Opportunities for teaching ABCDE-based patient examination in health education

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Research Article

Keywords: Education, Evaluation intervention, Evidence-Based Medicine, Complex intervention

Posted Date: February 23rd, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-219523/v1>

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Abstract:

Background: The ABCDE-based Patient Examination is a systematic patient examination aimed at early detection of a critical condition and prevention of life-threatening condition. Its education in the field of emergency patient care is most frequently provided in theoretical and / or practical education, in the form of frontal work, with indirect and direct illustration, as well as simulation and situational practice. The aim of our research is to assess which educational environment and method best support the acquisition of practical knowledge, to examine students' physiological reactions to different situations, to assess how the personal presence of the instructor influences the student's performance, and compare frontal education to the situation-simulation exercises.

Methods: The research was carried out by non - random sampling by an expert using a cross - sectional study. The study included 3rd and 4th year paramedics (N = 47 persons) who at the time of the research were studying at the Faculty of Health Sciences of the University of Pécs and participated in the previous semester online ABCDE patient examination education. Students who did not show up at the time of the study or those who work in ambulance or hospital emergency patient care were excluded. Three sub-samples were formed: in the first the instructor was present during the education (n = 11 persons), in the second the instructor was not present during the education (n = 8 persons), and in the third a realistic simulator was used without the presence of their instructors. (n = 28 persons). A descriptive analysis of the sample statistics and Kruskal-Wallis test was used for data analysis and SPSS 24.0 and GraphPad Prism 8.4 were used for evaluation.

Results: The results of the theoretical and practical tests did not correlate with each other ($p = 0,14$). During the practical test, the group using the realistic simulator achieved the worst result and the personal presence of the instructor did not improve the achieved result ($p < 0,001$). When monitoring students' heart rate, there was no significant difference between each group ($p = 0,79$; $p = 0,48$; $p = 0,48$).

Conclusions: The presence of the instructor during the practical simulation did not affect the result, so in the current epidemiological situation, the practical simulation can be safely and efficiently taught from the camera room. Based on our results, the efficiency of realistic simulators in this situation is questionable. We did not find a clear relationship between theoretical knowledge and practical implementation, but it would be worthwhile to repeat the study with more and various equipments and a larger number of participants.

Keywords: Education, Evaluation intervention, Evidence-Based Medicine, Complex intervention.

Background

The ABCDE Patient Examination is a systematic patient examination aimed at early detection of a critical condition and prevention of life-threatening condition in emergency patient care. The steps of the patient examination are always in the same order, each step is linked to each other in, so as long as there is a problem, we cannot move on to the next. The ABCDE algorithm includes simple, informative examinations and life-saving interventions. According to Thim et al. the ABCDE Patient Examination is a widely accepted method of emergency medicine experts that assists professionals in their work, thanks to its orderly principle, they can gain valuable time to spend on patient care, increasing the quality and efficiency of care. [1] In Jevon's study, Jevon emphasizes that clinical staff should follow the ABCDE approach to patient care in the care of patients with critical condition to avoid the use of suboptimal therapy. [2] The steps and importance of the ABCDE study are in several parts of the 2015 ERC Directive and are recommended by a number of international organizations for the examination of each patient. [3,4,5,6,7] The acquisition of the process in the field of emergency patient care is most frequently provided in theoretical and / or practical education, in the form of frontal work, indirect and direct illustration, as well as simulation and situational exercises. Hecht et al. say in their research, that they reviewed 14507 articles on the topic of EBM and found that such training has a positive effect on the quality of work of health care workers, the growth of their knowledge and the development of their skills. [8] Car et al. in their study, they conducted a systematic review in which they collected data on the effectiveness of digital education compared to other forms of education. The common result of these is that digital education of health professions based on clinical practice guidelines is at least as effective as traditional learning and more effective than non-interventional self-study. [9] Van Der Vleuten et al. believe that today's education is mostly governed by intuitions and traditions, which are not always correct. According to them, professional teachers need to continuously expand their theoretical knowledge and integrate new evidence-based methods into their teaching practice. [10] The aim of our research was to assess which educational environment and methods best support health practice knowledge, to examine students' physiological responses to each environment type and method, to assess how the instructor's personal presence influences the student's performance, and finally to compare frontal education to situational-simulation exercises.

Methods:

Our research was carried out at the Faculty of Health Sciences of the University of Pécs (in Pécs) among 3rd and 4th year paramedic students. The examination was from 01.09.2020 to 05.11.2020. which was hampered by the current epidemic situation and the adaptation to it. Considering the epidemic situation, this research was carried out with a low number of participants and as few face-to-face meeting as possible in order to protect students. The type of research is cross-sectional research, which examines the level of knowledge of students at a given moment. Sampling was performed by non-random sampling by an expert, selected statistical analyzes were performed using SPSS 24.0 and GraphPad Prism 8.4. The results obtained were considered significant from $p < 0,05$. The survey included students who participated in the theoretical online education in the previous semester (2020.01-2020.07) about the steps of the ABCDE patient study (N = 47 persons). Students who passed the

theoretical pre-test but did not show up at the simulation center at the time of the study, as well as students who were actively employed by the National Ambulance Service (Hungary) and / or any emergency department, were excluded from the study. Since the examined sample showed not normal distribution (Shapiro-Wilk test: $p < 0,001$), the Kruskal-Wallis test was used as a statistical method in addition to the descriptive statistics.

The test sample was divided into three subsamples. The first group consisted of $n = 11$ persons. In their case, the instructor was physically present during the teaching, the practice was conducted using traditional methods, the given task was supervised by the instructor. During the practice, the students performed the patient care on a traditional phantom, the instructor informed the students about the vital parameters of the patient, who had to adjust their way of care to the heard values. The second group consisted of $n = 8$ persons. In them, the instructor was not physically present during the solution of the practical task, the students' work was monitored with a camera system and the instructions and the patient's vital parameters were spoken through a microphone. In the case of the third group ($n = 28$ persons) the instructor observed the students through a camera system in a similar way to the previous group, however, they performed the appropriate interventions on a realistic simulator, which can produce the given vital parameters based on the interventions performed on it, so there was no contact with the instructor in the situation. As part of routine quality improvement projects no administrative permission was required to access the raw data used in the study. Specifically, this study was approved by the teaching committee and the anonymised data were provided by the administration. All methods were carried out in accordance with relevant guidelines and regulations.

Results:

The examined sample consisted of $N = 47$ students of almost the same age, the sample can be considered homogeneous in terms of gender, the participants were male. All of the participants wrote the preliminary theoretical assessment test, with an average score of 61% (the best-performing student scored 99% and the worst-performing scored 5%). (Fig.1.)

Fig.1. Practical method

During the practical tasks, the safety of the place was checked by 17 participants (36,2%) and 30 participants (63,8%) did not. 13 participants (27,7%) asked about the presence of visible major bleeding and 34 participants (72,3%) did not. The AVPU study was performed by 35 participants (74,5%) while 12 participants (25,5%) did not. 40 participants (85,1%) were checked the patient's airway patency and 7 participants (14,9%) were not. The patient's respiratory test (Part „B”) consists of several parts within the ABCDE patient test. In terms of their overall results, students achieved an average score of 49%. The best performing student achieved 100% and the worst performing achieved 17%. Looking at the results in part, it can be established that the symmetry of respiration was examined by 20 participants (42,6%), while 27 participants (57,4%) did not. Respiratory rate was checked by 12 participants (25,5%) and 35 participants did not (74,5%). Listening to the lungs was done by 36 participants (76,6%) and 11 participants (23,4%) did not. 5 participants (10,6%) asked about the use of respiratory auxiliary muscles and 42 participants (89,4%) did not. 44 participants (93,6%) asked about the numerical value of pulse oximeter and 3 participants (6,4%) did not. 20 participants (42,6%) checked the damage of the chest, while 27 participants (57,4%) did not. Part “C” of the ABCDE patient study was completed by the students with an average score of 54%. Including the CRT examinations were performed by 12 participants (25,5%) while 35 participants (74,5%) were not. The numerical value of blood pressure was asked by 45 participants (95,7%) and not by 2 participants (4,3%). The numerical value of the heart rate was asked by 31 participants (66%)

and 16 participants (34%) did not. Pulse rhythm was examined by 28 participants (59,6%) while 19 participants (40,4%) did not. 18 participants (38,3%) checked if the pelvis and femur damaged, while 29 participants (61,7%) did not. Part “D” of the ABCDE patient study was completed by students with an average score of 27%. The best performing student achieved 80%, while the worst performing student did not get any points. In this part of the neurological patient study, students assessed the laterality in 11 cases (23,4%) and not in 36 cases (76,6%). Differences in pupillary reactions were asked by 19 participants (40,4%) and not by 28 participants (59,6%). 27 participants (57,4%) asked about the value of blood sugar and 20 participants (42,6%) did not. The symmetry of the faces was examined by only 1 person (2,1%) and 46 participants (97,9%) did not. GCS was determined by 6 participants (12,8%) and not by 41 participants (87,2%). Part “E” of the ABCDE patient study was completed by students with an average score of 35%. The best performing student achieved 75%, while the worst performing student did not get any points. Including this, the SAMPLE study was performed by 16 participants (34%) while 31 participants (66%) did not. 19 participants (40,4%) asked about the differences in the ECG picture, while 28 participants (59,6%) did not. The “OPQRST” survey was performed by 16 participants (34%) while 31 participants (66%) did not. 14 participants (29,8%) asked about the numerical value of body temperature and 33 participants (70,2%) did not.

Investigating the results of the entire ABCDE patient study, it can be determined that the students achieved an average of 46%, the best performing student completed the tasks with 79% success, while the worst performing student achieved 17%. (Fig.2.)

Fig.2. Practical method

During the solution of the tasks, the heart rate of the students was monitored, the heart rate value was measured in the 5th minute and at the end of the task. Students had an initial average heart rate of 124/min (min: 72/min; max: 187/min; mode:125; median:125; SD:25,5). The average heart rate of the students at 5 min was 119/min (min:68/min; max:180/min; mode:105; median:116; SD:27,4). The average heart rate at the end of the task was 113/min (min: 75/min; max: 146/min; mode: 112; median:112; SD:16,8).

Examining the performance of the groups separately, it can be determined that in the first group, where the instructor was physically present, the students passed the theoretical preliminary test with an average result of 49,8% (min: 9%; max: 84%; SD: 25, 2). During the practical tasks, the safety of the place was checked by 5 participants (45,5%) and 6 participants (54,5%) did not. 6 participants (54,5%) asked about the presence of visible major bleeding and 5 participants (45,5%) did not. The AVPU study was performed by everyone in the first group and everyone was also checked the airway patency. Looking at the overall results of the “B” part of the ABCDE patient study, students achieved an average score of 70% in the first group. Looking at the results in parts, it can be established that the symmetry of respiration was examined by everyone in the first group. Respiratory rate was checked by 4 participants (36,4%) and not by 7 participants (63,6%). Listening to the lungs was done by 8 participants (72,7%) and 3 participants (27,3%) did not. 1 person (9,1%) asked about the use of respiratory auxiliary muscles and 10 people (90,9%) did not. Everyone in the first group asked about the numerical value of pulse oximeter and checked the damage of the chest. Part “C” of the ABCDE patient

study was solved by students in the first group with an average score of 77%. Included this, CRT examination was performed by 2 participants (18,2%) while 9 participants (81,8%) did not. Numerical values of blood pressure and heart rate were asked by 10 participants (90,9%) and 1 participant (9,1%) did not. Pulse rhythm was examined by 9 participants (81,8%) while 2 participants (18,2%) did not. 10 participants (90,9%) checked if the pelvis and femur damaged, while 1 participant (9,1%) did not. Part “D” of the ABCDE patient study was completed by students in the first group with an average score of 31%. In this part of the neurological patient study, students assessed the laterality in 4 cases (36,4%) and not in 7 cases (63,6%). 8 participants (72,7%) asked about the differences in pupillary reactions and 3 participants (27,3%) did not. 5 participants (45,5%) asked about the blood sugar value and 6 participants (54,5%) did not. Facial symmetry as well as GCS were not examined by anyone in the first group. Part “E” of the ABCDE patient study was solved by the students in the first group with an average score of 30%. Within this, 2 participants (18,2%) asked about the SAMPLE test and the ECG image, while 9 participants (81,8%) did not. The “OPQRST” survey was made by 8 participants (72,7%) while 3 participants (27,3%) did not. 1 participant (9,1%) asked about the numerical value of body temperature and 10 participants (90,9%) did not. The first group completed an average of 61% of the practical tasks in the ABCDE patient study. In the first group, the initial average heart rate of the students was 123/min (min: 94/min; max: 158/min; SD:19). The average heart rate of the students at 5 min was 110/min (min: 68/min; max:144/min; SD:21.6). The average heart rate at the end of the task was 110/min (min: 87/min; max:133/min; SD: 14,9).

In the second group, where the instructor was not present but instructed through a microphone and the students performed patient care on a simple phantom, the students performed the theoretical preliminary test with an average result of 54,1% (min: 5%; max: 75%; SD: 25,6). During the practice, the safety of the place, the AVPU scale, and airway patency were checked by all students. 7 participants (87,5%) asked about the presence of visible major bleeding and 1 participant (12,5%) did not. Looking at the overall results of the “B” part of the ABCDE patient study, students achieved an average score of 67% in the second group. Looking at the results in part, it can be established that the symmetry of respiration in the second group was examined by 7 participants (87,5%) and 1 participant (12,5%) did not. Respiratory rate was checked by 3 participants (37,5%) and not by 5 participants (62,5%). Listening to the lungs was performed by 7 participants (87,5%) and 1 participant (12,5%) did not. 2 participants (25%) asked about the use of respiratory auxiliary muscles and 6 participants (75%) did not. 6 participants (75%) asked about the numerical value of pulse oximeter and 2 participants (25%) did not. 7 participants (87,5%) asked about the damage of the chest and 1 participant (12,5%) did not. Part “C” of the ABCDE patient study was completed by the students in the second group with an average score of 73%. Including this, CRT was examined by 2 participants (25%) while 6 participants (75%) did not. 7 participants (87,5%) asked about the blood pressure value and 1 participant (12,5%) did not. The numerical value and rhythm of the heart rate were asked by 5 participants (62,5%) and not by 3 participants (37,5%). Everyone in the second group checked if the pelvis and femur damaged. Part “D” of the ABCDE patient study was completed by students in the second group with an average score of 40%. In this section of the neurological patient study, students were assessed the laterality in 5 cases (62,5%) and not in 3 cases (37,5%). Differences in pupillary reactions were asked by 4 participants (50%) and 4 participants (50%) did not. 6 participants (75%) asked about the blood sugar value and 2 participants (25%) did not. The symmetry of the faces was examined in the second group by 1 participant (12,5%) and

by 7 participants (87,5%) not. The value of GCS was not examined by anyone in the second group. Part “E” of the ABCDE patient study in the second group was completed by students with an average score of 28%. Including this, 2 participants (25%) asked for the SAMPLE study and 6 participants (75%) did not. 1 participant (12,5%) asked about the ECG image, while 7 participants (87,5%) did not. The “OPQRST” survey was conducted by 5 individuals (62,5%) while 3 individuals (37,5%) did not. 1 participant (12,5%) asked about the numerical value of body temperature and 7 participants (87,5%) did not. The second group completed an average of 64% of the practical tasks in the ABCDE patient study. In the second group, the initial average heart rate of the students was 119/min (min:93/min; max: 157/min; SD: 21.2). The average heart rate of the students at 5 min was 124/min (min: 85/min; max:160/min; SD:26.7). The average heart rate at the end of the task was 110/min (min: 89/min; max:146/min; SD:17,7). In the third group, where the instructor was not present and the students performed patient care on a realistic simulator, the students performed the theoretical preliminary test with an average result of 67.4% (min: 29%; max: 99%; SD: 16.8). During the practical tasks, the safety of the place was examined by 4 participants (14,3%) and 24 participants (85,7%) did not. Nobody in this group asked about the presence of visible major bleeding. The AVPU scale was performed by 16 participants (57,1%) and 12 participants (42,9%) did not. Airway patency was checked by 21 participants (75%) and 7 participants (25%) did not. Looking at the overall results of the “B” part of the ABCDE patient study, students achieved an average score of 35% in the third group. Looking at the results in part, it can be established that the symmetry of respiration in the third group was examined by 2 participants (7,1%) and 26 participants (92,9%) did not. Respiratory rate was checked by 5 participants (17,9%) and 23 participants (82,1%) did not. Listening to the lungs was done by 21 participants (75%) and not by 7 participants (25%). 2 participants (7,1%) asked about the use of respiratory auxiliary muscles and 26 participants (92,9%) did not. The numerical value of pulse oximeter was asked by 27 people (96,4%) and 1 participant (3.6%) did not. 2 participants (7,1%) checked the damage of the chest and 26 participants (92,9%) did not. Part “C” of the ABCDE patient study was solved by students in the third group with an average score of 39%. Including this, CRT testing was performed by 8 participants (28,6%) while 20 participants (71,4%) did not. Everyone in the third group asked about the value of blood pressure. 16 participants (57,1%) asked about the numerical value of the heart rate and 12 participants (42,9%) did not. 14 participants (50%) asked about the rhythm of the pulse and 14 participants (50%) did not. No one in the third group checked the pelvis and femur damaged. Part “D” of the ABCDE patient study was solved by students in the third group with an average score of 22%. In this part of the neurological patient study, students assessed laterality in 2 cases (7,1%) and not in 26 cases (92,9%). Discrepancies in pupillary reactions were reported by 7 participants (25%) and not by 21 participants (75%). 16 participants (57,1%) asked about blood sugar and 12 people (42,9%) did not. The symmetry of the face was not examined by anyone in the third group. The value of GCS in the third group was evaluated by 6 participants (21,4%) and 22 participants (78,6%) did not. Part “E” of the ABCDE patient examination in the third group was solved by students with an average score of 38%. Including this, 12 participants (42,9%) asked for the SAMPLE study and 16 participants (57,1%) did not. 16 participants (57,1%) asked about the ECG image, while 12 participants (42,9%) did not. The “OPQRST” survey was performed by 3 participants (10,7%) while 25 participants (89,3%) did not. 12 participants (42,9%) asked about the numerical value of body temperature and 16 participants (57,1%) did not. The third group completed the practical tasks of the ABCDE patient examination by an average of 36%. In the third group, the initial average heart rate of the students was 126/min (min: 72/min; max:187/min; SD: 29,1). The average heart rate of the

students at 5 min was 122/min (min: 72/min; max: 180/min; SD: 29,6). The average heart rate at the end of the task was 116/min (min: 75/min; max: 145/min; SD: 17,4).

The third group performed the preliminary theoretical test the best, but based on the Kruskal-Wallis test we did not find a significant relationship between the percental result of the theoretical test and the teaching method /environment ($p = 0,14$), which was also confirmed by the correlation test. In the overall results of part “A” of the ABCDE patient study, students were the best in the first two groups. In the overall results of part “B” and “C” of the ABCDE patient study, students in the first group achieved the best results and those in the third group achieved the worst. Observing the overall results of the “D” part of the ABCDE patient study, we can see that the second group performed the best and the third group the worst. In the overall results of the “E” part of the ABCDE patient study, the third group achieved the best result, and the second group achieved the worst. In the whole practice, the best result was achieved by the second group and the worst by the third group. Our results showed that the overall results are significantly related to the applied teaching method and the form of the simulation environment in the practice ($p < 0,001$). The results of the research revealed that the presence of the instructor (present or not) and whether or not a realistic simulator was included in the tasks had an insignificant effect on the results of the practice ($p < 0,001$).

The initial average heart rate was the highest in the third group and lowest in the second. The average heart rate value measured in the 5th minute was the highest in the second group and the lowest in the first group. The average heart rate measured at the end of the task was the highest in the third group, the first two groups had a lower, identical value. (Fig.3.) (Fig.4.) (Fig.5.)

Fig.3. Practical method

Fig.4. Practical method

Fig.5. Practical method

The research showed that the measured heart rate values did not show a correlation with the applied practical method /environment ($p = 0,79$; $p = 0,48$; $p = 0,48$). Based on the value of Pearson's correlation coefficient ($0,3 < R < 0,7$) in cases when the instructor was present during the practical training a significant relationship was detected in the heart rate values measured in the 5th minute and at the end of the task. In this case, the relationship was medium-strength ($R = 0,6$), with a determination coefficient of 41,9%. In the case where the instructor was not present during the practical tasks and the practice was performed by traditional methods, there

was no significant relationship between the measured heart rate values ($p = 0,47$; $p = 0,41$; $p = 0,17$). In the case when the instructor was not present during the practical tasks and a realistic simulator was used, there was a significant relationship between the pulse value measured in the 5th minute and the value measured at the beginning of the task ($p = 0,005$), in this case correlation coefficient indicated a medium-strength relationship ($R = 0,5$) and the determination coefficient was 26,2%. In addition, the pulse value measured at the beginning and at the end of the task showed a correlation in the group using the realistic simulator ($p = 0,03$), the relationship was also medium-strength ($R = 0,4$; $R^2 = 17,1\%$) and a medium-strength relationship ($R = 0,6$; $R^2 = 32,5\%$) was also observed between the heart rate values measured at the end of the task and at the 5th minute ($p = 0,002$). (Fig.6.)

Fig. 6. Theoretical and practice results of the students

Conclusions:

During the practice, the presence of the instructor did not affect the students' results, as those students performed best, who did not use a realistic simulator and the instructor was not present. This may be because students were able to perform better if they did not feel that they were being watched, and their thoughts may be diverted by observing what non-verbal signs the instructor is responding. The information needed to solve the task was also received through the camera and microphone system, so the content/verbal feedback was done, but in a way that did not have a negative impact on the student's performance. For the group using a realistic simulator, adapting to a more advanced technology phantom may require a high-level of concentration and creativity. This may also be the reason why, in the case of the third group, the highest student heart rate was measured prior to the use of the realistic simulator, which decreased with the completion of the task. Although the situation is more similar to real-life situations, it all had a negative impact on student performance and was a major source of stress.

Therefore, in order to achieve better efficiency, it may be useful to combine the teaching methods used in the study during the learning-teaching process. Peran et al. developed a cognitive aid (CAT) to aid in the ABCDE patient examination, which aims to avoid the need to memorize the steps to perform the patient examination, thus speeding up the process and minimizing the missing elements. Their study demonstrated that the use of the aid actually improved the quality of patient care in practice and did not increase the time of patient care. [11] Based on this, it would be worth to allow the use of a validated manual like this already during education. Hales et al. reviewed 1042 scientific publications on the role and effectiveness of checklists. Checklists are preferred as a cognitive aid in healthcare and beyond to guide users through the accurate performance of tasks. However, the authors have found that these descriptions do not provide sufficient detail to guide the development of effective checklists. [12] Marinopoulos et al. found 145 literature on the effectiveness of further training for physicians. The effectiveness of personal education versus textbook lexical knowledge and the positive impact of simulation education on the development of psychomotor skills were highlighted. [13] Both Cervero and Gaines assessed the opportunities for further training of physicians through literature analysis and found that further training days are more interactive than traditional institutional teaching methods, they use more methods, they have more time to discuss topics that focus on results that doctors consider important, thus leading to more positive results. [14] In his study, Wolf says that evidence-based medical education is the method that teachers use in their practical work based on the relevant evidence available. [15] Thus, in the courses, it is better to adapt the content of the curriculum to the students as much as possible and to involve various methods. The study opened up a whole new opportunity for health education practice during the epidemiological situation, as the results show that the physical presence of the instructor is not necessary for the practice, and in this form, training in small groups can be an effective protection for the instructors and the students too. Based on the results, the stress level of the students is independent of the examined teaching methods, however, it would be worth to repeat the same study with a larger number of participants, involving more stress parameters, more and various equipment and follow-up. In addition, it may be worthwhile to extend the research to each simulation method in isolation.

List of abbreviations:

AVPU:

An acronym used by health care providers to standardize the way of describing a patient's mental status. It stands for **a**lert (oriented to person, place and day); responds to **v**erbal stimuli (appropriate or inappropriate); responds to **p**ainful stimuli (localizes, withdraws or demonstrates decorticate or decerebrate neurological posturing); or totally **u**nresponsive.

CAT: cognitive aid tool.

CRT: Capillary Refill Time

EBM: evidence-based medicine

EKG: electrocardiograph/electrocardiogram

ERC: European Resuscitation Council

GCS: (Glasgow Coma Scale) A scale to determine a patient's level of consciousness. It is a rating from 3 to 15 of the patient's ability to open his *eyes*, respond *verbally*, and *move* normally

OPQRST: mnemonic used by medical professionals to accurately discern reasons for a patient's symptoms and history in the event of an acute illness.

OPQRST: mnemonic used by medical professionals to accurately discern reasons for a patient's symptoms and history in the event of an acute illness.

O: Onset of the event
P: Provocation or palliation
Q: Quality of pain
R: Region and radiation
S: Severity
T: Time (history)

SAMPLE: mnemonic acronym to remember key questions for a person's medical assessment.

- S – Signs/Symptoms (Symptoms are important but they are subjective.)
- A – Allergies
- M – Medications
- P – Past Illnesses
- L – Last Oral Intake (Sometimes also Last Menstrual Cycle.)
- E – Events Leading Up To Present Illness / Injury

Declarations:

Ethics approval and consent to participate: All ordinary procedures were followed to ensure ethics and data security. The study protocol was approved by the institutional committee (Faculty of Health Sciences, University of Pécs). The participants were informed both in writing and orally of their rights and the purpose of the study and consent was obtained from all subjects involved in the study.

Consent for publication: Consent to publish is approved by a statement signed by the participants observe by the regulation of Helsinki Declaration.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Funding: This research did not receive specific grants from any funding agency in the public, commercial or not-for-profit sectors.

Authors' contributions: All authors read and approved the final manuscript. A.P. and F.J. M. wrote the main manuscript text, please listed two first author in the article. B.R. and K.D made the study protocol, please listed two last author in the article. L. A. F and G. F. prepared figures. J. B. and Sz. R made the statistical analysis.

Acknowledgements: Not applicable.

Authors' information: Not applicable.

References:

- 1: Thim T, Kraup NHV, Grove EL, Rohde CV, Lofgen B. Initial assessment and treatment with the Airway, Breathing, Circulation, Disability, Exposure (ABCDE) approach. *International Journal of General Medicine*. 2012; 5: 117-121.
- 2: Jevon P. ABCDE: The assessment of the critically ill patient. *British Journal of Cardiac Nursing*. 2010;5(Suppl 6): 268-272.
- 3: Soar J, Nolan JP, Böttiger BW, et al. European resuscitation council guidelines for resuscitation 2015: section 3. Adult advanced life support. *Resuscitation*. 2015;95: 100–47. <https://doi.org/10.1016/j.resuscitation.2015.07.016>.
- 4: Maconochie IK, Bingham R, Eich C, et al. European resuscitation council guidelines for resuscitation 2015. Section 6. Paediatric life support. *Resuscitation*. 2015;95: 223–48. <https://doi.org/10.1016/j.resuscitation.2015.07.028>.
- 5: Truhlář A, Deakin CD, Soar J, et al. European resuscitation council guidelines for resuscitation 2015. Section 4. Cardiac arrest in special circumstances. *Resuscitation*. 2015;95: 148–201. <https://doi.org/10.1016/j.resuscitation.2015.07.017>.
- 6: Greif R, Lockey AS, Conaghan P, et al. European resuscitation council guidelines for resuscitation 2015. Section 10. Education and implementation of resuscitation. *Resuscitation*. 2015;95: 288–301. <https://doi.org/10.1016/j.resuscitation.2015.07.032>.
- 7: Lott C et al. Advanced life support: course manual. European Resuscitation Council; 2015.
- 8: Hecht L, Buhse S, Meyer G. Effectiveness of training in evidence-based medicine skills for healthcare professionals: a systematic review. *BMC Medical Education*. 2016;16 (Suppl 103):1-16. <https://doi.org/10.1186/s12909-016-0616-2>
- 9: Car LT, Soong AS, Kyaw BM, Chua KL, Low-Beer N, Majeed A. Health professions digital education on clinical practice guidelines: a systematic review by Digital Health Education collaboration. *BMC Medicine*. 2019;17(Suppl 139):1-16 <https://doi.org/10.1186/s12916-019-1370-1>
- 10: Van Der Vleuten CPM, Dolmans DHJM, Scherpbier AJJA. The need for evidence in education. *Medical Teacher*. 2009;22 (Suppl 3): 246-250. <https://doi.org/10.1080/01421590050006205>
- 11: Peran D, Kodet J, Pekara J, Mala L, Truhlar A, Cmorej PC, Lauridsen KP, Sari F, Sykora R. ABCDE cognitive aid tool in patient assessment – development and validation in a multicenter pilot simulation study. *BMC Emergency Medicine*. 2020;20(Suppl 95):1-8.

- 12: Hales B, Terblanche M, Fowler R, Sibbald W. Development of medical checklists for improved quality of patient care. *International Journal for Quality in Health Care*. 2008;20(Suppl 1): 22-30. <https://doi.org/10.1093/intqhc/mzm062>
- 13: Marinopoulos SS, Dorman T, Ratanawongsa N, Wilson LM, Ashar BH, Magaziner JF, Miller RG, Thomas PA, Prokopowicz GP, Qayyum R, Bass EB. Effectiveness of Continuing Medical Education. *Evidence Reports/Technology Assessments*. 2007;149: 1-69.
- 14: Cervero RM, Gaines JK. The Impact of CME on Physician Performance and Patient Health Outcomes: An Updated Synthesis of Systematic Reviews. *Journal of Continuing Education in the Health Professions*. 2015;35(Suppl 2): 131-138. <https://doi.org/10.1002/chp.21290>
- 15: Wolf FM. Lessons to be learned from evidence-based medicine: practice and promise of evidence-based medicine and evidence-based education. *Medical Teacher*. 2000;22 (Suppl 3): 251-259. <https://doi.org/10.1080/01421590050006214>

Figures

Fig.1. Practical method

Figure 1

Practical method

Fig.2. Practical method

Figure 2

Practical method

Fig.3. Practical method

Figure 3

Practical method

Fig.4. Practical method

Figure 4

Practical method

Fig.5. Practical method

Figure 5

Practical method

Fig. 6. Theoretical and practice results of the students

Figure 6

Theoretical and practice results of the students

Supplementary Files

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