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OPTIONS OF THE PREPARTICIPATION SCREENING OF YOUNG ATHLETES AND THE IMPROVEMENT OF TEACHING METHODS IN SPORTS BIOPHYSIOLOGY

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Background: The project entitled "Draft strategy screening of young athletes and improving teaching methods in the field of sports biophysiology for the prevention of cardiovascular complications in international cooperation" bringing new opportunities to improve early diagnosis of cardiovascular complications.

Methodology: The final output of the project is to extend and refine the protocol for screening young athletes. Timely and thorough search of cardiovascular disorders can prevent fatal complications during exercise. As part of the methodology was developed preventive screening protocol testing of athletes, which included personal, family and sports history, previous heart disease and screening symptoms such as palpitations, syncope, and others. Entrance examinations included physical examination with anthropometric parameters and evaluating indexes, resting 12-lead ECG and echocardiography. We made where appropriate stress test, 24-hour Holter ECG monitoring, electrophysiological testing and dynamic or pharmacologic stress SPECT examination.

Results: The selected sample of 220 previously examined athletes in 53 young athletes were deviations from standards, namely: dysfunction mitral valve, dysfunction aortic valve, presyncope conditions, abnormal blood pressure, coronary fistula, non-compact left ventricle, bradycardia with syncope at rest, intermittent AV block first and the second degree and myocardial muscle bridge.

Conclusion: Based on these results we will create a precise screening questionnaire and supplemented by further diagnostic capabilities to timely diagnose, treat and prevent cardiovascular complications in athletes.

Key words: screening, athletes, cardiovascular complications, educational materials, prevention.
**Introduction**

Project focuses its content on solving strategy of screening testing of young athletes and improvement in teaching methods of bio physiology of sport in order to prevent cardiovascular complications. Project started in 2011 and its completion is expected in 2013.

Implementation of the project was based on the practical experience of the medical community, which tells us that sudden death and other cardiovascular complications in athletes are a serious health problem. The most common causes of fatalities during competitions and training are timely undiagnosed cardiovascular diseases, congenital abnormalities and disease states with a potential threat to the lives of young athletes (hypertrophic cardiomyopathy, arrhythmogenic right ventricular dysplasia, congenital anomalies of coronary arteries, myocarditis etc.). These cardiac diseases and abnormalities are associating physical stress, which in turn increases the risk of complications and in some cases of sudden death of athletes. It is an interesting effort to develop more efficient testing strategies in order to increase prevention of cardiovascular complications of athletes. European project recommendations are considered by researchers in the prevention of sudden cardiac death of athletes, which include history, physical examination and 12 - lead ECG recording.

**Methods**

During the first year of the project it was planned to develop learning manual for teachers and students in printed and electronic form. Partial aim of the project within the screening for a period of two years was:

- extend the protocol of screening of athletes,
- test sample of young athletes in the Slovak Republic,
- test sample of young athletes within international cooperation - Ukraine,
- make modified Slovakia - Ukrainian version of a screening protocol of athletes on the website of University of Presov, Faculty of Health Care
- optimize content area of curriculum of students of the Faculty of Sport of University of Presov about cardiovascular complications and possibilities of their prevention,
• make forms of education more attractive for young athletes
• implement the results of testing in educational materials.

During testing of athletes protocol of their examination was created, which includes personal and sporting history, finding of inappropriate habits, such as smoking, alcohol, drugs and doping. Doctors of the research team surveyed prior medical history of heart diseases, looking for symptoms such as palpitation, presyncope or syncope, chest pain or dyspnoea. In a detailed family history they investigated the incidence of sudden cardiac death (especially at a young age and adolescence) or the incidence of potentially arrhythmogenic states. Entrance examination included a physical examination with assessment of anthropometric parameters and indices, 12-lead resting EKG and echocardiography. By echocardiography cardiac chambers size, wall thickness and segmental kinetic abnormalities were evaluated. Global systolic and diastolic function of both chambers was analysed (Doppler, TDI). Similarly, incidence of associated structural and functional abnormalities was observed. If necessary, load test was conducted, in which the analysis of nature symptoms, ST segment changes, and pulse pressure in response to strain, exercise tolerance threshold and the occurrence of arrhythmias was carried.

Electrophysiological study is indicated in case of hemodynamically significant arrhythmias. In case when ischemia is suspected physical or pharmacological stress perfusion SPECT myocardial imaging is indicated to prove the perfusion myocardial defects. The study group consisted of young athletes who were comprehensively tested.

**Results**

In the framework of international cooperation Uzhgorod National University located in Uzhgorod (Ukraine) was approached, were joint part of our project was carried out. The experience of both research teams with the above issues represents a guarantee that a similar cultural background, socio-economic status and specifics of health care system are the real basis for the objectification and develop diagnostic algorithm for assessment of the health status of athletes in both countries. Co-researchers teams compared their experiences, as evidence can be mentioned their joint publications,
presentation of their results on international level. Representation of specialist from partner institutions is guarantee for achieving the set goals.

During the project we set ourselves to prepare learning manual for teachers and students in printed and electronic form. We presented the results of screening of young athletes on national and international events. The output of the project will be a publication on a given subject in Slovak and Ukrainian language. The global objective of the project was to expand and improve screening protocol, which also represents the final outcome of the project.

Approved financial funds were used to purchase the device actigraphy GTX +3, which is important in the examination of athletes in the project objectives. During 2011, preparation was implemented, project planning and material - technical support. In connection with the planned objectives of the project investigators presented their initial findings at conferences and congresses in Izola (Slovenia), Budapest (Hungary), Salzburg (Austria), Split (Croatia) and Uzhgorod (Ukraine).

Abstracts and presentations from these events were published in the conference textbook and professional papers and journals. Students of the Faculty of Health Care were also involved in the project. In the conference textbook from Izola (Slovenia) outputs about the first experiences with physical activity measurement were published.

In 2012, a meeting of both implementation teams was conducted for the purpose of comparison of the results of the pilot testing, also design and innovation of questionnaire about screening. Preliminary results were also synthesized as well as their statistical processing and presentation at professional events (University of Primorska - Koper, Slovenia, Split, Croatia, Ljubljana, Slovenia and Uzhgorod, Ukraine). In 2013, a meeting of implementation teams took place about preparation of information sheet and implementation of the results obtained into teaching at the Faculty of Sport in Presov together with the issue of professional publications. The output of project is edition of monograph in Slovak and Ukrainian languages.

Discussion

The aim of the project was to modify, to test and to extend the protocol of screening of young athletes for purpose of prevention of cardiovascular complications. There is some controversy about the further increase the effectiveness of screening of athletes through inclusion in the examination of protocol of echocardiography (ECHO). Postulate
that the inclusion of ECHO investigation into the screening protocol is not financially advantageous has to be reviewed. ECHO examination is a valuable and effective non-invasive method for the selection of so-called cardiac abnormalities "Athlete's heart". And in particular, this fact confirms that the inclusion of ECHO examinations to a standard protocol for the examination of young athletes can increase the opportunity for potential life-saving screening in sports.

Members of the research team believe that the inclusion of ECHO examinations in European screening protocol as specified indications can be helpful in dealing with life-threatening cardiovascular complications in sport. Development of cost-effective screening protocol, which involves the use of ECHO modalities (although some have chosen their limitations) seems to be the most appropriate way of solving the problem of cardiovascular complications in sport. Based on sufficient evidence from obtained results during the project, new screening examination protocol should be applied to sports and teaching experience. According with the assimilation of preventive measures is important and effective early education which represents the real starting point to learn the activities aimed at the prevention of cardiovascular complications in sport.

**Conclusion**

Comparison of the results of a monograph edition in Slovak and Ukrainian languages creates a space for teacher and student mobility and improvement of education in the context of international cooperation.

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MONITORING IN INTENSIVE CARE

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Background: In the survey, we have set some goals: map the expertise of nurses and paramedics in the field of physiology and pathophysiology and monitored parameters of patients on, next to find out what affects nurses and paramedics whole monitoring patients by devices, to determine whether nurses and paramedics make mistakes when monitoring and assessment the findings and final goal is to create a practical guide for nurses and paramedics.

Methods: Respondents are nurses and paramedics working in Anesthesiology - Resuscitation and intensive care units at Regional Hospital of Tomas Bata in Zlin, a. s. We chose a quantitative method for exploratory investigation – intensive knowledge non-standard questionnaire containing 50 items focusing on basic monitoring. Total of 90 questionnaires were distributed, the return was less than 28% that means 25 replies. The reasons of low return was the complexity and scope of the questionnaire, negative attitude of nurses to review their own expertise, and we think that mainly ignorance of nurses.

Results: We found that addressed nurses and paramedics have only partly knowledge in physiology and pathophysiology of monitored parameters, which is surprising in view of the demands placed on the education of nurses working in Anesthesiology - Resuscitation departments. For example, the question number 8 on the questionnaire, in which respondents were asked to assign the respiratory curves of their right names. Kussmaul breathing correctly assigned 79% respondents, Cheyne - Stokes respiration 46%, Biot breathing 42% and eupnoe 79%. Furthermore, we found that various number of factors that influence nurses by patients monitoring and evaluating the data and found that they are often lost in measurements and numbers, and have problem with orientation to the patient and his actual health status. We realize that our results are not
relevant for a small number of respondents, but the research goes on and we are working on creating a practical guide for nurses focused on basic monitoring. Similar work focused on complex monitoring in intensive care, we have not found.

**Conclusion:** Nurses and paramedics working in Anesthesiology - Resuscitation have insufficient knowledge about monitoring patients.

**Key words:** monitoring-intensive care-inurse-instrumentations.

**Introduction** : Monitoring of patients is a common practice in intensive medicine. By Ševčík (Ševčík et al., 2004, p. 18). "Monitoring in intensive care can be defined as repeated or continuous monitoring of the patient’s physiological functions and devices activities used to support these functions in order to detect abnormalities, to easement the balance of eventual therapeutic interventions and to evaluate the efficiency of this intervention for its use.” We would like to expand this definition, because in intensive medicine there and can not only there monitoring what we see on the devices, but also monitoring the patient himself, respectively what we can objectively see on them can help us in diagnosing, treating and providing nursing care. That is why we looked at the issue of nurse’s knowledge about basic monitoring at the intensive care wards. We have set a number of goals, and to map the expertise of nurses and paramedics in the field of physiology and pathophysiology of monitored parameters of patients on, to find out what affects nurses and paramedics during monitoring patients, to determine whether nurses and paramedics make mistakes in monitoring and assessing identified facts and last goal is to create a handbook for nurses and paramedics.

**Methods:** We chose a quantitative method, in which we used a non-standard questionnaire. 90 questionnaires were distributed to nurses in Regional Hospital of Tomas Bata in Zlin, a. s. on Anesthesiology - Resuscitation ward (40 questionnaires) and intensive care units - pulmonary, neurological, internal, septic (50 questionnaires) at early April 2013, we collected them in early May 2013. Questionnaires were transmitted to station or department head nurse and from them we have also collected. The results were processed in Microsoft Excel.

**Results:** The return of questionnaires was 33, 33% (30 questionnaires), of which 5 questionnaires we had to discard for the minimum number of items answered. After removing them, the return was 28% (25 questionnaires). We included some
questionnaires, which were not completely filled, but for each question we present how the number of respondents changed.

In reconnaissance participated 24 women (96%) and 1 man (4%). 8 respondents (32%) graduate Secondary Nursing School specialization of general nurse, 5 respondents (20%) graduate a higher vocational medical school specialization of general nurse, 7 respondents (28%) university education 1. grade specialization general nurse or nursing, 1 respondent (4%) university education 1. grade specialization paramedic and 4 respondents (16%) graduated other university education. In the next item we investigated whether respondents have specialized training and which. 13 respondents (52%) has a specialization in the field, currently finalizing a specialized study 3 respondents (12%), 4 respondents (16%) expressed interest in specialized training and 5 respondents (20%) are not interested in specialized training. Most respondents 7 (28%) had a total length of Practice 1-5 years, 6 respondents (24%) 11 to 15 years and 6 respondents 21 years and more. On item about practice on intensive care units answered most respondents 9 (36%), that they operates between 1-5 years, 11-15 years’ experience have 4 respondents (16%) and more than 21 years working in intensive Care units 3 respondents (12%). From surveyed respondents works on Anesthesiology – Resuscitation ward 11 respondents (44%) and on intensive care units 8 respondents (56%).

Another 13 questions were focused on monitoring of the respiratory system. In question nr. 7 respondents were asked to assign commonly used terms such as eupnoea, tachypnea, bradypnoea, hyperventilation, hypoventilation, apnea, dyspnoea to the correct answers. Tachypnea were assigned to the wrong answer by 2 respondents (8%), defined it as deep breathing and 2 respondents (8%) incorrectly defined hyperventilation as a rapid breathing. In question nr. 8 respondents had to assign to the four breathing curves their proper names. Answered 24 respondents (100%). Most incorrect responses were associated with Cheyne - Stokes respiration, where incorrectly answered 13 respondents (54.2%) and in Biot breathing, which incorrectly answered 14 respondents (58.3%). Kussmaul breathing and eupnoe correctly assign the 19 respondents (20.8%). In question nr. 9 respondents were asked to assign the breathing rhythm of pathological conditions in which typically occur. Answered 23 respondents (100%). At Kussmaul breathing correctly assigned diabetic coma 20 respondents (87%)
and metabolic acidosis 21 respondents (91.3%). To Cheyne-Stokes respiration correctly assign sleep 13 respondents (56.5%) and unconsciousness 12 respondents (52.2%). In this part of the question was also the most incorrect answers. Sleep incorrectly assigned 10 respondents (43.5%) and unconsciousness 12 respondents (47.8%). At the Biot breathing correctly assigned meningitis 17 respondents (70.8%) and encephalitis 14 respondents (60.9%). In question 10 respondents were asked to indicate which type of breathing occurs apnea. Answered 24 respondents (100%). Properly marked Cheyne-Stokes respiration 16 respondents (66.7%) and the Biot breathing 21 respondents (87.5%). In question nr. 11 respondents were asked to indicate what changes occur in the laboratory finding by respiratory acidosis. Answered 22 respondents (100%). Properly marked increase in CO2 19 respondents (86.4%) and a decrease in bicarbonate 12 respondents (54.5%). In question nr. 12 respondents were asked to indicate in what condition occurs shallow breathing. Answered 23 respondents (100%). Correctly identified alkalosis 5 respondents (21.7%). On this issue, most respondents incorrectly identified unconsciousness 15 respondents (65.2%), in which contrast occurs often deeper breathing. In question nr. 13 respondents were asked to assign a physiological acid-base balance and blood gases in arterial blood. Answered 24 respondents (100%). PH 7.35 to 7.45 correctly assigned 19 respondents (79.2%), pCO2 4.6 to 6 kPa correctly assigned 21 respondents (87.5%), the value of pO2 from 10 to 13 kPa correctly assigned 21 respondents (87.5%), the value of HCO3 22-26 mmol/l correctly assigned 20 respondents (83.3%), the value of BE - 2 to + 2 mmol/l correctly assigned 23 respondents (95.8%) and SpO2 95% - 98% correctly assigned 24 respondents (100%). In question nr. 14 respondents were asked to indicate conditions, which is not measurable or incorrect measurable level of SpO2. Answered 22 respondents (100%). Properly marked jaundice 1 respondent (4.5%), the presence carbonyl hemoglobin 10 respondents (45.5%), peripheral circulatory failure 22 respondents (100%) and arrhythmia 2 respondents (9.1%). In question nr. 15 we investigated what affects the value of SpO2 jaundice. 20 respondents answered. The correct answer was, that jaundice false SpO2 value by increase reported 4 respondents (20%), 16 respondents (80%) incorrectly stated that jaundice does not change the value of SpO2. In question nr. 16 respondents were asked to indicate which are the clinical signs of hypoxia. We deliberately did not state any specific stage of hypoxia. 25 respondents answered. 24 respondents marked cyanosis (96%), 20 agitation (80%), 19 confusion (76%), 18
tachycardia (72%), followed by hypertension with 8 respondents (32%), 4 hypotension (16%) and 3 bradycardia (12%). Neither respondent did not mark all options. In question 17 respondents were asked to indicate, about what informs us ETCO2. Correct answer is the concentration of carbon dioxide in exhaled mixture at the end of expire said 22 respondents (88%), but another correct answer, that informs us of the alveolar ventilations answered correctly 4 respondents (16%). 2 respondents (8%) indicated that ETCO2 is the concentration of carbon monoxide in exhaled air at the end expire. In question 18 respondents were asked to assign a condition in which the characteristically elevated ETCO2. Answered 20 respondents (100%). Properly chosen to sepsis 8 respondents (40%) and the possibility of application bicarbonate 4 respondents (20%). 15 most respondents (75%) chose the incorrect answer increased alveolar ventilation.

The other 15 questions were focused on monitoring of the cardiovascular system. In question 20 respondents were asked to pathological ECG assign them a name. Submitted were 10 curves, with 8 of them respondents can be commonly found and two were typical and commonly seen on the wards. The best results were obtained when naming ventricular fibrillation and atrial flutter after the 21 respondents (84%), atrial fibrillation 20 respondents (80%), ventricular tachycardia 16 respondents (64%), atrial premature beats and sinus tachycardia correctly assigned in 15 respondents (60%), 12 respondents (48%) assigned ventricular premature beats, 11 respondents (44%), pulmonary embolism and 8 respondents (32%) ECG curve after application of digoxin. In question 23, we wanted to find out how respondents would react in the impossibility to measure the pulse device, for example device failure. The most common response was measured carotid pulse palpation for 20 respondents (80%), measurement of pulse palpation at the periphery 16 respondents (64%). Neither respondent not selected entry value, which was measured patient an hour ago. In question nr. 27 we investigated, about what informs us CVP. Answered 24 respondents (100%). Right atrial pressure correctly chosen 9 respondents (37.5%), intravascular filling stream chosen 20 respondents (83.3%). In issue 34 we investigated which introduces Swann - Ganz catheter. Correctly answered the pulmonary artery 9 respondents (36%), 8 respondents (32%) answered pulmonary vein, 7 respondents (28%) answered subclavian vein.

The other 3 questions were focused on neurological monitoring. In issue 35 we investigated which evaluates the Glasgow coma scale. In this issue incorrectly lists the
options chosen. 6 respondents (24%) answered pain and one respondent (4%) answered heartbeat and breathing activity.

Another 13 items were focused on further monitoring, satisfaction of respondents with the tracking method and the interest of respondents to construct manual aimed at monitoring. In issue 40 we investigated what affects diuresis of patient. Taking diuretics chose 25 respondents (100%), renal insufficiency 24 respondents (96%), blood pressure and heart failure chose 22 respondents (88%). In questions 43 and 44 we investigated what effects might leads to overlook development of complications in patient monitoring. 14 respondents (56%) indicated that such effects occur. Of these, the most pointed to taking care of another patient 11 respondents (78.6%), lack of time 9 respondents (64.3%), fatigue and stress obtained after the 8 respondents (57%), 7 respondents (50%) reported physical exhaustion, demands of work, mental exhaustion. In question nr. 45 respondents were asked an open question and should indicate what outside monitor and monitoring data should follow on the patient. 16 respondents answered. Respondents answered the color of the skin and mucous membranes, peripheral blood flow, state of consciousness, phlegm in the airways, breath odor, contact with family, hemorrhagic manifestations, diuresis, edema, momentum and other extremities. In question nr. 48, respondents were asked whether they think they have enough knowledge about monitoring. 10 respondents (40%) indicated that they had enough knowledge and information’s they can properly use, 12 respondents (48%) indicated that they had knowledge, but needs to educate, 1 respondent (4%) admitted that the big lack of knowledge. In issue 49 we investigated whether respondents are interested in producing a practical guide. 8 respondents (32%) stated unequivocally yes, 13 respondents (52%) answers maybe and 2 respondents (8%) said no and I do not know.

Discussion: We have set the main objective to determine the knowledge of nurses and paramedics in the field of physiology and pathophysiology of monitored parameters in patients on intensive care units and Anesthesiology - Resuscitation wards. In the area of respiratory monitoring take us these findings. Respondents incorrectly assigned names respiratory rhythms to respiratory curves. 54.2% of respondents incorrectly assigned Cheyne - Stokes respiration and 58.3% of the Biot breathing. The finding surprised us, because respiratory curve taught in high schools or medical first university
education degree, and we assumed that the units, which is in the intensive care medical staff knowledge in this area will be perfect. We drew from Kapounová (2007, p. 221) and Krišková (2001, p. 327). Furthermore, we found that respondents had difficulty in assigning a particular type of breathing to the state in which they occur. 43.5% of respondents did not know that Cheyne – Stokes respiration occurs in sleep and 47.8% respondents unable to assign the aforementioned type of depression to coma. While 39.1% of respondents mapped encephalitis and meningitis 26.1% to Biot breathing. We assumed that this question respondents can handle as far as the basic curriculum in medical fields. We drew from Trachtová (2006, p. 114), Mikšová (2006 ) and Krišková (2001, p. 327). When we asked what we can observe in the laboratory finding in respiratory acidosis increase in CO2 answered correctly 86.4% of the respondents fall in bicarbonate and 54.5% of respondents. We drew from Novak (2008, p. 470-471), Kapounová (2007, p. 249) and Larsen (2004, p. 271-273). The issue in which pathological state occurs shallow breathing alkalosis said only 21.7% of respondents. Up to 65.2% of respondents said unconsciousness in which the other hand, often occurs deeper breathing. We drew from Kapounová (2007, p. 248) and Trachtová (2006, p. 113). Assigning physiological blood gas values turned out surprisingly well. For each item answered correctly from 100% to 79.2% of respondents, although we are aware that different labs have different physiological values. We drew from Kapounová (2007, p. 248), Novak (2008, p. 470), Larsen (2004, p. 513, 242, 256-257, 275-276), Zemanová (2009, p. 37). 80% of surveyed respondents said that jaundice does not change the SpO2 value and only 20% of respondents knew that jaundice SpO2 value may be falsely increased. We drew from Ševčík (2004, p. 19) and Adamus (2012, p. 145). In question nr. 16, we asked for clinical signs of hypoxia and we deliberately did not set any stage of hypoxia. 96% of respondents said cyanosis, 80% restlessness, confusion 76%, 72% tachycardia, hypertension 32% and only 16%marked hypotension and 12% said bradycardia. We drew from Larsen (2004, p. 647). When asked where conditions may be at higher ETCO2 incorrectly chose increased alveolar ventilation 75% of respondents, but correctly answered 40% of sepsis and 20% hydrogen application. We drew from Larsen (2004, p. 639), Sevcik (2004, p. 19) and Adamus (2012, p. 146).

In the area of monitoring cardiovascular we were interested in these findings. In assigning the ECG waveform were biggest problems in 40% of the respondents did atrial extrasystole and sinus tachycardia in 52% of ventricular extrasystole in 46% of sinus
bradycardia and ventricular tachycardia in 56% of pulmonary embolism and 68% ECG curve after application of digoxin. We were aware that the last two of these curves are not typical and common, but we assumed that respondents have studied literature, in which they occur. We drew from Kapounová (2007, p. 256 – 259), Hampton (2007, p. 247 – 252), Larsen (2004, p. 652 – 656) and Krišková (2001, p. 726). We were pleased to find out how the respondents responded in the inability to measure the pulse device. 80% of respondents would measure the pulse of the carotid arteries, 64% in the periphery, 44% would be sought to correct monitoring equipment, 36% would be counter to measure the femoral artery and 28% measured by pulse auscultation. The surprise for us was to answer the question as it will appear after limb applications in pharmaceuticals arterial catheter. 19.7% of respondents answered that limb shows no change, 29.2% said they will show signs of inflammation, 41.7% answered that the limb becomes red. We assumed that this question know the right answer all respondents, because the administration of the drug into the arterial catheter is a fundamental flaw. We drew from Kapounová (2007, p. 37). The question of what informs central venous pressure incorrectly responsible for just 8.3% of respondents who selected the response assessment of left ventricular function. We drew from Kapounová (2007, p. 37), Sevcik (2004, p. 22) and Larsen (2004, p. 666). It shocked us finding that only 36% of respondents knew that Swan - Ganz catheter was introduced into the pulmonary artery.

In the neurological monitoring we were intrigued by findings that only 42.1% of respondents honest assessment follows the Glasgow coma scale and that 42.1% of respondents monitor does not transfer at all, the values automatically copies from a doctor.

For questions focused on the effects that operate in monitoring and data describing the sisters, we found that 56% of respondents said that there are influences that can cause the nurse inspects development of complications in the patient. Among the most common effects of respondents reported in 78.6% of the care of another patient, in 57% of fatigue and stress, in 50% of physical exhaustion, job demands, emotional exhaustion, 64.3% in no time. Other influences were put forward by inattention, saturation of a large number of data, working team. We realize that nurses on intensive departments often do not meet adequate staffing standards for the quantity and complexity of patients.
They took us answers of respondents on whether they think they have enough knowledge in monitoring. 40% of respondents feel that they have sufficient knowledge, 48% admitted that they would need further education in the area, 8% admitted that a partial knowledge, and 4% admitted that they have a big lack of knowledge. We believe that with the development of modern and new instrumentation and monitoring equipment is still necessary to educate, but also to learn to react while the monitoring device is in failure. In the monitoring is really difficult and challenging to find way.

Similar studies for comprehensive monitoring of intensive care, we have not found. We found works focused on different areas of invasive monitoring, but they did not focus on the physiology and pathophysiology of the measured and derived values and are not comparable to our survey.

**Conclusion:** We realize that we presented to respondents extensive and intensive questionnaire aimed at monitoring patients in intensive care. We were surprised by the unwillingness of respondents at answering. We do not wanted to examine nurses and paramedics, but our intention was to find out what knowledge in monitoring and processing of the data are. But it was evident that the respondents did not want to admit their own ignorance, so they rather did not fill the questionnaire. We found that in many areas the respondents in spite of higher education and specialization has reserves. Based on these findings, we are working to create a practical guide, which would help in easier guidelines for monitoring patients in intensive care in assessing the physiology and pathophysiology of monitored parameters and would be helpful in early detection of developing complications at patients, which could improve the quality of provided care. Continue to expand the sample of respondents. On the negative experiences when presenting a collection of questionnaire respondents and observations, we reduced the number of questions to 30, but we still tried to keep the complexity of the basic monitoring, with which we encounter daily on intensive care units. We think it is necessary to constantly train and complementary expertise focused on the issue of monitoring and continually improve the care of patients in risk of life.
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DEVELOPING COMPASSIONATE CARE: A TRANSFERABLE EDUCATIONAL MODEL

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Key words: compassion, care, communication, medical humanities, intensive care nursing, narrative-based medicine.

Introduction

The seeming lack of compassionate care being delivered by the health and social care services in the UK continues to be a highly visible debate presented in the media with headlines such as “Prince Charles calls for more compassion in NHS” (BBC 2012) and “How can a profession whose raison d'être is caring attract so much criticism for its perceived callousness? Does nursing need to be managed differently? Or is the answer to develop a new culture of compassion?” (Patterson 2012). Reports such as the one into the events at the UK’s Mid Staffordshire NHS Trust where poor nursing care and organisational and other professional failures were highlighted have also drawn attention to the need for the Compassionate Care (Francis 2013). The recent publication of the expected behaviours and values by health and social care staff, the 6Cs (Care, Compassion, Competence, Communication, Courage and Commitment) has provided a platform for innovation (Department of Health and NHS Commissioning Board 2012, p.28). It is against this background that the University of Greenwich and Dartford and Gravesham NHS Trust collaborated on the development of a post-registration course on Compassionate Care as a pilot project.

This paper will discuss the implementation of this pilot course as an example of a contemporary model of good practice in nurse education which provides a way in which compassionate care can be developed and enhanced. The content and structure
of the course will be explained. Furthermore, the transferability of this model to nurses working in and/or undertaking studies in Intensive Care Nursing in the Czech Republic will be explored.

Content

The word compassion is derived from the words *passio* (suffering) and *com* (with) — means to suffer with another. According to Gilbert (2010:117) compassion in care giving includes paying attention to the needs of others; thinking of ways in which to be helpful and non-judgmental; demonstrating feelings related to concern, empathy, kindness and warmth and behaviour (actions) that attempt to alleviate suffering or helping the other person to prosper, flourish and grow. So in summary, there are three process involved in delivering compassionate care observation (including looking and listening attentively) thinking and action.

Implementation in the UK

The University of Greenwich, London and Dartford and Gravesham NHS Trust (acute hospital), Kent collaborated on designing two academic based courses on Compassionate Care, at EQF levels 5 and 6, as part of the Hospital’s developing Medical Humanities programme. Both courses were given 15 credits (7.5 ECTS). Learning outcomes for the level 6 course included that need to critically assess background information and current literature and reports addressing the issue of compassion and humanity in healthcare. In addition, the need for critical reflection by the participants to reflect on their own practice and communication/interaction with service-users and colleagues within the healthcare setting in order to respond effectively to the needs and concerns of service-users and their families/carers. Furthermore, focus was also identifying and critically evaluating examples of good and varying practice.

The intended participants for this pilot courses were members of the multi-professional team across the hospital. To participate in the course, students needed an interest in compassionate care, to be post-registration and permission sought for funding from the Education Lead if required. The first level 6 course ran as a pilot and was taught on the hospital site 09:00-16:30, over 5 days which were spaced every two months.
in with workplace schedules. The inter-professional cohort included doctors, nurses and a midwife.

A three dimensional model of compassion was developed by Moreno-Leguizamon and Knight (2012) to provide a framework for the course based on the works of Gilbert (2010) and Nussbaum (2001). The diagram above illustrates these three strands. The initial discussion about compassion on Day 1 focused on the two aspects to compassion- self compassion and compassion. However, the course did not explore the notion of self-compassion in detail (Personal 1). A range of literature, media and evidence from the Humanities and Social Sciences were integral to the theoretical input into the curriculum and underpinned each of the themed days; for example, religion and spirituality (2. Theoretical). The Organisational (1. Personal and Organisational) aspects were explored in detail as it was seen as necessary for organisations to be compassionate in order for all staff to deliver compassionate care to their patients/service users. There was a strong emphasis on the practical aspects (3. Practical) of compassionate care. This led to the use of a range of teaching and learning strategies with a specific emphasis on communication and Narrative-Based Medicine; Reflective practice, Sharing experiences. Interactive learning underpinned by Health Humanities and Narratives. An essential component of this course was the patient voice. At each session, patients or their carers told 'their story' to enable
the participants to develop an understanding of their service-users’ needs and concerns, and those of other members of the healthcare team. This was at times emotional for all present and support was available from the hospital chaplaincy team. The course content was amended during the course based on the participants’ on-going evaluation and Trust requirements.

The assessment of this course focused on critically analysing and reflecting on an aspect of care within their clinical environment where compassionate care can be developer or improved. Assignments have been completed on how compassionate care can be enhanced in their clinical area; for example, dealing with miscarriages compassionately in an acute ward setting.

The pilot course was deemed a success by the participants and it will be repeated. It was advocated that it should be open to all staff in the organisation; this would ensure inclusion of support worker, ancillary and administrative staff. It was agreed that it should be run over a shorter period of time as every two months was too far apart. The idea of a whole study day set aside was welcomed as this facilitated managing workforce issues. The lecturers involved felt that the model of the three dimensions in compassionate care was a useful framework to underpin the structure of the course. The participants identified that the assessment should be a formal presentation or poster as to how compassionate care can be delivered or enhanced to a Trust audience, to ensure sustainability in the delivery of compassionate care and reach a wider audience. There was a formal presentation at the NHS Trust Board in July 2013.

**Transferring this model to the Czech Republic for Intensive Care Nursing**

The framework/model is transferrable across both acute and community settings within any health and social organisational or administrative setting to enhance compassionate care. A course at Masters level 15 credits has also now been developed and this model and EQF level is very applicable to nurses working in and/or undertaking studies in Intensive Care Nursing and can be used in the Czech Republic.

It has been agreed that there will be tuition on compassionate care for Master degree students who are specialising in intensive care nursing. It will be a core course. A similar model to that outlined above will be used; 5 seminars as part of the Didactics of Social Interaction in Intensive care. The course will have an interactive approach
and part of the discussion will be to develop a understanding of the difference between empathy and compassion. The narrative approach will be used in conjunction with a range of media, such as video based training. A key element will be reflective learning and improving clinical decision making and reasoning by using reflective diary. The course will take place in the first semester of the first year, before clinical practice commences in intensive care units. To note, all of the participants should have some experience from the clinical setting as Bachelor students. The last seminar after the practical training at intensive care units will be on reflection. Reflection will be focused on: interpersonal competences, relational skills, emotional maturity and enriched care environments. We do hope that we can use relational and responsive models rather than „perform or perish“ models for the future competencies of learners. We would like to use of appreciative language and a range of ways to build capacity/leaders during reflection meeting. We hope that through this activities we could celebrate success and clearly naming and sharing caring activity and behaviours across the team. We will encourage learners to use measurement as a development tool to celebrate success and prompt insight, motivation and discussion about future development.

**Conclusion**

This was an innovative pilot project that uses a framework/model that is transferrable to any health and social organisational or administrative setting to enhance compassionate care. A course at Masters level 15 credits has also been developed at the University of Greenwich. As has been shown this model (and EQF level) is very applicable to nurses working in and/or undertaking studies in Intensive Care Nursing and is to be used in the Czech Republic at the University of Masaryk. The development of the three dimensional model of compassion, which includes the Humanities and Social Science perspectives, was seen as a useful tool to structure the course around. It is anticipated that the authors will review and evaluate the Czech Republic version and progress.

**References**


IATROGENIC NURSING WOUND EVENTS IN THE INTENSIVE CARE (NURSE CAUSED WOUNDS IN THE INTENSIVE CARE)

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Abstract:

Introduction: Wound treatment by a method of phase healing has been carried out in the Clinics of Anaesthesiology, Resuscitation and Intensive Medicine (henceforth only KARIM) in Prague for almost twenty years. The Clinics provides treatment to two types of patient population. The first patient population type is represented by cardio-surgery patients who may incur skin damage at various body locations due to the surgical procedure strenuousity as well as due to the post-operational care. The second type is comprised of patients whose vital functions have failed at home, on the street or in a health care facility. These patients are very often admitted with skin integrity lesions incurred previously due to various causes.

Contents: The risk of skin damage in patients in Intensive Care Unit increases with many interventions requiring unnatural ports of entry into the body associated with invasive monitoring of various functions as well as with single or repeated medical examinations.

The principal goal of patient care is the prevention of skin integrity damage together with seeking potential and actual causes of its origin (according to the patient’s health status). Currently the attention is focused on wound care unification, quality monitoring and nurses’ education in wound healing of patients in intensive care. The awareness of choosing the proper traditional or alternative procedures and materials according to existing conditions and indicators becomes very important.
**Conclusion:** This paper presents a number of potential causes of impaired healing in patients who are at risk in intensive care due to nurse caused procedures as well as solution proposals specifically in the area of prevention and therapy.

**Key words:** wound healing, intensive care, skin damage, therapeutic dressings.

KARIM of the General University Hospital in Prague provides care to two patient population types. The first type includes patients with cardio-surgical diagnosis who typically stay at the ICU three to five days, provided the recovery period after the operation is standard. The second type includes patients with the basic diagnosis indicating them for the resuscitation care, are admitted to the ICU either „from the field“ or from other clinics. In the latter type, compared to the situation fifteen years ago, we may state that their hospitalisation (according to their actual health status) is now reduced to a few days or to two weeks at most.

There are the following serious factors contributing to the skin damage development: the overall deterioration of patient´s health status because of various other accompanying morbidities, immobility, malnutrition or impaired immunity. Topical factors worsening the condition are oedemas, mycoses, or haematomas incurred in the course of the surgical procedure. Additional factors impairing skin integrity are therapeutic invasive procedures or monitoring. However, there are also factors which are very hard to influence prior to patient admission, such as his/her poor hygiene, smoking, alcohol, drugs and various others.

Physical and chemical factors which may be met in most clinical environments, not only in the intensive care, are also increasing the risk of skin damage. Friction which occurs in changing the immobile patient´s position (especially on the heels; often the personnel omit to elevate heels above the bed surface), patient´s restlessness and immobility, cuff compression of the arm, or pressure exerted by monitoring devices. Chemical factors which are present in liquid stool and urine are very effective in damaging extensive areas of skin. Patient ´s allergic reactions to antibacterial substances or adhesives represent another serious danger to skin integrity. Low temperatures (used in patients after their resuscitation or in cases of fever) or warm therapy applied to undercooled patients, in patients in a shock condition) are also considered as potential participating factors in skin damage in critical care.
In order to resolve effectively the issues of iatrogenic wound events in clinical environment the management of KARIM has created a post of a wound manager, i.e. a nurse specialised in wound healing. Her tasks include active identification of existing and potential causes of skin damage, implementing a timely and high quality treatment, as well as adequate education of nurses. Nurses working in the intensive care are nowadays using very sophisticated technical devices such as ventilators, haemodialysis, oxygenators etc., and in their daily practice have to rapidly resolve acute changes of patient’s condition. The wound care seems to be a secondary problem compared to the above mentioned ones, but it is not so. On the contrary, nurses are truly interested in the new and effective procedures in wound management, in innovative dressings and they try hard to avoid nurse caused errors in patient care. In these days the modern ways of education are used, such as mentoring at the bed side and presenting examples. This differs greatly from the directive education used in the past. The incidence of nurse caused wounds at KARIM is presented in percentage and pertains to the last year. Pressure ulcers occur in patients with cardio-surgery diagnosis already in the course of their operation. Such lesions are observed mostly in the sacral area (30 %). The risk increases commensurate with the length of the surgical procedure, the patient’s age, combination of cold and antiseptics in the area of buttocks. Additional risk factors contributing to skin damage may be observed during the post-operation care while turning the patient and changing his/her position, by stray objects in bed or insufficiently smoothed bed linen and/or pads. Skin denudation of various extents develops mostly by careless removal of adhesives used for stabilisation of surgical wounds secondary dressing. Such peri-wound skin injuries may affect areas of various extents. Not only the adhesive removal is painful for the patient but the resulting skin damage means further discomfort and represents a potential risk of infection. There are sporadic cases of skin irritation behind patient’s ears caused by a rubber band holding the oxygen mask. Intertrigo can be seen in women below their breasts. The cause may be mycosis in a moist and warm environment and as a result of shear of the thoracic muscle in women with heavier breasts. The development of wounds in critical care patients is often complicated by a septic condition, oedemas in various localities, ischemia in the acral body parts, obesity and/or immobility. Pressure sores may also occur around lips which are caused by the pressure exerted by a tracheal tube. Nurses
often point out the necessity to securely stabilise the tube in restless patients in the period when their sedatives are gradually being withdrawn. However, preventative measures may be taken, such as frequent assessment of the skin condition, changing the tube site or by redistributing tube pressure by putting an appropriate pad under it. The subsequent wounds around lips are most often treated by application of sterile honey in a thin layer. Compared to the in the past very often used ointments (Infadolan, Calcium pantothenicum) patients perceive the taste of honey very positively. In about 50% patients presenting septic signs, the effects of oxygen saturation sensor pressure occur on their finger tips. In order to eliminate such detrimental pressure effects it has been recommended to switch the sensor localisation on finger tips each 60 minutes. In critical care blood pressure is measured with the help of a cuff rather rarely and therefore the incidence of suffusions caused by the cuff pressure is only 1%. On the contrary, invasive monitoring and catheterisation belong to standard methods of patient monitoring. Such monitoring and therapeutic devices have to be properly fixed and stabilised by adhesive tape sheets, tapes with adhesive borders on their entire circumference or by transparent film dressings. Quite often we encounter allergic skin reactions caused by various types of fixation materials. In order to avoid such unwelcome reactions it is necessary to primarily find out relevant anamnese pertaining to allergies in time, followed by regular patient assessment, utilisation of adhesive removers which can help in easier fixation removing and subsequent application of liquid barrier films on the affected area. Liquid film dressings form an interface and at the same time they represent a good mediator, however, with unfortunately insufficient preventative effect against the allergenetic activities of the allergen. In the past years the incidence of such surface skin irritations was as high as 50%, but the use of modern amorphous film dressings or emulsions, such as Cavilon has reduced significantly such skin problems as well as the associated patient discomfort.

As we have mentioned earlier, multiple skin wounds caused by pressure and friction develop while the patient is turned to prone position. This position is used for patients with acute lung failure. The patient stays in the prone position for several hours and therefore it is very important to focus on pressure redistribution and pressure relief in the most encumbered areas, such as forehead, nose chin, shoulders, pelvis, knees and insteps. Even if more personnel is involved in turning the patient to prone position, friction causes large skin lesions which occur usually on the thorax. Topical application
of the amorphous or large area film dressings on the most vulnerable sites is recommended or a systemic solution may be considered in the use of slip pads which make patient manoeuvres easier.

Friction is the source of other skin defects on and around the spine. Usually such problems occur in restless patients whose position has to be adjusted frequently. Restless patients have to be limited in their movements by certain means in the area of upper as well as lower extremities. Such limiting means are used only for a time period necessary to calm the patient down and therefore the incidence of skin damage is only 1%.

Thanks to active antidecubital mattresses combined with consistent and frequent changing patients’ position, the incidence of pressure ulcers in sacral and gluteal regions has been significantly reduced. The most common pressure ulcers in critical care units are pressure ulcers of Class II (50%). However, our goal is to eliminate pressure ulcers of all classes. At present attention is focused on the development of pressure ulcers after patient’s discharge from the clinics and the treatment of pressure ulcers in the other hospital departments (General University Hospital in Prague).

The use of “doughnut” antidecubital devices used to relieve pressure on the heels (Gilcreast et al. 2005, Pokorná, Mrázová 2012) discloses the fact, that nurses are not aware that such devices may impair blood circulation in the distal part of the under laid extremity. The elimination of use of such devices depends on on-going education of nurses as well as on unlimited availability of other types of antidecubital devices.

Various types of wounds incurred in the course of critical care in connection with serious conditions of the patient may result in wounds that do not heal and cause problems to the patient even after his/her discharge from the clinics. Usually after patients are discharged from KARIM to other departments we have no control over subsequent wound therapy and the time of healing. The out-patient unit of wound healing at the General University Hospital provides the opportunity for continuous topical wound therapy which the patient has received during his/her stay at KARIM. A model of such continuous wound care has been used in a patient with pressure ulcers on her heels and soles of her feet which she incurred during her stay at an IUC of the General University Hospital. The total time of healing took nine months. A very long time for the patient.
Conclusion:
The principal goal of solution of the nurse caused wounds problem is the prevention on both local and systemic levels. At present the efforts of management as well as of individual care givers is focused on the use of amorphous film dressings or an emulsion which are able to prevent chemical skin irritation, such as is caused by excrements. The use of protective topical preparations is combined with application of special foam dressing Reston in a roll the size of which may be individually adjusted in order to fit and which, thanks to its adhesive backing may be securely fixed on various body parts. The statistics of nurse caused wounds has served as a base for making various antidecubital devices available and it will be used for evaluating the quality of wound care in given departments.

The development of iatrogenic wounds is also caused by permanent lack of nursing time, lack of sufficiently educated personnel on various qualification posts, lack of profound knowledge of appropriate devices as well as of their unavailability, underestimation of problems pertaining to iatrogenic wounds and - last but not least – unclear accountability for wound care.

Newly established post of expert wound care nurse is the evidence of management acknowledgement of its accountability in solving problems of prevention and treatment of wounds. Unification of nursing care, searching for causes of wound development and statistics of skin damage incidence are the first steps to resolve the problems of nurse caused wounds. Repeated training and education in seminars and creating standards of nursing care as well as their regular updating are components of a long term project.

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THE NEED FOR COMPETENCE- BASED CRITICAL CARE NURSING EDUCATION

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Background: The aim of this paper was to articulate the need for critical care nursing education based on competences in the nursing education.

Methods: The research included 100 nurses working in intensive care units at clinical hospitals. Research was conducted using a questionnaire which included 11 questions and 10 statements about core competences. The data has been analyzed using descriptive statistical methods.

Results: The research data indicated the need for critical care nursing education after baccalaureate degree in 90% of the answers. 65% of the respondents thought that such education should last 2 years and 35% thought it should last only one year. Distribution of the level of agreement and disagreement with the competence statements was from 10% to 90%. There were significant differences in the area of nursing care, clinical practice and management in critical care.

Discussion: World Health Organization made recommendations for critical care nursing education in Europe as a direction for design and implementation of new curriculum of nursing critical care education.

Conclusion: The results indicated the need for further competence-based nursing education in critical care. Master's degree nursing education or nursing specialist education programs provide nurses with an opportunity to specialize in the clinical area.

Key Words: nursing education-competence-based critical care-nurses-nursing specialist.

Introduction

Nursing education is influenced by various trends which illustrate the complex environment and help explain why and how to change the education of nurses so that they could function in the modern society. Different trends affect the educational contents, expected outcomes, the learning process and assessment methods. A kind of "technological explosion" in the 20th and 21th century is present in all areas of human life and activity. In its technical sense, education is the process by which society voluntarily transmits knowledge, values and skills from one generation to the next.
Today the nursing profession includes nurses with different levels of education, from secondary education to PhDs. Nursing education in Croatia began in 1921 with The School for Nurse Aides. The education program lasted one year, and was later gradually extended to three years. Nursing education in Croatia is subject to constant changes, from high school level to university level. The harmonization of nursing education with the recommendations of the World Health Organization started in 1999, when a three-year nursing program at a higher level was introduced. By accepting the Bologna Declaration in 1999, Europe is trying to achieve uniformity, comparability and comprehensibility of higher education and achieved university degrees. The International Council of Nurses (ICN /1987, 1992) and the European Commission’s Advisory Committee on Nursing (1994) and the European Directives 89/48 EEC and 92/51/EEC, recommended that nurses should focus on narrow educational specialized areas in which they could deepen their theoretical and practical knowledge aimed at providing high quality care based on human needs. The project of harmonization of higher education on the European level (2007), „Socrates Tempus Tuning Education Structures in Europe“, provided further recommendations for nursing education: bachelor’s level as the first level of nursing education, training of nurses at the tertiary level and the possibility to continue their education in specialized and scientific studies. In accordance with the recommendations of the project, the recommendations and standards of the World Health Organization and the European Union (Education Strategy for Nurses and Midwives/WHO, 2003), the European Commission’s Advisory Committee on Nursing (1994; European Directives 89/48 EEC and 92/51/EEC) the University of Applied Health Studies in Zagreb, Croatia, introduced specialist professional graduate studies: Management in Nursing, Public Health, Clinical Nursing and Psychiatric Nursing. These programs allow for the acquisition of specific expertise in the field of management in nursing, clinical and public health fields, highlighting the area of nursing care in order to follow the needs of the health system at all levels of health protection and educational system in the Republic of Croatia according to the recommendations of the World Health Organization and the European Union. One of the very important area of health care that requires special expertise is clinical nursing. Study programs are focused on training nurses in different areas of nursing care and clinical and medical disciplines in order to be qualified for comprehensive care focused on clinical expertise in providing nursing care in accordance with needs of the
population. The area of intensive care should include a separate study program. The educational programmes should be accessible to nurses working in a critical care environment responsive to the needs of patients. Critical Care Nurse Education Review Forum defines critical care competence as "the combination of skills, knowledge and attitudes, values and technah abilities that underpin safe and effective critical care nursing practice and interventions." Education based on competences dates from 1900 when the first concepts were mentioned in the USA. Carie B. Lenburg has been a leder in the development of competency-based nursing education since the 1970s (Anema et al., 2010 p. 16). Competences can be defined as a combination of knowledge, abilities, skills and attitudes required in a particular context (Cindrić et al., p.216). Nurses in the intensive care unit are faced with technological progress in providing patient care, assessment and monitoring of patients, interventions, therapeutic procedures and preparation of patients for diagnostic procedures. The application of technology is changing the work protocols, it requires ongoing training of all employees in the health system, especially of doctors and nurses. The aim of this paper was to articulate the need for critical care nursing education based on competences in the nursing education

Methods

100 respondents participated in the research – all were nurses working in intensive care units. The research included three clinical hospitals in Zagreb. A questionnaire consisting of 11 questions and 10 statements has been designed for the research. The questions were related to gender, age, qualifications, years of work in the intensive care unit, continuing education in intensive care (attending seminars), length of formal education for nurses in the intensive care units, teaching institution, organization of the study, the type of nursing care in the intensive care unit. The statements included basic competences according to the WHO recommendation from 2003, from the guidelines for nursing education in the field of intensive care nursing. Respondents indicated their degree of agreement, disagreement or neutrality marking their answers on the Likert scale. Descriptive statistics was used for data analysis.

Results

Research included 100 respondents. 95 respondents were female (95%) and 5 respondents were male (5%). Most of the respondents were between the ages of 30 to 39 years (43%) and between the ages of 20 to 29 years (42%), and the smallest number of respondents between the ages of 50 to 59 years (2%). Most of the nurses that
participated in the research finished only secondary school (82 %), 17 % finished a three-year undergraduate study of nursing and 1% of the nurses finished a specialist graduate study program of nursing. The biggest number of the respondents worked in the intensive care units between 1 to 10 years (54%), and 36% between 11 to 20 years, while only 2% of the respondents had more than 31 years of experience in working in the ICU. Continuing education, frequency of attending seminars about the ICU nursing care ranges from 0 to 20 seminars during their employment. 12% of the respondents attended only 1 seminar, 10% 4 seminars, 3% attended 20 seminars, 18% of the respondents have never attended a seminar. 69% of the respondents consider a three-year higher education study necessary for working in the ICU, and 90% believe that nurses need to finish additional two years of specialist study program in intensive care. 43% of the respondents think that a specialist study should be implemented at colleges or polytechnics of applied health sciences and 57% of them think that it should be implemented at universities. 74% of the respondents think that the study should be organized as a part-time study and 26% as a full-time study. Among the respondents, 95% think that the education process should include nursing care in the ICU, clinical practice, organization and management in nursing care and evidence-based nursing care.

The results on agreement, neutrality and disagreement of the respondents with the proposed statements (competences) which students should acquire upon completion of their intensive care studies.

With the first (1) statement „Upon finishing their studies the students will be able to critically analyze the application of nursing care theories in critical care“, 47% respondents agreed, 32% were neutral, and 21 % disagreed with the statement.

With the second (2) statement „Upon finishing their studies the students will be able to explain the correlation between theory, practice and research in critical care“ 60% respondents agreed, 22% were neutral, and 18% disagreed with the statement.

With the third (3) statement „Upon finishing their studies the students will be able to assess the need for nursing care of critically ill patients“, 63% respondents agreed, 22% were neutral, and 15% disagreed with the statement.

With the fourth (4) statement „Upon finishing their studies the students will be able to plan and implement nursing care of critically ill patients based on ethical principles“, 63% respondents agreed, 27% were neutral , and 10% disagreed with the statement.
With the fifth (5) statement “Upon finishing their studies the students will be able to use new technologies in patient care in order to carry out safe and quality nursing care”, 69% of the respondents agreed, 21% were neutral, and 11% disagreed with the statement.

With the sixth (6) statement “Upon finishing their studies the students will be able to take part in diagnostic and therapeutic procedures in the process of critical care, and interpret the results”, 68% of the respondents agreed, 20% were neutral, and 11% disagreed with the statement.

With the seventh (7) statement “Upon finishing their studies the students will be able to analyze pharmacokinetics and pharmacodynamics of medicines used in critical care”, 49% of the respondents agreed, 35% were neutral, and 16% disagreed with the statement.

With the eighth (8) statement “Upon finishing their studies the students will be able to assess the influence of multisystem dysfunctions on the physiological condition of critically ill patients”, 56% of the respondents agreed, 30% were neutral, and 14% disagreed with the statement. With the ninth (9) statement “Upon finishing their studies the students will be able to organize the implementation of nursing care and lead a nursing care team”, 70% of the respondents agreed, 15% were neutral, and 15% disagreed with the statement.

With the tenth (10) statement “Upon finishing their studies the students will be able to participate in the implementation of critical care as a member of a interdisciplinary team”, 68% of the respondents agreed, 22% were neutral, and 10% disagreed with the statement.
The results of the research show that 90% of the respondents think that formal education in intensive nursing care is necessary after a three-year nursing study. 47-70% of the respondents agreed with the statements (competences). 15-35% were neutral and, 10 – 21% of the respondents disagreed with the proposed statements.

The results indicate the need for continuing education after secondary school and after undergraduate nursing study. 82% respondents completed secondary school and the results reveal the need for further education in the intensive care nursing and the recognition of the needs of the intensive care unit employees themselves.

**Discussion**

Survey results indicate the need for further formal education of nurses after completing secondary education and undergraduate study of nursing. 69% of the respondents believe that work in the intensive care unit requires a three-year nursing degree, and 90% of the respondents believe that after finishing a nursing undergraduate study nurses also need to complete a specialist nursing study program in the field of intensive care. Given that 82% of the respondents have completed secondary education, the results indicate recognition of the need for further education in the field of intensive care. In its European Strategy for Continuing Education for Nurses and Midwives in 2003, WHO has set educational goals and competences for nurses the intensive care units. The competencies or learning outcomes have been developed to demonstrate the
achievement of both theoretical and clinical learning in the following areas: specialist clinical practice, care and program management, clinical practice leadership, clinical practice development. (WHO, 2003, p.7). In many countries, the WHO strategies form the basis for curriculum development in intensive care study programs. In this research respondents recorded their agreement, disagreement and neutrality with the proposed 10 key competences in the education of nurses. Average data of agreement, disagreement and neutrality of the respondents to the proposed competencies indicate that 47-70% of the respondents agree with the proposed statements, neutrality was expressed by 15-35% of the respondents, and disagreement with the proposed statements expressed 10-21% of them. With the first statement (competence), "Upon finishing their studies the students will be able to critically analyze the application of nursing care theories in critical care", 47% of respondents agreed with the statement, 32% were neutral and 21% of respondents disagreed. Taking into consideration the level of education, results indicate a lack of familiarity with the health care theories and their implementation in practice. Regarding the seventh statement, "Upon finishing their studies the students will be able to analyze pharmacokinetics and pharmacodynamics of medicines used in critical care", 49% of respondents agreed, 35% were neutral, and 16% of respondents disagreed with the statement. The results were correlated with the level of education of respondents, lack of sufficient knowledge of pharmacodynamics and pharmacokinetics of medicines, as well as the limitations of nurses’ autonomy regarding the treatment process. With the eighth statement "Upon finishing their studies the students will be able to assess the influence of multisystem dysfunctions on the physiological condition of critically ill patients", 56% of respondents agreed with this statement, 30% were neutral, and 14% of respondents disagreed with the statement. Educational content on pathophysiological processes is more represented in the nursing study programs. At the secondary level this educational content is less represented which correlates with the lack of understanding of pathophysiological mechanisms in the development of the disease and lack of articulation of the pathophysiology as an important factor in understanding and defining the nursing diagnoses. The area of clinical judgment is the most sensitive field in nursing and nursing decision-making in this segment is limited. The highest percentage of agreement with the statements (competences) - up to 70% - was about the application of technology and teamwork - the use of new technologies and articulated teamwork in everyday practice. Research
results articulate the needs of nurses for education based on competences that respondents themselves recognized and indicate the orientation towards their adoption. With such large numbers, however, there is a paradigm shift to change priorities into doing the greatest good for the greatest number of people (Cherry et al., 2005. p. 296). The respondents identified all 10 competencies as needed for their jobs, and all competencies for which they needed additional training - especially in the area of nursing theory, pharmacology and pathophysiology.

**Conclusion**

The development of nursing as a profession should be oriented towards several different areas, and these are: self-regulation, the definition and establishment of standards, the development of education and research and the establishment of management and of clinical authority. The results indicate the need for continuing education after secondary school and after the undergraduate nursing study. 82% respondents completed secondary school and the results reveal the need for further education in the intensive care nursing and the recognition of the needs of the intensive care unit employees themselves. The achievement of professional status has consistently been linked to the need for better education (Chiarella et al., 2002. p.2005 to Russel 1990). Nurses must take responsibility for keeping themselves up to date and the entire educational system must take responsibility in recognizing the need for further training. Studies carried out on the process of education of nurses indicate the need for continuous modification of curricula, acceleration within the education system, transformation of one program into another and the attempts to minimize the differences within all systems in Europe and the world.

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PHENOMENON OF GASPING

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Background: The research objective was to determine the knowledge of first aid of the students of paramedical studies at the Faculty of Medicine of Masaryk University. We focused on correct identification of gasping during cardiac arrest and selecting the right procedure for the provision of first aid.

Methods: The examined group included active students of paramedical disciplines – nurse, nutritionists, geriatric nurse and radiology assistant. Additional parameter for their inclusion in the group was completion of first aid learning as a part of their studies at the Faculty of Medicine of Masaryk University. The results of the questionnaire are in Microsoft Excel and transferred to Microsoft Word. Individual items of the questionnaire are listed in the tables in absolute (N) and relative (%) frequencies rounded to one decimal place.

Results: There were 92 (76.6%) respondents who stated that they had experienced gasping, 28 (23.4%) students either do not know or have not encountered this issue. Most information about gasping respondents gained from lectures, which was the case for 75 (56.4%) respondents, from a traineeship it was 29 (21.8%) students, 24 (18 %) respondents drew from literature and 5 (3.8%) respondents quoted another source. The correct formulation of the gasping was answered by 59 (49.1%) respondents. The right answer to the question whether the presence of gasping affects the initiation of cardiopulmonary resuscitation (CPR) and its success was given by 57 (47.5%) respondents, 26 (21.7%) of them answered “probably yes”. 12 (10%) respondents answered “no” and 17 (14.1%) answered “probably not”. 8 (6.7%) respondents were not able to answer. The proper procedure for the provision of first aid in the presence of gasping was chosen by 86 (71.7%) respondents. Incorrectly answered 34 (28.3%) students, of which 11 (9.1%) would place a casualty in the recovery position, 12 (10%) would launch CPR to give mouth-to-mouth breathing and 11 (9.2%) would ensure a patient airway while waiting ambulance arrival. When asked about the prognosis of those afflicted by cardiac arrest with the presence of gasping, 50 (41.7%) respondents correctly believed that their prognosis is better than prognosis of those affected by
cardiac and respiratory arrest. 18 (15%) respondents answered exactly the opposite, 38 (31.7%) students replied that this condition does not affect the prognosis, and 14 (11.6%) respondents did not know.

**Conclusion:** Although 76.6% of respondents answered that they had experience with gasping, only 49.1% quoted the correct formulation of it. Only 47.5% of respondents believe that the presence of gasping affects the initiation of CPR and its success. Nearly a third of respondents (28.3%) are not able to provide first aid when gasping is present. Majority of wrong answers were received from radiology assistants. The survey proved that the issue of gasping, its recognition and its impact on the successful initiation of CPR is not devoted attention it deserved.

**Keywords:** gasping, cardiac arrest, cardiopulmonary resuscitation.

**Introduction**

International Liaison Committee on Resuscitation (ILCOR) associating multinational professional societies such as American Heart Association (AHA), European Resuscitation Council (ERC), Heart and Stroke Foundation of Canada (HSFC), Australian and New Zealand Committee on Resuscitation (ANZCOR), Resuscitation Councils of Southern Africa (RCSA), Inter American Heart Foundation (IAHF) and Resuscitation Council of Asia (RCA) has revised every five years since 2000 Guidelines for resuscitation based on newly discovered evidence of resuscitation medicine.

Guidelines are published in accordance with the principles of evidence-based medicine and they should provide a comprehensive guide for everyday clinical practice. (Černý 2009) However, new guidelines for resuscitation have more far-reaching impact than other medical advice. Instructions for proper performance of CPR should be used by both professional health care providers and general public. Especially help provided by those who witness sudden cardiac arrest usually decides on clinical outcome.

Gasping is characterized by breathing in remarkably long intervals gradually shifting towards an isolated activity of certain muscle groups taking part in the breathing (“carp” mouth opening load) to full arrest. This entire process can take tens of seconds to several minutes from the beginning of collapse. Gasping is a symptom of the early stages of collateral circulation, which takes only a certain period of time.
Gasping is associated with significant cardio-respiratory changes – during CPR improves blood gas exchange in the lungs, has a positive effect on changes in intra-thoracic pressure and increases venous return, cardiac contractility, aortic pressure and cardiac output. It improves also coronary perfusion and has a positive effect on cerebral circulation by reducing intracranial pressure and increased carotid perfusion. (Knor 2009)

According to the research made by Professor Bobrov and his team from Arizona in 2008 the incidence of gasping for cardiac arrest is common and it is associated with a higher chance of survival. Those affected by cardiac arrest, who not received CPR before the arrival of ambulance, had in a case of gasping higher survival (21%) than those without an evidence of gasping (6.7%). Patients with occurrence of gasping who received CPR before the arrival of ambulance had higher chance of survival (39%), unlike those without an evidence of gasping (9.4%).

During resuscitation the resurfacing of gasping might be interpreted as a sign of recovery of breath, so resuscitation effort is often interrupted. Gasping occurring during resuscitation it is not a sign of recovery, but it is a sign of an effective resuscitation which should continue, because the chance of survival for those patients is greater. In the presence of gasping there is no requirement for assisted ventilation. The recognition of gasping and its importance for patients with primary cardiac arrest is critical for successful resuscitation. (Bobrow 2008) However this phenomenon is not very pronounced and it is neglected in the education of health professionals as well as the general public.

Informal assistance should begin by identifying sudden cardiac arrest. Due to the high incidence of gasping respiration (for the observed cardiac arrest it is 55%) this initial step causes still great difficulties for laymen.

After finding the unconscious (the breakdown of a person unresponsive to external stimuli, such as shaking and speakerphone) it is followed by tilting the head to open the airway and lifting the chin and assessing the condition of breathing. It should not take longer than 10 seconds (look, listen and feel).
If not breathing, or if there is a presence of terminal gasping it must be immediately initiated indirect heart massage. At the same time it is called an ambulance (155) and, if available, it is used an automated external defibrillator (AED).

Knowledge of the importance of gasping will contribute to more frequent implementation of resuscitation. Those who will provide CPR will be assured that there is no need to hesitate to start a heart massage as well as no need to give mouth-to-mouth breathing while overcoming barriers both aesthetic and fear of infection.

Methods

The research was conducted by quantitative method using an anonymous questionnaire, which has the advantage of rapid acquisition of data from a large number of respondents. However, the data obtained through questionnaire are conditional and might be influenced by subjective opinion of respondents.

The examined group included active students of paramedical disciplines – nurse, nutritionists, geriatric nurse and radiology assistant. Additional parameter for their inclusion in the group was completion of first aid learning as a part of their studies at the Faculty of Medicine of Masaryk University.

Distributed questionnaire contained 10 items, from which 8 were closed questions, one semi-open and one was open question. Questions were formulated with regard to the theme and objectives of this paper. Items No. 1 and No. 2 contained identifying information, items No. 3 to No. 10 included questions concerning chosen topic. For questions No. 1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 14, 15 and 16 there was only one possible answer, for question No. 4 respondents could select from more answers. The full text of the questionnaire is shown in Appendix 1.

In May 2013 there was conducted preliminary research section of a selected group of ten respondents in order to assess the clarity of the questions and their evaluation. The final form of the questionnaire was prepared on the basis of this pretest. Because there was no fundamental change in the overall concept questionnaire, questionnaires were subsequently included in the actual survey. Respondents had the opportunity to respond to the questionnaire during June this year being in personal contact with the authors of the questionnaire.

The results of the questionnaire are in Microsoft Excel and transferred to Microsoft Word. Individual items of the questionnaire are listed in the tables in absolute (N) and
relative (%) frequencies rounded to one decimal place. Correct answers in the tables are marked in red. Some tables are accompanied by a pie chart.

**Results**

Total number of distributed questionnaires was 125, of which 5 (4%) questionnaires were excluded from the investigation for incomplete or incorrectly completed entries. 120 (96%) completed questionnaires were used for empirical treatment which is presented for further processing as a 100% sample, i.e. $n = 120$.

<table>
<thead>
<tr>
<th>Subject studied</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General nurse</td>
<td>17</td>
<td>14.2</td>
</tr>
<tr>
<td>Nutritional therapist</td>
<td>41</td>
<td>34.1</td>
</tr>
<tr>
<td>Geriatric nursing</td>
<td>47</td>
<td>39.2</td>
</tr>
<tr>
<td>Radiology assistant</td>
<td>15</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>120</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Of the total sample of respondents, most of them came from the study of geriatric nursing and nutritional therapist, i.e. 47 (39.2%) and 41 (34%) respectively. There were 17 (14.2%) general nurses and 15 (12.5%) respondents from degree course of radiology assistant.

<table>
<thead>
<tr>
<th>Type of employment</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary job</td>
<td>5</td>
<td>4.2</td>
</tr>
<tr>
<td>Traineeship</td>
<td>22</td>
<td>18.3</td>
</tr>
<tr>
<td>Full-time job</td>
<td>39</td>
<td>32.5</td>
</tr>
<tr>
<td>Without job</td>
<td>54</td>
<td>45</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>120</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

While studying, 39 (32.5%) respondents are working in health care, 22 (18.3%) respondents are doing a traineeship and 5 (4.2%) respondents are working in health care on a temporary basis. 54 (45%) respondents from the investigation sample have
not been working yet in health care because they will do a traineeship in next semesters after completion of first aid.

Table 3. Experience with gasping

<table>
<thead>
<tr>
<th>Answer</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>92</td>
<td>76,6</td>
</tr>
<tr>
<td>No</td>
<td>23</td>
<td>19,2</td>
</tr>
<tr>
<td>Not know</td>
<td>5</td>
<td>4,2</td>
</tr>
<tr>
<td>Sum</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

There were 92 (76.6%) respondents who stated that they had experienced gasping, 28 (23.4%) students either do not know or have not encountered this issue.

Table 4. Where to get experience with gasping

<table>
<thead>
<tr>
<th>Where</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>75</td>
<td>56,4</td>
</tr>
<tr>
<td>Traineeship</td>
<td>29</td>
<td>21,8</td>
</tr>
<tr>
<td>Literature</td>
<td>24</td>
<td>18,0</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>3,8</td>
</tr>
<tr>
<td>Sum</td>
<td>133</td>
<td>100</td>
</tr>
</tbody>
</table>

Respondents could choose from several options. Most information about gasping respondents gained from lectures, which was the case for 75 (56.4%) respondents, from a traineeship it was 29 (21.8%) students, 24 (18%) respondents drew from literature and 5 (3.8%) respondents quoted another source.
Table 5. The correct formulation of the gasping

<table>
<thead>
<tr>
<th>Formulation of the gasping</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Gasping is a symptom of the early stages of cardiac arrest with characteristic gasping in remarkably long intervals</td>
<td>59</td>
<td>49,1</td>
</tr>
<tr>
<td>b) Gasping (&quot;carp mouth opening load) occurs with shortness of breath with preserved heartbeat</td>
<td>27</td>
<td>22,5</td>
</tr>
<tr>
<td>c) Gasping is characteristic breaths in remarkably long intervals leading to cardiac arrest.</td>
<td>23</td>
<td>19,2</td>
</tr>
<tr>
<td>d) Gasping is a sign of extreme breathlessness</td>
<td>11</td>
<td>9,2</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>120</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The correct answer was identified by 59 (49.1%) respondents, which means that more than half of the students, i.e. 61 (50.9%) do not know the correct answer.

Table 6. The presence of gasping and its impact on the successful initiation of CPR

<table>
<thead>
<tr>
<th>Impact on CPR</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>57</td>
<td>47,5</td>
</tr>
<tr>
<td>Probably yes</td>
<td>26</td>
<td>21,7</td>
</tr>
<tr>
<td>Not</td>
<td>12</td>
<td>10,0</td>
</tr>
<tr>
<td>Probably not</td>
<td>17</td>
<td>14,1</td>
</tr>
<tr>
<td>Do not know</td>
<td>8</td>
<td>6,7</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>120</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Here we dealt with question whether the presence of gasping affects the initiation of CPR and its success. Correct answer “yes” was cited by 57 (47.5%) respondents, 26 (21.7%) of them answered “probably yes”. 12 (10%) respondents answered “no” and 17 (14.1%) answered “probably not”. 8 (6.7%) respondents did not know whether the presence of gasping affects the initiation of CPR.
Table 7. The proper procedure for the provision of first aid

<table>
<thead>
<tr>
<th>Provision of CPR</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Save the casualty in the recovery position with a clearing airway</td>
<td>11</td>
<td>9,1</td>
</tr>
<tr>
<td>b) Launch CPR to give mouth-to-mouth breathing</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>c) Ensure a patient airway while waiting ambulance arrival</td>
<td>11</td>
<td>9,2</td>
</tr>
<tr>
<td>d) Release an airway and begin indirect heart massage</td>
<td>86</td>
<td>71,7</td>
</tr>
<tr>
<td>Sum</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

The proper procedure for the provision of first aid in the presence of gasping was chosen by 86 (71.7%) respondents. Incorrectly answered 34 (28.3%) students, of which 11 (9.1%) would place a casualty in the recovery position, 12 (10%) would launch CPR to give mouth-to-mouth breathing and 11 (9.2%) would ensure a patient airway while waiting ambulance arrival.

Table 8. The prognosis for cardiac arrest with presence of gasping

<table>
<thead>
<tr>
<th>The prognosis</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worse than prognosis for cardiac and respiratory arrest</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>Better than prognosis for cardiac and respiratory arrest</td>
<td>50</td>
<td>41,7</td>
</tr>
<tr>
<td>Have no impact on the prognosis</td>
<td>38</td>
<td>31,7</td>
</tr>
<tr>
<td>Do not know</td>
<td>14</td>
<td>11,6</td>
</tr>
<tr>
<td>Sum</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

When asked about the prognosis of those afflicted by cardiac arrest with the presence of gasping, 50 (41.7%) respondents correctly believed that their prognosis is better than prognosis of those affected by cardiac and respiratory arrest. 18 (15%) respondents
answered exactly the opposite, 38 (31.7%) students replied that this condition does not affect the prognosis, and 14 (11.6%) respondents did not know.

**Table 9. Interested in information on this subject**

<table>
<thead>
<tr>
<th>Have an interest</th>
<th>Absolute frequency (N)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>106</td>
<td>88.3</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>11.7</td>
</tr>
<tr>
<td>Sum</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

Most respondents 106 (88.3%) are interested in further information on this issue, while 14 (11.7%) students do not seem to be interested in.

**Discussion**

The aim of our research was to determine respondents' knowledge of the provision of basic CPR when gasping is present.

Exploratory survey was attended by 120 (100 %) students, of which most respondents were students of nursing in geriatrics in the number of 47 (39.2%) and 41 (41%) were nutritional therapists. Exploratory investigation was also attended by 17 (14.2%) general nurses and 15 (12.5%) students from degree course in radiology assistant.

While studying, 39 (32.5%) respondents are working in health care, of which the majority comes from geriatric nursing as a form of its studies is combined. Another 22 (18.3%) respondents are doing a traineeship and 5 (4.2%) respondents are working in health care on a temporary basis. 54 (45%) respondents from the investigation sample have not been working yet in health care because they will do a traineeship in next semesters after completion of first aid.

In item No. 3 there were 92 (76.6%) respondents who stated that they had experienced gasping, 28 (23.4%) students either do not know or have not encountered this issue. Given the fact that degree course of radiology assistants do not have in its accreditation a separate subject of first aid, the students come across this issue for the first time in nursing lectures. Based on the results we admission of their first aid education is inadequate.
Item No. 4 was answered only by those who have experience with gasping, where they could choose from several options. Most information about gasping respondents gained from lectures, which was the case for 75 (56.4%) respondents, from the practice it was 29 (21.8%) students, 24 (18%) respondents drew from literature and 5 (3.8%) of them quoted another source.

For Item No. 5 respondents had to state a correct formulation of the gasping. The correct answer was identified by 59 (49.1%), which means that more than half of the students - 61 (50.9%) do not know the correct answer. Olga Škaroupková (2009) in her thesis titled "Resuscitation provided by of non-medical staff working in geriatric beds" shows the result focused on identifying of gasping. In her survey only 25 respondents (22.3%) answered correctly. At the same time recognizing the signs of cardiac arrest is crucial for early initiation of CPR. The correct answer is that we start CPR if the victim after tilting the head will not start breathing or if he/she is not breathing physiologically, i.e. gasping. Here we can state that even practical experience does not affect the level of knowledge in first aid.

Item No. 6 dealt with question whether the presence of gasping affects the initiation of CPR and its success. Correct answer “yes” was cited by 57 (47.5%) respondents, 26 (21.7%) of them answered “probably yes”. 12 (10%) respondents answered “no” and 17 (14.1%) answered “probably not”. 8 (6.7%) respondents did not know whether the presence of gasping affects the initiation of CPR.

In our survey, the proper procedure for the provision of first aid in the presence of gasping was chosen by 86 (71.7%) respondents. Incorrectly answered 34 (28.3%) students, of which 11 (9.1%) would place a casualty in the recovery position, 12 (10%) would launch CPR to give mouth-to-mouth breathing and 11 (9.2%) would ensure a patient airway while waiting ambulance arrival. This means that less than thirty percent of respondents could not correctly provide first aid in a case of cardiac arrest, which will be fatal for the afflicted.

In items 8 we examined what is the prognosis of those afflicted by cardiac arrest with the presence of gasping. 50 (41.7%) respondents correctly believed that their prognosis is better than prognosis of those affected by cardiac and respiratory arrest. 18 (15%) respondents answered exactly the opposite, 38 (31.7%) students replied that this
condition does not affect the prognosis, and 14 (11.6%) respondents did not know. This means that more than half of the respondents did not answer the question correctly.

**Conclusion**

In our research we were looking for verifying the knowledge of the students of paramedical studies on the issue of gasping and right procedure for the provision of first aid when gasping is present.

We can conclude that although 76.6% of respondents answered that they had experience with gasping, only 49.1% quoted the correct formulation of it. Only 47.5% of respondents believe that the presence of gasping affects the initiation of CPR and its success.

Nearly a third of respondents (28.3%) are not able to provide first aid when gasping is present. Majority of wrong answers were received from radiology assistants. We attributed this to the fact that this specialization is the only branch which does not have in its accreditation a subject of first aid. This issue is taught only in a very small period of time within Basic Nursing. Given the results we recommend to include first aid in radiology assistant curriculum.

To conclude, the survey proved that the issue of gasping, its recognition and its impact on the successful initiation of CPR is not devoted attention it deserved.

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