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User stories can help you to shape the design of an educational project: experience from WAVES

Finding overlapping terms in medical and health care curriculum using text mining methods: rehabilitation representation – a proof of concept

The level of emotional intelligence of nurses providing care for older people in retirement homes in the Czech and Slovak Republic Nursing study programme in Slovakia focusing on the first degree of university education

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# **EDITOR'S PREFACE**

It is with great pleasure that we present the 2nd 2016 issue of the MEFANET Journal (MJ). MJ is dedicated to provide readers around the world with high quality peer-reviewed articles on a wide variety of topics related to applications of computer science and technology-enhanced learning in medical education. Its mission is to become the premier vehicle for disseminating information about MEdical FAculties NETwork (www.mefanet.cz), which covers all Czech and Slovak medical faculties as well as schools or faculties of health care sciences.

This second issue encompasses a tutorial, three original articles and an editorial report. The tutorial by Schwarz & Kavia exemplifies the multidisciplinarity of medical education. The authors describe successful implementation of user stories in the early stage of a European project aiming at widening access to virtual educational scenarios. The user stories are one of the primary development artifacts which are typically encountered in agile software programming teams – the tutorial demonstrates, however, their use by developers of virtual scenarios engaged in clinical reasoning and critical thinking skills. Karolyi et al. focus on text mining algorithms and demonstrate their use in an interesting case study dealing with rehabilitation and physical medicine. The original article by Pokorná et al. identifies the level of emotional intelligence in nurses and utilizes data analytics to uncover that the age, experience and education is an important factor in nurses' emotional intelligence. Hudáková et al. describe the nursing study programmes in Slovakia and illustrate the constant need for further work and evidence supporting the academic education of nurses. The editorial by Chlupová et al. addresses the 8th AKUTNE.CZ Annual Congress, which was held in Brno in November 2016 and which attracted more than 920 participants interested in acute medicine and various medical simulation modalities.

I would like to extend my sincere gratitude to the editorial board members and reviewers, without whom this issue would not have been possible. I would like to see the complete fourth volume of the MEFANET Journal as an additional valuable resource for the MEFANET community and a stimulus for further research into the vibrant area of medical education science. The wide range of topics presented in this issue emphasizes the complexity of the use of information and communication technologies in medical education. Readers are encouraged to submit both comments on these articles and their own relevant manuscripts.

December 2016

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Daniel Schwarz Editor-in-chief

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# USER STORIES CAN HELP YOU TO SHAPE THE DESIGN OF AN EDUCATIONAL PROJECT: EXPERIENCE FROM WAVES

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### KEYWORDS

virtual scenarios; scenario-based learning; user requirements; user stories; software development



**ABSTRACT** — Interactive virtual scenarios and simulations in scenario-based learning are recognised by many teaching and learning communities as effective tools for developing reasoning, and for safe training in workplace competency. The WAVES project takes scenario-based learning 'out-of-the-box', to make it more accessible for a wide range of professions. User stories – the common artefacts used in many agile software development techniques – were used in the early stage of the WAVES project to shape future developments of existing software for authoring and playing virtual scenarios. The use of a specific template of a user story together with a gaming activity for sorting of all obtained user stories helped to simplify and accelerate the creation of user requirement specification document.

# BACKGROUND

The ERASMUS+ funded project entitled Widening Access to Virtual Educational Scenarios (WAVES) combines skill sets of both academic and enterprise partners to make Scenario-Based Learning (SBL) more accessible for a wide range of professions. SBL techniques are widely recognised as a key tool in the educational toolkit, for safe training in competency and decision-making [1]. There are several technical activities in the WAVES project, aiming at shaping upcoming developments of software – already available for authoring and playing virtual scenarios. As in any other projects involving a software development activity, the first step is to determine needs by composing a User Requirements Specification document (URS).

Creation of a URS document is said to be the single most important element in many guidelines, practices or event project management methodologies.



FIGURE 1. The V-model of the Systems Engineering Process. Image extracted from [2]

TABLE 1. Key-messages for End-User Specifications – identified in the dataset gathered during the on line survey

- KM1 The majority of responders feel that there is not sufficient content available online for learning through scenarios (58.3%), whereas only minority feels the opposite (15.2%).
- KM2 Relevance, usability, reputation of the course provider and interactivity are the five most important features of on-line learning activities.
- PC/Mac/Laptop is the most required device to access online learning (94.8%). More than half of responders
   prefer also smartphones or tablets. Educators and content developers report the need for mobile devices more frequently (61%) than learners (51%).
- KM4 Integration with existing systems (e.g. LMS) is a problem that should be addressed. Learners reported the lack of integration as one of the drawbacks of the existing scenario software. Educators as well as technologists pointed out the integration as the most important feature of an online learning platform to be implemented/ developed.

User's role	Scope	Category	Number
Learner	SBL	SBL-LEARNER	19
Educator	SBL	SBL-EDUCATOR	24
Technologist	SBL	SBL-TECHNOLOGIST	12
Learner	MOOCs	MOOCs-LEARNER	12
Educator	MOOCs	MOOCs-EDUCATOR	8
Technologist	MOOCs	MOOCs-TECHNOLOGIST	3

TABLE 2. Numbers of user stories in different categories

For instance, Good Automated Manufacturing Practice (GAMP), which was widely adopted by the pharmaceutical industry, includes a risk-based approach to computerized systems [3]. This approach can be explained by the V-model of the systems engineering process, which contrasts the specifications produced for a system to the testing performed as part of a verification process, see Figure 1.

The recent agile methodologies (see [3] for agile software development) for managing software development processes often shift the focus from writing about URS to talking about the requirements. Agile software development emphasizes frequent deliveries of working software, close customer collaboration and ability to respond quickly to changes. The particular agile methodologies (e.g. SCRUM or KANBAN) deliver set of development artefacts, among them are user stories – written as simple reminders to a conversation with project stakeholders or customers.

In the next sections, we show our approach to the creation and the use of user stories in the early stage of the WAVES project..

### WAVES ON-LINE SURVEY

A 44-item on-line survey was developed by the project partners and distributed via email, social media, and websites in April 2016. In total, 161 participants from 21 different countries responded to the questions. There were participants from all main target groups of the project – learners, educators, and technologists. The survey covered questions on general online learning resources, Scenario-Based Learning and Massive Open Online Courses. Selected results from the survey are summarized in Figure 2. Several key-messages identified in the obtained data are summarized in Table 1.

# **USER STORIES**

User stories were extracted from the dataset coming from need analysis. A crucial attention was paid to the answers to the open questions in the on-line survey and to the answers obtained during focus groups.

The stories were rewritten into business language (not technical) in this specific format:

(E.g.: **As a** learner, **I** want to join a scenario by entering my credentials which I am using at my home institution, **so that** I can be authenticated without need to create/remember a new account.)

There were 78 user stories mined from the dataset and classified into 6 different categories, see Table 2.

### Agile sorting

During the WAVES project kick-off meeting (June 2016), the group of 15 experts in the field of technology-enhanced learning and medical education was subdivided into three working subgroups. Each subgroup assigned one of three importance/relevance-label to each user story: (i) top priority, (ii) nice to have, (iii) not required. During this activity, the working group decided to concentrate mainly on the SBL-LEARNER and SBL-EDUCATOR categories. See Figure 3 for the pictures taken during the agile sorting activity.

### TABLE 3. The 11 most important user stories in the SBL-LEARNER category

Story [SBL-LEARNER]	Score
As a learner, I would like SBL to be based upon realistic cases, in order to learn effectively	6
As a learner I want SBL to be as realistic and authentic as possible, so that learners feel engaged	6
As a learner I would like SBL to allow me to experience the consequences of my decisions rather than simply asking me questions, so that I can learn in a safe environment what I will need to apply in my workplace	6
As a learner I want SBL to be realistic and engaging, so that it better prepares me for real life situations	6
As a learner I want SBL to be free from technical barriers, so that I can focus on learning	6
As a learner I want to be able to apply my learning through SBL to my real-life clinical practice, so that the learning has real value to me	6
As a learner when using SBL I want the decisions I make to matter, so that I can better remember the outcomes	6
As a learner, I need to see and reflect upon the consequences of my actions, so that I can assess the learning through simulated scenarios as useful	6
As a learner I want SBL to be closely linked with my intended learning outcomes, so that it best prepares me for my assessments	5
As a learner I want scenario based learning to be placed in context including theories and concepts, so that I can thoroughly understand the subject	4
As a learner, I would like to work with other real people in the SBL system, so that I can be involved in simulation of real life discussions	4

#### TABLE 4. The 13 most important user stories in the SBL-EDUCATOR category

Story [SBL-LEARNER]	Score
As an educator I would like SBL to be integrated with other existing systems, so that I can build complex eLearning environment	6
As an educator I want virtual SBL to be realistic/authentic, so that it reflects the reality the learner will experience in their workplace and so make the learning more engaging and relevant	6
As an educator, I think it not easy to create SBL/VP modules, so I would like to have better support and guidance, so that content can be created more efficiently	6
As an educator, I want the SBL platform to be integrated with the institutional LMS, so that resource fragmentation is prevented	6
As an educator, I intend my developed online content to be accessed on all kinds of devices, so that my learners are able to do instant and self-paced learning	6
As an educator, I prefer to develop decisions, options and apply consequences for them, so that my scenarios can be relevant to real life	6
As an educator, I need to be guided on how to design SBL, so that I can create my scenarios in a reasonable time and achieve high quality including good -wrong paths- which are usually the hardest thing to develop	6
As an educator I would like a method for monitoring learner's progress at a scenario level, so that I can approach my learners individually and provide a kind of personalized learning	5
As an educator I would like to see scenarios designed for different devices dependent upon the activity and the opportunity to learn, so that my learners can take best use of created content	5
As an educator, I would like to see what my students are doing without destroying their safe learning environment, so that my students feel free making errors and I still get a brief overview about the usage	5
As an educator I want to be able to provide instant feedback to my learners through SBL, so that they can immediately understand the consequences of the decisions that they have made	5
As an educator I want to have tools that are simple to use and well-documented, so that I can fully understand how the tools can be used educationally	5
As an educator I want to be able to easily preview my scenario on the fly while creating it, so that I can more quickly and easily understand how my scenario might be interpreted by learners	5



	1st	2nd	3rd	Total	Weighted Average
Engaging using audio with alerting signals	24.32%	32.43%	43.24%		
	9	12	16	37	2.19
Engaging using audio with sound bites from key opinion leaders	27.27%	45.45%	27.27%		
	12	20	12	44	2.00
Engaging using tactile methods by vibrations on handheld devices to alert	25.00%	25.00%	50.00%		
	2	2	4	8	2.25
Textually engaging by highlighting key messages	20.83%	29.17%	50.00%		
	10	14	24	48	2.29
Textually engaging by using infographics	26.79%	33.93%	39.29%		
	15	19	22	56	2.13
Visually engaging with animated sequences	59.77%	27.59%	12.64%		
	52	24	11	87	1.53
Visually engaging with static imagery and icons	19.15%	38.30%	42.55%		
	0	10	20	47	2.22

FIGURE 2A. Selected results from the on-line survey: Question 9 – How learning like their online learning to be presented



	1st	2nd	3rd	Total	Weighted Average
Visually engaging with static imagery and icons	<b>21.21%</b> 7	<b>42.42%</b> 14	<b>36.36%</b> 12	33	2.15
Visually engaging with animated sequences	<b>54.17%</b> 39	<b>22.22%</b> 16	<b>23.61%</b> 17	72	1.69
Engaging using audio with alerting signals	<b>14.29%</b> 2	<b>50.00%</b> 7	<b>35.71%</b> 5	14	2.21
Engaging using audio with sound bites from key opinion leaders	<b>27.78%</b> 10	36.11% 13	<b>36.11%</b> 13	36	2.08
Textually engaging by highlighting key messages	<b>30.56%</b>	<b>41.67%</b> 15	<b>27.78%</b> 10	35	1.97
Textually engaging by using infographics	20.00% 9	<b>35.56%</b> 16	<b>44.44%</b> 20	45	2.24
Engaging using tactile methods by vibrations on handheld devices to alert	<b>41.67%</b> 5	<b>16.67%</b> 2	<b>41.67%</b> 5	12	2.00

FIGURE 2B. Selected results from the on-line survey: Question 22 – What educators think learners want their online learning to be presented



Being able to relate my constraints of the second s

Answer C	hoices	Responses	
Seei	ng and reflecting upon the consequences of my actions	75.89%	85
Bein	g able to make decisions	75.89%	85
View	ing multimedia resources	33.93%	38
Rece	iiving a score/mark	23.21%	26
Bein	g able to relate my learning to real life	74.11%	83
Lear	ning/practicing in a safe environment	56.25%	63
Using concrete real world examples		71.43%	80
Othe	r (please give an example)	7.14%	8
Total Res	pondents: 112		
	Other (please give an example)	Date	
1	getting feedback	4/4/2016 2:03 PM	
2	Seeing the contracturences of my actions for different actions	4/1/2016 11:38 414	

FIGURE 2C. Selected results from the on-line survey: Question 13 – What education aspects of learning with SBL is most useful? Q27 What features are/would be important to you when designing/creating scenario based learning activities? (Select all that apply)



Answer (	hoices	Responses	
I do	not currently design scenario-based learning	26.19%	22
Bein	g able to develop decisions and options	67.86%	57
Impl	ementing multimedia resources	39.29%	33
Appl	ying scoring or marks	28.57%	24
Appl	ying consequences for action	57.14%	48
Crea	ting standardised and repeatable training	35.71%	30
Othe	r (please specify)	3.57%	3
Total Res	pondents: 84		
#	Other (please specify)	Date	
1	Having high quality scenario including high quality -wrong paths- which is usually the hardest thing to develop.	3/31/2016 12:14	PM
2	relevant to real life	3/31/2016 5:57 AM	
3	Replicating live systems	3/29/2016 7:48 P	м

FIGURE 2D. Selected results from the on-line survey: Question 27 – What educators think are important features when creating SBL?



38.75%	31
26.25%	21
17.50%	14
43.75%	35
60.00%	48
35.00%	28
11.25%	9
	38.75% 28.25% 17.50% 43.75% 60.00% 35.00% 11.25%

**FIGURE 2E.** Selected results from the on-line survey: Question 28 - What educators think are the main barriers to widespread use of SBL?



FIGURE 3. Agile card sorting activity during the WAVES project kick-off meeting

# Scoring

In order to recognize the most important user stories, the number of hits was counted for each story from each subgroup and these numbers were then used to compute the importance/relevance score – as a weighted average. Both tables 3 and 4 show the most important user stories in each category. All stories with their hit numbers and the final scores can be found in the resulting deliverable [4].

# CONCLUSIONS

The user requirements specification document is composed with the use of user stories – ordered by score, which represents the importance of the requirement and its relevance to the objectives of the project. There are many user stories touching on pedagogical issues, teaching/learning content and content authoring. These have been rephrased into two concluding end-user requirements:

- As a learner I want scenario based learning to be delivered through realistic means and media with impactful consequences so that it is engaging and useful for real life situations.
- As an educator I want an easy to use and powerful SBL authoring toolkit that can integrate realistic authentic means of interaction for impactful SBL educational episodes.

Although the presented specification is focused mainly on pedagogy aspects, some purely technical requirements are expressed predominantly as well:

- ► As a learner I want SBL to be free from technical barriers, so that I can focus on learning.
- As an educator I would like scenario based learning to be integrated with other existing systems, so that I can build complex eLearning environment.
- ► As an educator, I want the SBL platform to be integrated with the institutional LMS, so that resource fragmentation is prevented.
- As an educator, I intend my developed online content to be accessed on all kinds of devices, so that my learners are able to do instant and selfpaced learning.

In the following steps of the WAVES project, the user stories with the highest scores will be used: (i) to shape the directions of the developments in the technical work package and tasks; (ii) as a basis for quality control – acceptance tests may be derived from them, as there is the satisfaction component expressed clearly (iii) to acknowledge what non-technical support and guidance will need to be developed to aid the technical developments and knowledge of SBL for scenario creators. The authors of this tutorial believe that the user stories may be useful in other projects and more widely, as they help significantly in simplifying the process of composing the user requirements specification document.

Daniel Schwarz

### ACKNOWLEDGEMENT

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### REFERENCES

- WAVES Project Overview [Online]. Available at WWW: http://wavesnetwork.eu/index.php#page-project-overview. [Accessed: 25-Jan-2017].
- [2] Osborne L, Brummond J, Hart R, Zarean MM, Conger S. Clarus Concept of Operations. Publication No. FHWA-JPO-05-072, Federal Highway Administration (FHWA) 2005.
- [3] Beck K et al. Manifesto for Agile Software Development. Agile Alliance 2001.
- [4] WAVES D1.2 End-User Specification, [Online]. Available at WWW: http://wavesnetwork.eu/res/file/user-specification.pdf. [Accessed: 25-Jan-2017].

# FINDING OVERLAPPING TERMS IN MEDICAL AND HEALTH CARE CURRICULUM USING TEXT MINING METHODS: REHABILITATION REPRESENTATION – A PROOF OF CONCEPT

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natural language processing; curriculum; education; medical; rehabilitation



**ABSTRACT** — **Background:** Various institutions dealing with higher medical and healthcare education have different methods of organising their study programmes, which typically involve hundreds of theoretically and clinically focused courses. The importance of a well-balanced curriculum is indisputable – the society needs qualified doctors because people's health is necessary for the functioning and development of the entire society.

**Objectives:** In this paper, we introduce our innovative approach to identify overlaps among medical or healthcare disciplines using term similarity. A close attention is focused on the discipline of Rehabilitation and Physical Medicine and its role in the General Medicine study field in the Faculty of Medicine at Masaryk University.

### **Methods:** Data and text mining techniques were used in practice, in accordance with a time-tested methodological background, which systematically covers all fundamental steps to discover and to extract knowledge from data repositories. In order to extract term similarities from a medical curriculum dataset, the CRISP-DM reference model was chosen as a well-documented practical guideline.

**Results:** The achieved results clearly demonstrate overlapping areas among the defined disciplines in the explored curriculum. The resulting comprehensive analytical report presents the term occurrence in a set of figures and tables, which were thoroughly evaluated by experts familiar with the curriculum design process.

**Conclusions:** In this case study, we have proposed an innovative method for identifying overlaps of terms occurring in medical and healthcare disciplines when compared to the discipline of Rehabilitation and Physical Medicine. The first results are promising in the sense of face validity. We believe that this approach can be used similarly to gain an objective overview of the entire curriculum.

# INTRODUCTION

Correctly compiled and balanced curricula are an essential prerequisite for undergraduate medical and healthcare education [1]. Various institutions dealing with this kind of education have different methods of organising their study programmes, which typically involve hundreds of theoretically and clinically focused courses. Their curricula – in the form of compulsory, compulsorily optional, and optional courses – are available to students and teachers in various local online environments. These platforms, typically learning management systems (LMSs) and curriculum management systems (CurrMSs), can provide a very comprehensive description of the entire study programme structure including a detailed curriculum content.

Medicine is one of the widest branches of knowledge. The progress in medical research (including new findings, therapeutic procedures, laboratory and imaging methods etc.) is very fast [2–4]. That is why the compilation of the General Medicine (GM) curriculum is a very complex problem, which is really difficult to solve. However, the importance of a well-balanced curriculum is indisputable – the society needs qualified physicians who will look after people's health. Moreover, most physicians make every effort to treat patients according to their best knowledge and conscience. A well-balanced curriculum must guarantee that each medical student gets as much knowledge in a specific branch of medicine as it is needed for him/ her to be able to start working in the corresponding department after his/her graduation and, at the same time, he/she should get enough knowledge of all other branches of medicine in order to be able to effectively cooperate with his/her colleagues and to make appropriate decisions on diagnostic and therapeutic procedures.

The last decade has seen an increasingly growing trend towards the integration of automated natural language processing (NLP) techniques for obtaining relevant information from large amounts of data from the medical domain [5-7]. As regards the domain of curriculum innovation and its complexity, these methods could explore information-rich relations between the individual curriculum parts and contribute to a better transparency of a global overview. In this paper, we introduce our innovative approach to identify medical and healthcare disciplines overlaps using term similarity. A close attention is focused on one particular discipline, namely the Rehabilitation and Physical Medicine (RPM), and its role in the GM study field. We have investigated an effective model for a computer-assisted discipline comparison based on keywords representation. In our particular case, we have deeply analysed selected curriculum text-based descriptive parameters from the OPTIMED CurrMS [8]. OPTIMED has been developed and implemented in the Faculty of Medicine at Masaryk University (FM MU) in Brno, Czech Republic, and nowadays provides an essential support during curriculum planning, creation, management, and optimisation. It already covers a huge amount of data: 1,347 learning units and 6,974 learning outcomes, i.e. more than 2,500 standard pages of text.

# The role of rehabilitation in the curriculum of the General Medicine study programme

General Medicine (GM), the largest study field at FM MU, does not involve any separate RPM course. RPM is taught as part of two courses, namely Internal Medicine – Block 5, and Orthopaedics and Rehabilitation – Practice [9]. Apart from these two courses, a computer-assisted search for the representation of this discipline has to be done in all other courses of GM; in this way, we can find out whether the entire curriculum contains essential concepts of this medical discipline or not.

In general, RPM is an interdisciplinary branch of medicine closely linked to all other medical disciplines. Professor Pavel Kolář [10] defines the rehabilitation as follows: "Treatment rehabilitation is an integral part of healthcare and includes a complex of rehabilitative, diagnostic, therapeutic and organisational actions directed toward reaching an individual's maximum functional potential and establishing conditions for its achievement. Treatment rehabilitation can be provided in the form of inpatient care, outpatient care and specialised care in treatment institutions, including balneological centres. It should be initiated in all areas of clinical specialties, including intensive care units (ICU) during the period of acute inpatient medical care."

The postgraduate education of physicians encompasses a lot of interconnections between rehabilitation topics and other medical disciplines, too. In the Czech Republic, a graduate student must complete the socalled specialised education of physicians, involving a two-year common trunk followed by a basic branch (the final specialisation) to be allowed to work individually [11]. The majority of these branches are preceded by only one or two common trunks (for example, the internal medicine trunk or the paediatric medicine trunk precede the infectious medicine branch; the internal medicine trunk is a prerequisite of the angiology branch, etc.). However, the choice of the common trunk preceding the RPM branch is wider: a graduate student can choose one of five different common trunks to continue with the RPM branch, specifically the internal, surgical, paediatric, orthopaedic or neurological trunk.

The above-mentioned definition of rehabilitation and the postgraduate education description, as well as the experience from the clinical stage of medical education, imply that the knowledge of this discipline is really important for medical students and graduates. If a physician – a specialist in any medical discipline – has at least basic knowledge of rehabilitation, he/she will be able to apply it in his/her practice or contact a colleague specialised in rehabilitation at the right time and send a patient with mobility problems to the right place.

The global objective of this study was to find out how to measure the content similarities – based on keywords occurrence – among medical and healthcare disciplines from OPTIMED and RPM.

# **METHODS**

Using NLP techniques in practice should be based on a time-tested methodological background, which systematically covers all fundamental steps to discover and to extract knowledge from collected datasets. In general, standards establishment in the data-mining sphere always has to be taken into account. For the purpose of finding term similarities in medical curriculum data, the CRoss-Industry Standard Process for Data Mining (CRISP-DM) reference model was chosen as a well-documented practical guideline [12]. CRISP-DM divides the exploratory process into six major phases, as described below.

# **Business understanding**

First of all, domain understanding and formulation of the global objectives are required. Here, we used the dataset collected within OPTIMED CurrMS, which provides an essential support during institutional decision-making activities relating to the curriculum creation, management, and optimisation [1]. In this system, a curriculum is made of fundamental building blocks (such as study field, discipline, course, learning unit, and learning outcome) supplemented with descriptive attributes (such as teaching range and type, annotation, keywords, and information resources). OPTIMED CurrMS provides data about all 42 medical and healthcare disciplines except RPM. Based on these data, we were able to merge the selected attributes and to create textual representations for a further NLP discipline comparison. As RPM does not constitute a separate discipline or a course at FM MU, no data describing RPM were available. In order to have an adequate RPM keyword representation, a new RPM description standing out of OPTIMED was artificially defined by three RPM experts. It consisted of 110 fundamental terms divided into the three classes (Table 1).

# Data understanding

The concrete dataset that we used to measure content similarities with RPM was extracted from the above-mentioned 42 disciplines in the OPTIMED system. The main content of these disciplines is logically stored in learning units and learning outcomes. The curriculum of FM MU is currently described by 1,347 learning units and by 6,974 learning outcomes. In general, we are able to export all of these data using predefined or customisable exporting tools integrated within the OPTIMED platform as a text (free form) or as HTML tables (structured form). For the purpose of this study, we processed a comma-separated textual dump of learning units (approximately 6,149 kB of data) and learning outcomes (approximately 3,574 kB of data). The key attributes of each learning unit involved their importance, annotation (long text attributes), Medical Subject Headings (MeSH) standardized

### TABLE 1. Overview of 110 terms in three categories

Basic terminology	Analgesy, balneotherapy, biomechanical analysis, coding theory, comprehensive rehabilitation, convalescence, counternutation, deep stabilization system, developmental kinesiology, dispersion efect, elasticity, endorphin theory, ergotherapy, gate theory, goniometry, interstitial neuron, joint play, motoricity, muscle testing, muscle tone, myorelaxation, myostimulation, neuromuscular, neuromuscular coordination, nutation, palpation, physiatry, physiotherapy, post-isometric relaxation, psychosomatic medicine, pulmonary rehabilitation, reciprocal innervation, reconditioning, rehabilitation, rehabilitation medicine, rigidity, sensorimotor, stereotypic movement, thixotropy, trace element, vertebrogenic, vocational rehabilitation.
Pathology	Algodystrophy, arthrosis, avascular/aseptic necrosis, blockade, cerebral palsy, cervicalgia, complex regional pain syndrome (CRPS), contusion, conversion disorder, distortion, enthesopathy, functional disorder, hemiparesis, hyperalgesic area, hypermobility, chaining, chondromalacia patella, instability, key area, ligament laxity, lumbago, muscle dysbalance, myogelosis, pain, paraparesis, rupture, scoliosis, slipped disc, stress fracture, tendinitis, tenosynovitis, trigger point, upper crossed syndrome, vertebrocardiac syndrome, vertebrogenic algic syndrome (VAS), vertebrovisceral syndrome.
Therapy	Bobath concept, cardio workout, catelectrotonus, closed chain exercise, cryotherapy, dynamic neuromuscular stabilization (DNS), electrogymnastics, electrotherapy, HIL therapy, interfering current, laser therapy, long-term rehab program, lymphatic drainage, magnetotherapy, manipulation, massage, mechanotherapy, mobilization, Mojzis methods, orthosis, peloids, physical therapy, proprioceptive neuromuscular facilitation, prosthetics, reflex locomotion, reflexology, shockwave, soft tissue techniques, therapeutic exercise, thermotherapy, Vojta therapy, water therapy.

	blockade	contusion	
Anatomy	2	0	
Biology	0	3	
Nursing	1	1	

{"name":"RPM", "children":[

FIGURE 1. Dataset transformation from CSV to JSON

]}

keywords (one to five words), significant terms (set of words or phrases in the tree structure) and a list of linked learning outcomes according to the Bloom's taxonomy [13]. These dumps also included pieces of information irrelevant for this experiment, and these had to be removed (this process is described in the data preparation section). Furthermore, we also processed data on RPM which were not included in the OPTIMED CurrMS. In contrast to the description of the other 42 disciplines, this dataset consisted only of 110 terms divided into three subsections.

### **Data preparation**

Before the core measurement of content similarities, the data were preprocessed and cleaned. This was done by several subsequent techniques. The first one involved a supervised filtering of attributes via the OPTIMED custom export of learning units. In general, the user is able to specify which attributes of learning units (e.g. annotation, title, MeSH keywords, significant terms etc.) should be included to the final comma-separated values (CSV) file. This custom report is available for learning outcomes, and therefore they need to be filtered manually in third-party tools, e.g. Microsoft Excel. In the next step of data preparation, special characters were removed: in particular, HTML tags used for additional formatting were eliminated. In the last step of data preparation, the so-called stop words were removed. Data were cleaned from the verbal ballast, i.e. words such as conjunctions, prepositions and manually selected words from a predefined list. After this preprocessing step, the dataset was ready to be used in a further analysis. Further processing was performed using the TM package in R (https://cran.r-project.org/web/packages/tm/index. html) in order to obtain a document-term matrix. This procedure consisted of: (i) lowercasing, (ii) replacing multiword keyword expressions by "artificial under-lined words", (iii) removing punctuation, (iv) removing numbers, (v) removing stop-words (as provided as stop-words within tm package), and (vi) removing whitespaces.

### Modelling

A document-term matrix, which uses term frequency weighting, covers only words (tokens) of the length of at least 3 characters within the learning units; that means, words containing only one or two characters were ignored. From the entire document-term matrix, only a selection of words was used for further consideration: we therefore worked with a reduced matrix, namely with columns (words) that were both involved in the rehab-terms.txt (110 keywords of RPM defined by experts) and in at least one plaintext file that represented a certain discipline. Words from rehab-terms.txt that did not appear in any of the documents were stored in a special list (missing-words.txt).

The document showing overlaps between RPM and other disciplines was named as reducedDTM.txt and its content had the form of a matrix where the names of columns were keywords defined by experts with at least one occurrence in other disciplines; these disciplines were in rows of the matrix. For the purpose of visualisation, we transformed the data structure to



FIGURE 2. A general example of a sunburs graph (https://bl.ocks.org/)



FIGURE 3. RPM keyword occurrence

TABLE 2. Overlaps of medical disciplines with RPM

Non-overlapping	Anatomy, Basic Medical Terminology, Health Care and Policy, Histology and Embryology, Medical
disciplines	Chemistry, Medical Microbiology, Surgery.
Overlapping disciplines	Anaesthesiology and Treatment of Pain, Biology, Biophysics, Clinical Examination in Internal Medicine, Clinical Oncology, Communication and Self-Experience, Community Medicine, Dermatovenerology, Diagnostic Imaging Methods, Epidemiology of Infectious Diseases , Family Medicine and Geriatrics, First Aid, Forensic Medicine, Gynaecology and Obstetrics, Immunology, Infectious Diseases, Intensive Care Medicine, Internal Medicine, Medical Ethics, Medical Psychology, Neurology, Neuroscience, Nursing, Ophthalmology, Orthopaedics, Otorhinolaryngology, Pathological Physiology, Pathology, Paediatrics, Pharmacology, Physiology, Preventive Medicine, Psychiatry, Stomatology.

a more suitable format, namely the JavaScript Object Notation (JSON). The input and output examples of algorithm for the above-mentioned modification are shown in Figure 1.

# Evaluation

At this phase, RPM experts not involved in the OP-TIMED project critically assessed the achieved results in terms of medical curriculum keywords overlaps or absence. Based on the summarising report in the form of data tables and interactive graphs, experts commented on the keywords occurrence among medical and healthcare disciplines from OPTIMED and RPM. After this evaluation process, the presented solution was ready to deploy.

Deployment

The final visualisation was divided into three main parts and it can be seen online in the OPTIMED CurrMS (http://opti.med.muni.cz/en/reporting/web/ analyticke-reporty/rehabilitace-ve-vyuce). The first part is a list of the RPM keywords missing in other disciplines (missing-words.txt). The second part shows the list of disciplines having no intersection with the field of Rehabilitation and Physical Medicine. This means that not a single word from the above-mentioned 110 terms is present in the plaintext file of that discipline. The list of missing disciplines is a by-product derived from the last step of data preparation. It illustrates the intersections of RPM keywords with other 42 disciplines. We used the sunburst chart (see Figure 2) to display hierarchical data, more specifically the three-layered tree. RPM corresponds to the root, the other 42 disciplines are in the second layer, and terms are located in the third layer. The size of each sector depends on the number of occurrences of each term in the respective discipline.

# RESULTS

Our results show how the disciplines from OPTIMED CurrMS are connected to RPM. Table 2 represents two sets of disciplines: (i) disciplines not overlapping with RPM terms, (ii) disciplines overlapping with RPM



terms, containing at least one occurrence of any fundamental RPM keyword. In our case, seven out of 42 disciplines had no overlap with RPM and were therefore excluded from further analysis.

The most frequently occurring word was "pain" (see Figure 3), which was found 115 times across all disciplines' files. The frequency of other words is significantly lower.

Figure 4 shows the coverage of three RPM subsections of terms. The left pie chart shows the relative sizes of input sets, whereas the right pie chart shows the relative sizes of sets in which keywords overlap with other 42 medical disciplines. The result is unbalanced, considering the fact that the basic terminology provides the biggest set of keywords, and its portion is only 24 per cent.

# DISCUSSION

RPM experts not involved in the OPTIMED project critically commented two principal points resulting from our study. Firstly, the methodology evaluation: the methods used in our study (and the achieved results as well) reflect on the actual conditions of RPM education (or any other discipline which was not originally included in OPTIMED). The model is suitable to provide comparisons among disciplines which are included in the entire GM curriculum. Secondly, the RPM education overview: the RPM education does not play a sufficient role in the GM curriculum at FM MU according to results of this study, considering its impact to the medical knowledge and the professionalism of future physicians.

### Methodology evaluation

RPM experts agreed that this model is very useful for a general overview about keywords representation in each discipline. The model brings a unique possibility to compare taught medical and healthcare disciplines in the levels of learning units and learning outcomes; this can be very helpful in any optimisation efforts related to curriculum management. Our model is therefore a functional instrument for the achievement of goals for which OPTIMED was developed.

Our model has several limitations. Firstly, the English mutation of OPTIMED was used to compare terms across disciplines due to the difficulty of automatic natural language data processing in the Czech language. But the conformity of using terminology in both languages can be questionable because of necessity of translation Czech medical terms to English ones. Moreover, the practical use of OPTIMED has shown slight discrepancies between terms representing individual disciplines in Czech and English language mutations. The OPTIMED curriculum browser in the Czech language found several of 84 fundamental RPM terms among learning units and learning outcomes despite the fact that these terms could not be found across all disciplines' files in our study. The second limitation arises in cases where there are too many universal terms with a vague meaning (e.g. "pain, contusion, instability, palpation" etc.). These terms are included in descriptions of multiple disciplines, but they represent very universal and common symptoms or processes in medicine. Consequently, their representation in the curriculum cannot guarantee the education of RPM specifically. And thirdly, one expert pointed out that just a simple occurrence of a medical term in a learning unit or a learning outcome cannot assure that the term is interpreted and understood correctly by students.

### **RPM education overview**

Our results demonstrate that the described curriculum at FM MU does not contain a large part of RPM keywords. The essential terms "rehabilitation" and "physiotherapy" have been found only 17 times and 13 times respectively in the whole dataset. That is a very low frequency considering the fact that the RPM is closely linked to all other medical disciplines. The missing RPM basic terms describe treatment methods which are used in many patients in everyday clinical practice. For example, GM students at FM MU do not learn anything about the "Vojta therapy", which is a globally recognised and widely used therapeutic method developed by a Czech neurologist, Professor Vaclav Vojta. Other terms, namely "cryotherapy", "magnetotherapy" and "electrotherapy" have been found only 2 times in the dataset, but such a low frequency does not correlate with the widespread use of these therapeutic methods.

The study brings interesting results from the analysis of keywords' frequency in various disciplines. We were glad to see a relatively numerous representation of RPM terms in the Orthopaedics discipline. We were rather surprised at the presence of First Aid and Forensic Medicine among six disciplines with the largest numbers of RPM keywords. On the contrary, the results show a poor representation of RPM basic terms in many disciplines such as Surgery, Paediatrics and Preventive Medicine, although these medical disciplines are closely linked to RPM in clinical practice. There are various explanations for these results. For example, descriptions of different disciplines might not contain the same terms at the same level of detail. In our study, RPM terms were divided into three classes. Keywords of the Therapy group covered only 10% of all terms of the entire curriculum. One of our experts pointed it out with an explanation that it might reflect the fact that the GM education puts more emphasis on the pharmacological or surgical treatment despite their costs and side effects.

# CONCLUSION

In this case study, we have designed, performed and evaluated an innovative method for identifying overlaps of terms between a whole medical curriculum and the specific discipline of Rehabilitation and Physical Medicine. The achieved pilot results seem to be promising in terms of face validity. We believe that the presented method can provide an objective curriculum overview described by individual medical and healthcare disciplines. We concluded that the RPM education is not represented sufficiently in the GM curriculum at FM MU. Its coverage in this specific curriculum does not correspond to the importance of the RPM discipline in the domain of clinical medicine. RPM experts agreed that results of our study are very consistent with the reality of current conditions in clinical medicine. Based on our results, experts concluded that the absence of a separate RPM course is not well substituted by other GM courses. In general, the global reasonability and usability of this model in practice has a big potential. As indicated above, the model is a functional instrument for the achievement of goals for which OPTIMED was developed. Our case study shows an innovative way of measuring medical curriculum content similarities using the keyword occurrence.

Matěj Karolyi

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### REFERENCES

- Komenda M. Towards a Framework for Medical Curriculum Mapping. PhD thesis, Masaryk University, Faculty of Informatics, 2016.
- Azuaje F. Computational models for predicting drug responses in cancer research. Brief Bioinform 2016. DOI: 10.1093/bib/bbw065
- [3] Vercher-Conejero JL, Pelegrí-Martinez L, Lopez-Aznar D, del P. Cózar-Santiago M. Positron emission tomography in breast cancer. Diagnostics 2015; 5(1): 61–83.
- [4] Calvet D, Mas JL. Recent advances in carotid angioplasty and stenting. Int J Stroke 2016; 11(1): 19–27.
- [5] Hersh WR, Gorman PN, Biagioli FE, Mohan V, Gold JA, Mejicano GC. Beyond information retrieval and electronic health record use: competencies in clinical informatics for medical education. Adv Med Educ Pract 2014; 5: 205–212.
- [6] Dajun T, Xu Z. Analysis on curriculum of information retrieval of library and information science in America. Libr Inf Serv 2014; 15: 17.
- [7] Rindflesch TC, Fiszman M. The interaction of domain knowledge and linguistic structure in natural language processing: interpreting hypernymic propositions in biomedical text. J Biomed Inform 2003; 36(6): 462–477.
- [8] Komenda M, Schwarz D, Vaitsis C, Zary N, Štěrba J, Dušek L. OPTIMED platform: curriculum harmonisation system for medical and healthcare education. Stud Health Technol Inform 2015; 210: 511–515.
- [9] Táborská E, Neckařová M. Faculty Calendar 2016/2017. [Online]. Faculty of Medicine, Masaryk University, 2016.
   [cit. 2016-Oct-07]. Available at WWW: <a href="http://www.med.muni.cz/index.php?id=10">http://www.med.muni.cz/index.php?id=10</a>>.
- [10] Kolář P et al. Clinical Rehabilitation. Alena Kobesová, 2014. ISBN 978-80-905438-1-2.
- [11] IPVZ. Jak získat specializovanou způsobilost. [Online]. [cit. 2016-06-24]. Available at WWW: <a href="https://www.ipvz.cz/lekari-zubni-lekari-farmaceuti/ziskavani-specializace/jak-ziskat-specializovanou-zpusobilost">https://www.ipvz.cz/lekari-zubni-lekari-farmaceuti/ziskavani-specializace/jak-ziskat-specializovanou-zpusobilost</a>>.
- [12] Chapman P et al. CRISP-DM 1.0 Step-by-step data mining guide. SPSS 2000.
- [13] Huitt W. Bloom et al.'s taxonomy of the cognitive domain. [Online]. Educational Psychology Interactive. Valdosta State University, 2011. [cit. 2016-10-29]. Available at WWW: <a href="http://www.edusycinteractive.org/tonics/cognition/bloom.html">http://www.edusycinteractive.org/tonics/cognition/bloom.html</a>).

<http://www.edpsycinteractive.org/topics/cognition/bloom.html>.

# THE LEVEL OF EMOTIONAL INTELLIGENCE OF NURSES PROVIDING CARE FOR OLDER PEOPLE IN RETIREMENT HOMES IN THE CZECH AND SLOVAK REPUBLIC

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**ABSTRACT** — **Introduction:** Facilities providing care for older people host more and more people with increasingly complex care needs. Nurses are educated in theory and trained for practice but their workload is high and their attitude often seemingly cold and impersonal. Nurses should be able to use their emotions as their 'wise guides' instead of concealing them.

Aim and methods: The aim of this study was to identify the emotional intelligence (EI) of nurses and determine EI differences with regard to age, years of work experience and education. The research sample comprised of 208 nurses working in nursing homes in the Czech Republic and Slovakia. Their average age was 42.82 (SD  $\pm$  9.17) and average years of work experience were 19.27 (SD  $\pm$  9.87). Their EI was measured using questionnaires representing temporary notions of EI. The STEU (Situational Test of Emotional Understanding) questionnaire determines EI as an ability and provides a sum of correct answers that represents the total EI score. The SEIS (Schutte EI Scale) questionnaire determines the level of EI as a trait. The data was processed by statistical software SPSS 15.0.

**Conclusion:** Nurses achieved adequate EI scores using both tools. SEIS provided statistically significant differences related to the age and length of work experience (older and more experienced nurses achieved higher scores). STEU provided statistically significant differences related to the level of education (university graduates achieved higher scores p < 0.05). Our findings are supported by other evidence which states that the ability of dealing with emotions is a significant part of providing health and social services. EI is an ability which can be influenced by education and is important in the care of older people.

# INTRODUCTION

Nurses are indispensable in the lives of older people (people aged 60 years and over) and based on the demographic changes and increasingly complex health needs, their role in influencing wellbeing in old age will increase. The particular needs of older people are acknowledged by many studies [1,2] and nurses need to be equipped to provide good quality individualised care [3]. In old age, the ability to control emotions decreases [4]. The need for a specific approach relating to emotions and interaction with older people is especially emphasized when people are not living in their natural social environment but for, some reason, dwell in institutions such as nursing homes [1,2]. Nurses and other medical staff must be able to provide emotional support to these older people and their families, whilst managing their own emotions. Indeed, nurses need rational abilities (such as, decision making skills based on logic) as well as abilities that are related to emotional intelligence (EI).

Emotional intelligence is a widely known construct that has received much scientific and lay attention [i.e. 5-7]. According to Schutte et al. [8], "Emotional intelligence consists of adaptive emotional functioning involving inter-related competencies relating to perception, understanding, utilising and managing emotions in the self and others". Central to emotional intelligence are specific competencies which should be an indispensable part of medical and other healthcare staff's education. These have been identified as perception, understanding, utilizing and managing emotions effectively in the self and others [9]. Within EI are two conceptualisations which have been identified as measurable through performance tests - trait EI and ability EI. Trait EI refers to self-perceived emotion-related abilities and is therefore measured by self-reported inventories [10]. Ability EI can be observed in action and can be assessed by a performance test [8]. However, trait EI and ability EI are interconnected concepts. Schulze and Roberts [11] write that there is a need for diverse scientific approaches that would more rigorously scrutinize the theoretical fundaments of EI from several scientific perspectives. This paper seeks to make a contribution to this debate.

For a more comprehensive understanding of EI each component/competency needs to be defined. Competency in the perception of emotion involves recognizing emotion-related facial and voice cues of others and awareness of one's own body states relating to those emotions. Competency in understanding one's own and others' emotions consists of knowing the causes and consequences of different emotions as well as being able to differentiate between varying emotions. Utilizing emotions involves harnessing the effects of emotions, for example by drawing on a positive mood to enhance creative thought. Managing emotions in one's self and others consists of regulating emotions so that they are compatible with the requirements of a situation or the goals of individuals [8].

Nursing studies scrutinize EI in several contexts. Many authors consider EI to be a concept important for the development of nursing relationships [12–14] and also for understanding patients' needs [13,15], moods and emotions [16,17]. EI is important for problem solving and decision making [12,17,18] and for the management of negative emotions from patients [13,19]. EI also has a major impact on the wellbeing of nurses and their perception of working stress [20]. Furthermore, Cherry, Fletcher and O´Sullivan [21] discuss EI and its importance in clinical communication. According to McQueen [13], EI also plays an important part in forming successful human relationships. The Czech and Slovak scientific nursing community [22] have so far discussed EI only in theoretically terms. The reason for this might be that EI is perceived as a general notion and thus an indepth level of knowledge in this area is not sought. Thus the study of EI is limited but it is nonetheless relevant to all aspects and fields of medical education and, in particular, nursing. For the purposes of this study we sought to understand EI in relation to the care of older people as this is an increasing population and have often received so called "Cinderella" care. Good communication, empathy, the quality of relationship and understanding the needs of older patients are perceived as attributes of good quality care. These "good quality care factors" are influenced by the EI of individual actors. In our study we focused on the EI of nurses who provide care for older people in retirement homes. We sought to compare EI as a personality trait and EI as a learned behaviour that might be influenced by the different factors of experience, education and practice.

In economically developed countries the functional and health state of the older population is improving [23]. This is due to the increased quality of life and medical/pharmaceutical development resulting in life expectancy rising both in the Czech Republic and Slovakia. As well as self-sufficient older people living independently, there is another group of older people evolving who are dependent on the care of their families who may often refuse to look after them. The care is then transferred to medical/health and social service facilities. In Northern Europe, for instance, more than 90% of older people live independently, according to the Survey of Health, Ageing and Retirement in Europe (SHARE), whereas in Southern Europe (which includes the Czech and Slovak Republics), less than 60% live independently [24]. This means that a high number of older people are in institutions which provide care. Goodman [25] states that community services should incorporate procedures that ensure that older people in community homes receive quality care. Several authors [i.e. 26–28] believe, and we support this view, that in such a community, emotional and psychological support is a key element of nurses' work. According to Gray [29] many care and nursing staff are afraid to admit their emotions and sometimes refuse to address painful feelings that are often a part of care. Nel et al. [30] claim that if professionals who provide personal care, are not able to understand and manage their own emotions or emotions of other people, they tend to show lower vitality and less selflessness. According to several authors [i.e. 12,13,31] the research of EI in the context of nursing is rare and different approaches to the study of EI are necessary.

### AIM

The overall aim of this study was to assess the quality of nurses' EI and level of EI displayed during interactions with older patients. This paper aims to answer three research questions using quantitative methods of research (survey):

- 1. What is the relationship between the STEU construct mapping EI as ability and SEIS construct determining EI as a trait of nurses working in social care facilities (retirement homes) with regard to the specificity of both constructs?
- 2. What is the level of EI in nurses providing care to older people regarding the notion of EI (i.e. trait, ability)?
- 3. What are the differences between the individual EI levels regarding social and demographic attributes

of the respondents (age, years of working experience, education)?

# **METHODS**

In this research, EI was assessed through questionnaires with the use of a method based on EI as an ability and a method based on perceiving EI as a trait (a mixed concept). The first research tool – STEU (Situational Test of Emotional Understanding) determines EI as an ability. We used a 26-item questionnaire modified by Baumgartner et al. [32] to reflect the social and cultural environment of respondents from the participating countries (Czech Republic and Slovakia). The respondents chose, from five possibilities, the emotion they considered to be the most adequate in the described situations. For every item there is only one correct answer. The outcome is the total EI score given by the sum of correct answers (max. 26, min. 0).

The second research tool used was SEIS (Schutte Emotional Intelligence Scale) measuring EI as a trait [33]. We used a modified 41-item version [34].

Example of the questions included: optimism/ mood regulation (example item: "I have control over my emotions"), appraisal of emotions (example item: "I am aware of my emotions as I experience them"), social skills (example item: "I like to share my emotions with others") and utilisation of emotions (example item: "When my mood changes, I see new possibilities") [35, 36]. A 5-point Likert Scale (1 - strongly disagree; 5 - strongly agree) was used. A validation study in South Africa indicated a five factor structure with alpha coefficients ranging from 0.58 to 0.85 [36]. Cronbach's a coefficient was also high in our research, with a value of  $\alpha$  = 0.734. Both research groups from each country received the written questionnaire forms in their respective language. Demographic data of the respondents was collected (age, education level, year of professional experience). The questionnaire form was distributed personally in the written form by the researchers during the November and December 2015. Nurses completed them independently during a seminar in their department and returned them anonymously to the researchers sealed in an unmarked envelope.

### **Ethical aspects**

The study was conducted according to the ethical recommendations of the Helsinki declaration (2002). All participants (nurses) were informed of the aims of the study and agreed to take part in it. The nurses were informed that their participation in the survey would be entirely voluntary and any request to be exempted from the project would be respected. Informed consent was required for this survey and all of the collected data were kept confidentially in a locked area. The authors declare that there is no conflict of interest. Statistical analysis was realized with the use of software SPSS 15.0 on the level of statistical significance 0.05 and with the use of these tests: Normality test Kolmogorov-Smirnov, Kruskal Wallis Test, Mann-Whitney U-test and Student T-test.

### Sample

Twenty nursing homes were included for the purposes of this study - ten nursing homes in the Czech Republic, the Vysočina Region, and ten Slovak facilities in Trnava and Nitra Regions. (These regions were chosen as they have the highest number of older people). The managers of these facilities consented to the research being undertaken upon request. The research sample comprised of 208 nurses (100 % of nurses invited to participate) of which 96 (46.15%) were from the Czech Republic and 112 (53.85%) from Slovakia. The criteria for selection were: at least oneyear employment in the facility, be providing care to older people (60 years and older) and willingness to take part in the research by agreeing to participate by informed consent. The data was collected from August to November 2014. 250 questionnaires containing both STEU and SEIS methods were sent to the nurse participants. The rate of return was 83%. The nurses age ranged from 22 to 63 years (mean age of 42.82 ± 9.17 years). The average period of working experience was 19.27 (SD ± 9.87). Only 30 nurses (14.42%) had a university degree (bachelor, master), 133 nurses (63.94%) had been educated at secondary level and 45 (21.63%) nurses had received a college education (diploma). The total of 52 (25%) nurses had some kind of specialization (not only in community nursing).

There were no significant differences between Czech and Slovak nurses in these areas.

# RESULTS

As a first step before verifying the relationship between the two constructs – EI as ability (STEU) and EI as a trait (SEIS), cardinal variables were tested with the use of the normality test (Table 1).

# The relationship between the STEU construct determining EI as ability, and the SEIS construct determining EI as a nurses' trait

The first research question of our study was focused on the verification of the relationship between EI as an ability and EI as a trait via a non-parametric Spearman's correlation coefficient, as one (EI as ability, STEU) variable shows normal distribution (see Table 2).

 
 TABLE 1. The results of the Kolmogorov-Smirnov Test of normality of cardinal variables

	Statistic	df	Sig.
STEU	0.104	204	0.000
SEIS	0.058	204	0.097
Age	0.056	204	0.200
Working experience	0.069	204	0.021

Note: In Table 1, results of testing the normality of variables included in the research are shown. Normal distribution was verified for the SEIS variable (EI as a trait) and the age of respondents. This test is important in regard to further opportunities for using statistical tests.

There is no statistically significant relationship between EI perceived as a trait (SEIS) and EI perceived as an ability (STEU) – p > 0.05. The constructs determine the EI score from two points of view – seeing it as a trait or as an ability. Therefore it is not surprising that their mutual relationship was not verified. EI as a trait is part of an individual's personality which develops over time and it can only partly be influenced by social impacts. On the contrary, EI as an ability is more dependent on genetic prepositions and the chances of developing it by an intentional impact, for instance by means of systematic and focused education, are weaker.

# EI levels of nurses providing care to elderly

The descriptive characteristics of variables – methods are shown in Table 3.

The nurses' score achieved in STEU (determining EI as ability) was 12.41 (SD  $\pm$  3.13) points, which means that the acquired values find themselves below the centre point of the theoretical interval. In the SEIS questionnaire (determining EI as trait) the nurses achieved the score of 152.19 (SD  $\pm$  13.76), which is above the midpoint of the interval in which the acquired values can be found. It can however be assumed from these outcomes that EI scores of the nurses fluctuate somewhere close to the theoretical middle points.

# Determination of EI score differences in relation to the age

Before testing the differences in EI scores in relation to the age of the nurses, we determined the normality of the STEU variable in three compared age groups formed from our respondents (early adulthood up to 34 years, middle adulthood from 35 to 45 years and late adulthood over 46 years). Due to non-normal distribution of variables in all groups, non-parametric Kruskal-Wallis Test was chosen for testing (see Table 4).

#### TABLE 2. Relationship between the constructs studied

		SIES
STEU	Spearman Correlation Coefficient	0.121
	Sig.	0.081
	Ν	207

Legend: N - absolute count

Based on the outcomes, we consider the determined differences among the groups to be significant (p > 0.05). There were no statistically significant differences in the level of EI as ability (STEU) in nurses of different age (p = 0.962) but we did find statistically significant differences in the level of EI as trait (p = 0.011). The score of EI as trait (SEIS) increases in relation to their ageing.

# Determination of EI score differences in relation to the years of working experience

Before we approached testing the differences of EI score in relation to the length of working experience of the nurses, we scrutinized normal distribution of the variable in the individual groups. On the basis of the result of the normality test we used a non-parametric Mann-Whitney U Test (Table 5).

# Determination of EI score differences in relation to the level of education

Before testing the differences in EI scores in relation to the achieved level of education, we scrutinized normal distribution of variables in the research groups. Normal distribution was found at the average SEIS value only (assessment of EI as a trait). Upon determination of the STEU difference we therefore used the non-parametric Mann-Whitney U-Test and received results shown in Table 5.

As we can see in Table 5, no statistically significant relationship was confirmed. There is no significant difference in the scores of EI perceived as ability (determined by STEU) between the group of nurses with shorter working experience (up to 11 years) and the group of nurses with longer working experience (11 and more years).

The SEIS variable was distributed equally in both groups. The outcomes of the statistical T-test confirmed significant differences (p < 0.01). We verified the difference among nurses based on the years of their working experience. Higher values of EI perceived as a trait (SEIS) are achieved by nurses whose working experience is longer, i.e. eleven years or more (Table 6).

Most of the respondents in the research group achieved secondary level of education or a diploma from a college medical school. University graduates

			-		
Min	Max	Average	SD	Median	Theoretical midpoint
3	19	12.41	3.13	13	13
117	183	152.19	13.76	153	123
	Min 3 117	Min         Max           3         19           117         183	Min         Max         Average           3         19         12.41           117         183         152.19	Min         Max         Average         SD           3         19         12.41         3.13           117         183         152.19         13.76	Min         Max         Average         SD         Median           3         19         12.41         3.13         13           117         183         152.19         13.76         153

#### TABLE 3. Descriptive features of the two EI levels

Legend: SD – standard deviation, Min – minimal value achieved; Max – maximum value achieved; theoretical midpoints – midpoints of research tools

Research tools	Age of nurses	N	Average order	Kruskal W	allis Test
STEU	Up to 34 year	21	105.74	Chi-square	0.078
	From 35 to 45 years	110	103.40	df	2
	More than 46 years	77	105.73	Sig.	0.962
	In total	208			
SEIS	Up to 34 year	21	66.45	Chi-square	8.986
	From 35 to 45 years	110	106.08	df	2
	More than 46 years	76	110.78	Sig.	0.011
	In total	207			

TABLE 4. Difference in measuring EI as ability	(STEU) and EI as trait (	SEIS) related to the age
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Legend: N – absolute count

formed only 14% of the sample which could affect the results of the test because the higher score of EI as an ability (STEU) was achieved by nurses with university degrees (Table 5). Based on the data analysis we confirmed the significant difference between university graduates and nurses with lower levels of education. We suggest that these nurses are able to recognise and classify interpersonal interactions better and subsequently react more appropriately in their interactions with elderly people living in social care facilities. The difference between the scores of EI determined as a trait (SEIS) was verified with the use of the Student T-Test.

We did not find any significant difference in EI scores of nurses with different levels of education when we measured EI with SEIS (EI as trait) questionnaire (Table 6).

# DISCUSSION

The aim of the study was based on contemporary EI theory and measurement tools (trait and ability EI) and the assumed differences of EI scores in relation to the age, years of work experience and the level of education of nurses providing care to elderly people living in nursing homes. We selected research instruments on the basis of previous research undertaken in the Czech Republic [32].

Our hypothesis about the existence of a correlation between EI perceived as an ability (STEU) and EI as a trait (SEIS) was not confirmed owing to the specific nature of both constructs (p > 0.05). This finding corresponds with current knowledge about EI and confirms the perception of EI from two points of view, where one group of scientists [37, 38] sees EI as an ability whereas other authors [10, 39, 40] define the conceptual framework of EI as a personality trait. Baumgartner and Karaffová [32] identified a statistically significant correlation (p < 0.01) between EI as an ability (STEU) and as a trait (SEIS) but its value is relatively low (r = 0.197).

Nurses in our study who provide care to older people living in nursing homes achieved an adequate EI scores in both questionnaires; that is to say, according to the values which are "normal" for this measurement tool.

The STEU score was 12.41 (SD ± 3.13) which is slightly below the theoretical centre of the scale. In SEIS, the achieved score was 152.19 (SD  $\pm 13.76$ ); in this case the outcomes were above the theoretical centre. Results that are similar to ours (where the values oscillate around the centres of the scales) can be found in other studies such as those of authors [41, 42, 43]. We observe that the average score achieved by nurses in our study is a favourable finding. Nurses who provide care for older people in social care nursing facilities could improve their relationships with them, and also with their colleagues because, as we verified, the nurses in this study were not emotionally neutral and demonstrate emotional activity (EI). It can be suggested that they need to improve their competency in perception and understanding of emotion. Some researchers mentioned already above [41, 42, 43].) in various fields have begun to investigate whether it is possible to increase EI and explore the best way to evaluate it. Studies employing a comparison group or other designs, such as use of pre and post intervention measures with no comparison group or a case study method are being used [40]. Our study is descriptive and is one of the first to be undertaken in both countries and we acknowledge its limitations and that we cannot currently provide information regarding the causal impact of training.

Research tools	Years of experience	N	Average order	Mann-Whit	tney U Test
	Up to 11 year	45	93.32	U	3164.5
STEU	11 years or more	163	107.59	Z	-1.417
	In total	208		Sig.	0.157
	Level of education	N	Average order	Mann-Whit	tney U Test
SEIS					
SEIS	Secondary school and medical college	178	101.08	U	2060.5
SEIS	Secondary school and medical college University	178 30	101.08 124.82	U Z	2060.5 -2.012

TABLE 5. Difference in STEU related to the years of working experience and level of education

TABLE 6. Difference in SEIS related to the years of working experience and level of education

Years of experience	N	Average	SD	T-test of ave	erages	
Up to 10 year	44	146.64	12.65			
Over 11 years	163	153.69	13.70	t	df	Sig.
In total	207			-3.078	205	0.002
Level of education	N	Average	SD	T-test of ave	erages	
Secondary school and medical college	177	152.23	13.20			
University	30	151.93	16.96	t	df	Sig.
In total	207			0.092	35.202	0.927
	Years of experience Up to 10 year Over 11 years In total Level of education Secondary school and medical college University In total	Years of experienceNUp to 10 year44Over 11 years163In total207Level of educationNSecondary school and medical college177University30In total207	Years of experienceNAverageUp to 10 year44146.64Over 11 years163153.69In total207100Level of educationNAverageSecondary school and medical college177152.23University30151.93In total207	Years of experience         N         Average         SD           Up to 10 year         44         146.64         12.65           Over 11 years         163         153.69         13.70           In total         207         100         100           Secondary school and medical college         N         Average         SD           University         30         151.93         16.96           In total         207         100         100	Years of experience         N         Average         SD         T-test of average           Up to 10 year         44         146.64         12.65 <td< td=""><td>Years of experience       N       Average       SD       T-test of averages         Up to 10 year       44       146.64       12.65       <math>-3.078</math>       df         Over 11 years       163       153.69       13.70       t       df         In total       207       <math>-3.078</math>       205         Level of education       N       Average       SD       T-test of averages         Secondary school and medical college       177       152.23       13.20       <math>-12.25</math> <math>-12.25</math>         University       30       151.93       16.96       t       df         In total       207       <math>-5.078</math>       20.59       20.59</td></td<>	Years of experience       N       Average       SD       T-test of averages         Up to 10 year       44       146.64       12.65 $-3.078$ df         Over 11 years       163       153.69       13.70       t       df         In total       207 $-3.078$ 205         Level of education       N       Average       SD       T-test of averages         Secondary school and medical college       177       152.23       13.20 $-12.25$ $-12.25$ University       30       151.93       16.96       t       df         In total       207 $-5.078$ 20.59       20.59

Legend: N – absolute count, SD – standard deviation

Antonakis et al. [44] indicate in their research that there is a positive link between high levels of EI and high levels of nurses' contentment, engagement and satisfaction with their work. Gignac and Ekermans [45] discovered that nurses with high levels of EI are able to manage their relationships with various people (health and social care staff and also patients and relatives), maintain a healthier attitude towards patient care and form and maintain relationships with patients and co-workers. According to Groves [46], emotions are a manifestation of the authenticity of nurses and it is an unavoidable precondition of a close relationship and communication. Furthermore, King's [47] system interaction theory emphasises the inevitable presence of EI abilities among nurses who are involved in complex care based on establishing relationships between nurses and patients. The American Nurses Association (ANA) suggests that nursing involves much more than technical competence and kind touches. Nursing is also an emotional activity. However, some Slovak authors [48] believe that emotional (affectionate) neutrality is necessary in the nurse's role and that a nurse should provide nursing care without involving her emotions in her relationship with the patient. This feature of a nurse's role - emotional neutrality - is described as the ability to subordinate emotionality to the rational control. This has the potential to lead to stress and burnout in nurses.

One interesting finding in our study is the statistical significance (p = 0.011) of EI as a trait (SEIS) in relation to the age. This could mean that there is a difference in the levels of EI in relation to the age of nurses who provide care to older people in nursing homes. Similarly, we found a significant difference (p < 0.01) between groups of nurses (young adulthood and middle adulthood) when we assessed EI as a trait. Higher scores of EI, as a trait (SEIS), were achieved by nurses in middle adulthood (35-45 years) in comparison to younger nurses (aged up to 34 years) who also work in nursing. Lachman [49] claims that, in the context of middle adulthood, the quality and intensity of emotions is a concept which is important for people in this age group. Experiencing emotions is still very intense in comparison with those in the older age group and their range is rather similar to the preceding age groups [4]. These findings are partly supported by other authors; for example, Mayer et al. [9] who believe that the EI level rises with ageing and gaining experience and, as a set of abilities, develops by experiencing social interactions. It could be assumed according to Bar-On [6] that EI develops with age, which means that older nurses' emotional reactions could be more mature owing to their experience. However, several other studies [i.e. 50, 51] show no significant difference in EI levels in relation to age. These findings might be associated to the specific research sample which was formed of students, i.e. people whose professional approach and personal qualities may be seemingly underdeveloped and whose age range and experience is limited. Nevertheless, for people who are preparing for a professional career in healthcare, the issue of EI cannot be underestimated or ignored.

As far as the years of working experience are considered, we did not find any significant difference (p > 0.05) in EI perceived as an ability (STEU) but we found a statistically significant difference (p = 0.002) in EI perceived as a trait (SEIS) in relation to the years of working experience. Higher EI scores were achieved by nurses with longer working experience (more than 11 years) who provided care to older people living in nursing social care facilities. In another study, Juhásová et al. [43], found no significant difference in EI as an ability, nor EI as a trait, among nurses with differing lengths of work experience (where the difference between a short and long work experience was set at seven years).

Elder and Giele [52] point out that during his or her life, an individual is formed by the institutions and social systems they interact with, as well as the demands on then depending on his or her age. This opinion supports our premise that the level of education makes a difference to the EI scores of the nurses in our study. We noted a significant difference in EI perceived as an ability (STEU) related to their level of education. Higher scores were achieved by university graduates who provide care to older people living in nursing homes. In our view these nurses are more skilled in distinguishing emotions and respond more sensitively in relationships with older people in order to meet individual needs. It is, however, important to point out that the share of university graduates was quite low (14%) in our research sample. In both countries the share of nurses with university diplomas/ degrees working in nursing homes is very low. Social workers without a medical education are the dominant workforce in these facilities. No significant difference (p = 0.157) was found in the level of EI as a trait (SEIS) in relation to the level of education. Our outcomes correspond with findings of other authors [i.e. 50, 51] who also did not find significant differences in EI as a trait in relation to the educational level of a group of students. A possible explanation of the non-existent difference in EI as a trait is the above mentioned fact that the proportion of university graduates in the research sample is very low. On the other hand we have verified that EI could be influenced by appropriate educational strategies as presented in our previously published study [53]. Slaski and Cartwright [54], Kotsou et al. [55] and Nelis et al. [56] found that EI training increased trait EI, as assessed by self-reports and observer reports. Kirk et al. [57] found that training increased both emotional self-efficacy and trait EI. Of course we should be aware that there are always individual differences in characteristics that are associated

with EI and these could influence the effectiveness of interventions or might suggest different intervention approaches [40]. We can however suggest that neither educational institutions, nor employers, support the development of emotional competences. They seemingly do not see the importance of EI or emotional competences as an indispensable part of effective quality nursing care for older people in nursing homes. Another reason may be that those involved in the education of nurses do not know how to develop emotional skills. A cause for concern in relation to EI and providing quality care in the Czech Republic and Slovakia for older people is that staffing is being reduced. Medical personnel are being replaced by social workers with little knowledge of nursing (they only undertake a three-month education course) and university graduates are very scarce.

# CONCLUSION

It is understandable that care provided to older people is coming under the spotlight as its importance rises owing to the changing demographic trends. It is not easy to meet the unique needs of older people without nurses who are prepared both professionally and emotionally. The outcomes of the study demonstrate that in these nursing homes for older people, the care is provided by nurses with adequate global levels of EI. Better scores were achieved by university graduates and by nurses with working experience of longer than 11 years who were aged 35-45 (middle adulthood). We recommend that educational institutions should provide programmes in the Czech and Slovak Republics that would assist nurses with their personal development, guide them in understanding both their own and their patients' emotions, whilst teaching them to use their emotional skills effectively. We also suggest that the management of social care facilities should seek to support nurses in their self-improvement in relation to EI, through training, as we believe this would enhance the quality of care provided to older people and improve their wellbeing.

# IMPLICATIONS FOR POLICY AND FUTURE RESEARCH

Continued research on the topic of EI and nursing is needed to build the knowledge base on how to promote positive wellbeing for older people and improve health outcomes. Further research should focus on identifying how nurses and older people evaluate their relationship with both quantitative and qualitative evidence sought.

# LIMITATIONS OF RESEARCH

This study has some limitations that must be considered. The study was conducted with employees in a nursing environment and the results obtained cannot therefore be generalized to other health professions (i.e., medical doctors, physiotherapists, psychologists, etc.) or the public as a whole. The techniques used in our research provide only a partial insight into EI. This should be kept in mind when assessing the outcomes. The validity of statements depends on the quality of self-reflection of nurses in this research group.

# THE BULLET POINTS OF THE RESEARCH AND ARTICLE

What is known about the topic:

- Emotional Intelligence (EI) plays an important role in the nursing care of older people.
- The ability to control emotions is an important skill for nurses.
- Lack of studies mapping the emotional intelligence of nurses who care for older people.

What this paper adds:

- Nurses who provide care in selected nursing homes in the Czech Republic and Slovakia demonstrate an adequate emotional intelligence score.
- The higher the level of education, the higher the nurses' emotional intelligence score (assessed with STEU; EI is an ability).
- Older nurses and nurses with a longer working experience demonstrated a higher EI score (assessed with SEIS; EI is a trait).

# ETHICAL CONSIDERATIONS

The study complied with the ethical principles for research involving human subjects (in accordance with the Declaration of Helsinki) and was approved by the institutional ethics committees. Participation was entirely voluntary and could be terminated at any time during the survey.

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### REFERENCES

- Knight M, Seymour TL, Gaunt JT, Baker C, Nesmith K, Mather M. Aging and goal-directed emotional attention: Distraction reverses emotional biases. Emotion 2007; 7: 705–714.
- [2] Nielsen L, Knutson B, Carstensen LL. Affect dynamics, affective forecasting, and aging. Emotion 2008; 8: 318–330.
- [3] Knight A, La Placa V, Schofield P. The Wellbeing of Older People. In: Knight A, La Placa V, McNaught A (eds). Wellbeing: Policy and Practice. Lantern Publishing: Banbury 2014: 63–73.
- [4] Urry HLJ, Gross JJ. Emotion Regulation in Older Age. Curr Dir Psychol Sci 2010; 19(6): 352–357.
- [5] Ashkanasy NM, Daus CS. Rumors of the death of emotional intelligence in organizational behaviour are vastly exaggerated. J Organ Behav 2005; 26: 441–452.
- [6] Bar-On R.Emotional intelligence: An integral part of positive psychology. South Afr J Psychol 2010; 40: 54-62.
- [7] Goleman D. Emotional intelligence. Bantam Books: New York 1995.
- [8] Bester M, Jonker CS, Nel JA. Confirming the factor structure of the 41-item version of the Schutte emotional intelligence scale. J Psychol Afr 2013; 23(2): 213–222.
- [9] Mayer J D, Salovey P, Caruso DR. Emotional intelligence: New ability or eclectic traits? Am Psychol 2008; 63: 503–517.
- [10] Petrides KV, Pérez-González JC, Furnham A. On the criterion and incremental validity of trait emotional intelligence. Cogn Emot 2007; 21: 26–55.
- [11] Schulze R, Roberts RD. Emoční inteligence: přehled základních přístupů a aplikací. [Emotional intelligence: an overview of basic approaches and applications]. Portál: Praha 2007.
- [12] Akerjordet K, Severinsson E. Emotional intelligence: a review of the literature with specific focus on empirical and epistemological perspectives. J Clin Nurs 2007; 16(8): 1405–1416.
- [13] McQueen ACH. Emotional intelligence in nursing work. J Adv Nurs 2004; 47(1): 101-108.
- [14] O'Connell E. Therapeutic relationships in critical care nursing: a reflection on practice. Nurs Crit Care 2008; 13(3): 138–143.
- [15] Kooker BM, Shoultz J, Codier EE. Identifying emotional intelligence in professional nursing practice. J Prof Nurs 2007; 23(1): 30–36.
- [16] Akerjordet K, Severinsson E. The state of the science of emotional intelligence related to nursing leadership: an integrative review. J Nurs Man 2010; 18(4): 363–382.
- [17] Freshwater D, Stickley T. The heart of the art: emotional intelligence in nurse education. Nurs Inq 2004; 11(2): 91-98.
- [18] AlMazrouei SAS, Dahalan N, Faiz MH. The impact of emotional intelligence dimensions on employee engagement. International Journal of Management and Commerce Innovations 2015; 1(3): 376–387.
- [19] Sandgren A, Thulesius H, Fridlund B, Petersson K. Striving for emotional survival in palliative cancer nursing. Qual Health Res 2006; 16(1): 79–96.
- [20] Karimi L, Leggat SG, Donohue L, Farrell G, Couper GE. Emotional rescue: the role of emotional intelligence and emotional labour on well-being and job-stress among community nurses. J Adv Nurs 2014; 20(1):176–186.
- [21] Cherry MG, Fletcher I, O 'Sullivan H. Exploring the relationships among attachment, emotional inteligence and communication. Med Educ 2013; 47(3): 317–325.
- [22] Ilievová L, Lajdová A, Jakubeková J. Qualifications for exercising the profession of nurse. In: Ryska M (ed). Assisting Professions in the Context of University Education. Otto Printing Office: Prague 2010: 11–21.

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- [23] United Nations, Department of Economic and Social Affairs. World Population Ageing 2013. ST/ESA/SER.A/348. [On-line] United Nations: New York 2013 [cit. 2016-10-07]. Available at WWW: http://www.un.org/en/development/ desa/population/publications/pdf/ageing/WorldPopulationAgeing2013.pdf.
- [24] SHARE. The Survey of Health, Ageing and Retirement in Europe (SHARE) Micro-data files. [On-line] SHARE-ERIC 2011. [cit. 2015-07-28] Available from WWW. <a href="http://www.share-project.org/">http://www.share-project.org/</a>.
- [25] Goodman C, Robb N, Drennan V, Woolley R. Partnership working by default: district nurses and care home staff providing care for older people. Health Soc Care Community 2005; 13: 553–562.
- [26] Burton J, Hope K. An exploration of the decision making processes at the point of referral to an Admiral Nurse team. J Psych Mental Health Nurs 2005; 12: 359–364.
- [27] Clarke PJ, Ailshire JA, House JS, Morenoff JD, King K, Melendez R, Langa KM. Cognitive function in the community setting: the neighbourhood as a source of 'cognitive reserve'? J Epidemiol Community Health 2012; 66(8): 730–736.
- [28] Pejner MN, Ziegert K, Kihlgren A. Trying to cope with everyday life Emotional support in municipal elderly care setting. Int J Qual Stud Health Well-being 2012; 13; 7: 1–7.
- [29] Gray B. The emotional labour in nursing 1: exploring the concept. Nursing Times 2009; 8:26–29.
- [30] Nel JA, Cara S, Jonker CS, Rabie T. Emotional intelligence and wellness among employees working in the nursing environment. J Psychol Afr 2013; 2: 195–203.
- [31] Bulmer Smith K, Profetto-McGrath J, Cummings GG. Emotional intelligence and nursing: An integrative literature review. Int J Nurs Studies 2009; 12: 1624–1636.
- [32] Baumgartner F, Karaffová E. Emoční inteligence a její vztah k zvládání [Emotional intelligence and its coping]. In: Blatný M (ed). Člověk v kontextech celoživotního vývoje [People in contexts of life-span development]. Psychologický ústav Akademie věd ČR: Brno 2014: 39–59.
- [33] Schutte NS, Malouff JM, Hall LE, Haggerty DJ, Cooper JT, Golden C, Dornheim L. Development and validation of a measure of emotional intelligence. Pers Individ Differ 1998; 25: 167–177.
- [34] Austin EJ, Saklofske DH, Huang SHS, McKenney D. Measurement of trait emotional intelligence: Testing and crossvalidating a modified version of Schutte et al.'s (1998) measure. Pers Individ Differ 2004; 36: 555–562.
- [35] Petrides KV, Furnham A. Gender differences in measured and self-estimated trait emotional intelligence. Sex Roles 2000; 42: 449–461.
- [36] Van der Merwe PR, Coetzee S, De Beer M. X Measuring emotional intelligence (EQ): a construct comparison between the Bar-On EQ-i and the OPQ32i EI report. Southern African Business Review 2010; 9: 34–50.
- [37] Mayer JD, Salovey P. What is emotional intelligence? In: Salovey P, Sluyter DJ (eds). Emotional development and emotional intelligence: Educational implications. Harper Collins: New York 1997: 3–31.
- [38] Matthews G, Roberts RD, Zeidner M. Seven myths about emotional intelligence. Psychol Inq 2004; 15: 179-196.
- [39] Salbot V et al. Črtová emocionálna inteligencia a psychometrické vlastnosti nástrojov na jej meranie [Emotional intelligence and psychometric properties of the instruments to measure it]. Univerzita Mateja Bela, Pedagogická fakulta: Banská Bystrica 2011.
- [40] Schutte N S, Malouff JM, Thorsteinsson EB. Increasing emotional intelligence through training: current status and future directions. The International Journal of Emotional Intelligence 2013; 5(1): 56–72.
- [41] Baumgartner F, Molčanová Z, Chylová M. Emočná inteligencia vo vzťahu ku copingu [Emotional intelligence in relation to the coping]. In: Ruisel I, Prokopčáková A (eds). Kognitívny portrét človeka [Cognitive Portrait of Human]. Institute of Experimental Psychology, Slovak Academy of Sciences: Bratislava 2010: 186–204.
- [42] Harper MG, Jones-Schenk J. The emotional intelligence profile of successful staff nurses. J Contin Educ Nurs 2012; 43(8): 354–362.
- [43] Juhásová I, Ilievová Ľ, Baumgartner F. Emočná inteligencia sestier a jej úloha v ošetrovateľstve [Emotional intelligence of nurses and its role in nursing]. Ošetřovatelství a porodní asistence 2013; 4(2): 589–594.
- [44] Antonakis J, Ashkanasy NM, Dasborough MT. Does leadership need emotional intelligence? Leadersh Q 2009; 20: 247–261.
- [45] Gignac G, Ekermans G. Group differences in EI within a sample of black and white South Africans. Pers Individ Differ 2010; 49: 639–644.
- [46] Groves W. Professional practice skills for nurses. Nurs Stand 2014; 29(1): 51-59.
- [47] King IM. A theory for nursing: Systems, concepts, process. John Wiley and Sons: NewYork 1981.
- [48] Matulníková Ľ. Ošetrovateľstvo ako veda [Nursing as a Science]. In: Botíková A (ed). Manuál pre mentorky v ošetrovateľstve [Toolkit for Nurses]. Trnavská univerzita v Trnave: Trnava, 2011: 16–55.
- [49] Lachman ME. Development in midlife. Ann Rev Psychol 2004; 55: 305-331.
- [50] Birks Y, McKendree J, Watt I. Emotional intelligence and perceived stress in healthcare students: a multi-institutional, multi-professional survey. BMC Med Educ 2009; 61: 59–61.
- [51] Juhásová I, Ilievová Ľ, Baumgartner F, Rojková Z. Možnosti uplatnenia emočnej inteligencie v kontexte ošetrovateľstva [The possibilities to use emotional intelligence in the context of nursing]. In: Halama P, Hanák R, Masaryk R (eds). Sociálne procesy a osobnosť 2012. Ústav experimentálnej psychológie SAV: Bratislava 2012: 313–319.
- [52] Elder GH Jr, Giele JZ (eds). The Craft of Life Course Research. Guilford Press: New York & London 2009.
- [53] Pokorná A, Knight A. Development opportunities of emotional intelligence with reflective strategies using video-based training. Mefanet J 2015; 3(2): 43–47.
- [54] Slaski M, Cartwright S. Emotional intelligence training and its implications for stress, health, and performance. Stress Health 2003; 19: 233–239.
- [55] 55. Kotsou I, Nelis D, Grégoire J, Mikolajczak M. Emotional plasticity: Conditions and effects of improving emotional competence in adulthood. J Appl Psychol 2011; 96: 827–839.
- [56] Nelis I, Kotsou J, Quoidbach M, Hansenne F, Weytens P, Dupuis, Mikolajczak M. Increasing emotional competence improves psychological and physical well-being, social relationships, and employability. Emotion 2011; 11(2): 354–366.
- [57] Kirk B A, Schutte N S, Hine DW. The effect of an expressive writing intervention for employees on emotional self-efficacy, emotional intelligence, affect, and workplace incivility. J Appl Soc Psychol 2011; 41: 179–195.

# NURSING STUDY PROGRAMME IN SLOVAKIA FOCUSING ON THE FIRST DEGREE OF UNIVERSITY EDUCATION

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nursing; study programme; learning outcomes; course assessment



**ABSTRACT** — Introduction: The university study programme of nursing in Slovakia is fully compatible with the Directives of the European Commission (EC) and European Strategy of the World Health Organization for education of regulated professions. Nurse have applied and used authonomy in practice, decision-making and planning of nursing interventions.

**Objective:** The aim of article is to present the nursing study programme (structure of programme) and credit system at universities in Slovakia according to applicable nurses competencies.

**Methodology:** The methodology for this article was used literature review, legislative standards of the Slovak Republic and European Union, the Accreditation document of the Faculty of Health Care of University of Prešov and review of studies in science databases: EBSCO, Medline, ProQuest.

**Results and discussion:** The main topics of core knowledge of the 1st degree of university studies are based primarily on the theory and practice of nursing. The study programme is divided into academic subjects. The standard student workload for one academic year is total 60 credits in full-time study, for three years of standard study it is 180 ECTS.

**Conclusion:** Competence of nurse is the state of having the knowledge, skills, energy, experience and motivation required to respond adequately to the demands of one's professional responsibility.

# INTRODUCTION

Nursing is a field of study in the system of study programmes, administered by the Ministry of Education, Science, Research and Sports of the Slovak Republic through which the graduate of the study programme gains the professional ability/qualification to practice the profession or is prepared to continue in following university studies. The profile of studies is harmonized with the criteria of the European directives, enhanced by the adoption of the Declaration of Munich and implemented into the curriculum of educational institutions that provide this training. Study programme of nursing is compiled according to competencies of the Directive 2013/55/EU and in the context of the National Reference Framework, Decree of the Government of the Slovak Republic No. 296/2010 on professional qualification for performance of health service occupation, the method of further education of health professionals, system of specialized fields and system of certified working activities, Decree of the Ministry of Health of the Slovak Republic No. 364/2005 Coll. which determines the scope of nursing and midwifery practice provided by nurses and by midwives independently and in conjunction with a doctor [1,2]. The structure of nursing study programme and its credit system at universities in Slovakia are presented topics of article.

The Bologna Declaration (1999) is binding also for studying nursing at Slovak universities. Highlights the need for: nursing education designed so as to be compatible in content, scope and conditions of admission and graduation with developed countries; to meet European standards of education; curriculum designed so as to be oriented not only to the sick, but also in healthy individuals [3]; systematically lead to a change in medical preview of nursing to nursing thinking, thinking caring change to nursing; strengthen and highlight the formal component of education, strengthen communicative and creative skills, critical thinking and create abilities to solve problems; not only prepare nurses to practice nursing, but also to research, education and management and prepare nurses for taking an active role of nursing in primary care [4]. Nurses using authonomy in practice, decision-making and planning of nursing interventions. Nurses are sufficiently informed about the new developments of science and technology as well as new nursing procedures and to work based on principles Evidence Based Practice (EBP) and Evidence Based Nursing (EBN) [5]

# **OBJECTIVE**

Individual levels of university studies in the study programme of nursing in Slovakia are based on theoretical and practical knowledge of current science, development of independent practical and theoretical abilities and skills of the graduate, as per Act of the National Council of the Slovak Republic No. 578/2004 Coll. on health care providers, health service personnel, professional organizations in health service and on amendments to certain acts [6]. Pursuant to Act No. 131/2002 Coll. on Higher Education the professionally oriented bachelor study programmes of the 1st degree of university study are focused on acquirement of theoretical and practical knowledge in case of occupation performance based on a current state of science and art with the possibility to continue in university study of the 2nd degree. The successful graduates of the 1st degree of university study are awarded Bachelor degree. Clause 1 §53 of the same Act quotes that the study programme of the 2nd degree is focused on acquirement of theoretical and practical knowledge based on the current state of science, technology or art and on development of management skills of their creative application in case of occupation performance or when continuing in university study according to doctoral study programme of the 3rd degree [3,7].

The specific objective of this article is to present a study programme in nursing in Slovak Republic, describe its accredited study programmes, characteristics of the study programme, the credit system, the graduate profile and criteria for achieving credits by students, which is implement the current European requirements of education in nursing of the Western Balkan countries.

# METHODOLOGY

The methodology for this article was used literature review, legislative standards of the Slovak Republic and European Union, the Accreditation document of the Faculty of Health Care of University of Prešov and review of studies in science databases: EBSCO, Medline, ProQuest.

# **RESULTS AND DISCUSSION**

# Scope of knowledge of graduate of nursing (1st degree)

Theoretical knowledge include: has a theoretical command of and practically use professional nursing terminology; gains and understand basic facts, concepts, principles and theory of nursing; has a theoretical command of and use the method of the nursing process in nursing practice; is able to integrate knowledge from theory and models in nursing and use them in nursing practice; is able to implement change, accept risk, take responsibility, improvise in unavoidable situations; gains knowledge in the field of communication, management, social and behavioural disciplines which are applied in contact with the patient/ client.

Practical abilities and skills: in performing the nursing practice provides nursing care in accordance with legal regulations, within the scope of studies and using professional experience of gained knowledge and skills; applies nursing models in practice; works with nursing documentation; forms and shapes the standards of nursing care; monitors nursing problems and provides individualized nursing care using the method of nursing process in collaboration with the client, family, supporting persons; communicates within the health care team with the client, family, group and community; introduces new technologies and procedures in clinical practice within nursing; analyses problems and makes decisions in partnership with the client to optimize the patient's medical condition; provides qualified first aid in trauma and life-threatening conditions, in mass casualties, and attacks using weapons of mass destruction; makes use of computer and information technology [2]. Additional knowledge, skills and abilities: cooperate and coordinate teamwork; organize their own learning and to continue their own professional development; speak foreign languages; maintain contact with the development of science and knowledge; participate in ethical decision-making and apply ethical principles in nursing practice; use knowledge of psychology and pedagogy in education of clients and in training new members of the nursing team. Professional qualifications is determined: Decree of the Government of the Slovak Republic No. 156/2002 Coll. on the professional qualifications of health professionals; together 4 600 hours total (contact and non-contact hours) education of which 60% in practical education; Decree of the Government of the Slovak Republic No. 296/2010 Coll. on professional qualification for performance of health service occupation, the method of further education of health professionals, system of specialized fields and system of certified working activities.

# The academic courses of study programme in nursing

The study programme is divided into academic courses. The academic course is formed from a study programme unit or a group of units intended to provide training in the designated area (lecture, workshop or seminar). Each course is defined by a code and a name. Information on the nature of the course, teachers, credits and hourly duration, the conditions of its completion and evaluation of learning outcomes, contents and recommended literature is stated in the course information sheet. The teacher is responsible for updating the data in the course information sheet at the beginning of the academic year.

According to European Directives 2005/36/EC, 2013/55/EU and Decree of the Government of the Slovak Republic No. 614/2002 Coll. on the credit system, the minimum requirements for the content of nursing education in Slovakia are divided into two sections: theoretical disciplines (nursing disciplines, basic medicine disciplines and social science disciplines) and practical disciplines. Courses of the nursing programme are divided into: *compulsory* (comprise 75–80% of study programme), *compulsory optional* (comprise 15–20% of study programme), and *optional* (comprise 5% of study programme) [3,8,9].

Depending on prior requirements for taking courses included in the academic programme, they are divided into courses conditional on the successful completion of other courses, the prerequisite or the other courses and courses without prerequisites. The recommended study plan, drawn up on the basis of the courses of the field study, defines the list of compulsory and compulsory optional courses and the recommended scope of optional courses, their credits and the number of hours recommended for learning. The state exam shall be considered a course with a defined number of hours. The study plan is created in the framework of defined regulations in conjunction with the academic advisor/department [9,10].

The student is obliged to gain, in the study programme, the required number of credits for which the distribution and total number of semesters is determined by the accreditation file. The standard student workload for one academic year is total 60 credits in full-time study, for three years of standard study it is 180 ECTS (European Credit Transfer System). Each course in the study programme is evaluated by the number of credits which reflect a quantitative measure of student workload in the study of the course. A particular course has the same credit evaluation for all students. A student may gain credits for a course only once during the course of their studies: theoretical courses (lectures, seminars and practicals) are converted to credits based on student workload: 1 ECTS = 25 hours workload on the student and practical training (clinical training, clinical practice, continuous clinical practice, and summer clinical practice) is converted based on student workload: 1 ECTS = 30 hours workload on the student. As per Act of the National Council of the Slovak Republic No. 455/2012 amending and supplementing Law No. 131/2002 Coll. on universities and on amendments certain acts as amended Coll. the full-time study, form the point of view of time corresponds to student work of 1500–1800 hours per academic year, known as the workload on the student. It consists of contact hours (e.g. attendance at lectures, seminars, clinical practice) and non-contact hours (e.g. self-study and independent creative activities) [7,11]. The student must fulfil the requirements to gain credits from a course in the following manners: *completed* (C), *continuous assessment* (CA), *examination* (X) or *a state exam* (SX). The workload on the student also vary in terms of the final assessment. Training activities can be performed: by attendance, distance learning or by combined method [11].

Assessment of student learning is a key issue for students, those who teach and those who are responsible for the design, accreditation, quality assurance and review of courses. Brown et al. assert that: "Assessment defines what students regard as important, how they spend their time and how they come to see themselves as students and then as graduates" [23]. Research in learning and teaching in higher education has demonstrated the profound impact of assessment method upon depth of study. Other authors showed how the use of tests and multiple-choice questions promoted reproductive styles of learning, whereas projects and open-ended assessment promoted independence and deeper strategies of understanding. In the recent past, there has been a dramatic shift in the procedures and methods of assessment in higher education. One of the driving forces behind the shift has been the renewed emphasis on and the current interest in the professional preparation, development and accreditation of university teachers [24].

Methodology for theoretical education in study programme nursing include: research papers focus on student comprehension, ability to understand material, projects are an exceptional method to assess student's creation or innovation abilities. Other methods are case studies, seminars, reviews, quizzes, online assessment, essays and other.

# **Examples of students workload**

A workshop is a form of educational activity, whereby instructor/assistant prepares a topic, objective and programme. The student, through various techniques (brainstorming, feedback) and by using their own knowledge and experience, acquires skills that will be used in practice.

During the workshop the instructor/assistant organizes, supervises and helps students with the course. The workshop is meant to deepen already acquired knowledge and skills. The output of the workshop is to fulfil the conditions of the specified topic and objective. The workshop does not have a theoretical component, it is assumed that the student has a theoretical basis and is able to transfer theoretical knowledge into practical skills and it therefore calls for active cooperation among the participants of the workshop. A workshop can be prepared on the basis of various scientific or professional topics. It is recommended to be prepared for approximately 60 min. (one topic) with an optimal number of 25 participants [12]. Workload on the student: preparation and realization of a workshop on a professional topic (15 hours of student work); preparation and realization of a workshop on a scientific topic (30 hours of student work) [13]. We describe approaches to coursework assessment in Table 1.

Nursing education in Western Balkan countries is in the transition period (implementation of new methods, development of new methods based on existing competences, creation of joint programmes with other institutions). There are differences in the basic training of nurses (secondary qualification, post-secondary qualification, and bachelor studies). Impact on nursing education is represented the establishment of private universities offering education programmes in nursing with a different standard than the public universities. This creates a room for improvement in theoretical and practical areas. Methods for theoretical and practical training require innovation. Despite these deficiencies, there are also positive trends in nursing education, such as the ongoing reforms in the context of European criteria for the higher education, implementation of new strategies and cooperation with the concerned organizations, cooperation within individual faculties, investments in the material equipment of educational institutions [20].

Nurses represent the largest percentage of the health care workforce in Bosnia and Herzegovina. In the field of nursing, the educational system is still divided into two levels with no proper distinction in legal documents regarding what is the responsibility of nurses with a high school education and what is the responsibility of nurses with a bachelor's degree. Implementation of new teaching methodologies and assessment methodologies is crucial [21].

Of the data collected, it is evident that five of the twelve EU countries (Belgium, Finland, Germany, Netherlands and Sweden) provide a two-level education for nurses [22].

Transformation of education in the European Union has brought numerous changes in the modification of teaching, curriculum and time allocation of classes within courses, implementation of new teaching methods to studies, etc. The project is entitled TEMPUS – Competency based Curriculum Reform in Nursing and Caring in Western Balkan Universities (CCNURCA No. 544169-TEMPUS-1-2013-1-BE-TEM-PUS-JPCR) and it is currently under way in the international cooperation, which initiates European standards in order to innovation the content of training in nursing [25].

# Control of study and evaluation of academic results

Evaluation of academic results of the student within the academic subject is carried out: through continuous controlling of academic results during the period of study (written tests, seminar work etc.) and by exam for the given period of study. The teacher gives a grade for the completion of the course. The grade expresses the quality of acquired knowledge and practical skills in accordance with the results of learning on the subject information sheet [17]. Theories or models that have been applied to nursing include Bloom's

Essays	A standard method, essentially concerned with trying out ideas and arguments, supported by evidence. Has potential for measuring understanding, synthesis and evaluative skills. In most essays, there are no absolutely right or wrong answers and marking for feedback can be time consuming. Variations between markers can be high.
Case studies and open problems	Case studies have potential for measuring application of knowledge, analysis, problem-solving and evaluative skills. This method allows students to apply theory to practical situations. Marking criteria help re-grading and feedback.
Projects and group projects	Good all-round ability testing. Potential for sampling wide range of practical, analytical and interpretative skills. Develops tutor/student and student/student relationships. Wider application of knowledge and skills to real/simulated situations. Motivation tends to be high. Feedback potential (especially in incorporating self or peer assessment). Tests methods as well as end results and use of criteria reduces variability. May include seminars and tutorials, case studies, simulation, role-plays, problem solving exercises, team-building and experiential ('live' project) learning.
Seminar presentations	Feedback potential from tutor, self and/or peers; tests preparation, understanding, knowledge, capacity to structure information and oral communication skills. Can broaden possible topic and approaches. Marking based on simple criteria is fast and potentially reliable.
Laboratory/ Practical work	Feedback potential; with potential for measuring knowledge of experimental procedures, analysis and interpretation of results. Can also test preparation and practical skills and can help broaden topic and approaches, particularly in terms of application of knowledge.
Posters	Students summarise their work by preparing a poster. Encourages students to think creatively about their work and present it effectively, as well as presenting findings and interpretations succinctly and attractively. Presentation and feedback potential, from tutor, self and peers.

#### TABLE 1. Approaches to coursework assessment

Sources: [13–16]

cognitive taxonomy of learning. Bloom's Taxonomy is classification, so the well-known taxonomy of learning objectives is an attempt (within the behavioural paradigm) to classify forms and levels of learning. It identifies three "domains" of learning, each of which is organised as a series of levels or pre-requisites. As well as providing a basic sequential model for dealing with topics in the curriculum, it also suggests a way of categorising levels of learning, in terms of the expected ceiling for a given programme [18].

# CONCLUSION

Nursing encompasses autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings. Nursing includes the promotion of health, prevention of illness, care of ill, disabled and dying people. Advocacy, promotion of a safe environment, research, participation in shaping health policy and in patient and health systems management, and education are also key nursing roles. Broadly speaking postgraduate degrees for nurses fall into categories: leadership, management and administration of health services; clinical nursing specialities with or without practice competences; general nursing studies; research methods in health; nurse education. In addition, nurses undertake interprofessional/multidisciplinary courses associated with health education, medicine or social care, for example studies in rehabilitation, nutrition, public health, counselling. Competence of nurse is the state of having the knowledge, skills, energy, experience and motivation required to respond adequately to the demands of one's professional responsibility [19].

# CONFLICT OF INTEREST STATEMENT

Neither author has any financial or personal relationship with people or organisations that could inappropriately influence their work.

Anna Hudáková

### REFERENCES

- Decree of the Government of the Slovak Republic No. 296/2010 Coll. on professional qualification for performance of health service occupation, the method of further education of health professionals, system of specialized fields and system of certified working activities.
- [2] Decree of the Ministry of Health of the Slovak Republic No. 364/2005 Coll., which determines the scope of nursing practice provided by nurses independently and in conjunction with a doctor and the scope of midwifery practice provided by midwives independently and in conjunction with a doctor (as amended by No. 470/2006 Coll.).
- [3] Kuriplachová G, Magurová D, Hloch S, Chattopadhyaya, S. Effectiveness of education in nursing. ISM: Dhanbad 2014. ISBN 978-93-5212-000-0.
- Boyd DH, Cowan JA. Case for self-assessment based on recent studies of student learning. Assess Eval High Educ 1985; 10(3): 225–235.
- [5] Zeleníková R, Gurková E, Žiaková K, Tomagová M, Jarošová D. 2016. Psychometric properties of the Slovak and Czech versions of the evidence-based practice beliefs and implementation scales. Worldviews Evid Based Nurs 2016; 13(2): 139–152.
- [6] Act of the National Council of the Slovak Republic No. 578/2004 Coll. on health care providers, health service personnel, professional organizations in health service and on amendments to certain acts.
- [7] Act of the National Council of the Slovak Republic No. 131/2002 Coll. on Higher Education and on Amendments and Supplements to Certain Acts as amended by later regulations.
- [8] Information on study for academic year 2010-2011. Faculty of Health Care, University of Prešov: Prešov 2011.
- [9] Decree of the Government of the Slovak Republic No. 614/2002 Coll. on the credit system.
- [10] Decree 155/2013 of the Ministry of Education, Science, Research and Sport of the Slovak Republic amending and supplementing Decree of the Ministry of Education of the Slovak Republic no. 614/2002 Coll. the credit system.
- Act of the National Council of the Slovak Republic No. 455/2012 amending and supplementing Law no. 131/2002 Coll. on universities and on amendments certain acts as amended Coll.
- [12] Heywood D J. Assessment in Higher Education. John Wiley & Sons: New York 1989.
- [13] Brown G. 2001. Assessment: a guide for lecturers. Assessment series No. 3. Learning and Teaching Support Network. [Online]. York, 2001. Available at WWW: <a href="https://www.heacademy.ac.uk/">https://www.heacademy.ac.uk/</a>>
- [14] Heathfield M. How to assess student group work. The Times Higher Education Supplement 1999; 26(3): 40-41.
- [15] Wondrak R. Using self and peer assessment in advanced modules. Teaching News 1993: 22-23.
- [16] Quality Assurance Agency. Enhancing practice: assessment. Reflections on assessment, Volumes I and II. [Online]. Quality Assurance Agency for Higher Education: Gloucester 2005. Available at WWW: <a href="https://www.enhancementthemes.ac.uk/resources/">https://www.enhancementthemes.ac.uk/ resources/</a>>.
- [17] Ainscow M, Booth T. From Them to Us: An International Study of Inclusion in Education. Routledge 2005. 280 p.
- [18] Bloom BS. Taxonomy of educational objectives. Handbook 1 cognitive domain. [Online]. Longmans: London 1956. Available at WWW: <a href="http://www.learningandteaching.info/learning/bloomtax.htm#ixzz3QgluU4qS">http://www.learningandteaching.info/learning/bloomtax.htm#ixzz3QgluU4qS</a>>.
- [19] Roach Arvid. The Virtues of Clarity. The Aba's New Choice of Law Rule for Legal Ethics, 36 S. Texas L Rev 1995: 907.
- [20] Competency based Curriculum Reform in Nursing and Caring in Western Balkan Universities. Newsletter No.1. (September 2014). [Online]. [cit. 2015-04-06]. Available at WWW: <a href="http://www.ccnurca.eu/newsletters">http://www.ccnurca.eu/newsletters</a>

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- [21] Oruč M, D. Bokonjič F, Dumez F, et al. Nursing Education in BiH: Roadmap toward the EU Directive. Sanitas Magisterium 2015; 1(2): 73–82.
- [22] Debout C. The French healthcare system at a glance. Presentation to European Academy of Nursing Science Summer School, York. [online]. International Council of Nursing, 2007. [cit. 2015-04-09]. Available at WWW: <a href="http://icnapnetwork.org">http://icnapnetwork.org</a>
- [23] Brown G, Bull J, Pendlebury M. Assessing student learning in higher education. Routledge, London 1997.
- [24] Watkins D, Hattie J. A longitudinal study of the approaches to learning of Australian tertiary students. Human Learning 1985; 4: 127–141.
- [25] Competency-based Curriculum Reform in Nursing and Caring in Western Balkan Universities. 2014. Newsletter No.1. (September 2014). [online]. [cit. 2015-04-06]. Available at WWW: http://www.ccnurca.eu/newsletters

# 8TH AKUTNĚ.CZ CONFERENCE – THE CZECH BIGGEST EVENT FOR YOUNG ANAESTHESIOLOGISTS AND MEDICAL STUDENTS

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AKUTNĚ.CZ; Emergency Medicine Course; simulation medicine; emergency medicine; intensive care; anaesthesiology; medical students



**ABSTRACT** — The eighth meeting of anaesthetists and sympathisers of intensive medicine took place in Brno. Its participants gathered in the University Campus at Bohunice and joined the AKUTNĚ.CZ conference. This one-day conference is the biggest event of its kind in the Czech Republic, visited by a record number of people who are interested in acute medicine news.

Each year, the University Campus at Bohunice becomes a place where experts and students meet together, enjoying hot anaesthetics issues. Lectures of famous speakers were followed by workshops, which were scheduled over the whole day. On-line video streaming was also available. Recorded lectures can be found at http://www.akutne.cz/index. php?pg=aktuality&aid=714.





FIGURE 1. Dr Klučka and Dr Růžková (Jiří Mach Award winners) with Pavel Tomeš, patron of the AKUTNĚ.CZ endowment fund

Brno. The number of participants was astonishing: a total of 928 people joined the conference. More than

**FIGURE 2.** Videolaryngoscopic orotracheal intubation in the workshop "It's about time"

400 attendants took part in 11 workshops which were running in many cycles. The participants could visit as many as 39 lectures in just one day. It is obvious that AKUTNĚ.CZ is considered to be the most practically oriented acute medicine conference.

At the beginning of the conference, recently deceased Dr Jiří Mach was remembered as a great anaesthesiologist and a popular teacher who supported his young colleagues. In memory of him, Jiří Mach Awards were given to Dr Růžková and Dr Klučka. They were awarded for their articles in prestigious journals Pediatric Anesthesia and BioMed Research International. The awards were handed over by Pavel Tomeš, patron of the AKUTNĚ.CZ endowment fund.

Eight participants were involved in the poster section of the conference. The prize for the best poster was awarded to Dr Martin Harazim from Pilsen.

Volunteers could take part in a brand new workshop called "AKUTNĚ.CZ Algorithms", which was designed as a PBL/TBL (Problem Based Learning/Team Based Learning) lesson. The workshop was hosted by Dr Hana Harazim, who is a well-known expert in the field of virtual patients. Her workshop was actually groundbreaking: it was for the first time that a workshop of this type was held in a Czech acute medicine conference. It demonstrated how the education of young doctors and medical students could look like in a few years. Medical students were very interested in this workshop: there was no vacancy during the two one-hour-lasting workshops. Young students and the lecturer discussed one of the algorithms created by AKUTNĚ.CZ. Students tried to take care of the virtual patient step by step. First they made an initial examination, then established the diagnosis, and finally suggested the therapeutic procedure. According to the students' feedback, this kind of education is very attractive and popular and could become the educational standard in future.

The AKUTNĚ.CZ conference is extraordinary due to the great organising team involving doctors and medical students as well. The whole team was very well evaluated in questionnaires. For example, 100% of participants who filled the questionnaire would recommend the conference to their colleagues. Let's begin preparations for the next year! See you on 25 November 2017 in Brno.

...let's meet on AKUTNĚ.CZ...



FIGURE 3. Virtual patient AKUTNĚ.CZ in PBL session workshop



FIGURE 4. Bronchoscopy workshop

# MEFANET JOURNAL PROFILE

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The journal is intended to present within a single forum all of the developments in the field of medical informatics, medical education, e-learning and thereby promote the synergism among these disciplines. The journal is the premier vehicle for disseminating information about MEdical FAculties NETwork, which covers all Czech and Slovak medical faculties.

The journal enables medical teachers and scientists to share and disseminate evidence demonstrating the actual practice in on-line education in medicine and healthcare sciences by focusing on:

- research in medical educational informatics and learning analytics
- applications of medical informatics into education
- design, usage and results of novel e-learning tools and innovative pedagogical methods in medical teaching and learning
- other interdisciplinary topics related to information and communication technology in medical education

In 2009–2012, MEFANET report was published as one volume per year and was printed in 1000 copies. Since 2013, MEFANET journal has been published biyearly.

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- E-health and telemedicine
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# 1<sup>st</sup> Workshop on Technology Enhanced Medical and Healthcare Education (TEMHE'17)



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- D Paper submission (strict deadline): May 10, 2017.
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