mefanet 2016

10th international conference of Czech and Slovak faculties of medicine, focused on e-learning and medical informatics in the education of medical disciplines

29–30 November 2016, Brno, Czech Republic

... TELL AND LISTEN TO THE STORIES THAT EDUCATE, MOVE AND INSPIRE ...

EDITORS

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WELCOME WORD

Dear colleagues and students,

we are pleased to welcome you at the 10th year of the MEFANET conference, which traditionally brings together experts in the field of medical and educational informatics, teachers and students from faculties of medicine and faculties of healthcare sciences across Czechia and Slovakia. Besides the methodological and educational aspects of technology-enhanced learning and teaching, the conference will be again focused on the impact of this phenomenon on a specific field of medicine. For this year, the programme committee has chosen the topic: "Technology-enhanced education in radiology".

The conference programme encompasses two workshops, two keynote lectures, one symposium, one topical session, and sessions with short communications and posters. The workshops will be focused on: (i) improving the quality of assessment activities by analysis of test items, (ii) international standards and recommendations in the field of curriculum mapping. Two excellent speakers – Andrzej Kononowicz (Jagellonian University, Krakow) and Luke Woodham (St George's University, London) have been invited and their keynote lectures:

- Virtual Patients – Where are we? Where are we going?
- Moving into MOOCs: what does this mean for health education?

will cover the area of virtual patients – recently reinvented in a few of European projects aimed at scenario-based learning – and the area of MOOCs (massive open online courses) – a buzzword which has emerged in medical education lately.

We thank all participating speakers and authors of the conference proceedings contributions. It is our sincere hope that this conference will be a valuable resource for the MEFANET community and will inspire further research and development in the vibrant area of medical education science.

On behalf of the Programme Committee
Daniel Schwarz, Marek Mechl & Vlastimil Válek

On behalf of the Organization Committee
Martin Komenda, Jaroslav Majerník & Daniel Schwarz

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GENERAL INFORMATION

CONFERENCE VENUE

Hotel Continental Brno
Kounicova 6, 602 00 Brno, Czech Republic
GPS: 49°12'2.194"N /16°36'16.155"E
www.continentalbrno.cz

CATERING

Lunch is included in the registration fee and will be provided to all conference participants on 29 and 30 November 2016 in the foyer.

REGISTRATION OF PARTICIPANTS AT THE CONFERENCE VENUE

29 November 2016 from 12.00 to 17.00 h
30 November 2016 from 8.00 to 15.00 h

INFORMATION FOR AUTHORS

- Data projector and PC will be available to the lecturers.
- The lecturers are invited to test the technical equipment before the conference start or during coffee breaks.
- Technical assistance will be available for the whole time of the conference.
- A typical time slot for a contribution having the form of short communication is 12 min + 3 min discussion.

WE KINDLY ASK LECTURERS TO STAY WITHIN THE TIME LIMIT FOR THEIR PRESENTATIONS.

TUESDAY — 29 NOVEMBER

REGISTRATION	12.00
LUNCH	12.30
WORKSHOP: TEST AND ITEM ANALYSIS AND THEIR APPLICATIONS TO IMPROVE THE QUALITY OF TEST	13.30
COFFEE BREAK	15.30
WORKSHOP: MEDCIN PROJECT MEDICAL CURRICULUM STRUCTURES CONSTRUCTION	16.00
MEFANET COORDINATION COMMITTEE OPEN MEETING	18.00
RECEPTION	19.30

WEDNESDAY — 30 NOVEMBER

8.00	*REGISTRATION*
9.00	**SYMPOSIUM: THE CLINICAL LEARNING ENVIRONMENT IN NURSING EDUCATION**
10.30	*POSTER SESSION & COFFEE*
11.00	**CEREMONY: 10TH ANNIVERSARY OF MEFANET**
11.30	**KEYNOTE LECTURES: VIRTUAL PATIENTS & MOOCS** *KONONOWICZ A* – VIRTUAL PATIENTS – WHERE ARE WE? WHERE ARE WE GOING? *WOODHAM L* – MOVING INTO MOOCS: WHAT DOES THIS MEAN FOR HEALTH EDUCATION?
12.50	*POSTER SESSION & LUNCH*
13.45	**TOPICAL SESSION: TECHNOLOGY-ENHANCED EDUCATION IN RADIOLOGY**
15.45	*COFFEE BREAK*
16.00	**SHORT COMMUNICATIONS: DATA ANALYTICS & TECHNOLOGY-ENHANCED LEARNING**
18.00	*CLOSING CEREMONY*

D1.1 WORKSHOP:
TEST AND ITEM ANALYSIS AND THEIR APPLICATIONS TO IMPROVE THE QUALITY OF TESTS

Tuesday, 29 November, 13.30–15.30, Hall

CHAIR: VEJRAŽKA M

FIRST FACULTY OF MEDICINE, CHARLES UNIVERSITY

D1.2 WORKSHOP:
MEDCIN PROJECT – MEDICAL CURRICULUM STRUCTURES CONSTRUCTION

Tuesday, 29 November, 16.00–17.45, Hall

CHAIR: KOMENDA M

FACULTY OF MEDICINE, MASARYK UNIVERSITY

D2.1 SYMPOSIUM:
THE CLINICAL LEARNING ENVIRONMENT IN NURSING EDUCATION

Wednesday, 30 November, 9.00–10.30, Hall

CHAIRS: GURKOVÁ E, ŽIAKOVÁ K, MIKŠOVÁ Z

FACULTY OF HEALTH CARE, UNIVERSITY OF PREŠOV IN PREŠOV; JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA; FACULTY OF HEALTH SCIENCES, PALACKÝ UNIVERSITY IN OLOMOUC

10TH ANNIVERSARY OF MEFANET

Wednesday, 30 November, 11.00–11.30, Hall

CHAIRS: BAREŠ M, ŠTÍPEK S, SCHWARZ D, DUŠEK L

FACULTY OF MEDICINE, MASARYK UNIVERSITY, FIRST FACULTY OFMEDICINE, CHARLES UNIVERSITY

D2.2 KEYNOTE LECTURES:
VIRTUAL PATIENTS & MOOCS

Wednesday, 30 November, 11.00–11.30, Hall

CHAIRS: BAREŠ M, ŠTÍPEK S, SCHWARZ D, DUŠEK L

VIRTUAL PATIENTS – WHERE ARE WE? WHERE ARE WE GOING?

KONONOWICZ A

JAGIELLONIAN UNIVERSITY MEDICAL COLLEGE, KRAKÓW

MOVING INTO MOOCS: WHAT DOES THIS MEAN FOR HEALTH EDUCATION?

WOODHAM L

ST GEORGE'S, UNIVERSITY OF LONDON

D2.3 TOPICAL SESSION: TECHNOLOGY-ENHANCED EDUCATION IN RADIOLOGY

Wednesday, 30 November, 13.45–15.45, Hall

CHAIRS: VÁLEK V, MECHL M

FACULTY OF MEDICINE, MASARYK UNIVERSITY

TECHNOLOGY-ENHANCED EDUCATION IN RADIOLOGY

MECHL M

FACULTY OF MEDICINE, MASARYK UNIVERSITY, UNIVERSITY HOSPITAL BRNO

E-LEARNING IN RADIOLOGY FROM THE NATIONAL AS WELL AS INTERNATIONAL VIEWPOINT

VÁLEK V

FACULTY OF MEDICINE, MASARYK UNIVERSITY, UNIVERSITY HOSPITAL BRNO

EDUCATIONAL PACS SYSTEMS: TECHNICAL NOTES

ZOUBEK D

SECOND FACULTY OF MEDICINE, CHARLES UNIVERSITY, UNIVERSITY HOSPITAL IN MOTOL

DIDACTIC PRINCIPLES OF THE USE OF IMAGING DATA IN MEDICAL EDUCATION

POKORNÁ A

FACULTY OF MEDICINE, MASARYK UNIVERSITY

RADIODIAGNOSTIC ELEMENTS IN VIRTUAL PATIENTS AKUTNE.CZ

HARAZIM H

FACULTY OF MEDICINE, MASARYK UNIVERSITY, UNIVERSITY HOSPITAL BRNO

GENERAL DATA PROTECTION REGULATION

BRECHLEROVÁ D

FACULTY OF BIOMEDICAL ENGINEERING, CZECH TECHNICAL UNIVERSITY IN PRAGUE

D2.4 SHORT COMMUNICATIONS: DATA ANALYTICS & TECHNOLOGY--ENHANCED LEARNING

MINUTOVÝ RECNÍK

Wednesday, 30 November, 16.00–18.00, Hall

CHAIRS: VEJRAŽKA M, ZAHRADNÍČEK O

FIRST FACULTY OF MEDICINE, CHARLES UNIVERSITY, FACULTY OF MEDICINE, MASARYK UNIVERSITY

VALIDATION OF ADMISSION TEST AND CONCEPTUAL ASSESSMENTS FOR MEDICAL SCHOOLS

MARTINKOVÁ P

CZECH ACADEMY OF SCIENCES

WEB-BASED APPLICATION PROVIDING GUIDANCE FOR THE CORRECT STATISTICAL TEST SELECTING

ŠTĚPÁNEK L

FIRST FACULTY OF MEDICINE, CHARLES UNIVERSITY

KEYWORD SIMILARITY IN REHABILITATION: CASE STUDY
KOMENDA M
FACULTY OF MEDICINE, MASARYK UNIVERSITY

EDUCATIONAL DATA VISUALIZATIONS FROM THE PERSPECTIVE OF DATA-DRIVEN DECISION MAKING
KAROLYI M
FACULTY OF MEDICINE, MASARYK UNIVERSITY

POTENTIALS OF COMPUTERIZED ADAPTIVE TESTING IN HIGH SCHOOL PHYSICS KNOWLEDGE ASSESSMENT OF 1ST YEAR MEDICAL SCHOOL STUDENTS
KOMARC M
FIRST FACULTY OF MEDICINE, CHARLES UNIVERSITY

EXPERIENCE WITH E-LEARNING IN THE ENGLISH VERSION OF THE ELECTIVE SUBJECT: BASIS OF HARVEST AND PRESERVATION OF TISSUES FOR TRANSPLANTATION
MĚŘIČKA P
FACULTY OF MEDICINE IN HRADEC KRÁLOVÉ, CHARLES UNIVERSITY

MOODLE MOBILE IS THE OFFICIAL MOBILE APP FOR MOODLE
KORDEK D
FACULTY OF MEDICINE IN HRADEC KRÁLOVÉ, CHARLES UNIVERSITY

POSTER SESSION
Foyer

RESEARCH JOBS

PROJECT "THE CONCEPT OF CO-ORDINATION AND IMPLEMENTATION OF CROSS-BORDER EMERGENCY MEDICAL SERVICES COOPERATION"
BOLEK L
FACULTY OF HEALTH CARE STUDIES, UNIVERSITY OF WEST BOHEMIA

RESULTS OF BACHELOR THESES FROM STUDENTS OF BIOMEDICAL INFORMATICS
BRECHLEROVÁ D
CZECH TECHNICAL UNIVERSITY IN PRAGUE

EXAMINATION METHODS IN OBSTETRICS AND GYNECOLOGY -E-LEARNING EDUCATION
KELČÍKOVÁ S
JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA

SIMULATION ENVIRONMENT FOR HEALTHCARE MESSAGE INTEGRATION IN THE TEACHING OF HOSPITAL INFORMATION SYSTEMS AT FBME CTU
KLEMPÍŘ O
FACULTY OF BIOMEDICAL ENGINEERING, CZECH TECHNICAL UNIVERSITY IN PRAGUE

HUMAN ANATOMY IN MULTIMEDIA LECTURES
MAJERNÍK J
FACULTY OF MEDICINE, PAVOL JOZEF ŠAFÁRIK UNIVERSITY IN KOŠICE

CARE OF WOMAN WITH POSTPARTUM HAEMORRHAGE AS A VIRTUAL PATIENT IN MIDWIFERY

MASKÁLOVÁ E

JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA

TAKING CARE OF A NEW-BORN BABY – E-LEARNING EDUCATION

MAZÚCHOVÁ L

JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA

THE IMPLEMENTATION PROCESS OF THE NEW ONLINE RECORDING SYSTEM FOR PRESSURE ULCERS MONITORING

POKORNÁ A

FACULTY OF MEDICINE, MASARYK UNIVERSITY

MD EDUCATION SCIENCE COMPONENT: IMPORTANT ISSUES IN STRUCTURE AND DESIGN

TABAGARI N

DAVID TVILDIANI MEDICAL UNIVERSITY, TBILISI

PERINATAL LOSS AS VIRTUAL PATIENT IN MIDWIFERY

URBANOVÁ E

JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA

LASER-TISSUE INTERACTION AND THEIR SIMULATION

URZOVÁ J

FACULTY OF BIOMEDICAL ENGINEERING, CZECH TECHNICAL UNIVERSITY IN PRAGUE

ABSTRACTS

TEST AND ITEM ANALYSIS AND THEIR APPLICATIONS TO IMPROVE THE QUALITY OF TESTS

Guarantee:
Martin Vejražka, Čestmír Štuka, Patrícia Martinková, Martin Komenda, Lubomír Štěpánek
First Faculty of Medicine, Charles University; Czech Academy of Sciences; Faculty of Medicine, Masaryk University

High-quality assessment of students' knowledge based on written tests involves not only a careful preparation of the test itself and the preparation of specific problems, but also the subsequent test analysis of item analysis. Such analyses aim to evaluate the quality and benefit of individual problems, i.e. their capacity to recognise the level of students' knowledge, and to find out how well the test works as a whole. Workshop participants will learn how to use freely available tools in order to perform a basic test analysis and item analysis, and how to interpret their results. Practical examples will be used to teach workshop participants how to use statistical evaluation in order to recognise phrasing inaccuracies, as well as errors in items that have been marked as low-quality by the item analysis. Possibilities of editing such problems for subsequent test rounds will be presented. Workshop participants will obtain written materials and get an insight into selected tools for test analysis and item analysis. After attending the workshop, participants should be able to: (i) understand the basic psychometric characteristics of items and learn their simple interpretation; (ii) identify questionable problems or answers in selected problems, based on statistical data on items; (iii) recognise the most frequent mistakes in the phrasing of test problems. The workshop will show that tools for a basic item analysis are available, and that their use is not excessively difficult.

MEDCIN PROJECT: WORKSHOP ON MEDICAL CURRICULUM STRUCTURES CONSTRUCTION

Guarantee:
Martin Komenda, Matěj Karolyi, Dimitris Spachos, Christos Vaitsis, Luke Woodham
Faculty of Medicine, Masaryk University, Aristotle University of Thessaloniki, Karolinska Institutet, St George's University of London

Many medical and healthcare institutions have already described their curricula. The comparison of curriculum content is a challenging area, where no proven approach has been published so far. The need for standardized curriculum particularly in medical education is indispensable. The primary goal of this workshop is to deeply understand the general medical and healthcare curricula structure in accordance with international standards and recommendations. Organizers want to get relevant feedback from participants describing expected medical curricula structures, which will be used for the MEDCIN project needs in the future.

We aim to identify and validate novel, potentially useful patterns, which will significantly help curriculum managers/evaluators to make right decisions, and afterwards build a well-balanced medical curriculum. MEDCIN will not only eliminate poor transparencies in curricula, but will also help to improve teaching as such.

The MEDCIN workshop (reg. no.: 2015-1-CZ01-KA203-013935) is funded from the European Commission ERASMUS+ program.

SYMPOSIUM

THE CLINICAL LEARNING ENVIRONMENT IN NURSING EDUCATION: CONCEPTUAL, METHODOLOGICAL AND ORGANIZATIONAL ISSUES

Guarantee: Elena Gurková, Katarína Žiaková, Zdena Mikšová

Faculty of Health Care, University of Prešov in Prešov; Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava; Faculty of Health Sciences, Palacký University in Olomouc

Keywords: *clinical learning, clinical learning environment, supervision, mentorship*

Clinical learning (workplace training) covers unavoidable and significant component of nursing education considering that nursing is practice-based profession. Students' exposure to clinical learning environment is one of the most important factors affecting the teaching-learning process in clinical settings. There is a broad range of international studies developed and published within multiple European projects comparing clinical learning environment in relation to organizational aspects of clinical learning or clinical supervision. Following these international activities, several Slovak and Czech national projects and dissemination activities were initiated, which were focused on sharing problems and task allocation between educational institutions and healthcare providers regarding clinical education as well as critical judgement of models and conditions for clinical education in several universities in the Czech and Slovak Republic. As a result of these activities, the role of teacher was reduced, clinical mentors were introduced and programs for mentor professional training were developed. However, current situation in clinical education structure can be described by sustaining variability and diversity in the implementation of clinical education models especially regarding the role and professional training of a mentor in nursing.

Because of the mentioned problem areas it is necessary to explore factors influencing clinical practice efficiency in an interactive workshop. The aim of this workshop is focused on the conceptual; methodological; and organizational issues regarding clinical nursing education.

Conceptual issues are focused on inconsistencies in terminology of roles and competencies in clinical nursing education. Methodological issues involve ambiguity in measurement of clinical

learning environment and availability of validated instruments in evaluation of specific aspects of clinical learning environment useful in measuring the quality of clinical education in higher nursing education. Organizational issues are associated with inconsistency in the role and responsibility of mentors, differences in availability of mentor training programs regarding clinical nursing education.

Further studies in this field, extended to different European countries and clinical settings, may help us to understand how to improve clinical learning environment and models of clinical or workplace training.

Acknowledgements: The workshop was supported by Grant KEGA: Evaluation of clinical learning enviroment in nursing pre-gradual education (016PU-4/2015).

KEYNOTE LECTURES

VIRTUAL PATIENTS – WHERE ARE WE? WHERE ARE WE GOING?

Andrzej Kononowicz
Jagiellonian University Medical College, Kraków, Poland / Karolinska institutet, Stockholm, Sweden

Despite much excitement around virtual patients, the concept of using computers to simulate real-world clinical scenarios is all but new, and can be dated back to the late 1960s. However, what has recently changed is the attitude of the mainstream medical community, who have ceased to regard the use of this technology as idiosyncrasy, but instead as a viable learning tool available to modern universities. Many myths have formed around the concept regarding its efficacy, cost and practicalities of use, but also its future. The goal of this presentation is to shed more light on the current status of virtual patient implementations, and give an overview of current developments. The views will be presented from multiple angles: 1) an ongoing Cochrane collaboration systematic literature review of virtual patient simulations and former qualitative evidence summaries of the presenter; 2) experiences collected while incorporating virtual patients in edX Massive Open Online Courses at Karolinska Institutet in Stockholm; but also 3) the perspective of Jagiellonian University Medical College in Kraków, where virtual patients are being incorporated in the health professions curricula for several years and form an important component of the developing medical simulation centre.

MOVING INTO MOOCS: WHAT DOES THIS MEAN FOR HEALTH EDUCATION?

Luke Woodham
St George's, University of London

Recently, MOOCs (Massive Open Online Courses) have become the subject of increasing debate in education. Offering the possibility for teaching to reach thousands of users at a time, a number of competing platforms offering a huge variety of courses have emerged, and have been enthusiastically adopted by a large number of institutions. However, the role of MOOCs in medicine and healthcare education is less clear; their limited provision for formal assessment and the absence of face-to-face interaction has led some to question their value. This presentation will consider the recent developments being made by MOOC providers to address these criticisms, and reflect upon the work in delivering healthcare-related MOOCs at St George's, University of London. It will explore the importance of obtaining professional recognition for completing MOOCS, and touch upon the possibilities for fostering greater levels of interactivity and engagement with participants; projects such as the WAVES (Widening Access to Virtual Educational Scenarios) network aim to demonstrate that pedagogically-proven tools can enhance the teaching and learning opportunities available to learners and educators.

TOPICAL SESSION

TECHNOLOGY-ENHANCED EDUCATION IN RADIOLOGY

Guarantee: Vlastimil Válek, Marek Mechl
Faculty of Medicine, Masaryk University

Radiology is a clinical discipline that makes a substantial use of the current technical possibilities of computer technology: from examinations themselves to their assessment and the subsequent processing of results, and of course in undergraduate and graduate education. A wide range of possibilities is therefore available when it comes to e-learning in radiology, which does not necessarily mean that this is an advantage at all times. From the point of view of data processing and subsequent use for whatever purpose, one must take into account legislative aspects as well – which is not always obvious, and tends to be neglected in practice.

In fact, image documentation obtained by various imaging techniques accompanies future physicians during their entire study, from basic anatomy to demanding therapeutic procedures navigated by the results of radiological examinations. It is therefore essential that undergraduate

students get a basic insight into the possibilities of various imaging techniques, and that young physicians pursuing board certification in radiology deepen their knowledge.

From the technical point of view, it is relatively simple to make and to store image documentation. Making it accessible to various groups of students, however, is more difficult, particularly when taking into account the legislation on personal data protection. Last but not least, one must take into consideration the fact that one examination can involve hundreds to thousands of images that should be available to students, because this will be the case later in clinical practice.

Individual contributions will look into the above-mentioned issues from the points of view of technology and medicine, as well as the practical implementation of teaching about individual imaging techniques, including education on an international level.

GENERAL DATA PROTECTION REGULATION

Dagmar Brechlerová
Faculty of Biomedical Engineering, Czech Technical University in Prague

Post acquaintes with the Regulation of the European Parliament and of the Council (EU) 2016/679 of 27 April 2016 on the protection of individuals with regard to the processing of personal data and the movement of such data - General Data Protection Regulation ("GDPR"). General Data Protection Regulation is a breakthrough in the transfer of personal data at international level and has a major impact on all entities that personal data processed for different purposes. Its impact eg. in the health sector will be huge.

This new EU regulation has been studied including the views of lawyers and particularly the Czech Office for Personal Data Protection. Therefore article summarizes both essential elements of the regulation, as well as contemporary views on law and information technology. The paper pays particular attention to the possible impact on health.

General Data Protection Regulation is a groundbreaking EU regulation, which must be from 2018 incorporated into national legislation. This regulation introduces an entirely new rules and obligations. Some organizations eg. must have special person - Data Protection Supervisor. It will reporting obligations, which the administrator can mean administrative burden, it is reporting breaches of personal data (ie. Data breaches). For health care as a major processors of personal data, including genetic data that regulation is also crucial. It is therefore necessary to be familiar with this Regulation and to start preparing for its impact.

Post summarize the main points of the General Data Protection Regulation. Highlights of the possible impacts GDPR and time schedule of acceptation into national legislation. Emphasizes effects on health, including medical education.

Acknowledgements: Innovation and redesign of a group of courses on information systems in healthcare (a CTU grant)

SHORT COMMUNICATIONS

VALIDATION OF ADMISSION TEST AND CONCEPTUAL ASSESSMENTS FOR MEDICAL SCHOOLS

Patrícia Martinková, Čestmír Štuka, Martin Vejražka
Institute of Computer Science, Czech Academy of Sciences; Fist Faculty of Medicine, Charles University

Keywords: *admission tests, conceptual assessments, validity, reliability, undergraduate students, item fairness*

Knowledge assessments that are used to measure students' understanding of disciplinary concepts need to be valid and reliable (AERA et al., 2014; Downing and Haladyna, 2006). This robustness is essential for high stakes tests used, for example, in college admissions, and it is also essential for drawing inferences about student performance on lower stakes assessments, such as those within science classrooms.

In this work, we present overview of validation studies of admission test to Czech and foreign colleges, mostly consisting of analysis of predictive validity. Further, on example of validation of conceptual assessments in physiology, we demonstrate that validation encounters besides gathering proofs of predictive validity also providing proofs of content and construct validity, estimation of test-retest reliability and internal consistency, as well as providing detailed item analysis assuring range of item difficulties, sufficient item discrimination and checks for item fairness towards gender and minority groups. Last, we apply these methods to provide complex validation of admission test to medical school. We demonstrate, how freely available statistical software R and its web application framework Shiny can provide complex but still user-friendly analysis toolbox.

Published studies of predictive validity of Czech admission tests provide proofs of predictive and incremental validity of subject specific exams (e.g. biology, chemistry and physics). In other words, these admission tests are shown to have the power to predict student's future study performance and probability of successful completion of medical study; moreover, they are in some studies shown to provide additional information over high school GPA.

Inspired by more complex set of validity proofs used in validation studies of concept inventories (e.g. Homeostasis Concept Inventory, HCI, McFarland et al.) we try to show how the admission test reflects expert's view on important parts of tested knowledge, we show that the test is reliable and contains items that have range of difficulties, sufficient discrimination and that the items are fair.

Developing valid, reliable and fair tests is a value that all educators should aspire to in order to ensure that tests are accurate for student feedback, but also for informing modifications to teaching. For admission tests this value is even more important to ensure fair and effective selection. Test analysis should have a routine role in all our assessment development in an effort to ensure more equitable—and therefore more valid—science knowledge measurement.

Acknowledgements: This research was supported by the Czech Science Foundation grant number GJ15-15856Y.

Links: https://shiny.cs.cas.cz/ShinyItemAnalysis/ http://physiologyconcepts.org/

WEB-BASED APPLICATION PROVIDING GUIDANCE FOR THE CORRECT STATISTICAL TEST SELECTING

Lubomír Štěpánek, Čestmír Štuka, Martin Vejražka
First Faculty of Medicine, Charles University; Faculty of Biomedical Engineering, Czech Technical University in Prague

Keywords: *statistical computations, R, biostatistics, ShinyApps, statistical support, decision making, flowchart*

The problem of choosing the right statistical method in order to analyse our data properly is still the crucial part of a research publication preparation, and – what is more –, the correctness of the choice significantly affects whether the publication will be accepted or rejected by a research journal in the end. We tried to simplify this process in terms of working out an application that gives a helping hand to a researcher handling with statistics in her or his analysis. The application is based on a flowchart diagram navigating to applicable statistical method.

The application is online and free-available. The core of the application is written in language R. The R is a free-as-in-beer and free-as-in-speech programming language and environment for statistical computing and graphics and is widely used among statisticians, econometricians, or biologists – it ensures reliability of computations performed by the application. Code chunks written offline in R language were uploaded online using shiny package to a server dedicated to R calculations. Shiny package is a library written also in R which provides an online framework for R scripts. The application is available at R server of the First Faculty of Medicine, http://shiny.statest.cz. Application uses Czech as a language of choice since we aim on Czech-speaking researchers and students. The flowchart integrated into application helps to make correct statistical decisions depending on the type of inputted data and intended statistical hypothesis; its design arises both from common good practise and from author's experience in this field, too. Statistical methods which are processed so far cover both parametric ones such as t-tests, F-tests or family of ANOVA and others; and non-parametric ones such as Wilcoxon tests, Kruskal-Wallis tests or Friedman ANOVA and others. These methods are directly linked with the flowchart leaf nodes.

The key component of the application is the mentioned flowchart diagram (Fig. 1, in Czech). It enables a researcher who has collected some data and formulated a research hypothesis, to pick the most appropriate statistical method by means of going through the flowchart and step-by-step answering questions. When the researcher reaches an advice which method to choose, a link is provided that allows to perform the suggested method. There is an interface for uploading researcher's data and performing the whole analysis. The key decision points of the flowchart require answering the questions dealing with data types and structures, empirical distributions of data, number of compared samples and whether analysis should compare measures of average or measures of variability.

The project is still in progress and could be interactively updated in response to feedback of its users. In order to reveal our future plans, a way of semi-automated recommendations of which statistical method to use, based on inputted data of a user which could be (pre)processed but non-coerced, suggests itself.

There is no doubt that quality of statistical results presented in any research article significantly affects the overall impact of the publication. The first key step of every statistical analysis is

the choice of an appropriate statistical model. This step is however tricky and difficult for many researchers. A user-friendly tool that makes this choice easier was developed. The direct connection between the best possible statistical method and graphical interface performing computations could improve the user experience.

KEYWORD SIMILARITY IN REHABILITATION: CASE STUDY

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Keywords: *natural language processing, medical curriculum, rehabilitation*

Current higher medical and healthcare education institutions have different methods of organizing their study programmes, which are represented by hundreds of theoretically and clinically focused courses. The importance of the well-balanced curriculum is indisputable – the society needs to have erudite doctors because the health of people is necessary for its functioning and development. In this paper, we introduce our innovative approach to identify medical and healthcare disciplines overlaps using term (keyword) similarity. The close attention is focused on the discipline Rehabilitation and Physical Medicine (RPM) and its role in the General Medicine (GM) study field at Masaryk University Faculty of Medicine (MU FM).

Little usage of text mining techniques was applied in practice in accordance with a proven methodological background, which systematically covers all fundamental steps to discover and extract knowledge from data repositories. For purposes of a term similarity on medical curriculum data, CRISP-DM (CRoss-Industry Standard Process for Data Mining) reference model was chosen as a well-documented practical guideline. CRISP-DM divides the exploratory process into six major phases: (i) Business understanding; (ii) Data understanding; (iii) Data preparation; (iv) Modeling; (v) Evaluation; (vi) Deployment.

The achieved results show overlaps between 42 GM disciplines defined in the OPTIMED curriculum management platform at MU FM, and artificially described RPM discipline by senior experts, because it does not constitute a separate discipline or course at MU FM. The comprehensive analytical report presents term occurrence in a set of graphs and tables. All the outputs were deeply evaluated by experts standing out of MU FM.

In this case study we have proposed an innovative method for identifying keyword overlaps from medical and healthcare disciplines in comparison with rehabilitation. The first results seem to be promising in terms of face validity and hopefully it should bring an objective overview on the entire curriculum description.

Links: http://opti.med.muni.cz/cs/

EDUCATIONAL DATA VISUALIZATIONS FROM THE PERSPECTIVE OF DATA-DRIVEN DECISION MAKING

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Keywords: *education, data mining, visualizations, curriculum optimization, data-driven decision making*

Data analysis outputs can be used in many ways. Advanced analytical reports above an educational data primarily uncover hidden links, intersections, and gaps across the teaching. They are also used to detect potential overlaps in the listed courses, which must be passed by graduates. Each analysis can also fulfill a complementary role in the curriculum optimization and restructuralization. It offers an objective starting point for subsequent decision making to the university management and guarantors of courses. This can have several scenarios. Ideally, the final results will serve as a proof that curriculum is stable and well-planned, and there is no need to interfere in its structure. Conversely, if necessary, the outputs of analysis can help to determine which direction should lead the change.

Our analytical approach is based on the CRISP-DM methodology (Cross-Industry Standard Process for Data Mining) and is presented as interactive web-based visualizations. The aim is to transmit data to the form where a user is able to filter the dataset and focus on subsections that interest him/her. The advantage of showing results in a publicly accessible place is that we are able to easily and transparently share our knowledge with the outside world.

Within the curriculum optimization which is performed by academicians through the OPTIMED curriculum management system at the Faculty of Medicine, Masaryk University (MU FM), we created four advanced analyses focusing on the medical disciplines exploration in medical and healthcare study fields. Curriculum designers and professional society can learn from it the key concepts such as each discipline describes itself, how disciplines are linked together and in which aspects overlap. Interesting is the fact that the analyses are based one another and together form a more robust tool for the data-driven decision making, than if they were presented separately.

It is important to remember that the primary goal of presented visualizations is not to support data-driven decision making, but rather to describe the current state of the teaching and to define the profile of a graduate student. However, using the achieved results for decision-making processes can be very useful, especially when deciding whether the current state of distribution of the teaching is optimal or is not.

Links: http://opti.med.muni.cz/en/reporting/web/

POTENTIALS OF COMPUTERIZED ADAPTIVE TESTING IN HIGH SCHOOL PHYSICS KNOWLEDGE ASSESSMENT OF 1ST YEAR MEDICAL SCHOOL STUDENTS

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Keywords: *item response theory, psychometrics, computerized adaptive testing*

The current practice of educational assessment at the medical schools in Czech Republic (e.g. admission tests, semestral final exams, knowledge screening tests, ...) utilizes almost exclusively a linear testing format - that is, all tested persons answer to all items (questions) in a test. However the developments of psychometric theory in recent decades allow for efficient implementation and practical use of so-called Computerized Adaptive Testing (CAT) for educational assessment purposes. In this novel approach to the test administration, items (questions) are selected adaptively, based on previous responses of tested individuals in order to maximize the measurement accuracy. Since fewer items (questions) are usually administered in CAT, it offers a possibility of increasing the efficiency of the entire testing process compared to the linear testing format (reducing the test length and thus the testing time, ...). The aim of this paper was to validate the usefulness of CAT when testing high school physics knowledge in 1st year medical school students.

For the purpose of the current simulation study, the responses of students (1st year students from the involved medical schools in Czech Republic, N = 1012) in a high school biophysics test (taken place in 2014) were utilized. The test was designed to map the level of high school physics knowledge and it contains 32 items (question). The difficulty and discrimination parameters of the test items needed for the Item Response Theory (IRT) based CAT were computed using 2-parameter logistic model. For each examinee, the adaptive administration of the test was simulated, while items were selected based on Fisher's information function and the level of knowledge was estimated by maximum likelihood method (van der Linden, Pashley, 2010). All the simulations and subsequent analyses were carried out in R statistical environment.

The results have shown that the adaptive administration of the high school physics test can be very useful, especially for screening purposes. When a relatively low but often acceptable measurement accuracy (reliability = 0.7) was required, the average number of administered questions from the test was 15.8 (SD = 7.4), saving more than half of all the test items. The individual's level of knowledge based on CAT corresponded highly with the level of knowledge obtained using the whole test (Pearson r = 0.97).

Our findings indicate that computerized adaptive testing of the high school physics knowledge represents a fruitful way of increasing the efficiency of a testing procedure (reducing the test length and thus respondent's burden, boredom). Given the positive results of our simulation study, it would be useful to verify the potentials of the high school physics knowledge CAT in real conditions.

Acknowledgements: This study was supported by projects PRVOUK 39 a SVV 2016 – 260346.

EXPERIENCE WITH E-LEARNING IN THE ENGLISH VERSION OF THE ELECTIVE SUBJECT: BASIS OF HARVEST AND PRESERVATION OF TISSUES FOR TRANSPLANTATION

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Keywords: *e-learning, tissue donation, tissue harvest, tissue bank, tissue establishment*

The authors review their experience with E-learning in an elective subject for medical students. The first English version of the E-learning course was introduced into practice in the academic year 2013/2014.In the current academic year introduction of the new E-learning course focused on the issues of Donation and Harvest of cells and tissues is planned.

All functions of the courses are operated in Moodle. The theme of the new course is divided into two parts. In the first part the legal and ethical rules of donation and harvest are dealt with. The second part deals with practical examples of donor eligibility assessment, technique of cell and tissue harvests and presentation of the donation issues to the public. The third part of the course is represented by a database for preparation, presentation and archivation of the seminar theses.

The experience with the first version of the course was positive. It was verified in the group of 14 English speaking students. All students completed the course successfully. The new course was reviewed by 2 specialists in the field: Prof. B. Fuller, Ph.D. from University College, London, UK, and Ass. Prof. L. Klein from the Department of Surgery, University Hospital Hradec Králové and published on Mefanet in 2016.

The previous experience showed that e- learning course could serve as a useful support of the elective subject. This new version is planned to be used by a broader spectrum of users including surgeons and post-graduate students of different doctoral study programmes.

MOODLE MOBILE IS THE OFFICIAL MOBILE APP FOR MOODLE

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Keywords: *Moodle Mobile, students, courses*

The contribution responds to increasing students' interest about the applications optimized for the mobile devices. It is thus necessary to deal with these possibilities in the education. The attendee will be familiarized with the Moodle Mobile app, which is based on a full version of the Moodle, but is optimized directly for the mobile devices. The presentation will be carried out by the possibilities of the organizer. This will be either directly via mobile device or by a mini-PC with the OS Android. The attendee gets the specific and real idea of how the app can be used.

The student can install the Moodle Mobile app to the mobile devices with all the three general OS (Android, Mac OS, Windows Phone). After installation, the student must connect the app to the Internet, enter a single address https://moodle.lfhk.cuni.cz/moodle2 and the credentials into Moodle LFHK. After the log there are displayed the courses, in which the student been enrolled in the Web version of the Moodle LFHK. If the course includes the study materials (eg. a book or file) the student has the opportunity to open. The data are simultaneously recorded to the local library and the student can browse even without an Internet connection. The individual library of the courses is available for every student. Courses where is not the student enrolled, are not accessible. After connecting to the Internet, the student has the option of direct communication with classmates, store and see the calendar events and recently also has the option to complete the test. The interactive answers are directly in the text of the books. This is added value of the functionality.

The result of the project will be e-learning courses optimized for the mobile devices. Especially considering the size of images, videos, etc., which the author can upload directly as files into the books. The development and the feedback options in the module "book" are expected. The attendee will be acquainted with this optimized benchmarked course in the contribution. The important feedback from the students on the use of the Moodle Mobile app will be imported. This will be probably implemented by an electronic questionnaire.

It should be said that in the presented app are also some disadvantages. The most important of these concerns is the inability to fill the tests without an Internet connection opposed of reading a "book". Generally, the Moodle Mobile app allows students to easily obtain information and verify their knowledge in the areas where it previously did not have these options.

The contribution has been realized within the project IRP 2016-2018: Creating a cross-platform systems to support education, including the tools for user-friendly feedback.

POSTER SESSION

PROJECT "THE CONCEPT OF CO-ORDINATION AND IMPLEMENTATION OF CROSS-BORDER EMERGENCY MEDICAL SERVICES COOPERATION"

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Keywords: *project, cross-border, emergency medical services, cooperation, Bavaria, Pilsen, e-learning*

On 1st July 2016 started the international project of cross-border emergency medical services cooperation. The basic idea of the project is to achieve sustained cooperation of emergency medical services in Bavaria and Pilsen, Karlovy Vary and South Bohemia in creating conditions for rapid,

high quality, effective and legislatively appropriate cross-border medical assistance for urgently ill persons in both individual and in the mass cases.

The project is divided into nine key activities. One of them is aimed at training paramedics for conditions of cross-border cooperation of rescue services. This activity needs substantial support of electronic learning.

Within the various activities of the project, which deals with the unresolved issues, a large number of completely new experience and the ensuing practices that will be needed to reflect in the educational process of rescuers, will be collected. The project will include several key activities such as reciprocal internships of paramedics, operational and tactical exercises that will demonstrate in practice, where are problems of border cooperation and how to solve them. These are the findings that are not yet in the Czech Republic so far implemented in the educational process.

In the above-mentioned activities will be done the preparation of specific educational materials for education and continuing education of students in universities, vocational schools and employees of the participating rescue services. Experience gained during the project will be reflected in both the content and structure of the educational process of rescuers and in a file of electronic educational materials, that will be unique based on real and yet undescribed practice of the common border cooperation.

We expect that during the project and during its sustainability will be created a series of mostly electronic educational materials with valuable content that we intend to provide for educational network MEFANET. We believe that these materials significantly filled yet, especially from the learning point of view, totally insufficient electronic educational materials in the field of rescue.

Within the extensive project "The concept of co-ordination and implementation of cross-border emergency medical services cooperation" many new experiences that we want to project in the educational process of rescuers, both on the Czech and Bavarian side of the border, will be obtained. Among other unique, mostly electronic materials that we intend to provide for students and their teachers through educational network MEFANET, will be created.

Acknowledgements: Concept of coordination and implementation of cross-border cooperation between emergency medical services, Cross-Border Cooperation Programme Czech Republic – Free State of Bavaria Objective ETC 2014–2020

Links: http://www.fzs.zcu.cz/Projekty/

RESULTS OF BACHELOR THESES FROM STUDENTS OF BIOMEDICAL INFORMATICS

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Keywords: *biomedical informatics, elearning courses, educational websites, theses*

There is at the Faculty of Biomedical Engineering Czech Technical university in Prague for several years the field of biomedical informatics. Today, graduates in this field have created a number of interesting undergraduate work. This poster wants to introduce these works. Poster particularly keen to show the area, where the works of students are directed.

Students of Biomedical Informatics from the Faculty of Biomedical Engineering at the Czech

Technical University in Prague at the end of their studies create their bachelor theses. Topics of bachelor theses are usually a topic from the area between computer science and medicine and it is often associated with the research activities of faculty members. Poster summarizes the themes and shows the results of some student works. It also wants to approach what topic the students favor.

The result of the work of students of Biomedical Informatics are often e-learning courses in medicine or patient education. Another part of the work serves as a support for rehabilitation. Another topic are robotic systems for medicine. Other topics relates to the security of medical data. Poster shows the results of this work and the focus of students. Some works are very interesting and offer opportunities for cooperation especially for healthcare professionals.

Poster presents the results of the work of students of Biomedical Informatics. Results are shown in their undergraduate work. These bachelor works include broad theme of areas related to medicine and informatics. Work process various topics, which members of the Department of Biomedical Informatics working on it.

EXAMINATION METHODS IN OBSTETRICS AND GYNECOLOGY – E-LEARNING EDUCATION

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Keywords: *e-learning, practical skills, procedures obstetrics, gynecological examination methods, information and communication technology*

Modernising education through e-learning education has its aims to support development of practical skills of midwifery. The aim is through individual and interactive learning process to prepare student for practical mastering of working practices in elementary and special gynecological examination methods in clinical practice.

To create e-learning classes were used programming languages html a php. The classes are available at URL address: http://techniky-pa.jfmed.uniba.sk/. Information on availability e-learning classes is published at MEFANET JLF. Feedback between a student and the subject of his studies is provided in the test form and solving problem tasks.

We have created a study material focused specifically on procedures for basic and special gynecological examination methods with the emphasis on definition of basic terms and definitions, basic gynecological equipment and tools, techniques, positioning women for gynecological examination table, working practices for basic and special gynecological examination methods (taking the ILO, cytology, material culture), menstrual calendar, basal temperature measurement and breast self-examination. Our intention was to allow female students follow in detail midwifery training aids, environment, position of women, the procedure for individual performance and visualize the individual partial steps in the implementation of selected gynecological examination methods. The study material is composed of educational audio-visual elements (images, videos) to create a clearer, more visual and better understand the process of investigation methods and a basis for the acquisition of the necessary practical skills. At the same time, we managed to solve the problem of small spaces and gynecological clinic students and their limited access to the investigative methods implemented in clinical practice.

E-learning processing of presented issues "Examination methods in obstetrics and gynecology" completes presence form of education and enables dynamic connection of theory and practice, helps to more active, more flexible, faster knowledge achievement, leads students of Midwifery to independency and enables modernization of midwives education at Jessenius Faculty in Martin.

Acknowledgements: Supported by grant KEGA č.057UK-4/2013 Innovation in the contents, forms and methods to promote practical skills in midwifery (e- learning education)

SIMULATION ENVIRONMENT FOR HEALTHCARE MESSAGE INTEGRATION IN THE TEACHING OF HOSPITAL INFORMATION SYSTEMS AT FBME CTU

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Keywords: *communication standards, HL7, Mirth, practical exercise in IS*

The hospital information systems lectures at the Faculty of Biomedical Engineering, CTU in Prague include demonstration of the protocols for medical systems data exchange (HL7v.x, DASTA, DICOM). For better understanding, the practical lessons should consist exercises using these protocols. Therefore, we deployed and described of specific simulation environment Mirth that is determined for heterogeneous health care message integration and transformation to standardized format. Practical work with this system helps students to understand communication standards in medicine.

Based on our previous experience and knowledge gathered from experts from the Informatics Department of the Czech Ministry of Health we decided to choose an open source integration platform called Mirth. It is a way, how to easily transform non-standard data into standard formats. By supporting numerous standards (like HL7, EDI/X12, XML, NCPDP, DICOM, and Delimited Text) and protocols (like TCP/LLP, HTTP, JDBC, and File/FTP/SFTP), Mirth Connect is able to simulate message routing between disparate systems allowing them to share data through a communication channel. Using the multiplatform Mirth in education at Czech universities is currently unique.

Mirth Connect was installed in the Laboratory of Hospital Information Systems supervised by the Department of Biomedical Informatics. Access rights for students to store standardized data in the school's MySQL database were configured. 76 students of 2nd and 3rd year bachelor's degree in fields of Biomedical informatics and Biomedical technician were enrolled in the course. The faculty Moodle system materials are used for testing their learned skills.

Main scenario - receiving HL7 messages from the medical device and subsequent saving in different variations to the student database. Within the main scenarios have been proposed various tasks depending on the complexity:

- HL7 is read from a file, mapped to another format (eg. XML).
- HL7 is read from a FTP, mapped to another format.
- HL7 is read from a file, mapped to student database table.
- DICOM is read from a connector and visualized in HTML5 Canvas.

Benefits of using virtual simulation tools for teaching health professionals has been shown previously and not only within the MEFANET. Advantageously it can be used in the classroom

not only in biomedical engineering fields, but also at the medical faculties in the subject Medical Informatics. Students will acquire practical experience in the acquisition and transformation of heterogeneous medical data formats that are used for the transmission of information within the hospital information systems. It can be executed without the need of programming knowledge.

Acknowledgements: Supported by project Innovation and restructuring of the group of subjects relating to Information Systems in health care.

Links: https://www.mirth.com

HUMAN ANATOMY IN MULTIMEDIA LECTURES

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Keywords: *anatomy, dissection, education, video*

Human anatomy belongs to the core subjects in general medicine. For a long history, it was taught using traditional teaching methods. However, there are extensive discussions about suitable methods of delivering anatomical knowledge between professionals all around the world. It is because a deep understanding of anatomy is essential for later safe clinical practice. The lack of cadavers, teaching hours in curricula, resources but also increasing number of students forced us to change present teaching methods to more sophisticated alternatives utilizing combination of dissections and available imaging and multimedia resources. Therefore, the methodology to support teaching of anatomy and the system to share our multimedia education outputs of human anatomy across faculties were developed and integrated into curricula.

Teaching of anatomy at our faculty was based mostly on memorizing of individual systems' anatomical structures using textbooks. In this manner, teachers and students missed convenient illustrations helping to fix important structural information. Education was aimed to absorb systemic anatomy without emphasis on relations to surrounding structures and their localization in human body. Latter, the curriculum involved regional anatomy and in combination with dissections it was more effective approach. The lack of cadavers forces us to create well illustrated textbooks and especially multimedia education materials. Except of teaching periods the students are allowed to use such materials also in repetition and self-learning. Access to the materials including movies, 3D models and animations improve not only the quality of education but also the quality of preparation for responsible clinicians and health care professionals.

The scheme of modernized education of anatomy involves traditional lecturing with explanation, exercises in dissecting rooms, study of anatomical structures in computer lab, lecturing with 3D virtual projection as well as on-line access to education multimedia outputs for distance and self-learning.

To develop anatomically demonstrative and useful educational video-clips we started with recording of dissections realized at the Department of Anatomy. These new video record are realized in both 2D and 3D forms to be able to select the best scenes for the final educational versions and to use it in off-line and on-line tools. Individual video-clips, describing particular human body systems and structures are presentment as separate educational parts. However, they are stored and archived for upcoming faculty's multimedia atlas of human body once all body systems will be processed. Particular scenes required cadavers suitable also for dissections in practical teaching.

Thanks to the activities of our anatomist the scenes were recorded from several cadavers and combined anywhere where it was convenient to obtain the most illustrative outputs.

To make didactic lectures more demonstrative and attractive we designed teaching materials with strong emphasis on teaching content, interaction with students and effective evaluation tools. Therefore, the 3D virtual projection system was implemented into to the lecturing process. However, its main aim is not to replace but to support traditional form of education. The system is installed in the lecture room with the capacity of 200 students.

Respecting the principles of processes used to increase the ability to remember ideas, where the association, visualization, concentration and repetition are involved, we were able to offer more illustrative and explanatory education materials to our student. However, better quality of 3D cameras will be needed to improve our outputs and to be able to capture as small details as possible.

The first results of our work also convinced us that the students' abilities to understand body composition, topography of anatomical structures as well as functions and interactions of individual body systems were improved as they achieved better study results. Students appear to learn more effectively when multimedia approaches are integrated in teaching and learning activities. Comparing results of another works in this area we have to agree that no single teaching tool has been found to meet the curriculum requirements and the best way to teach modern anatomy is to combine multiple pedagogical resources to complement one another.

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CARE OF WOMAN WITH POSTPARTUM HAEMORRHAGE AS A VIRTUAL PATIENT IN MIDWIFERY

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Keywords: *postpartum haemorrhage, virtual patient, midwifery, education*

Postpartum Haemorrhage (PPH) is generally defined as blood loss greater than or equal to 500 ml within 24 hours after birth, while severe PPH is blood loss greater than or equal to 1000 ml within 24 hours. PPH is the most common cause of maternal death worldwide (WHO, 2009). Postpartum haemorrhage can present in different clinical scenarios. Bleeding may be immediate and in large amounts, it may be slow and unresponsive to treatments, or it may be associated with systemic problems, such as clotting disorders. It is essential that midwives know how to detect early symptoms of PPH. Early identification of PPH is important for midwives to implement successful interventions.

The basis of our work is a virtual patient, which is available on the platform Open Labyrinth. Virtual patient is used for training only simple procedures in midwifery and therefore in the design a branched schema of virtual patient is used. This virtual patient is open to students of midwifery on the website: http://www.jfmed.uniba.sk/pracoviska/ucelove-pracoviska/simulacne-vyucbove-centrum/virtualni-pacienti/.

The principal goal of our project was the development of virtual patient simulation for PPH, specifically on the algorithm of nursing intervention in woman with PPH (monitoring blood loss,

blood sampling for necessary tests, administration of oxygen, monitoring of vital signs, monitoring of fluid intake and urinary output...). The algorithm was logically processed step by step, including the rationale for correct and incorrect answers.

Virtual patient as well as this case of PPH provide valid, cost-effective teaching and helps students to train especially clinical reasoning skills of midwives students.

Acknowledgements: Supported by project KEGA No. 025UK-4/2014 Virtual patient in Midwifery.

TAKING CARE OF A NEW-BORN BABY – E-LEARNING EDUCATION

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Keywords: *e-learning, midwifery, care of a new-born baby, practical skills*

The aim of presentation is to introduce the chosen part of e- learning education "Taking care of a new-born baby", which we implement within project KEGA called Innovation in the contens, forms and methods to promote practical skills in midwifery (e- learning education).

To create e-learning classes were used programming languages html a php. The classes are available at URL address: http://techniky-pa.jfmed.uniba.sk/. Information on availability e-learning classes is published at MEFANET JLF. Feedback between a student and the subject of his studies is provided in the test form and solving problem tasks.

We have created the study material particularly targeted to care of a new-born baby, within are included concepts and definitions and the description of a physiological new-born baby, first care of new-born baby, daily care of new- born baby, bathing new- born baby and screaning examinations. Our aim was to enable the students of Midwifery to watch properly tools preparation, enviroment, procedure within each act and to get used to every partial steps in taking care of new-born baby. The study material is composed of audiovizual educational elements (pistures, recorded videos with audio comments), which enable clearer, more visual and easier comprehension of selected topics and to create preconditions for acquiring essential practical skills in care of a new-born baby in natural conditions. Alike we succeeded in solving the problem of the small spaces and overdimension of Neonatological clinic by students and their limited approach to taking care of new-born baby.

E-learning processing of presented issues "Taking care of a new-born baby" completes presence form of education and enables dynamic connection of theory and practice, helps to more active, more flexible, faster knowledge achievement, leads students of Midwifery to independency and enables modernization of midwives education at Jessenius Faculty in Martin.

E-learning processing of presented issues "Taking care of a new-born baby" completes presence form of education and enables dynamic connection of theory and practice, helps to more active, more flexible, faster knowledge achievement, leads students of Midwifery to independency and enables modernization of midwives education at Jessenius Faculty in Martin.

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THE IMPLEMENTATION PROCESS OF THE NEW ONLINE RECORDING SYSTEM FOR PRESSURE ULCERS MONITORING

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Keywords: *pressure ulcers; monitoring; uniform assessment; nursing education; data collection; implementation*

Pressure ulcers (PU) are still unfortunately common complication in care in different types of patients and types of settings. Accurate assessment and documentation of a pressure ulcer is important to the care of the patient, to provide legal documentation, and for reimbursement. The purpose of this project was to develop and implement a pressure ulcer assessment and documentation pocket guide as well as new electronic tool for PU monitoring. Use of the tool has the potential to improve identification, and documentation of pressure ulcers. Implications for advanced practice are discussed as well as appropriate implementation strategy for better user-friendly approach.

Description of implementation strategy for new online reporting system will be presented - cross sectional multicentric implementation strategy. The experience of the benefits of using ICT and electronic patient records influence their acceptability (De Veer et al., 2010) and the implementation processes. For the above mentioned reasons, the long-term implementation plan (at least 6 months) was carefully prepared to implement online monitoring tools. Yet identification and documentation of wounds is mostly very difficult task for clinicians. The ability of the average, non-expert clinician to correctly stage pressure ulcers is poor, ranging from 23% to 58% (Young et al., 2012).

The reporting system (electronic tool) will be piloted in three faculty hospitals in the Czech Republic (two in Prague and one in Pilsen) and in two of them they will adopt data set into their local clinical informational system (internal hospital informational/electronic system) which should allow nurses to report information immediately after their collection in direct contact with patients. In one hospital nurses will have possibility to use tablets for point of care reporting. The first logical step is education of staff. Pilot implementation is important as a part of formative evaluation and feedback for designers of the electronic tool.

PU remain an important nursing concern, hospital-acquired pressure ulcer (HAPU) become a topic of special interest because of Centres for Medicare & Medicaid Services guidelines (in USA) regarding reimbursement. HAPU III and IV category are identified as “never events”, which no longer reimburse hospitals for the costs of caring for those HAPUs (Cherry et al., 2012). In the Czech Republic PUs are treated as common complication BUT should be reported as adverse events. The electronic tool should lead to increase number of reported PU’s and to higher quality of care (earlier identification of risk in patients and categories of PU’s).

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MD EDUCATION SCIENCE COMPONENT: IMPORTANT ISSUES IN STRUCTURE AND DESIGN

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Keywords: *science course, MD programme, problem-based learning*

The necessity of strengthening scientific knowledge and reasoning among doctors early in training is widely emphasized. Scientific thinking and action form the basis of appropriate patient-oriented selection of diagnostic and therapeutic measures. Therefore obligatory development of scientific competencies in a degree programme is essential for responsible, professional work, requiring specific courses to enhance scientific competencies. The management of the course, its' design and structure is currently a topic of dispute.

Outcomes of the two TEMPUS projects' (PACT and ePBLnet) are adapted and implemented for the development of the science course at David Tvildiani Medical University. The `Problem-Based Learning Weeks` formed in the frameworks of the ePBLnet project for the medical sciences` learning process are being used and included into the course to stimulate students' research idea formation. The PACT project outcomes – scientific project/research proposal development/writing skills are used to guarantee effective transformation of the research ideas into completed projects. The updated course design is being piloted and evaluated.

The scientific learning course contains: 1) principles of research; 2) available PBL courses in the range of medical specialties; 3) completion of the research proposal based on the developed idea. The course (Science) content is taught primarily in interdisciplinary, organ and topic-based modules; pre-clinical and clinical content is integrated bi-directionally.

Research component is integrated in ME through structural integration in the curriculum and educational integration through the ePBLnet and PACT projects' outcomes: as the research idea formation and research proposal writing education course.

PERINATAL LOSS AS VIRTUAL PATIENT IN MIDWIFERY

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Keywords: *perinatal loss, virtual patient, midwifery, education*

Perinatal loss, which is also referred to as pregnancy loss or perinatal death, includes ectopic pregnancy, or tubal pregnancy, spontaneous abortion (miscarriage, in lay terms), late-pregnancy loss, or stillbirth, and, lastly, neonatal or newborn death up to the 28th day of life while an expected mother's (parents') answer to the loss is deep sorrow and grief. A suitable approach to the parents with perinatal loss from the health professionals is essential. Woman (parents) need help and support.

Perinatal loss is very suitable for processing as a virtual patient. It is not a common situation, but it is high presumption that the perinatal loss during clinical practice meets every midwife.

The basis of our work is a virtual patient available on the platform Open Labyrinth. Virtual patient will be used for training specific procedures and teaching clinical reasoning in study program of midwifery. In the design we uses a branched schema of virtual patient. This virtual patient will be open to students of midwifery on the website: http://www.jfmed.uniba.sk/pracoviska/ucelove-pracoviska/simulacne-vyucbove-centrum/virtualni-pacienti/.

The content is aimed at the selected interventions linked to prenatal loss: help with the acceptance of perinatal loss, support of a trust relationship between the woman and the midwife, support of family cohesiveness, support of verbalization of emotions and grief reactions, identifying the pathological grief reactions, using the therapeutic communication elements. The algorithm is logically processed step by step, including the rationale for correct and incorrect answers.

Research shows that effective virtual patient simulations should provide opportunities for trial-and-error, allow the student unrestricted opportunity to query and examine the patient, allow the student to control certain time aspects of the virtual patient simulation and these aspects are very important in solving problems related to perinatal loss.

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LASER-TISSUE INTERACTION AND THEIR SIMULATION

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Keywords: *medicine laser, photoablation, COMCOL multiphysics, heat transfer simulation*

The application of medical lasers is on the rise in numerous medical fields. During the laser-tissue interaction the pathological tissue is removed via photoablation and heat spreads throughout the surrounding tissue. The aim of our work is a theoretical model for heat transfer in the tissue following its interaction with the laser, which can be used to predict heat transfer during the procedure. The model was created using the COMSOL Multiphysics software, the MATLAB software and experimentally verified in the labs of FBME, CTU. Our model is good visualization of this type of laser-tissue interaction.

The theoretical model was created using the COMSOL Multiphysics 4.4 software, with the pre-defined module "Bioheat Transfer". Laser beam parameters (pulse length, repetition frequency, energy density) can be adjusted for each specific application, tissue parameters were calculated or predetermined experimentally in Joint laboratory of the First Medical Faculty and CTU, Prague – Albertov.

During the experiment several ablative craters in porcine muscle were made and their depths measured using various methods, to help determine their depths CT scan by the XR 4.0, PHYWE RTG unit and MATLAB were used to ascertain the precise crater depth. The physical principle behind this model is a simplified version of the Pennes bioheat transfer equation.

For validating the proposed model a theoretical calculation of the surface heat transfer was compared to an image captured by a thermal camera monitoring the sample surface throughout the exposure.

Two types of interactions occur in the laser-tissue interaction when using the same energy densities as in actual operations. Firstly a thermal reaction followed by heating of the surrounding

tissue and secondly the desired photoablation, which effectively removes any unwanted arrhythmogenic sources. Due to both of these interactions occurring at the same time, the model must calculate the heat transfer in conjunction with the changing shape of the affected area.

The ablation crater has a typical trapezoidal shape with rounded edges and its depth increases throughout the procedure. Experimentally established crater depths for heart muscle tissue were compared to published values. The value we established, (14.0 ± 1.5) μm, matches the published values.

Default values of all the aforementioned thermophysical parameters can be established experimentally, or calculated from the chemical ratio of proteins-carbohydrates-lipids-ashes to water, which affect them significantly.

Our work requires a multidisciplinary linking disciplines - medicine, physics, biophysics, chemistry, biology. FBME students are ready for this work, which proved enough.

We have created a working model of heat transfer in human tissue following its exposure to a laser and subsequently verified it experimentally. The model allows us to predict changes in temperature during the process of removing tissue target using a pulse laser. With it, the type of laser and its parameters (energy density, frequency) can be tailored for each individual procedure. Students – biomedical technics have contributed to each of the individual steps in the context of team projects and bachelor thesis, which they could capitalize on theoretical information on seminars.

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