is presented below (Figure 2).

With regard to the trauma theme (Figure 3), the following were included: wrist/elbow/ankle/knee injuries, concussion, fractures caused by the child falling, burns and scalds, penetrating trauma associated with foreign bodies, nosebleed/epistaxis, the child getting the wind knocked out of him/her, abrasions and lacerations, and a knocked-out tooth.

Traumas are ubiquitous. Their frequency is influenced by the rules for prevention, but partly they are the result of coincidence. An analysis of the results for the trauma theme ("pre-test (trauma1)" and "post-test (trauma2)") in two subgroups divided according to the number of previous first-aid courses ("no pre-course" and "with pre-course"), is presented below (Figure 3).

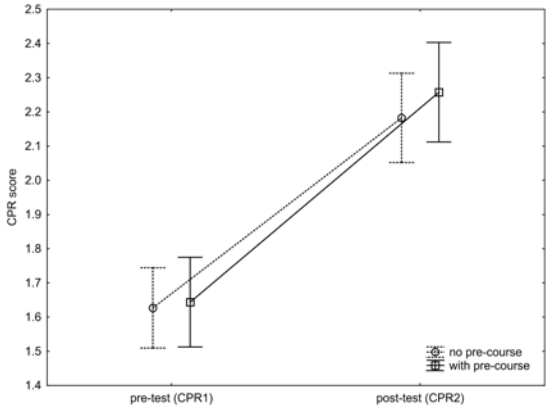

Figure 2: Level of knowledge of first aid – the CPR theme. An attendance of the fist-aid course increased significantly the CPR score in both research groups (details in text). Source: Authors.

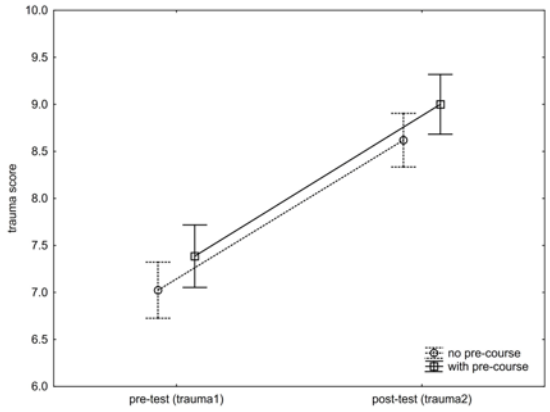

Figure 3: Level of knowledge of first aid – the trauma theme. An attendance of the fist-aid course increased significantly the trauma score in both research groups (details in text). Source: Authors.

For the non-trauma theme (Figure 4) the following were included: asthma attack, convulsive state/epilepsy, hypoglycaemia/diabetes mellitus, anaphylaxis, and hyperventilation/panic attack.

An analysis of the results for the non-trauma theme ("pre-test (non-trauma1)" and "post-test (non-trauma2)") in two subgroups divided according to the number of previous first-aid courses, is presented below (Figure 4).

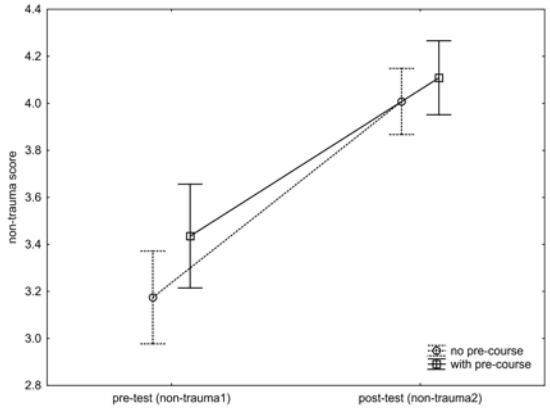

Figure 4: Level of knowledge of first aid – the non-trauma theme. An attendance of the first-aid course increased significantly the non-trauma score in both research groups (details in text). Source: Authors.

3.5 Level of knowledge of first aid in the hypoglycaemia/diabetes mellitus theme and the convulsive state/epilepsy theme

3.5.1 The hypoglycaemia/diabetes mellitus theme

Students with/without current/former classmates or loved ones with diabetes responded to the hypoglycaemia item within one week before (pre-test) and one week after the course (post-test). The subgroup "diabetes 0" includes students without current/former classmates or loved ones with diabetes, while the subgroup "diabetes 1" includes students with current/former classmates or loved ones with diabetes. Table 4 shows numbers of students with/without correct responses in the hypoglycaemia item a week before the first-aid course, while the level of knowledge with regard to the hypoglycaemia item is presented in Figure 5 (below).

Table 4: Numbers of students with/without correct responses in the hypoglycaemia item a week before the first-aid course.

	Hypoglycae-mia – correct response	Hypoglycae-mia – incorrect response	In total
Students without current/former classmates or loved ones with diabetes	54	18	72
Students with current/former classmates or loved ones with diabetes	99	26	125
In total	153	44	197

Source: Authors.

Contact with a diabetic person did not affect the frequency of correct responses in the hypoglycaemia item before our first-aid course ($\chi^2 = 0.465$; df = 1; p = 0.495).

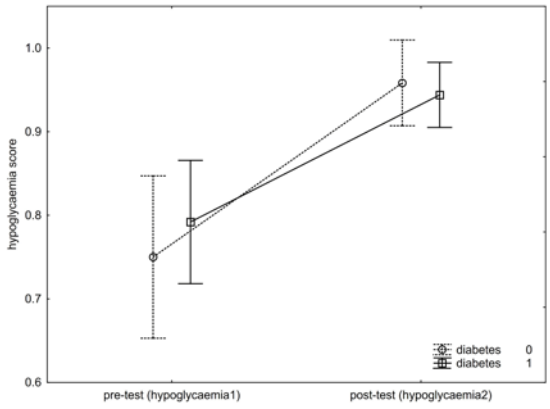

Figure 5: Level of knowledge of first aid in the hypoglycaemia item. An attendance of the fist-aid course increased significantly the hypoglycaemia score irrespective of previous direct knowledge of persons with diabetes (details in text); "diabetes 0" – the subgroup without current/former classmates or close relatives with diabetes; "diabetes 1" – the subgroups with current/former classmates or close relatives with diabetes. Source: Authors.

The effect of our first-aid course is significant ($F_{1, 195} = 32.142$; $p<10^{-7}$), but the effect of contact with a diabetic person is not significant ($F_{1, 195} = 0.133$; p = 0.715). The improvement in knowledge of the hypoglycaemia item was slightly higher in students who are/were not in contact with a diabetic person ("diabetes 0"), but the difference against the subgroup of students with current/former classmates or loved ones with diabetes ("diabetes 1") is not statistically significant ($F_{1, 195} = 0.786$; p = 0.377).

3.5.2 The convulsive state/epilepsy theme

Students with/without current/former classmates or loved ones with epilepsy responded to the convulsive state item within one week before (pre-test) and one week after the course (post-test). The subgroup "epilepsy 0" includes students without current/former classmates or loved ones with epilepsy, while the subgroup "epilepsy 1" includes students with current/former classmates or loved ones with epilepsy. Table 5 shows numbers of students with/without correct responses in the convulsive state item a week before the first-aid course, while the level of knowledge for the convulsive state item is presented in Figure 6 (below).

Table 5: Numbers of students with/without correct responses in the convulsive state item a week before the first-aid course.

	Convulsive state – correct response	Convulsive state – incorrect response	In total
Students without current/former classmates or loved ones with epilepsy	84	49	133
Students with current/former classmates or loved ones with epilepsy	48	16	64
In total	132	65	197

Source: Authors.

Contact with an epileptic person did not affect the frequency of correct responses in the convulsive state item before our first-aid course ($\chi^2 = 2.74$; df = 1; p = 0.098).

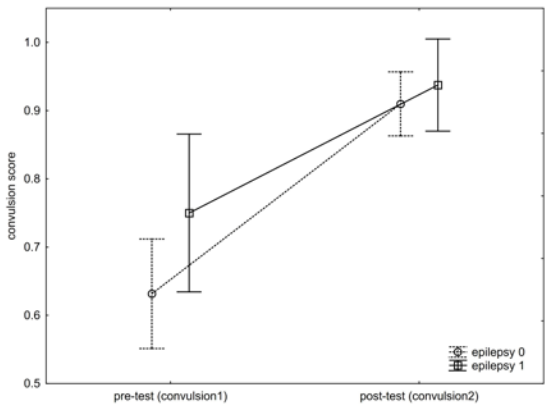

Figure 6: Level of knowledge of first aid in the convulsive state item. An attendance of the first-aid course increased significantly the convulsion score irrespective of previous direct knowledge of persons with epilepsy (details in text); "epilepsy 0" – the subgroup without current/former classmates or loved ones with epilepsy; "epilepsy 1" – the subgroup with current/former classmates or loved ones with epilepsy. Source: Authors.

The effect of our first-aid course is significant ($F_{1, 195} = 36.215$; $p<10^{-8}$), but the effect of contact with an epileptic person is not significant ($F_{1, 195} = 2.778$; p = 0.097). The improvement in knowledge of the convulsive state item was slightly higher in students who are/were not in contact with an epileptic person ("epilepsy 0"), but the difference against the subgroup of students with current/former classmates or loved ones with

epilepsy ("epilepsy 1") is not statistically significant ($F_{1, 195}$ = 1.374; p = 0.243).
In general, contact with a diabetic or an epileptic person did not affect the frequency of correct responses from our students in the hypoglycaemia/convulsive state items.

3.6 Changes in the health status of children and adolescents managed by the South Bohemian Emergency Rescue Service

Demographic statistics for the South Bohemian Region (as of 31 December 2018; CSOEdu, 2020) state the following numbers of children and adolescents: nursery schools (i.e. pre-primary schools) 23,060 children, basic schools (i.e. primary and lower-secondary schools) 57,070 pupils, secondary schools (i.e. higher-secondary schools) 25,939 pupils. The distribution of the population by sex and age in the South Bohemian Region (as of 31 December 2018; CSOPop, 2020) is the following: a total of 642,133 people, including 26,833 children aged 1–4 years, 34,037 children aged 5–9 years, 33,628 adolescents aged 10–14 years and 29,020 adolescents aged 15–19 years.

The anonymized data (cases during school hours) were collected between September 2018 and June 2019 by the South Bohemian Emergency Medical Service; the data are presented in Table 6 and Table 7.

Table 6: Numbers of patients with traumas (based on an emergency call)°.

Age (years)	Patient status		
	Not vital danger	Vital danger	Resusci-tation
	boys/girls	boys/girls	boys+ girls
3–6 y.	34/18	10/18	≤3
7–11 y.	59/36	32/20	≤3
12–15 y.	59/47	44/26	≤3
15–19 y.	74/46	45/24	≤3
In total	226/147	131/88	≤3

Note: °Includes all persons alive contacted in primary rides (flights). For exceptional cases of resuscitation (0-3 cases), the number "≤3" is given. Source: Authors.

Table 7: Numbers of patients with acute conditions of chronic diseases (based on an emergency call)°.

Age (years)	Patient status		
	Not vital danger	Vital danger	Resusci-tation
	boys/girls	boys/girls	boys+ girls
3–6 y.	19/31	32/37	≤3
7–11 y.	51/42	20/27	≤3
12–15 y.	55/97	30/51	≤3
15–19 y.	79/155	55/92	≤3
In total	204/325	137/207	≤3

Note: °Includes all persons alive contacted in primary rides (flights). For exceptional cases of resuscitation (0-3 cases), the number "≤3" is given. Source: Authors.

3.6.1 Cause of action – based on an emergency call for patients with started/ongoing resuscitation performed by bystanders

The causes are listed from most common to less common. Children 3–6 years old: drowning, polytrauma, intracranial injury, unconsciousness, cardiac arrest; children 7–11 years old: intracranial injury, polytrauma, unconsciousness, cardiac arrest, drowning; adolescents 12–15 years old: unconsciousness, meningitis, cardiac arrest, acute intoxication, sepsis; adolescents 15–19 years old: polytrauma, intracranial injury, cardiac arrest, unconsciousness.

3.6.2 Cause of action – based on an emergency call for patients with life-threatening conditions

The causes are listed from most common to less common. Children 3–6 years old: fever (unspecified), unspecified head injury, shortness of breath (dyspnoea), febrile convulsions, acute obstructive laryngitis (croup), other and unspecified abdominal pain, penetrating head injury (partially unspecified), nausea and vomiting, concussion, epilepsy (unspecified); children 7–11 years old: head injury (unspecified), fever (unspecified), other and unspecified abdominal pain, concussion, syncope and collapse, nausea and vomiting, epilepsy (unspecified), penetrating head injury (partially unspecified), allergies (unspecified), shortness of breath (dyspnoea); adolescents 12–15 years old: syncope and collapse, other and unspecified abdominal pain, unspecified head injury, concussion, epilepsy (unspecified), knee contusion, disorders caused by alcohol - acute intoxication, fracture of forearm (partially unspecified), fever (unspecified), hyperventilation; adolescents 15–19 years old: unspecified head injury, syncope and collapse, other and unspecified abdominal pain, epilepsy (unspecified), disorders caused by alcohol – acute intoxication, concussion, knee contusion, fever (unspecified), psychotic disorders (unspecified).

3.6.3 Cause of action – based on an emergency call for patients with non-life-threatening conditions

The causes are listed from most common to less common. Children 3–6 years old: fever (unspecified), unspecified head injury, penetrating head injury (partially unspecified), allergies (unspecified), medical examination and observation after a traffic accident, nausea and vomiting, other and unspecified abdominal pain, shortness of breath (dyspnoea), nosebleed/epistaxis; children 7–11 years old: unspecified head injury, fever (unspecified), nausea and vomiting, medical examination and observation after a traffic accident, other and unspecified abdominal pain, allergies (unspecified), penetrating head injury (partially unspecified), knee contusion, syncope and collapse, hyperventilation; adolescents 12–15 years old: syncope and collapse, hyperventilation, unspecified head injury, disorders caused by alcohol – acute intoxication, fever (unspecified), allergies (unspecified), nausea and fatigue, other and unspecified abdominal pain, shortness of breath (dyspnoea), psychotic disorders (unspecified); adolescents 15–19 years old: syncope and collapse, disorders caused by alcohol – acute intoxication, unspecified head injury, medical examination and observation after a traffic accident, hyperventilation, other and unspecified abdominal pain, nausea and vomiting, knee contusion, epilepsy (unspecified), wrist and hand injuries (unspecified).

4 Discussion

4.1 Level of knowledge of basic first aid

The level of knowledge of basic first aid before our first-aid course was insufficient (the mean value was 66%). The highest scores were calculated for fall from a height (96%), suffocation (94%), fever (91%), headache (90%), and psychological support (90%). On the other hand, the lowest scores were calculated for the CPR item (an alarming 16%), a knocked-out tooth (18%), shortness of breath (33%), nosebleed (41%), and panic attack (42%). The differences in knowledge of first aid before and after our first-aid course were statistically significant when assessed for all students in the overall results ($p \leq 0.05$), as well as for all subgroups in individual items ($p \leq 0.05$ in all comparisons). The level of knowledge of basic first aid after our first-aid course was sufficient (the mean value was 81%). However, as teachers (Hrušková et al., 2022) expressed their wish, the first-aid course should be repeated every year or every two years (71%), predominantly using simulations (93%).

4.2 Chronic diseases in current/former classmates or loved ones

While traumas can happen in every class, students and teachers usually have the opportunity to share information about chronic diseases in children and adolescents attending school and the same goes for loved ones. All our students are/were close with at least one chronic disease in current/former classmates or loved ones. Students reported in the questionnaire that they are/were close with the following selected chronic diseases (the frequency of affirmative answers of all students): food allergy (70%), diabetes mellitus (58%), nosebleed/epistaxis (55%), allergy to insect bites (50%), asthma (47%), and epilepsy (31%). Likewise, teachers (Hrušková et al., 2022) reported the most frequently food allergies (dairy products, chocolate, gluten, and citrus). 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 chronic rhinitis (with epistaxes), epilepsy, bronchial asthma, diabetes mellitus, and allergy to insect bites were expressed by teachers (Hrušková et al., 2022).

4.3 Content of the first-aid course and statistics of the teachers and the Emergency Medical Service

Pre-primary, primary, and secondary-school teachers (Hrušková et al., 2022) 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, 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. In addition, the statistics of the South Bohemian Emergency Medical Service mentioned unconsciousness, intracranial injury, cardiac arrest, and further meningitis, sepsis, 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. It is necessary to appeal to schools' administrations in order to prevent any tragedies and to ensure first-aid training for all teachers. Not only physical-education teachers but any teacher should know first aid. It is necessary to understand that the health status of any pupil can suddenly change during any lesson. Should it be necessary to add other reasons for why knowledge of first aid is necessary, all relevant medical statistics on Czech children and adolescents are provided by UZIS (2022).

4.4 Teachers or future teachers educated in basic first aid

Ninety-eight percent of the schoolteachers agreed with including first aid training in schools and as part of university degree programs (Abelairas-Gómez et al., 2021). Our first-aid course is a mandatory part of the curriculum for future teachers at the Faculty of Education. Students (future teachers at the pre-primary, primary, and secondary-school levels) are trained according to the current recommendations of the European Resuscitation Council for teaching first aid (Greif et al., 2021). Students learn theory and practical skills, including simulations (safety, calling emergency, control of consciousness and breathing, resuscitation, arrest of massive bleeding, traumas and non-traumas, and others).

Students of Faculty of Education with first-aid training could serve as tutors at educational activities or camps, consequently they could provide first aid more frequently. Therefore, it is understandable that our students with previous first-aid training reported providing first aid more frequently than those who have not passed any first-aid course. In addition, the expected outcome of any basic first aid course is that students are more safety-conscious and more willing to provide first aid, because they have learned and practiced the procedures (Kuba et al., 2019) and also students with any first-aid course should be less afraid to help someone (Kuba & Havlíková, 2023).

Except for teachers of children aged 7–15 years, the teachers (Hrušková et al., 2022) expressed a considerable degree of uncertainty in their ability to provide appropriate first aid (e.g. 56% of secondary-school teachers teaching for 21 years or more, 36% of pre-primary teachers teaching for 21 years or more). Similarly e.g. 50% of Flemish teachers felt that they lacked knowledge of first aid (Mpotos et al., 2013). It can be recommended that a higher frequency and targeting of first-aid courses be provided to everyone (e.g. passing a first-aid course including possible health conditions using simulations once every two years). Qualified lecturers (a) in terms of first-aid topics, (b) acquiring the necessary educational and psychological skills and principles, (c) didactic competences, and (d) necessary equipment (Kuba & Havlíková, 2023) are essential. In any event, teachers (Hrušková et al., 2022) expressed their wish to take a first-aid course once every year or every two years (71%), predominantly using simulations (93%).

4.5 Basic first aid training for pupils

Teaching basic first aid should be an integral part of the Framework Education Programme for Basic Education (FEP BE, 2008). After an update ("minor revision"; FEP BE, 2021) only isolated parts of basic first aid remained in the mandatory education at the lower secondary-school level. Within the mandatory subject Physical Education, first aid in physical education and sports is required; within the mandatory subject Chemistry, first aid in case of skin contact with acid or hydroxide is required; and within the mandatory subject Biology, first aid for mushroom poisoning is required. On the contrary, providing adequate first aid if necessary is required in the non-mandatory subject Health Education. Another update ("major revision"; FEP BE, 2023) is currently being worked out, which should hopefully lead to the re-inclusion of all basic first aid for pupils.

4.6 Teacher or future teacher as a first-aid instructor

According to a British study (Cooper, 2012), 89–99% of the pupils enjoyed first-aid training, and 98% of the parents believed it was important for their children to learn first aid. Future teachers of Physical Education, Human Biology, etc. can teach first aid very competently (Jimenez-Fábrega et al., 2009; Bohn et al., 2012) but need more support in their university curricula in Norway (Bakke et al., 2017), just as in the Czech Republic (Kuba & Havlíková, 2023).

Motivation to teach first aid could be reduced by the unclear range of topics and procedures of basic first aid for pupils (Bakke et al., 2017), lack of time for the inclusion of first-aid teaching in education (Campbell, 2012) as a consequence of an extensive curriculum of subjects, or lack of funds for first-aid instructors and equipment (De Buck et al., 2015) – especially a sufficient number of resuscitation manikins (Kuba & Havlíková, 2023). Additionally, our previous research (Hrušková et al., 2022) has shown that 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. A lack of knowledge of first aid can have serious consequences for a particular teacher.

An acute condition does not have to be lethal if bystanders can take the right steps immediately, however. Bystanders are the basis for the chain of survival (a series of actions that, properly executed, reduce mortality). Trained pupils could help themselves, and the people around them, not only after the first-aid course but also in adulthood. They could be bystanders willing and able to help. When first-aid training is not mandatory, uptake in schools is low, even if teachers are convinced of its importance (Campbell, 2012).

5 Conclusion

Students filled out a questionnaire that contained first-aid test questions as well as questions about providing first aid, and contact with current/former schoolmates or loved ones with chronic disease. Students are trained according to the current recommendations of the European Resuscitation Council for teaching first aid (Greif et al., 2021), statistics of Emergency Medical Service, and responses from teachers (Hrušková et al., 2022). Through the questionnaire survey (a) significant differences were found in the mean values of knowledge of first aid in sum between all subgroups of students ($p \leq 0.05$), (b) in the level of knowledge of first aid for cardiopulmonary resuscitation (CPR), traumas, and acute conditions of chronic diseases ($p \leq 0.05$), and (c) in the level of knowledge of each first-aid item individually ($p \leq 0.05$).

In general, completing our first-aid course is essential for all our students ($p \leq 0.05$), even for those who have already completed some previous first-aid course.

The authors thank the students, the teachers and the Emergency Medical Service for their helpfulness and willingness to participate.

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