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**Knowledge of Vocational Education
and Practical Training Teachers on Providing
Pre-medical First Aid in the Czech Republic**

**Znajomość zasad udzielania pierwszej pomocy
wśród nauczycieli kształcenia zawodowego
i praktycznego w Republice Czeskiej**

Introduction

In 1960, a paper on the necessity and effectiveness of external cardiac massage was published. One year later, Dr Safar created a method to be used for urgent cardiopulmonary resuscitation. (ABC of resuscitation, 2013). Experts realized that it was necessary for the methods to be standardized and regularly updated, and thus the European Resuscitation Council and American

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Cardiology Association were established which evaluate methods for providing urgent resuscitation (Česká resuscitační rada, 2010). The aim of the updates is to make first aid procedures as simple as possible, and to remove the barriers that affect the provision of first aid (Hanušová 2014, Kolektiv autorů, 2012).

Pre-medical first aid is a treatment provided to an injured person prior to the arrival of a qualified medical professional. It has been proven that the first 15 minutes after an accident are most important and decisive for the survival of injured people (Hasík, 2012).

Research tools used in the study described below also covered two scenarios. The authors are very well aware that an indispensable part of first aid competences is sufficient practical training.

According to the definition of health, first aid cannot be focused on physical aspects only, but must also reflect mental, social and spiritual aspects (Křivohlavý, 2009). When considering the examined issue, it is necessary to keep in mind that a lay rescuer must overcome many barriers when providing first aid. These include, for example, concern about not being able to handle the situation – concern about the outcome, concern about possible future problems, concern about one's own life – and the risk of contracting a disease or being injured (Hanušová, 2013, Hanušová, 2006).

The entire process is associated with a significant emotional burden which may substantially complicate it. It also needs to be stressed out that a failure to provide pre-medical first aid has legal consequences. In the Czech Republic this issue is governed by Act No. 40/2009 Coll., the Criminal Code, according to which a failure to provide first aid is punishable by deprivation of liberty for up to two years in case of a layman, and up to three years or by a loss of right to practice in case of a professional (Česko, 2009).

It should be noted that first aid provided by a correctly trained person is more effective and rational, and reduces the risk of damage to both, the rescuee and the rescuer.

Material and methods

The aim of the research study (2019–2021) was to find out whether and to what extent the selected teachers of vocational education and practical training at vocational schools are competent to provide layman's first aid, to understand possible gaps in these competencies, and establish corresponding training needs. The research sample included 325 teachers of vocational

education and practical training at vocational schools, secondary vocational schools or secondary and higher technical schools, with varying levels of teaching experience, from the entire Czech Republic. A quantitative method (questionnaire) was used in the research. The respondents completed a questionnaire covering 15 questions in total and 2 scenarios.

It was planned to address at least 150 educational professionals selected by stratified random sampling every year. Therefore, the total of 450 respondents should be addressed during the observation period. 375 respondents have been addressed so far for the years 2019 and 2020. The response rate to the questionnaire was 87% (325) in the said period. Due to the limited scope of the paper, the following section will focus only on selected questions from the questionnaire.

Selected results

325 educational professionals took part in the research, which tracked sex (table 1), duration of educational experience (table 2), level of education (table 3) and school type (table 4) of the respondents.

Table 1. Respondents by sex

Sex	Number of respondents
Female	175 (54%)
Male	150 (46%)
Total	325 (100%)

Table 2. Respondents by duration of their educational experience

Duration of educational experience	Number of respondents
Below 3 years	38 (12%)
3 to 10 years	150 (46%)
Over 10 years	137 (42%)
Total	325 (100%)

Table 3. Respondents by level of education

Level of education	Number of respondents
Secondary vocational education	200 (62%)
Higher vocational education	75 (23%)
University education	50 (15%)
Total	325 (100%)

Table 4. Teachers of vocational education and practical training by a school type

Teachers of vocational education and practical training by a school type	Number of respondents
Vocational schools	90 (28%)
Secondary vocational schools	120 (37%)
Secondary and higher technical schools	115 (35%)
Total	325 (100%)

Table 5. Regular participation in pre-medical first aid training sessions provided by an employer

Regular participation in pre-medical first aid training sessions	Number of respondents
Yes, I participate in training sessions regularly, at least once every 5 years	138 (43%)
Yes, but I do not participate in training sessions	34 (10%)
No, but I would be interested in them	100 (31%)
No, I am not interested in them	53 (16%)
Total	325 (100%)

Only 172 (53%) out of 325 respondents indicated that their employer makes it possible for them to participate in regular pre-medical first aid training sessions (Table 5). However, only 138 respondents use this opportunity regularly, at least once every 5 years. 53 (16%) respondents are not interested in such training at all, and this is an alarming result.

Table 6. Location of the spot for indirect cardiac massage

Location of a spot for cardiac massage	Number of respondents
2–3 finger-widths above the xiphisternum	105 (32%)
Middle of the sternum between the nipples	208 (64%)
On the clavicle	0 (0%)
Left side of the chest where the heart can be found	12 (4%)
Total	325 (100%)

The correct spot, i.e. the middle of the sternum between the nipples, was indicated only by 208 (64%) out of 325 respondents (Table 6). 32% of respondents still believe that it is necessary to locate the end of the sternum, the so-called xiphisternum, and place their hands 2–3 finger-widths above

this spot to perform an indirect cardiac massage. The remaining 4% would perform the cardiac massage on the left side of the chest.

Table 7. Pre-medical first aid for a knocked-out permanent tooth (including the root)

Procedure in case of a knocked-out tooth	Number of respondents
Not to look for it, let it be	89 (27%)
Soak it in milk	99 (31%)
Other, specify	137 (42%)
Total	325 (100%)

Table 7 summarizes respondents' choices as to the first aid procedure in case of a tooth knocked-out with its root. 58% of respondents would act incorrectly. A correct answer ("Other, specify") was given by 137 (42%) respondents. The respondents could provide an explanation: I would find the tooth, clean it and, according to a status of the injured person, put it back into their mouth or store it in a cloth wetted by saliva and transport the injured person to a dentist.

Table 8. First aid for nosebleed

Nosebleed	Number of respondents
Plug nostrils with cotton wool	6 (20%)
Tilt the head of the person backwards and put a cold compress on their forehead and neck	150 (46%)
Tilt the head of the person forward and pinch the nostrils shut with your fingers	115 (36%)
No first aid necessary	39 (12%)
Total	325 (100%)

The procedure chosen by the respondents for nosebleeds is shown in Table 8. 209 (64%) out of 325 respondents were wrong, and this is alarming, considering the frequent occurrence of this condition.

Table 9. First aid for femoral arterial bleeding

First aid for femoral arterial bleeding	Number of respondents
Always use a tourniquet	158 (49%)
Press the injured site with your fingers	114 (35%)
Cover the wound with a sterile bandage	53 (16%)
None of the options is correct	0 (0%)
Total	325 (100%)

Table 9 shows that respondents do not know how to stop the arterial bleeding. The correct way (pressing the artery with fingers directly in the wound) was indicated by 114 (35%) out of 325 respondents.

Table 10. Position of a person having an asthma attack

In what position should a person having an asthma attack be placed?	Number of respondents
Shock position	100 (31%)
Sitting or bending forward	114 (35%)
Recovery (safe airway) position	103 (32 %)
Lying on their back	8 (2 %)
Total	325 (100 %)

Table 10 shows that respondents do not know the correct procedure (position) applied in case of an asthma attack. A correct position (sitting or bending forward) was indicated by 114 (35%) out of 325 respondents.

Table 11. First aid in case of hypoglycaemia

Select the correct pre-medical first aid practice for a conscious person experiencing hypoglycaemia	Number of respondents
Administer insulin to the person	108 (33%)
Give an ample amount of fluids containing sugar to the person	100 (31%)
Do not give anything orally to the person, place them in a shock position and call the emergency medical service	115 (35%)
Induce vomiting	2 (1%)
Total	325 (100%)

Table 11 shows that respondents do not know the correct procedure applied in case of hypoglycaemia (blood glucose level dropping below the lower threshold). The correct answer, i.e. to give an ample amount of fluids containing sugar to the person, was chosen by 100 (31%) out of 325 respondents.

Table 12. Scenario No. 1

Determine whether first aid was provided correctly in the given example and underline any mistakes. Indicate a possible health issue in the given case.

Blanche was pouring water from the pot in which she was cooking potatoes, when suddenly the lid slid and she scalded her left hand. She cried out in pain and her hand swell and became red immediately. She started cooling her hand under running cold water and continued for about a minute. After that she dried her hand and put a moisturiser on the affected area.

All (325) respondents correctly identified a burn. There were 2 mistakes in the scenario: “cooling her hand....for about a minute” and “put a moisturiser on the affected area”. Both mistakes were correctly identified by 208 (64%) respondents.

Table 13. Scenario No. 2

Determine whether first aid was provided correctly in the given example and underline any mistakes. Indicate a possible health issue in the given case.

Peter was running on a playground and suddenly tumbled down. He started twitching and convulsing. Others ran up to him quickly and tried to calm him down. Two boys grabbed his legs and other two, his arms. Another one tried to open his mouth and pull the tongue out. But he broke loose and the convulsions continued. A passer-by called the emergency medical service. Before they arrived, Peter was already conscious and in a shock position. At first glance he looked fine, just bleeding from his mouth a little.

315 (97%) respondents answered correctly that it was an epileptic seizure. There were 3 mistakes in the scenario: “grabbed his legs and other two, his arms”, “open his mouth and pull the tongue out”, “in a shock position”. All three mistakes were correctly identified only by 136 (42%) respondents. When the authors analysed only the underlined answers, “grabbed his legs and other two, his arms” was underlined 150 times, “open his mouth and pull the tongue out” 136 times and “in a shock position” 140 times.

Table 14. Summary of selected correct answers to the questionnaire by school type

Wording of the question	Vocational schools	Secondary vocational school	Secondary and higher technical school	Total
Location of the spot for indirect cardiac massage	52 out of 90	75 out of 120	81 out of 115	208 out of 325
First aid for a knocked-out permanent tooth	30 out of 90	49 out of 120	58 out of 115	137 out of 325
Scenario regarding first aid for epilepsy	29 out of 90	46 out of 120	61 out of 115	136 out of 325
Correct answers in total	306 out of 720	393 out of 960	434 out of 920	1133 out of 2600
Correct answers in total, as %	43%	41%	47%	44%

Table 14 shows that respondents with the highest percentage of correct answers (47%) were teachers of vocational education and practical training at secondary or higher technical schools, followed by teachers of vocational education and practical training at vocational schools (43%). Respondents with the lowest percentage of correct answers were teachers of vocational education and practical training teaching at secondary vocational schools (41%).

The number of correct answers was the lowest (31%) in the case of the question regarding first aid in case of hypoglycaemia and the highest (64%) in the case of the question regarding location of the spot for indirect cardiac massage.

Discussion

Already the initial analyses of the results showed significant problems in this area. If we focus only on several findings most important in the authors' opinion, we have to mention the issue of stopping bleeding and treatment of wounds.

It is striking that 150 (46%) of the addressed educational professionals believe that it is necessary to tilt the head of a person with a nosebleed backwards (Table 8). The rule applying to bleeding from body cavities, including the nasal cavity, is that the casualty has to be put in a position allowing for the free flow of blood and preventing accumulation of fluid in any cavity. In case of arterial

bleeding (Table 9), 211 out of 325 (65%) respondents answered incorrectly. 158 (49%) respondents opted for “Always use a tourniquet” as the first-choice method to stop arterial bleeding. The two questions how to stop bleeding were answered correctly by 100 (31%) out of 325 respondents.

Respondents indicated an outdated practice of first aid for a knocked-out permanent tooth. There was a long-standing myth among professionals, as well as lay public, that the tooth should be put in milk (Table 7). However, a tooth is usually knocked-out outdoors, e.g. during a sporting activity, or in a playground, i.e. places where no milk is readily available. Moreover, a tooth cannot get any mineral salts, including calcium, from milk. In principle, the tooth should be kept moist and first aid should be as fast and as simple as possible.

The question with the highest succession rate in terms of correct answers was the one regarding indirect cardiac massage. The research showed that 36% (117 out of 325) of respondents do not know the right spot for cardiac massage (Table 6). The spot for indirect cardiac massage was modified (simplified) as early as in 2005. The right spot, i.e. the middle of the sternum between the nipples, was correctly indicated only by 208 (64%) out of 325 respondents. 32% of respondents still believe that it is necessary to locate the end of the sternum, the so-called xiphisternum, and place the hands 2–3 finger-widths above this spot to carry out an indirect cardiac massage.

Obsolete methods were indicated also in case of epileptic seizures (Table 13) by 189 (58%) participants. Long-standing myths came up in this question as well, e.g. that a person having an epileptic seizure should be grabbed by arms and legs and held tight, that their mouth should be opened and tongue pulled out, or that they should be placed in a shock position.

The question on the position of a body during an asthma attack was also a tough one for the vocational training teachers. 31% of respondents chose the shock position. The shock position is not a part of layman’s (pre-medical) first aid, the same goes for the recovery position which was chosen by 32% of respondents. Presently, it is recommended for the person to choose a comfortable position themselves, if they are conscious.

The most difficult question for the respondents was the one regarding first aid for hypoglycaemia. Only 31% of respondents answered it correctly. Teachers of vocational education and practical training need to be reminded that any healthy person can get a mild hypoglycaemia, e.g. in case of a low food intake or high physical or mental strain, and it does not have to be only an acute complication of diabetes. Moreover, even in diabetics, insulin must not

be administered during hypoglycaemia. Insulin does not increase blood sugar level, on the contrary, it decreases it.

Another alarming fact is that only 17% (170 out of 325) of respondents have the possibility to attend pre-medical first aid training provided by their employer at least once every 5 years (Table 5). It is interesting that none of the respondents who indicated that they were not interested in the training answered all knowledge questions in the questionnaire correctly.

There was the total of 1,132 (44%) correct answers out of 2,600 (Table 14). The percentage of correct answers regarding pre-medical first aid was the highest for teachers of vocational education and practical training teaching at secondary and higher technical vocational schools, and the lowest for teachers of vocational education and practical training teaching at secondary vocational schools (Table 14). The highest number of incorrect answers were given to the question on first aid for hypoglycaemia. All selected questions testing the participants' knowledge were correctly answered only by 70 out of 325 respondents, the majority of them being teachers of vocational education and practical training teaching at secondary and higher technical vocational schools, and with the lowest share of teachers of vocational education and practical training teaching at secondary vocational schools.

There were also other incorrectly answered questions which are not covered by this paper, e.g. on the width of a tourniquet, on methods for examining vital signs, on internal bleeding, how to remove a tick, etc.

When analysing the results in more detail, the authors failed to establish the link between the duration of professional teaching experience and the above stated answers to questions testing knowledge. At the moment, it is not possible to compare data because the research is in progress and the conditions (Guidelines) in the area of pre-medical first aid provision change. The above mentioned survey will be completed in December 2021.

Hanušová (Hanušová, 2016/2017) carried out a similar long-term survey in teaching students (future teachers) at the Faculty of Education, Charles University in Prague, students of the course of Secondary School Teaching within the Lifelong Learning Programme at the Faculty of Education, Charles University (Hanušová, 2018), as well as in selected educational professionals (teachers in kindergartens, elementary and secondary schools) in the Czech Republic (Prokop, Hanušová, 2016). The research was completed in 2019 and the data was compared within and between individual data sets. The results revealed new educational needs in the area of pre-medical first aid. In the

upcoming academic year, a new elective subject will be launched, “Pre-medical First Aid”, that will be available to teaching students of full-time and combined courses at the Faculty of Education, Charles University. The indirect training will be conducted via Moodle, where students will be provided with assistance, test questions, and videos on pre-medical first aid. The direct training will be carried out in small groups (max. 14 students) and will include first aid practical training using appropriate scenarios. Following the pilot course, Hanušová wants to offer a similar course to other faculties of education in the Czech Republic that prepare future teachers. At the same time, the author prepared another course entitled “Health Protection and First Aid” which has been provided as a compulsory class in the present academic year to selected students of Lifelong Learning Programmes at the Faculty of Education, Charles University.

Conclusion

Taking into account the sample size and continuation of the research, it is certainly not possible to draw any general conclusions on a basis of the presented research. The authors think that it is necessary to establish a regular pre-medical first aid training at prescribed intervals. The interval should be chosen in a way ensuring adequate learning and remembering of the methods, and in particular, the hands-on practice. A form and people providing the pre-medical first aid training are also important. In the authors’ opinion, a suitable interval would be one year, with an annual training held in the preparatory week before the school year, as mentioned by some respondents in comments to the questionnaire. The training should be provided by a qualified lecturer(s) according to a number of employees at a given school. The authors do not believe that the situation could be solved by employing a so-called school paramedic. We all have to know how to provide first aid. Moreover, every school is obliged to take measures to minimize the possibility of accidents and life-threatening situations as a part of a prevention system. Prevention includes training of school staff how to provide pre-medical first aid. According to applicable legislation, all teachers are required to attend an OHS (occupational health and safety) training at least once a year, and it should also include a first aid training. The authors recommend placing a greater emphasis on practising pre-medical first aid using appropriate scenarios. Any lack of competence in this area might endanger health and life of a child.

Abstract: The authors carried out a long-term research on knowledge of providing pre-medical first aid amongst elementary school teachers in the past years. The research results showed, among the others, that more than 45% of accidents at schools happen during vocational training. On this basis, the authors decided to carry out a long-term (2019–2021) research verifying the level of selected pre-medical first aid competencies amongst educational professionals providing vocational education and practical training. The study aimed at finding out whether and to what extent the vocational education and practical training teachers are competent in providing layman's first aid, to understand possible gaps in these competencies, and to establish corresponding training needs. At this moment, the study sample includes 325 teachers of vocational education and practical training at vocational schools, secondary vocational schools, or secondary and higher technical schools, with a varying level of teaching experience. A quantitative method was used (questionnaire) in the research. The respondents completed a questionnaire consisting of two parts. The first part focused on selected attitudes, opinions and experience in providing pre-medical first aid, and the second part contained a knowledge test.

The results show that the highest number of respondents failed questions on how to stop bleeding and treat wounds. The respondents believe that these are the most frequent injuries during vocational education and practical training. Many respondents also failed questions on what to do in case of a knocked-out tooth (only 42% of correct answers), how to provide first aid in case of epileptic seizure (42% of correct answers), and how to provide first aid in case of hypoglycaemia (31% of correct answers) and asthma (35%). It is clear that the failures stated above might have been influenced by not being familiar with updated international recommended first aid procedures, which are updated every five years, and 53% of respondents do not receive a pre-medical first aid training where they could gain this information.

Taking into account the sample size and continuation of the research, it is certainly not possible to draw any general conclusions on the presented research. The respondents themselves state that they feel quite uncertain about their knowledge and skills related to providing layman's first aid. However, this situation can lead to a serious threat or damage to health and lives of students. The authors of this study realize that it is necessary to take very seriously every sign of incompetency, and that they can only be eliminated by systematic education based, in particular, on regular practical training sessions (acquiring practical skills) in small groups and a development of interactive materials on first aid. An annual training session within the OHS (occupational health and safety) system is evidently insufficient.

Keywords: Pre-medical first aid, vocational education and practical training teachers, competencies, practical skills

Streszczenie: Autorzy przeprowadzili długoterminowe badanie dotyczące wiedzy z zakresu udzielania pierwszej pomocy przedmedycznej wśród nauczycieli szkół podstawowych w ciągu ostatnich lat. Wyniki badania pokazują, że m.in., 45% wypadków w szkołach miało miejsce podczas szkolenia zawodowego. Na tej podstawie autorzy zdecydowali się przeprowadzić długoterminowe badanie (2019–2021) weryfikujące poziom wybranych kompetencji z zakresu udzielania pierwszej pomocy przedmedycznej wśród specjalistów prowadzących kształcenie zawodowe i praktyczne. Badanie ma na celu ustalenie, czy i w jakim zakresie nauczyciele kształcenia zawodowego i praktycznego mają kompetencje w udzielaniu nieprofesjonalnej pierwszej pomocy, znalezienie potencjalnych luk w tych kompetencjach oraz określenie potencjalnych potrzeb szkoleniowych. Obecnie badana próbka obejmuje 325 nauczycieli kształcenia zawodowego i praktycznego w szkołach zawodowych, szkołach średnich zawodowych oraz średnich i wyższych szkołach technicznych o różnym poziomie doświadczenia w zakresie nauczania. W badaniu zastosowano metodę ilościową (kwestionariusz). Respondenci wypełniali formularz złożony z dwóch części. Pierwsza część koncentrowała się na wybranych postawach, opiniach i doświadczeniach z zakresu udzielania pierwszej pomocy przedmedycznej, a druga część zawierała test z wiedzy.

Wyniki pokazują, że największa liczba respondentów nie udzieliła poprawnej odpowiedzi na pytania jak powstrzymać krwawienie oraz opatrywać rany. Respondenci uważają, że są to najczęstsze urazy występujące podczas szkolenia zawodowego i praktycznego. Wielu respondentów nie udzieliło również poprawnej odpowiedzi na pytania dotyczące postępowania w przypadku wybicia zęba (jedynie 42% poprawnych odpowiedzi), jak udzielić pierwszej pomocy przy wystąpieniu drgawek padaczkowych (42% poprawnych odpowiedzi) oraz jak udzielać pierwszej pomocy w przypadku hipoglikemii (31% poprawnych odpowiedzi) i astmy (35%). Jasnym jest, że wymienione powyżej nieprawidłowe odpowiedzi mogą być wynikiem nieznamomości zaktualizowanych międzynarodowych zalecanych procedur udzielania pierwszej pomocy, aktualizowanych co pięć lat, a 53% respondentów nie przeszło szkolenia z pierwszej pomocy, na którym mogliby uzyskać takie informacje.

Biorąc pod uwagę wielkość próbki oraz kontynuację badania, na pewno nie jest możliwe wyciągnięcie ogólnych wniosków na temat przedstawionego badania. Sami respondenci twierdzą, że czują się dość niepewnie, jeżeli chodzi o ich wiedzę i umiejętności związane z udzielaniem nieprofesjonalnej pierwszej pomocy. Jednakże sytuacja ta może prowadzić do poważnego zagrożenia lub uszczerbku na zdrowiu i życiu uczniów. Autorzy niniejszego badania zdają sobie sprawę, że niezbędne jest bardzo poważne potraktowanie wszelkich oznak niekompetencji, a można je wyeliminować jedynie przez systematyczne kształcenie oparte, w szczególności na regularnych szkoleniach praktycznych (nabywanie umiejętności praktycznych) w małych grupach oraz opracowywaniu materiałów interaktywnych dotyczących pierwszej pomocy. Coroczne szkolenia w ramach BHP (bezpieczeństwo i higiena pracy) najwyraźniej nie wystarczają.

Słowa kluczowe: pierwsza pomoc przedmedyczna, nauczyciele kształcenia zawodowego i praktycznego, kompetencje, umiejętności praktyczne

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Date of the submission of article to the Editor: 30.08.2020

Date of acceptance of the article: 15.10.2020