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CONTENTS

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PREFACE

We would like to present, with great pleasure, the inaugural volume of a new scholarly journal, "MEFANET Journal (abbrev. Mefanet J)". This journal follows the edition of the annual proceedings RITM report 01–02 and MEFANET report 01–05, published between 2005 and 2012. It is devoted to the gamut of medical education science issues, from theoretical aspects to application-dependent studies and the validation of emerging technologies. This new journal was envisioned and founded to represent the growing needs of computational science as an emerging and increasingly vital field, now widely recognized as an integral part of medical education scientific and technical investigations. Its mission is to become the premier vehicle for disseminating information about MEdical FAculties NETwork, which covers all Czech and Slovak medical faculties as well as schools or faculties of health care sciences.

This inaugural volume comprises four original articles, one review and one detailed editorial report on the last MEFANET conference 2012. The presented articles can be categorized into the following groups:

- e-learning in medical education,
- multimedia,
- e-health and telemedicine.

The original articles exemplify the use and exploration of interactive learning programs and systems in various domains of medical education. They provide invaluable insights into the studied problems and offer convincing case studies and experimental analysis. The review is concerned with history and progress of information technology in health care from a perspective of an experienced computer scientist.

I am very thankful to everybody within the MEFANET community who supported the idea of creating a new MEFANET subline – the MEFANET Journal. We are certain that this very first issue will be followed by many others, reporting new developments in medical informatics, medical education, e-learning and thereby promoting the synergism among these disciplines. This issue would not have been possible without the great support of the Editorial Board members, and I would like to express my sincere thanks to all of them. I would also like to express my gratitude to the honorary advisors of the journal: Assoc. Prof. Ladislav Dušek, Prof. Vladimír Mihál, Prof. Aleš Ryška and Prof. Stanislav Štípek. It is my hope that this fine collection of articles will be a valuable resource for MEFANET Journal readers and will stimulate further research into the vibrant area of medical education science.

June 2013

Daniel Schwarz
Editor-in-chief

WEB-BASED INTERACTIVE LEARNING PROGRAMS FOR DENTISTRY CONCEPT AND ITS EVALUATION

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ABSTRACT — *The change in pedagogy relates partly to the development of electronic media and communication possibilities that are available in networked environments. This new technology dominates and supports the international educational content and learning. The aim of our study was to evaluate this progress in dental education. The education was compared parallel in two groups of Czech and international students. Groups and teaching hours were in the fourth year of the MD curriculum. Stomatology course materials were prepared and published on the portals of the individual dental study programs[1]. The lectures had different access levels, ranging from materials that were freely available to all International WEB dental faculties' sources to materials that were accessible only after receiving permission from the authors. A number of software tools were used for the creation of e-learning courses, such as, e.g., WebCT, Blackboard, Adobe Connect or Microsoft Class Server. The 291 students who were included in our study were divided into two groups according to the e-learning program. The goal of our study was to check student activities during the educational process, namely online work – lessons, articles, videos, literature, quizzes and direct Internet access. The statisticaly significant differences were found in the results of the questionnaire based on five-point Likert scale. The Mann Whitney nonparametric test was used to evaluate students' activities during the education process. The e-learning course had a direct influence on learning experiences, dental information, opinions and comments. Our results verified that satisfaction is an important and influential factor in determining whether a student decides to choose a dentistry and maxillofacial surgery course. Students prefer to have more time for practical therapy in the clinic. It was demonstrated that examination results did not correspond to the type of education but it was confirmed that e-learning helped to prepare students for practical training.*

INTRODUCTION

The change in pedagogy relates partly to the development of electronic media and communication possibilities that are available in networked environments. This new technology dominated the process and took the focus away from the educational content and learning. It has now reached a more mature state and the focus is now placed increasingly on content, learning and outcome. A prerequisite for a rational learning process is that knowledge is easily accessible, searchable and retrievable. In this respect electronic technology is a necessary tool in modern learning.

Computer-aided learning was first employed in 1971 at the University of Kentucky and has since been developed in three main directions – computer-based training, web-based training and the learning management system[2], the most advanced method of e-learning [1]. The learning management system encompasses a wide array of instructional methodologies and tools and represents an accessible, interactive and flexible way of giving multimedia presentations and of utilizing text and visual

[1] http://dl.cuni.cz
[2] http://www.pbs.org/als/dlweek/history/index.html

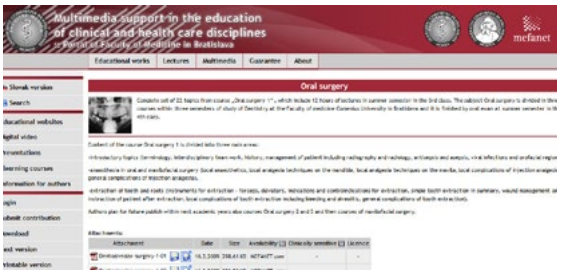

Figure 1: Dental study programs[5] – MEFANET – Faculty of Medicine Comenius University in Bratislava portal

Figure 2: International WEB dental faculties' open sources – School of Dentistry – University of Washington

materials, as well as sound and motion. Rosenberg's literary review [2] confirms the benefit of computer-aided learning, while Mattheos [3] emphasizes the necessity for important conditions to be met in order to ensure the quality of e-learning: the quality of learning materials, which must have well-defined learning objectives, be up-to-date, and use evidence-based data. Furthermore, consideration must be taken of developers' intellectual rights, and original content needs to be secure from unauthorized changes. These points must be fulfilled by the creator of the e-learning course. Once these conditions have been met, the e-learning course is made accessible to students. Some studies even demonstrate that students using computer-aided learning require less time to achieve learning objectives. Students using e-learning achieve better final results than students who have not had access to computer-aided learning [4]. Dental education is an ever-changing, competitive, challenging and complex environment, where the development of new dental schools globally is the order of the day [5].

In the same time it is a challenge of how utilize them in dental education the best way. The year 2005 meant the initiation of the MEFANET project (MEdical FAculties NETwork[3]), which allowed international, effective and open cooperation between all medical faculties in the Czech Republic and Slovakia. Amongst the fundamental goals of the project is the advancement of medical teaching and learning through the use of modern information and communication technologies. As the means to achieve this goal, MEFANET decided to develop an original and uniform solution for educational web portals, which are used, together with a central access point[4], to offer and share digital educational content. This has allowed the growth of a unique collaborative environment, full of shared resources [6].

For that reason the aim of our study was to evaluate the results of Czech-English education courses in Dentistry for students of general medicine and to compare students with access to Internet based e-learning courses to those without it.

COURSE ARRANGEMENT

The education was compared parallel in two groups of Czech and international students. Groups and teaching hours were in the fourth year of the MD curriculum: Stomatology – course duration 10 days – examination – 4 EC credits; book – Dentistry and Oral Diseases; 10 lectures – traditional lectures (years 2008–2009) or e-learning education (years 2010–2012); 10 lectures – contact hours.

Materials were published on the portals of the individual dental study programs[5]. The lectures had different access levels, ranging from materials that were freely available to all International WEB dental faculties' sources (Figure 1, 2) to materials that were accessible only after receiving permission from the authors (Figure 3, 4). A number of software tools were used for the creation of e-learning courses, such as, e.g., WebCT, Blackboard, Adobe Connect or Microsoft Class Server.

DENTISTRY COURSE EVALUATION

The 291 students who were included in our study were divided into two groups according to the e-learning program: those with classical courses only (N = 161; 130 – Czech students; 31 – international group; 81 women and 80 men with average age 24 years), and those with e-learning lectures (N = 130;

[3] http://www.mefanet.cz/index-en.php
[4] http://portal.mefanet.cz/
[5] http://dl.cuni.cz

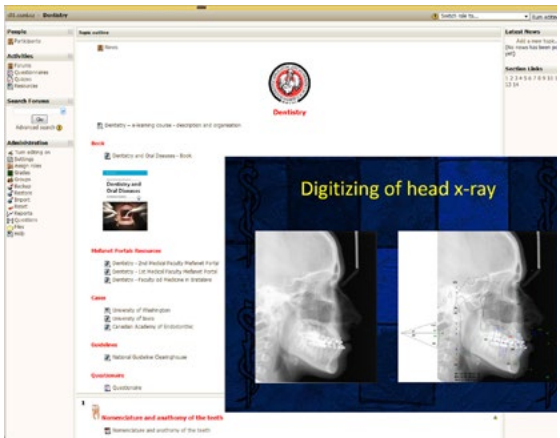

Figure 3: Dental study programs[6]

Figure 4: Interactive treatment planning

105 – Czech students; 25 – international group; 60 women and 45 men with average age 24 years). All students were asked to fulfill a anonymous questionnaire in one session. Learning contents were provided through the university's website[7] via personal login.

The questionnaire based on a five-point Likert scale was used to check student activities during the educational process [6] (Table 1).

RESULTS

The Mann Whitney non-parametric test was used to evaluate students' activities during the education process. A non-parametric test (distribution-free) compared two independent groups with and without e-learning education.

The statistical significant differences were found in the results of the questionnaire based on five-point Likert scale. It was confirmed that students using the e-learning system have seen greater benefits in theoretical and practical training ($p \leq 0.05$), Table 2, pp. 6–7.

DISCUSSION

Hillenburg's questionnaire [6] showed that e-learning would play an important role in the future of education. Our questionnaire confirmed that the e-learning helped to prepare the practical training better than special book only. It was also suggested that standardized courses should be developed and taught by recognized authorities in dental education. These conditions were met and the results did not show absolute acceptance by students. It was judged that the results of computer-aided learning are similar to or even better than those of traditional methods [7].

Table 1: The questionnaire

Questionnaire – Five-point Likert Scale Evaluation	
1.	Effective use was made of which percentage of lessons
2.	Adherence to the schedule
3.	The online presentation of this school department
4.	The selection of recommended literature
5.	If a lesson was announced in advance to be led by a specific teacher, was this adhered to:
6.	During the course we clarified with teachers all important technical concepts (principles, skills ...) mentioned in the syllabus or required for the exam
7.	To what extent do you agree with the following statement: seminars (or practical exercises) were mostly well prepared (selection of themes and seminar structure)
8.	When teaching the subject/course teachers showed us how the subject matter discussed related to practice or real-life situations:
9.	Were you satisfied with the quality of discussion?
10.	Do you agree that tutor's attitude to students was mainly open and respectful?
11.	Do you think that number of students per tutor was adequate?

[6] http://dl.cuni.cz
[7] http://www.cuni.cz

Table 2: Questionnaire Results – Mann Whitney non-parametric test evaluation

Question/scale	Year 2008–2009 answers	Year 2011–2012 answers	Mann Whitney test results
Effective use was made of which percentage of lessons (estimated):			
1 – almost 100%	47 (44%)	55 (64%)	$p < 0.05$
2 – more than 70%	36 (33%)	28 (33%)	
3 – approximately half	19 (18%)	2 (2%)	
4 – less than half	5 (5%)	1 (1%)	
5 – cannot judge	1 (1%)	0 (0%)	
Adherence to the schedule was:			
1 – very good	44 (41%)	61 (71%)	$p < 0.05$
2 – good	53 (49%)	24 (28%)	
3 – bad	9 (8%)	0 (0%)	
4 – very bad	2 (2%)	0 (0%)	
5 – don't know	0 (0%)	1 (1%)	
The online presentation of this school department is:			
1 – very good	24 (22%)	37 (43%)	$p < 0.05$
2 – good	43 (40%)	25 (29%)	
3 – bad	10 (9%)	3 (3%)	
4 – very bad	4 (4%)	0 (0%)	
5 – don't know	26 (24%)	21 (24%)	
The selection of recommended literature is:			
1 – very good	62 (58%)	65 (76%)	$p < 0.05$
2 – good	33 (31%)	16 (19%)	
3 – bad	8 (7%)	2 (2%)	
4 – very bad	4 (4%)	0 (0%)	
5 – don't know	0 (0%)	2 (2%)	
If a lesson was announced in advance to be led by a specific teacher, was this adhered to:			
1 – (almost) always	69 (64%)	79 (92%)	$p < 0.05$
2 – in more than 70 %	30 (28%)	5 (6%)	
3 – in about half lessons	6 (6%)	1 (1%)	
4 – in less than half lessons	2 (2%)	0 (0%)	
5 – cannot judge	1 (1%)	1 (1%)	
During the course we clarified with teachers all important technical concepts (principles, skills ...) mentioned in the syllabus or required for the exam:			
1 – totally agree	63 (58%)	53 (63%)	$p < 0.05$
2 – rather agree	2 (2%)	28 (33%)	
3 – rather disagree	37 (34%)	3 (4%)	
4 – totally disagree	6 (6%)	0 (0%)	
5 – do not wish to answer	0 (0%)	0 (0%)	
To what extent do you agree with the following statement: seminars (or practical exercises) were mostly well-prepared (selection of themes, structure of seminars):			
1 – totally agree	43 (40%)	54 (63%)	$p < 0.05$
2 – rather agree	50 (46%)	29 (34%)	
3 – rather disagree	12 (11%)	1 (1%)	
4 – totally disagree	3 (3%)	1 (1%)	
5 – do not wish to answer	0 (0%)	1 (1%)	

Table 2 (continued): Questionnaire Results – Mann Whitney non-parametric test evaluation

Question/scale	Year 2008–2009 answers	Year 2011–2012 answers	Mann Whitney test results
When teaching the subject/course teachers showed us how the subject matter discussed related to practice or real-life situations:			
1 – totally agree	36 (35%)	60 (70%)	$p < 0.05$
2 – rather agree	49 (48%)	24 (28%)	
3 – rather disagree	13 (13%)	1 (1%)	
4 – totally disagree	5 (5%)	1 (1%)	
5 – do not wish to answer	0 (0%)	0 (0%)	
Were you satisfied with the quality of discussion?			
1 – absolutely yes	42 (40%)	61 (72%)	$p < 0.05$
2 – rather yes	51 (48%)	23 (27%)	
3 – rather not	10 (9%)	0 (0%)	
4 – absolutely not	3 (3%)	1 (1%)	
5 – don't know	0 (0%)	0 (0%)	
Do you agree that tutor's attitude to students was mainly open and respectful?			
1 – absolutely yes	48 (45%)	71 (83%)	$p < 0.05$
2 – rather yes	46 (43%)	12 (14%)	
3 – rather not	10 (9%)	2 (2%)	
4 – absolutely not	3 (3%)	0 (0%)	
5 – don't know	0 (0%)	1 (1%)	
Do you think that number of students per tutor was adequate?			
1 – absolutely yes	42 (40%)	50 (58%)	$p < 0.05$
2 – rather yes	36 (34%)	22 (26%)	
3 – rather not	15 (14%)	10 (12%)	
4 – absolutely not	12 (11%)	2 (2%)	
5 – don't know	0 (0%)	2 (2%)	

It was observed that students would like to use e-learning for their education. Very few dental students have tried animated multimedia software during their education [7]. Peroz' study [8] confirmed that students enjoyed the oral lecture significantly more than the computer aided learning (CAD) online tool, but favored their use as a supplement to this.

From our previous results, it can be seen that students used e-learning programs to a greater degree than when they did not have access to any other source of information (classic textbooks, lectures) and in rapidly developing subjects with new procedures [4].

CONCLUSION

The e-learning course has a direct influence on learning experiences, dental information, opinions and comments. Our results verified that satisfaction is an important and influential factor in determining whether a student decides to choose a dentistry and maxillofacial surgery course. Students should be given time for practical therapy in the clinic. The findings highlighted the importance of e-learning to training in dentistry and maxillofacial surgery. It was observed that students would like to use e-learning for their training. It was confirmed that students enjoyed the oral lectures significantly more than computer-aided learning online tools, but favored their use as a supplement to this. It was demonstrated that examination results did not correspond to the type of education but it was confirmed that e-learning helped to prepare students for practical training. The e-learning course had a direct influence on learning experiences, dental information, opinions and comments.

MUDr. Jitka Feberová, Ph.D.

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REFERENCES

[1] Rosenberg H, Grad HA, Matear DW. The effectiveness of computer-aided, self-instructional programs in dental education: a systematic review of the literature. Eur J Dent Educ 2003; 67(5): 524–532.
[2] Hu J, Yu H, Shao J, Li Z, Wang J, Wang Y. Effects of dental 3D multimedia system on the performance of junior dental students in preclinical practice: a report from China. Adv Health Sci Educ Theory Pract 2009; 14(1): 123–133.
[3] Schönwetter DJ, Reynolds PA, Eaton KA, De Vries J. Online learning in dentistry: an overview of the future direction for dental education. J Oral Rehabil 2010; 37(12): 927–940.
[4] Feberová J, Dostalová T, Hladíková M, Kasal P, Polášek J, Seydlová M, Janda A, Schwarz D. Evaluation of 5-year Experience with E-learning Techniques at Charles University in Prague. Impact on Quality of Teaching and Students' Achievements. New Educational Review 2010; 21(2): 110–120.
[5] DeLone WH, McLean ER. The DeLone and McLean model of information systems success: a ten-year update. J Manage Inform Syst 2003; 19(4): 9–30.
[6] Hillenburg KL, Cederberg RA, Gray SA, Hurst CL, Johnson GK, Potter BJ. E-learning and the future of dental education: opinions of administrators and information technology specialists. Eur J Dent Educ 2006; 10(3): 169–177.
[7] Peroz I, Beuche A, Peroz N. Randomized controlled trial comparing lecture versus self studying by an online tool Randomized controlled trial comparing lecture versus self studying by an online tool. Med Teach 2009; 31(6): 508–512.

CLINICAL DECISION SUPPORT SYSTEM IN DENTAL IMPLANTOLOGY

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ABSTRACT — *Implantology is rapidly developing interdisciplinary field providing enormous amounts of data to be classified, evaluated and interpreted. The analysis of clinical data remains a big challenge, because each new system has specific requirements. The aim of study was prepare specific tool for treatment planning. Decision support system is built on Expert system. It is interactive software which provides clinical recommendations and treatment planning. Expert systems are knowledge-based computer programs designed to provide assistance in diagnosis and treatment planning. These systems are used for health care (dentistry, medicine, pharmacy etc.). The application contained the medical history analysis to obtaining information useful in formulating a diagnosis and providing implant insertion and prosthetic reconstruction to the patient; the diagnostic examination of dental implant procedure; implant positioning diagnosis – 3-D measurement; diagnostic information for treatment planning; treatment plan in the form of objective measurement of implant placement that helps surgeon and prosthodontics. The decision algorithm implemented by programming language is used. Core of program is an expert knowledge programming like a decision tree. The analysis of the decision-making process for implant treatment in general practice is prepared and analyzed.*

INTRODUCTION

Implantology is rapidly developing interdisciplinary field providing enormous amounts of data to be classified, evaluated and interpreted. Approaches offered by dentistry and also by dentoalveolar surgery and prosthodontics data analysis and treatment are therefore of extreme interest. Numerous methods are now available as open source tools for data evaluation ready to support the various treatment plans. The analysis of clinical data remains a big challenge, because each new system has specific requirements. The aim of study is to prepare specific tool for treatment planning. This tool is web-based application developed for using knowledge base (expert knowledge) and solving included data by user and making decision and recommendations in treatment. The tool is kind of DSS (Decision support system) that is classified as clinical considered DSS (using knowledge base and inference engine) [1]. There are more than 30 decision support systems in Dentistry mentioned in literature, which are classified to seven subcategories according to special attributes identified by White [2] (Table).

We have found out only one DSS regarding dental implantology in literature; a pilot study for preoperative planning software for oral implanatology. They developed software by Microsoft tools (C++, VTK and ITK) [3]. This software could not be useable in different operating system only in Windows; this could be first limit for usability and operability.

We have decided build standard web application which is accessible through online interface (it has only one restriction; access to Internet). System is available on all platforms and operating systems.

Our system is designed to provide recommendations for application of the implant based on anamnesis and diagnostic medical examination. This system,

Table: Seven subcategories classified by White

Subcategory	
A	Dental emergencies and trauma
B	Oral – facial pain
C	Oral medicine
D	Oral radiology
E	Orthodontic
F	Pulpal diagnosis
G	Restorative dentistry

which leads the patient and his physician by the decision, should provide optimal dental rehabilitation. It is based on a number of following factors; Examination of the patient (anamnesis and overall health status of the patient), Decision-making supportive system in dental implantology (recommendation to implant), Final protocol [4].

The aim of study is to prepare new expert system which could be practically used in dental clinic treatment planning.

METHODS

Decision-making supportive system in dental implantology is divided into following three modules:

First module is **anamnesis** including questions regarding patient illness (interactive questionnaire).

Second module is the **diagnostic examination** of dental implant procedure

- First step is select position of implant (Figure 1);
- Implant positioning diagnosis – 3-D measurement (Figure 2);
- Diagnostic information for treatment planning (Figure 3).

Third module is the **treatment plan** in the form of objective measurement of implant placement that helps surgeon and prosthodontics (considering anamnesis and overall health status of the patient based on previous form (first and third module).

We have developed architecture model based on structure model of DSS (Figure 4).

The structure model with four basic components (Inference engine, Knowledge base, Working memory and Explanation) is prepared.

System structure:

Inference engine – is core of system or the main part of Expert System or DSS (programming language – php (there are mechanisms for processing and evaluating data based on KB – knowledge base and WM – working memory).

Knowledge base – this component includes knowledge of experts.

Working memory – patient's data collection.

Explanation – this module may explain outputs of system (recommendation for implantation of teeth based on patients.

Model has a unique structure consisting of two main parts (Figure 5):

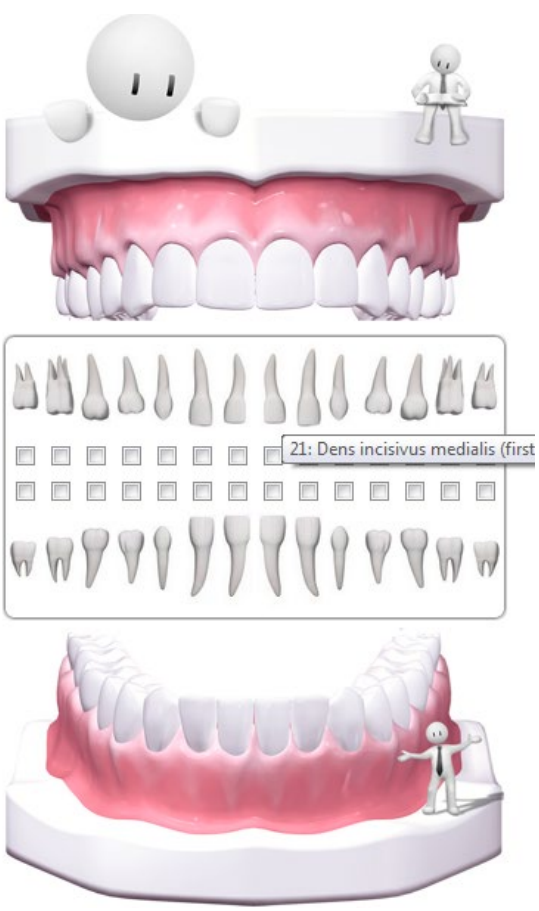

Figure 1: Selection of teeth

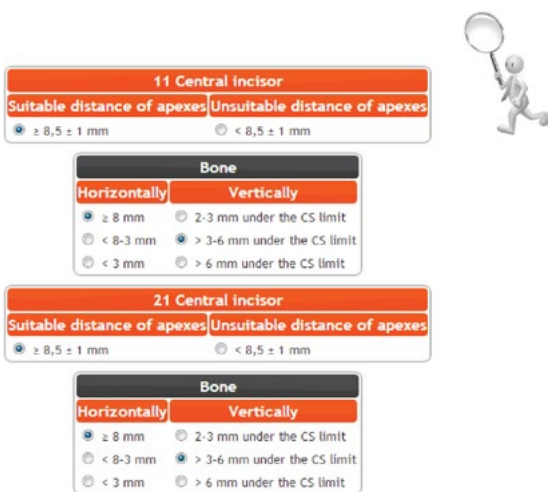

Figure 2: 3-D analysis

Figure 3: Diagnostic information for treatment planning

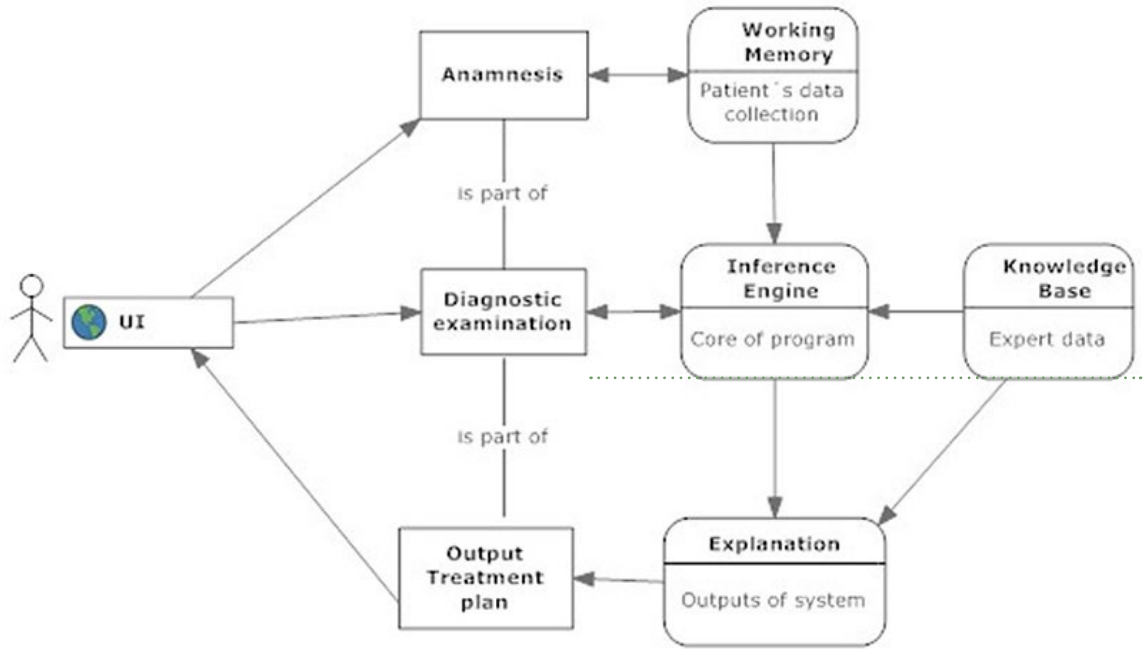

Figure 4: Draft of model

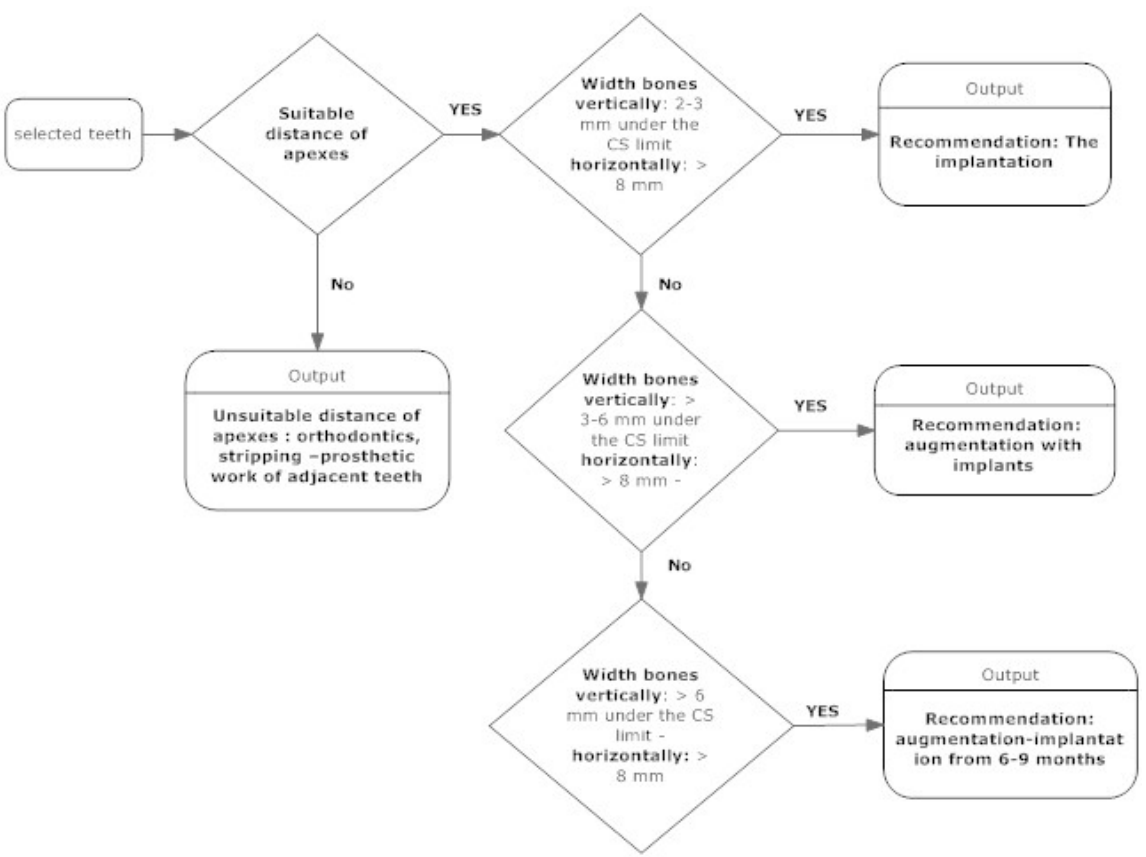

Figure 5: Draft of schema

Inference Engine – is program implemented in php which is processing input gained data from Working Memory. Data is processed of this program driven by conditions from Knowledge Base. Programming language PHP is open source with ability to run on almost all platforms. Data is collected in mysql, open source implementation of databases. Inputs an Outputs are presented through web based interface

Knowledge Base – is in this case a set of thresholds. Thresholds are used in Inference Engine to make decisions and to output correct result. For example, there is width threshold to determine which treatment will be better.

Programming schema is illustrated in Figure 5. It is part of decision tree, representing choice of teeth and next steps leading to the final recommendation decision. Rhomb is argument of decision based on your choice. You will get recommendation and you may go on to next step to final decision.

DISCUSSION AND CONCLUSION

A clinical decision support system (CDSS) is an application designed to assist health professionals in decision-making tasks as in regard to diagnosis and treatment planning [5]. Focusing on dentistry, there are not many relevant studies exploring the potentials of CDSS. Brickley et al. [6] developed a neural network application to provide decision support for lower third molar treatment-planning. Benn [7] prepared CDSS examples for caries management, and Finkeissen et al. [8] evaluated intelligent dental treatment planning. All systems are base mainly on dental odontology – tooth anatomy, disease, and treatment and are semantically linked by the Relation Ontology [9,10] and some application-specific properties.

CDSS for dental implantology planning is based on comprehensive appraisal of the morphologic features of the proposed implantation site: the quality and quantity of available bone, the presence of pathoses, the inclination of the alveolar process, and the relative location of anatomic structures to the site of implantation. It is known that decision can be qualified as either "effective" or "preference sensitive", to the extent that it is related to scientific evidence of benefits and risks to patients [11]. Our system can practically help to receive objective treatment plan including implant objectification in general practice. The presented data support the clinical implants planning and warrant more comprehensive evaluation of future therapy.

Mgr. Alexandra Polášková

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REFERENCES

[1] Shibl R, Lawley M, Debuse J. Factors influencing decision support system acceptance. Decis Support Syst 2013; 54(2): 953–961.
[2] Vikram K, Karjodkar FR. Decision support systems in dental decision making: an introduction. J Evid Based Dent Pract 2009; 9(2): 73–76.
[3] Chen X, Yuan J, Wang C, Huang Y, Kang L. Modular preoperative planning software for computer-aided oral implantology and the application of a novel stereolithographic template: a pilot study. Clin Implant Dent Relat Res 2010; 12(3): 181–193.
[4] Dostálová T, Feberová J, Polášková A. Publication system to support implantations. [Online]. Available at WWW: <http://dlcv.cuni.cz/course/view.php?id=29>.
[5] Park SG, Lee S, Kim MK, Kim HG. Shared decision support system on dental restoration. Expert Syst Appl 2012; 39(14): 11775–11781.
[6] Brickley MR, Shepherd JP. Performance of a neural network trained to make third-molar treatment-planning decisions. Med Decis Making 1996; 16(2): 153–160.
[7] Benn DK. Applying evidence-based dentistry to caries management in dental practice. A computerized approach. J Am Dent Assoc 2002; 133(11): 1543–1548.
[8] Finkeissen E, Stamm I, Müssig M, Streicher J, Koke U, Helmstetter C, Hassfeld S, Wetter T. AIDA: Web agents in dental treatment planning. Adv Dent Res 2003; 17(1): 74–76.
[9] Smith B, Ceusters W, Klagges B, Köhler J, Kumar A, Lomax J, Mungall C, Neuhaus F, Rector AL, Rosse C. Relations in biomedical ontologies. Genome Biol 2005; 6(5): R46.
[10] Hippmann R, Dostalova T, Zvarova J, Nagy M, Seydlova M, Hanzlicek P, Kriz P, Smidl L, Trmal J. Voice-supported electronic health record for temporomandibular joint disorders. Methods Inf Med 2010; 49(2): 168–172.
[11] O'Connor AM, Légaré F, Stacey D. Risk communication in practice: the contribution of decision aids. BMJ 2003; 327(7417): 736–740.

A LONG-TERM STUDENT'S EVALUATION OF THE NEW E-LEARNING METHOD OF TEACHING HISTOLOGY PRACTICAL

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ABSTRACT — *We introduced a new method of teaching practical histology using virtual slides (VS) at the Department of Histology and Embryology in Olomouc. In the database of e-practical sessions there are sets of virtual slides for each topic taught, and several supporting documents available to students that help them to orient easily in the subject of the practical session. We have also introduced practical examination of histology slides with electronic tests on personal computers (PC). We have prepared our own specific set of evaluation questions and allowed students to evaluate this new method of practical sessions. The results of these anonymous questionnaires are of a great importance to our teaching staff, as they represent an important feedback for further improvement of teaching practical histology. Comparing student´s responses in three subsequent academic years, we have found no changes in their highly positive evaluation of the use of PC for observation of virtual slides. Increase in positive responses were observed in answers to questions concerning the use of supporting documents attached to the database of virtual slides (from 50% to 68%) and active preparation of students prior to practical sessions (from 3% to 15%). Students also admitted that they increasingly benefited from the in-course electronic testing (from 86% to 93%) that motivated students to more systematic studies during two semesters of the histology course. They unequivocally preferred electronic forms of examinations over oral ones. On the other hand, students agreed that they were not able to express their theoretical knowledge properly in oral discussions or exams.*

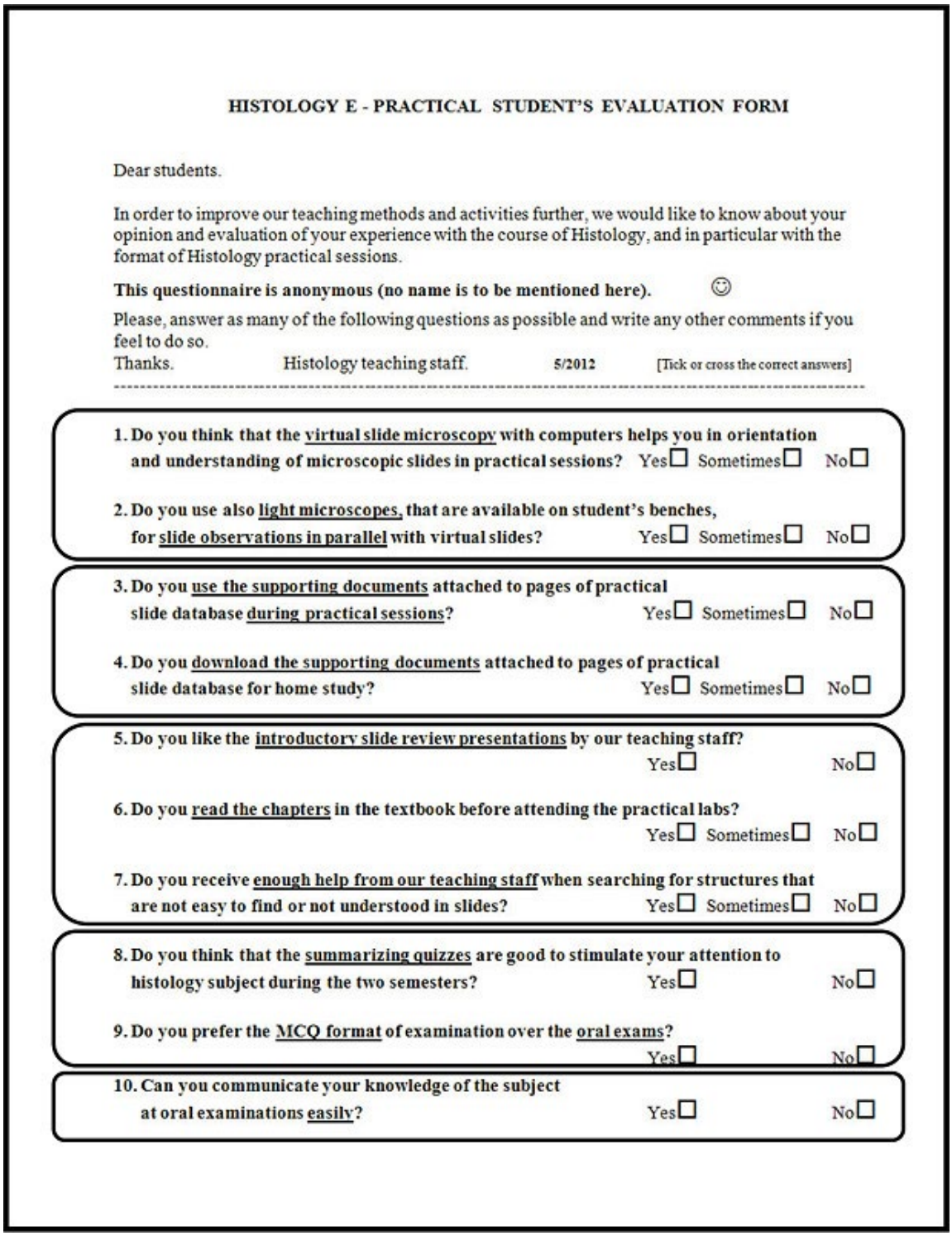
INTRODUCTION

Information explosion in biomedical fields and progress in technical applications enable to specify diagnostic and therapeutic strategies and to move them towards cellular and subcellular levels. These given circumstances must be transferred into the pre-gradual education of medical and non-medical professionals. The effort to change present technologies of education belongs to the characteristic feature of the current pre-gradual teaching of medicine and related biomedical disciplines, especially morphological subjects.

We introduced a new method of teaching practical Histology at the Department of Histology and Embryology in Olomouc. This method is based on the use of digital equivalents of traditional glass slides, called "virtual slides" (VS) [1]. The implementation of virtual slides in practical sessions is one objective of the unique project supported by European Social Fund grant. Students also have to use accompanying supporting documents which help them to orient easily in histological specimens observed during practical sessions. We have also introduced practical examination of histology slides with electronic tests on PCs. Students of both general medicine and dentistry study programmes have had an opportunity to evaluate the new way of teaching histology in anonymous questionnaires at the end of this subject.

METHODS

Glass histology slides have been scanned with Olympus dotSlide scanning system [2] using standard 40× objective lens, creating thousands of overlapping images. The VS images are viewed on student's PC as a single image map at variable magnifications using free dedicated viewer software (Olyvia, Olympus). Technical setup of our histology practical classroom consists of 1 server PC (teacher) and 30 client's PC (students). The core of this virtual slide learning system is our own "Database of Histology Practical"



HISTOLOGY E - PRACTICAL STUDENT'S EVALUATION FORM

Dear students.

In order to improve our teaching methods and activities further, we would like to know about your opinion and evaluation of your experience with the course of Histology, and in particular with the format of Histology practical sessions.

This questionnaire is anonymous (no name is to be mentioned here). ☺

Please, answer as many of the following questions as possible and write any other comments if you feel to do so.

Thanks. Histology teaching staff. 5/2012 [Tick or cross the correct answers]

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1. **Do you think that the virtual slide microscopy with computers helps you in orientation and understanding of microscopic slides in practical sessions?** Yes☐ Sometimes☐ No☐

2. **Do you use also light microscopes, that are available on student's benches, for slide observations in parallel with virtual slides?** Yes☐ Sometimes☐ No☐

3. **Do you use the supporting documents attached to pages of practical slide database during practical sessions?** Yes☐ Sometimes☐ No☐

4. **Do you download the supporting documents attached to pages of practical slide database for home study?** Yes☐ Sometimes☐ No☐

5. **Do you like the introductory slide review presentations by our teaching staff?** Yes☐ No☐

6. **Do you read the chapters in the textbook before attending the practical labs?** Yes☐ Sometimes☐ No☐

7. **Do you receive enough help from our teaching staff when searching for structures that are not easy to find or not understood in slides?** Yes☐ Sometimes☐ No☐

8. **Do you think that the summarizing quizzes are good to stimulate your attention to histology subject during the two semesters?** Yes☐ No☐

9. **Do you prefer the MCQ format of examination over the oral exams?** Yes☐ No☐

10. **Can you communicate your knowledge of the subject at oral examinations easily?** Yes☐ No☐

Figure 1: Evaluation Questionnaire

that is build up in MS Excel document format [3]. Each practical session contains a set of virtual slides with slides properties, keywords, file size information and overview pictures of virtual slides. Additional supporting documents in PDF and PPSX format are available for each of the histology topic. These documents are as follows: "Guide to the Practical Session", "Teacher's Presentation" for pre-lab session,

"Presentation of Electron Micrographs", and a folder of movies, animations, and embryology notes. Moreover, classical binocular light microscopes are available for each student in the class to revise and compare the virtual and optical microscopy images of histological structures.

For electronic testing of student's practical knowledge we use a special software Articulate Quizmaker'09 [4], which enables to prepare text and picture templates of questions and set important parameters of each test (minimal limit for passing the quiz, whole time score, etc.). This software has a selective option to shuffle sequences of questions and also to shuffle all distracters in the quiz randomly on monitors of client's PCs. Owing to this, a lateral communication and cribbing was minimalized and therefore, one version of histology test was enough to prepare for one practical class. This software also scores the test automatically and displays the final results at the end of the test. This gives an objective evaluation of student's results.

The evaluation questionnaire (Figure 1) contains in total 10 questions that concern benefits in the use of VS as compared to classical glass slides (q. 1–2), the use of supporting documents during and after the practical session (q. 3–4), evaluation of teacher's and student's activity during practical sessions (q. 5–7) and benefits of in-course electronic testing of practical skills and knowledge in multiple choice questions (MCQ) format (q. 8–9). One question is aimed at student's capability to express their theoretical knowledge properly in oral examinations (q. 10).

RESULTS

Comparing student's responses in three subsequent academic years concerning the benefits in the use of virtual slides and classical glass slides, there were no changes in their highly positive evaluation of this new method. Increasingly positive responses were also in their use of supporting documents (Figure 2) attached to the database of virtual slides (from 50% to 68%) and active preparation of students prior to practical sessions (from 3% to 15%) (Figure 3). Students also admitted that they increasingly benefited from the in-course electronic testing (from 86% to 93%) that motivated students to more systematic studies during two semesters (Figure 4). They unequivocally preferred electronic forms of examinations over oral ones. On the other hand, some of students agreed that they were not able to express their theoretical knowledge properly in oral discussions or exams.

In their free comments at the time of the evaluation students expressed their positive attitude towards this new method by following statements: "Computer usage is more efficient compared to manual microscope". "Histology method of teaching involves all senses of mine, including seeing, listening, hearing and more importantly observation and understanding". "Now, Histology can be more interactive between students and professors".

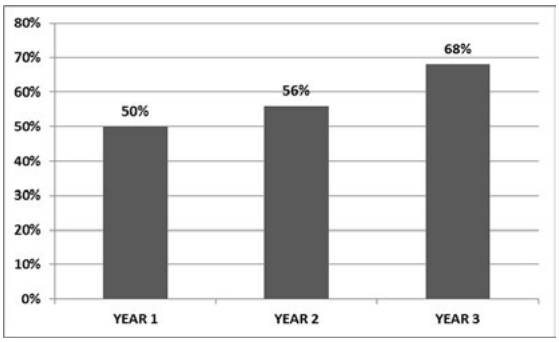

Figure 2: Supporting documents. Do you use the supporting documents attached to pages of practical slide database during practical sessions?

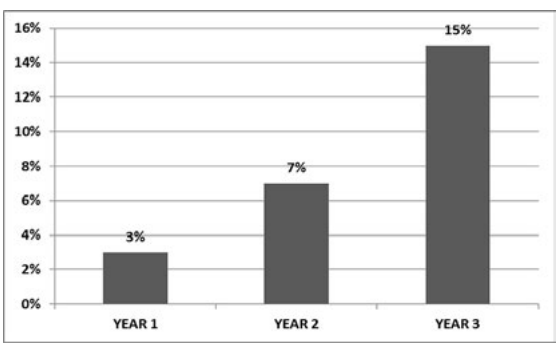

Figure 3: Active preparation. Do you read the chapters in the textbook before attending the practical labs?

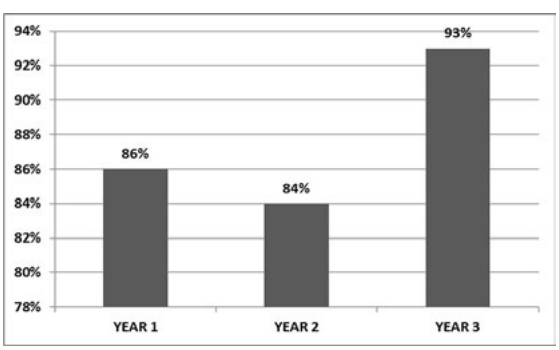

Figure 4: In-course testing and motivation. Do you think that the summarizing quizzes are good to stimulate your attention to histology subject during the two semesters?

CONCLUSION

Students of both General Medicine and Dentistry programmes readily accepted the use of computers for observation and description of virtual slides. They represent a "computer-trained" generation of future medical professionals that is able to utilize fully the

capability of modern PC technology and absorb information from new software applications easily. Majority of students evaluated positively the use of virtual slide. They also benefited from using the attached supporting documents during practical session and self-studies. They also admitted that they benefited from the in-course electronic testing, as they became motivated to more systematic studies during both semesters. Regarding PC-based examination, most of the exposed students preferred practical examination in MCQ format over the classical oral examination. This may be also related to the recent trend of decreasing capability of students to express their acquired knowledge orally, regardless of the subject they study. Teacher moderated in-group discussions with students over displayed virtual slides in practical sessions could be a good remedy for this negative trend.

Up to now, experiences gained from the application of PC technology in teaching practical histology reveal that implementation of virtual slides seems to be a modern and didactically effective tool for student's motivation and activation. Students can participate in practical sessions more actively by comparing and discussing the observed structures with their classmates and teachers. Moreover, the teaching procedure using modern PC technologies creates a good condition for active forms of study and revisions outside the regular teaching hours through the internet connection to the database of virtual slides [5,6]. The interactive PC form of teaching morphological subjects (such as Histology) prefers an active dialog between teacher and student over a passive memorizing of data, and forms a knowledge-based foundation for further clinical practice.

MUDr. Radka Lichnovská, Ph.D.

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REFERENCES

[1] Triola MM, Holloway WJ. Enhanced virtual microscopy for collaborative education. BMC Med Educ 2011; 11(4): 1–7.
[2] Olympus dotSlide Virtual microscope. [Online]. Available at WWW: <http://www.olympus-europa.com/microscopy/en/microscopy/components/component_details/component_detail_11267.jsp>.
[3] Krajčí D, Pospíšilová E, Černochová D, Kopečný T, Pop A. Histology practical in electronic format of virtual slides. In: Schwarz D, Komenda M, Štípek S, Mihál V, Dušek L (eds). MEFANET Report 04. Efficient multimedia teaching tools in medical education. Masaryk University: Brno 2011: 60–68. ISBN 978-80-210-5539-1.
[4] Articulate Quizmaker'09. [Online]. Available at WWW: <http://www.articulate.com/products/studio.php>.
[5] Olympus Net Image Server SQL for virtual slide microscopy. [Online]. Available at WWW: <http://www.olympus-europa.com/microscopy/en/microscopy/components/component_details/component_detail_24257.jsp>.
[6] HISTOLOGY_PRACTICAL database. [Online]. Available at WWW: <http://158.194.8.20/WebDatabaseClient/dbWebAccount.aspx>. Login credentials: User Name: student. Password: student. Database: HISTOLOGY_PRACTICAL.

VIDEO GALLERY OF EDUCATIONAL LECTURES INTEGRATED IN FACULTY'S PORTAL

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ABSTRACT — *This paper presents a web based educational video-clips exhibition created to share various archived lectures for medical students, health care professionals as well as for general public. The presentation of closely related topics was developed as video gallery and it is based solely on free or open source tools to be available for wide academic and/or non-commercial use. Even if the educational video records can be embedded in any websites, we preferred to use our faculty's portal, which should be a central point to offer various multimedia educational materials. The system was integrated and tested to offer open access to infectology lectures that were captured and archived from live-streamed sessions and from videoconferences.*

INTRODUCTION

Plenty of teaching methods can be used to bring information and new knowledge from almost any scientific areas to the educational processes [1–3]. Similarly, health related information can be conveyed to the students, health professionals, but also to the patients with the aim to increase public knowledge and to ensure greater prevention behaviors [4–6]. The most frequently used methods include written materials, community programs, school programs, physician recommendations etc. However, these methods require various resources to be implemented and have usually limited coverage considering their widespread use in the general public [7, 8]. On the other hand, recent trends in education indicate an expansion of distance forms that can be considered as an effective alternative. Regarding used grade of technology, it may be organized as different concepts including distance learning, distributed learning, online learning, e-learning, virtual education, web-based learning, computer-based training, and blended or hybrid learning [9–11]. Therefore, the goal of our project is to use potential of such modern multimedia techniques to disseminate the latest infectology knowledge. In our project, we organize live video broadcasts of scientific and educational sessions and then the archived video lectures are shared in the form of online video-clips to be accessible anytime and anywhere.

METHODS

To support distance education forms at our faculty we created a systematic approach in organization of special live streamed meetings. The selected specific topics cover the branch of infectology as it concerns not only clinicians and medical students, but also a large group of patients as well as a wide range of healthy population. In this way, we offer the most recent information and knowledge in periodically repeated sessions led by specialists from academic and health branches. Here, the topics like bacterial resistance against antibiotics, the most convenient antiinfectious treatment or nosocomial infections are only some of themes that every one of us should have

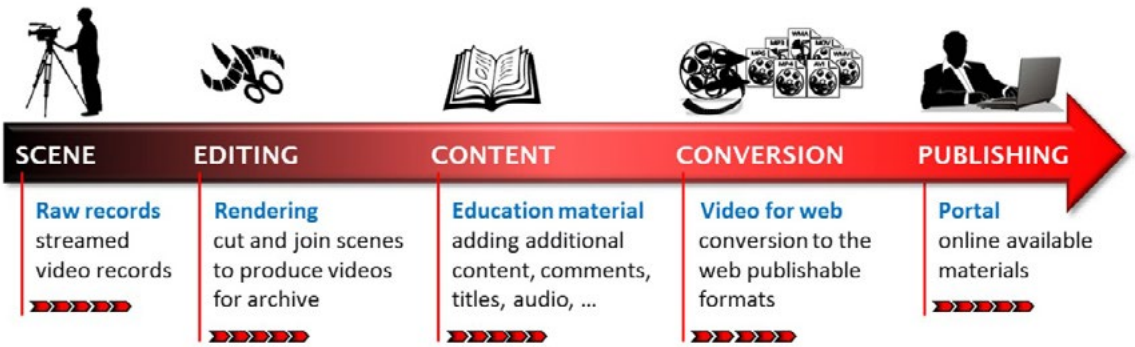

Figure 1: Educational video processing scheme

information about. These topics specify also one of the major problems of European Commission (EC) in the area of public health. It is also the priority of national government as the consumption of antibiotics is one of the greatest in European Union (EU). European Surrveillance Antibiotic Consumption (ESAC) rated Slovak republic on the sixth place in consumption of antibiotics. Furthermore, there are 80 million patients hospitalized per year in EU and 5 percent of them get nosocomial infections. Approximately 40 thousand of such patients die of it. This is the reason why also the EC emphasizes the need to increase awareness of population using educational activities with the aim to improve situation and to solve these problems.

Individual live video streams are broadcasted as free to join events, so everybody interested in particular topics is able to watch them. However, there are often various objective reasons why some of the sessions cannot be viewed when broadcasted. Therefore, the raw video records are used to prepare archive of audiovisual lectures including DVD movies, compressed video formats for web as well as interactive presentations. Educational outputs are processed to be available for students in both on-line and off-line forms. In this manner, the streams can be archived and shared together with additional education materials. The process to create usable audiovisual educational works include scene capturing, editing and rendering of teaching suitable parts, adding additional content and comments, conversion to the requested video/multimedia format and publication of final materials as shown in Figure 1.

Here, considering the technical point of view, the selection of the most convenient video format was one of the most important parts for us. There are two preferred video formats to share video content on the web. These are MP4 and FLV, and both containers have their pros and cons. Because the flash was the most relevant target platform for many years, and because it uses progressive download, can be downloaded from start to finish over HTTP, plays as the file

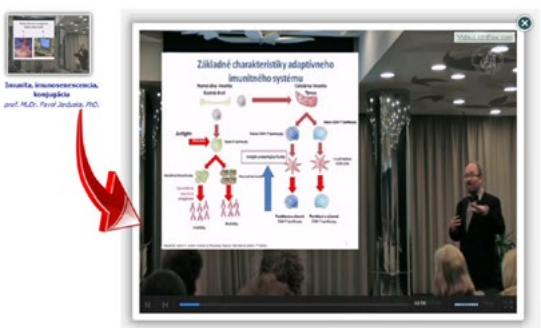

Figure 2: Video thumbnail and FLV player embedded in portal's article

is downloaded (no need to wait), is low cost and effective and is useable also for slow connections, we selected the FLV. It also allows us to set good quality to file size ratio. Parameters like video size, bitrate, frame rate, aspect ratio and audio compression were set to acquire optimal output quality. We recognized the values like 640 × 480 px, 512 bps, 15 fps and MP3 audio are sufficient for our video lectures. It is because of combination of the dynamic movie of the speaker and the static frames of his/her presentation.

RESULTS

Creation of educational videos was only the first part of our work. Then, we tried to find the best way to offer them to the public. As we want to move all electronic materials or at least the hyperlinks to such faculty materials on one place - faculty's portal, the major question was how to share these movies in an attractive way? The answer was found in video galleries. To do this, we used principles of Video LightBox which is the free wizard program allowing adding videos to almost any website with stylish popup video effects. This beautiful product helps to generate source codes to embed particular video to the website in a few clicks. In general, it is necessary just to add video, to specify the template for video

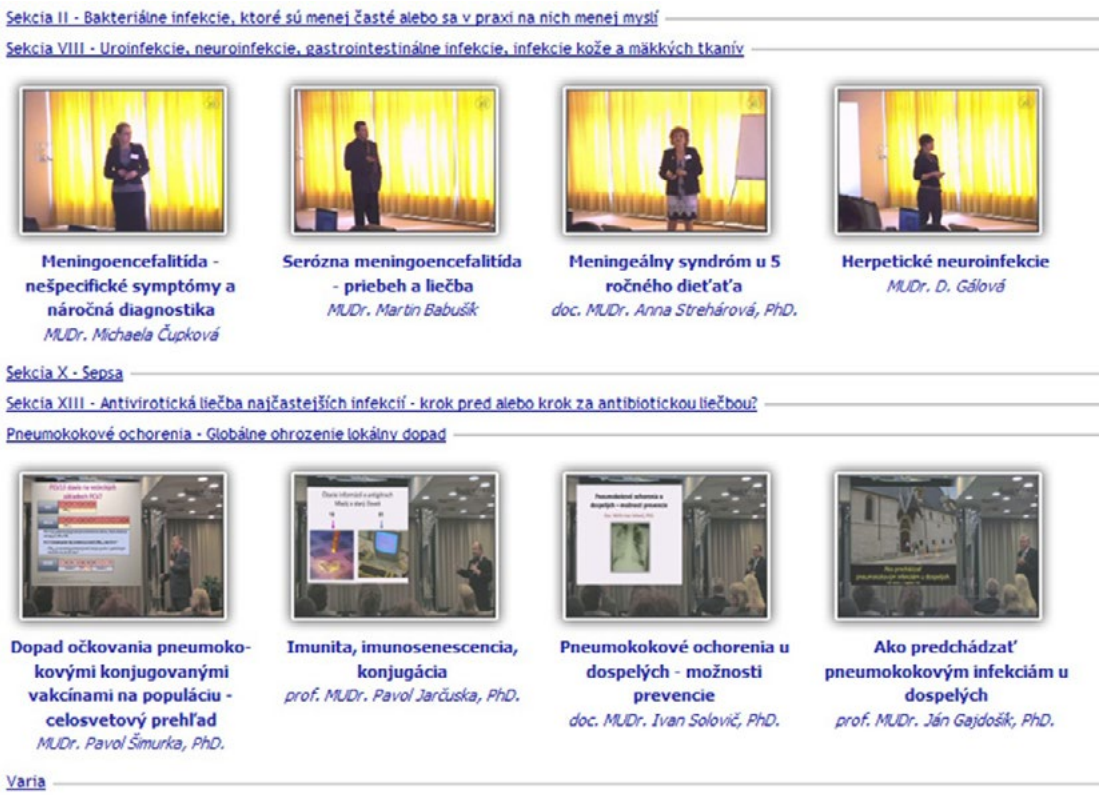

Figure 3: Video gallery of infectology lectures published at our faculty's portal

popup and video thumbnail appearance and to publish the result. Except of thumbnail, each educational video is equipped with the title and the name of the speaker/author. An example of resulting published lecture and FLV player embedded in our portal article is shown in Figure 2.

All the FLV files can be stored on external servers or directly on the portal. We did not specify any restrictions to access individual lectures as these should be available for all. However, respecting principles of the portal, the access rights can be specified in the same way as in other attachments. Then the content can be set to be available for various groups of users, including

- nonregistered anonymous users
- registered anonymous users who accept the terms of use within his/her registration
- users of MEFANET network, i.e., students or teachers from any Czech or Slovak medical faculty
- users of local university or faculty, whose affiliation to that university/faculty has been verified at the portal via the local information system of that university/faculty
- users to whom attachments are made available only on the author's explicit consent

In order to have a clear and well-arranged list of video lectures, we separated closely related themes in 15 groups. These groups were classified as sessions to cover most relevant infectology topics including the most frequent bacterial infections, antibacterial pharmaceutics, respiratory infections, nosocomial infections, resistance on anti-infective pharmaceutics, preventions against infections, antivirotic treatment of the most frequent infections, etc.

Currently, there are lectures in six of these 15 sessions published on the portal. All the sessions are presented as simple hyperlinks and their content is shown or hidden only after the user will select it. In this way, it is possible to filter the video lectures, save the space in the article and to show the users only the materials he/she is interested in. An example of final published video gallery is shown in Figure 3.

DISCUSSION

Learning science is quite complicated system affected by too many input and output factors that should be beard in mind while searching for optimal and the most effective methods. We suppose the combination of traditional teaching methods and new technological innovations satisfies teachers as well as students and may offer optimal learning experience also for clinical medicine subjects. Therefore, we capture the live broadcasted lectures and the records are processed to be used by the students during their

study, but also by the wider group of undergraduate students, PhD students, physicians in continuous education and general public. Such audiovisual content is shared using our faculty's portal with no restrictions that ensures whole world accessibility.

Ing. Jaroslav Majerník, Ph.D.

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REFERENCES

[1] Gorghiu G, Gorghiu LM, Bizoi M, Suduc AM. Setting up of a web educational video-clips exhibition related to the implementation of virtual experiments in Sciences education. Procedia Soc Behav Sci 2010; 2(2): 2906–2910.
[2] Masats D, Dooly M. Rethinking the use of video in teacher education: A holistic approach. Teach Teach Educ 2011; 27(7): 1151–1162.
[3] Wiens PD, Hessberg K, LoCasale-Crouch J, DeCoster J. Using a standardized video-based assessment in a university teacher education program to examine preservice teachers knowledge related to effective teaching. Teach Teach Educ 2013; 33: 24–33.
[4] Goodman K, Nowacki A, Wua J, Hickner J. Utilization and impact of pre-office visit video health maintenance education. Patient Educ Couns 2011; 85(2): e65–e68. [Online]. Available at WWW: < http://www.sciencedirect.com/science/journal/07383991/85/2>.
[5] Komenda M, Schwarz D, Feberova J, Stipek S, Mihal V, Dusek L. Medical faculties educational network: Multidimensional quality assessment. Comput Meth Programs Biomed 2012; 108(3): 900–909.
[6] Penhaker M, Krawiec J, Krejcar O, Novak V, Bridzik R. Web System for Electrophysiological Data Management 2010. In:2nd International Conference on Computer Engineering and Applications 2010: 404–407. ISBN 978-0-7695-3982-9.
[7] Ramsay SA, Holyoke L, Branen LJ, Fletcher J. Six Characteristics of Nutrition Education Videos That Support Learning and Motivation to Learn. J Nutr Educ Behav 2012; 44(6): 614–617.
[8] Kozlikova K, Martinka J, Bulas J. ST segment body surface isointegral maps in patients with arterial hypertension. Physiol Res 2012; 61(1): 35–42.
[9] Reisslein J, Seeling P, Reisslein M. Video in distance education: ITFS vs. web-streaming – evaluation of student attitudes. Internet Higher Educ 2005; 8(1): 25–44.
[10] Macurova A. The roughness surface expressed by the mathematical model. Appl Surf Sci 2010; 256(18): 5656–5658.
[11] Kay R, Kletskin I. Evaluating the use of problem-based video podcasts to teach mathematics in higher education. Comput Educ 2012; 59(2): 619–627.

PROGRESS OF INFORMATION TECHNOLOGY IN HEALTHCARE, CURRENT STATE, OUTLOOK TOWARD FUTURE

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ABSTRACT — *Brief summary of reasons for development of Hospital Information Systems (HIS) is described. We mention different concepts of HIS development. Primary negative attitude of physicians to the invasion of information technology to hospitals has been slowly changed.*

Extended teaching of fundamentals of computer science at medical universities is very important for a new generation of physicians. Modern methods of e-learning allow using websites and medical atlases including presentations of surgical interventions in different branches of surgical medicine, physiotherapeutic methods, etc. Medical staff in hospitals may also profit from electronic tools used for education in medical informatics or for obligatory postgraduate courses.

Software producing companies are obliged to teach potential users how to use implemented information systems effectively. E-learning is a good method how to teach new employees who need to start using the system.

Telematics in health service and use of Internet data storages may be a trend in future development of information systems. Large amount of patient data in current databases is a big encouragement for expanded use of data mining and application of artificial intelligence methods in medical expert systems.

REASONS FOR MEDICAL INFORMATION SYSTEMS DEVELOPMENT

There were several good reasons for genesis and development of healthcare information systems. In the beginning it was necessary to make patient medical record more precise, to store large amount of data and to accelerate data transmission.

It was difficult to obtain in short time medical data from earlier treatments that were archived in paper form. It was tiring to wait for laboratory and other diagnostic results when they were prepared in laboratory and were just waiting for manual transport to demanding site. Laboratory practice was expecting rationalization of daily routine by implementation of specialized laboratory information systems connected to laboratory analyzers. Digital representation of images implied storing of those bulk data in high capacity storage with subsequent access to necessary images directly from medical departments [1]. Great attention was consequently paid to homogeneity and coding of data. Information systems started to be responsible for automatic billing to insurance companies. Existence of databases allowed fast access to stored data and have accelerated extended scientific research. Large databases became good source of data for medical publishing, e-learning material and excellent base for statistics. Building of decision support systems with well arranged outputs for medical decision making helped not only to clinicians [2] but also to healthcare managers to keep cost control in desired limits [3,23]. Special algorithms with elements of artificial intelligence may help to interpret laboratory data to physicians and to propose possible treatment. Systems are well prepared to help with calculations and sorting of patients to predefined categories. Their use for calculation of many different indicators like for example Glasgow Coma Scale [4], acute physiology score SAPS II [5], disease classification system APACHE II [6] or TISS score for patients treated on intensive care units [7] are well known among physicians. Implementation of information systems has increased substantially productivity of many departments – laboratories, imaging methods, functional examinations and consequently it increased competitive ability of those departments.

A BIT OF HISTORY

Medical informatics started to be developed in Czechoslovakia in early 1970s. In the beginning there was a lack of suitable computers and high capacity storages. An absolute inexperience of medical staff with computer technology was a great problem. It was also difficult to overcome mental barriers of physicians who had unsubstantiated fear of possible replacement of them by computers in the process of medical treatment (!). The situation continuously changed when a new generation of physicians with fresh basic knowledge of information technology started to work in hospitals.

Reasons for this change were:

1. Development and production of new very useful and respectable medical devices like CT, NMR, bedside monitors, modern ECG, laboratory and lot of other diagnostic and therapeutic instruments. All of them were equipped by computer technology.
2. It was possible to see medical information systems working and helping successfully in some hospitals. Information systems have brought new quality to physicians' work. Access to enormous amount of data was suddenly very simple and very fast. They made administrative work of physicians much easier.
3. A massive public education was going on.

To be successful in application of computers in healthcare information systems, it was necessary to establish an information center in some hospital. It was a Research Institute of Traumatology in Brno that was chosen in year 1975 to be a leading institute for development of hospital information systems in Czech Republic. First information system including signal analyses was realized there for intensive care units. It was a base for consequent development of Clinical IS.

First successful attempts of medical information systems development were done also in some other hospitals:

- Register of all patients in Benešov district including dispensary care was realized in Benešov Hospital.
- A very sophisticated Laboratory information system was developed in Hospital Bulovka in Prague.
- In University Hospital in Prague (Královské Vinohrady) was developed a Departmental information system.
- In Ostrava City Hospital there was realized an information system for resuscitation units.

Research Institute of Medical Bionics in Bratislava was a very important co-operating partner in Slovakia.

A conception of development teams was different. Developers in Brno considered a Clinical IS connected to all diagnostic departments a base of future Hospital information system. Development team in Bulovka Hospital considered a Laboratory IS a base of Hospital information system (HIS). Developers in Prague promoted a philosophy "a hospital equals a hotel" that laid stress to economical behavior of a hospital. A research team in Ostrava has paid a great attention to signal and laboratory results interpretation.

Conditions have changed after political changes in Czechoslovakia in 1989. Most of developers from hospitals and research institutes have switched to private business and they have established small software houses or have joined large and respected companies where they continued in development of medical information systems using their experiences from previous period. Hospitals have suddenly become obligatorily profit-making subjects. That was determining how to continue in development of HIS. Managements of software houses had to decide which program modules to prefer not to be in loss, as the development was extremely expensive. Lot of small companies also went bankrupt at that time.

It was evident already in year 1990 that hospitals, which wouldn't have suitable information system, could have great economical difficulties. It resulted in fact that every hospital has more or less functional information system at present, at least for billing of patients and obligatory reporting. Information systems are currently well accepted in hospitals. E-learning is a good method how to teach new employees who need to start using the system. Prepared manuals, animated presentations and e-learning courses are well accepted, especially by new users who didn't pass starting training after system implementation and therefore hadn't a personal contact to the training person. Particularly the nurses are employees, who migrate often from one hospital to another.

WHAT DID WE ACHIEVE?

We may state that since the end of 1970s we were able to collect large amount of patient data and medical data in general, to store and display them, we were also able to interpret some of them. But it was quite difficult to search and find relations between data in large databases. Data mining is a consequential branch of information technology that has good chance to be successful in this field.

Security of data is a very important attribute of hospital information systems. Backup and archiving procedures are on a very good level. Fast and large external memories allow quick access to archived data. We may expect that use of new technology of bulk external storages will yet shorten time of access to enormously large data in databases, for example images.

COMPARISON OF DIFFERENT ATTITUDES

There was an essential difference between information systems in Czechoslovakia and western countries before year 1993. Czech and Slovak developers were not obliged to pay attention to economical behaviour of hospitals. On the other side, processing of economical data, and particularly billing of patients, was a fundamental characteristic in western hospital information systems.

Law changes concerning financing of medical treatment in Czech Republic in year 1993 caused great changes in existing medical information systems. A constitution of health insurance companies and frequent changes of billing rules caused often headache to programmers of hospital information systems. It was a good decision of Czech parliament to authorize General Insurance Company (Všeobecná zdravotní pojišťovna – VZP) to determine billing rules and to develop list of registered medical activities and medication that are obligatory for all Czech insurance companies. Otherwise it would increase costs of keeping particular billing programs up to date enormously.

EXPERIENCES WITH SERVERS AND DATABASE

There exist two basic concepts of HIS: System with distributed database and with centralized database.

HIS with distributed database was very popular when database servers weren't fast enough to serve hundreds of terminals. Database was split to a set of servers each of them serving to a particular professional unit or department and connected together physically by LAN with a help of a communication center. If one of the servers was down from any reason, all the others were working independently. It was a great advantage. But it was painful for system people to administer a distributed database like this with all those necessary backups, prophylactics and other potential problems.

With improved performance of large computers it was more and more frequent to run HIS with centralized database and with hundreds of terminals, and later client PCs, connected to application and database servers. PCs have fully replaced earlier alphanumeric terminals. Their graphical capabilities make possible to share images across the hospital, which is a very appreciated feature in medical environment.

It was always important to choose a good brand-name hardware produced by respectable companies and a high-quality and robust operating system like UNIX, recently also LINUX, and their clones. Operating system Microsoft Windows wasn't accepted for a long time as a reliable operating system for a serious around-the-clock work in large medical information systems. But since version MS Windows Server 2003 it was considered to be a reliable operation system and is currently widely used especially in smaller applications like laboratory IS or outpatient IS.

A good choice of correct database is an important factor when we build a medical information system. Although the first attempts to construct medical information systems were based on simple databases like dBase, FoxBase, Clipper, later also FoxPro, it was soon evident that large information systems with lot of data need a powerful, large, fast and reliable database. The database should have optimal storage of data, should be on-line backed up or replicated, self-correcting and with acceptable costs of its licenses [8].

Database Caché, a product of company Intersystems [9], seems to be very favorable in medical information systems. Its data are stored in tree structure. This database is a successor to database concept MUMPS [27] that was developed and cultivated in USA and afterwards in Europe since the end of 1960s. It is very often used in medical information systems in USA and also in Europe because of its excellent ability to treat text information.

If the system works in a regular medical environment and the cache buffer is well adjusted, the database control system (DBCS) Caché ensures that up to 99% of data are transmitted to requiring program from the cache buffer without need to go physically for data to the disc. A clone of database Caché is available also for applications designed for operation system Microsoft Windows Server. Database Caché shows very good results on database servers in cases where databases like Informix (also designed for text treatment) have serious problems with performance.

Databases Progress and Microsoft SQL Server are also popular in Czech medical information systems. A highly respected database Oracle has a license policy and prices corresponding to tradition and reputation of Oracle Company and from that reason it may be too expensive for use in Czech healthcare service.

DATA CODING, CLASSIFICATIONS AND NOMENCLATURES

If we want from information systems to process data automatically, to sort them and produce correct statistics and if the principal data should be understood globally, it is necessary to use international coding systems and nomenclatures in a process of data acquisition. Electronic patient record is classified usually by principal diagnosis coded in International Classification of Diseases – ICD-10. The 10th version of this classification is obligatory to be used in Czech healthcare since year 1994 [10,26]. It differs substantially from 9th version. It is interesting that a change from ICD-9 to ICD-10 in USA is so painful

that they started with the change only in 2007 and still most of codes we see in United States today are version 9. We believe it is due to the fact that medical informatics in USA was in 1994 already widely applied, the transition from ICD-9 is very expensive and that is why most American providers have not yet upgraded to the ICD-10 system [11].

Czech authorities in cooperation with WHO have ordered to all providers of medical care to use International Classification of Functioning, Disability and Health – ICF since year 2010 [12,13]. It is another classification that allows coding of important facts describing patient's status and it is internationally understandable.

It is a pity that other international classifications like ICPM (International Classification of Procedures in Medicine), SNOP (Systematic Nomenclature of Pathology) or SNOMED (Systematic Nomenclature of Medicine) are used in Czech healthcare only rarely [14].

Obligatory use of wide range of lists published by Czech Ministry of Health is necessary for coding of data and regular reporting to NZIS (National Healthcare Information System) [15]. General insurance company VZP also publishes lists of medical activities and medication to be registered during patient treatment. Registered data are then used for billing to insurance companies [25].

DATA AND COMMUNICATION STANDARDS

Communication between two systems or subsystems or applications is a base for successful implementation of distributed architecture of large information system. Open architecture of particular systems prefers exchange of data and information structured in messages instead of direct access to other databases. Messages have standardized structure defined in data standard and both communicating subjects must accept their syntax and semantics.

It is very practical to use an open architecture when developing a new information system or subsystem. No software house produces whole range of subsystems that cover needs of all professional departments in hospital and it is often necessary to implement subsystems from different producers. And that is a moment when two companies have to agree on contents of exchanged messages. Structure of particular messages is then defined in the used standard for data exchange.

Historically, there were developed many partial or national standards for data exchange and this fact complicates process of globalization of healthcare. Czech national standard (DASTA) that was developed in 1990s and is being currently used, is an example of this undesirable effect. In spite of that, it is widely used in information technology in Czech healthcare service [16].

The worldwide used international standards in healthcare are HL 7 [17,18] and DICOM (Digital Imaging and Communications in Medicine) [19]. HL-7, an American standard for data exchange in healthcare, was a great model for Czech developers of DASTA. Conceptually, both of these standards are similar.

Digitalization of more and more departments working with images implies massive use of PACS (Picture Archiving and Communication System) [20]. PACS is a medical imaging technology that provides economical storage of images from multiple modalities and also convenient access to them. The universal format for PACS image storage and transfer is DICOM. The goal of DICOM is to reach compatibility and to improve effectiveness of workflow between imaging systems used in healthcare worldwide. The base for success of DICOM is a close cooperation of all top producers of medical imaging systems who voluntarily apply DICOM standard into their new developed systems and actively cooperate on improvement of DICOM standard [21]. DICOM enables currently integration of scanners, servers, workstations, printers, and network hardware from multiple manufacturers into PACS. DICOM has been widely adopted by hospitals worldwide as well as in Czech Republic.

WHAT DO WE OWE TO MEDICAL INFORMATICS

In the section of medical software that is engaged in administration we mustn't leave out free text processing. This is a very complicated task. Medical texts are written often in a hurry or in stress. They contain lot of typing errors, missed or distorted words and ambiguities that are interpreted correctly by a physician who reads the text in context with a previous text and thus may understand it correctly. Using simple algorithms for interpreting such a text may lead to very incorrect conclusions. That will need lot of effort in the future.

Voice analysis and its implementation to medical information systems will surely increase value of those systems in the future. Currently, it is still an unreachable goal "to speak with computer like with an intelligent creature with great knowledge". It would be very appreciated in situations when the physician hasn't his hands available for touching a keyboard, e.g., during operation, and needs some information that currently nobody knows and that is stored somewhere in the database of information system.

Also dictation of doctor letters to a secretary using information system technology is only a simulation of earlier voice recorder. A secretary types the acoustic record into the information system and it is stored in a form of typed text together with the voice

information in electronic patient record. Here is also a field for some brilliant solution in the future.

Never lasting changes in billing rules complicate life of programmers. It is a big challenge for good programmers to build billing programmes parametrically so that a changed rule could be set as a parameter and the current program would behave alternatively without changing it.

USE OF INTERNET IN MEDICAL INFORMATICS

Development and expansion of Internet is no doubt the most important breakthrough in information technology at the end of 20th century. An unexpected increase of network infrastructure and its availability at that time caused that original supposition of prof. Shortliffe [21] about connection of 200 millions of computers to Internet network in a first decade of 21st century was surpassed several times. Internet has offered an easy and fast exchange of clinical information. It allowed an easy on-line access to medical information, to knowledge databases and to educational tools of e-learning type. Information technology is accessible also to patients. They may make an appointment with their physicians; they have also access to their medical records stored in electronic patient record. They also have an access to professional information stored in Internet databases. We may say that a passive role of a patient in the system of medical care is changing.

PROFESSIONAL FIELDS IN MEDICINE WHERE INFORMATION TECHNOLOGY HAS IRREPLACEABLE POSITION

First area, a functioning of which we cannot imagine without information technology, is knowledge databases of particular medical branches. The databases contain examples of typical and above all atypical manifestation of diseases and methods of successful treatment. Databases of drugs and of special medical material function on the same principal. An on-line access into those large databases and existence of sophisticated and optimised search algorithms mean a great progress in medicine.

Second area is the use of information technology in fundamental medical research for acquiring of experimental and clinical data, their sorting and evaluation. Application of different technologies in clinical diagnostic and therapeutic process couldn't also be realized without using information technology.

Third area, that is currently the most dynamic application of information technology in medicine, is transmission and sharing of medical records in electronic form. Development and expansion of those applications of information technology gave rise to a new medical discipline – telemedicine, when a part of diagnostic and therapeutic processes is being realized without physical presence of a physician [22].

ARTIFICIAL INTELLIGENCE? EXPERT SYSTEMS?

Physicians and IT specialists have expected since 1980s from information technology a support of diagnostic decision-making process. Big effort has been made, and is still being made, to algorithm development of medical decision-making processes. Vagueness of those processes and thus a difficult algorithm definition are reasons of their rare application in practice. It resulted in current use of information technology first of all for supervision of standard diagnostic and therapeutic procedures and quality of care. We may suppose that corresponding to development of medicine, to expansion of medical knowledge base and to ability of information technology this field becomes also an important application of IT in medicine.

CONCLUSION

What can we expect from IT applications in the future:

- Extended use of tablets as communication tools in clinical information systems; it is a very practical device for data acquisition right at bedside.
- Increase of speed of access to data in databases; we may suppose that new generation of bulk capacity memory (SSD) as well as new electronic components will be continuously released for commercial use.
- Some other form of generally accessible electronic patient record than actually criticized IZIP.
- Verbal communication with an information system.
- Telemedicine development and expansion.
- Development and algorithm definition of medical decision-making processes with a clear goal: implementation of expert systems in selected medical branches.
- Development and expansion of e-learning and its application not only in schools with various orientations but also in other domains of human activities.

Ing. Miroslav Dvořák, CSc.

REFERENCES

[1] van Bemmel JH, Musen MA. Handbook of Medical Informatics. Springer-Verlag: Heidelberg 2000. ISBN 3-450-63351-0.
[2] Richards B. How Turing and Wolf Influenced my Decision Support Systems, In: Blobel B, Hasman A, Zvarova J (eds). Proceedings of EFMI Special Topic Conference: Data and Knowledge for Medical Decision Support, Praha 2013: 31–35. ISBN 978-1-61499-239-4.
[3] Dvořák M, Münz J. Informační systém pro vedoucí pracovníky ve zdravotnictví. In: Popelínský L, Krátký M (eds). Sborník posterů konference Znalosti 2004: 5–8. ISBN 80-248-0456-5.
[4] Glasgow Coma Scale. [On-line]. Available at WWW: <http://www.mudr.org/web/glasgow-coma-scale>.
[5] Le Gall JR, Lemeshow S, Saulnier F. A new Simplified Acute Physiology Score (SAPS II) based on a European/North American multicenter study. JAMA – J Am Med Assoc 1993; 270(24): 2957–2963.
[6] Knaus WA, Draper EA, Wagner DP, Zimmermann JE. APACHE II: A Severity of Disease Classification System. Crit Care Med 1985; 13(10): 818–829.
[7] Skórovací system TISS. [On-line]. Available at WWW: <http://mudr.org/web/tiss-score>.
[8] Date CJ. An Introduction to Database Systems, 5th Ed. Addison Wesley 2000. ISBN 0-201-51381-1.
[9] InterSystems. [On-line]. Available at WWW: <http://www.intersystems.com/>.
[10] ICD-10. [On-line]. Available at WWW: <http://www.uzis.cz/cz/mkn/index.html>.
[11] Torrey T. What are ICD-9 or ICD-10 codes? [On-line]. Available at WWW: <http://patients.about.com/od/medicalcodes/a/icdcodes.htm>.
[12] World Health Organization. International Classification of Functioning, Disability and Health: ICF. World Health Organization 2001. ISBN 92-4-154542-9.
[13] World Health Organization. Mezinárodní klasifikace funkčních schopností, disability a zdraví: MKF. Grada Publishing: Praha 2010. ISBN 978-80-247-1587-2.
[14] SNOMED-CT. [On-line]. Available at WWW: <http://www.ihtsdo.org/snomed-ct>.
[15] Informace o NZIS. [On-line]. Available at WWW: <http://www.uzis.cz/nas/informace-nzis>.
[16] Datový standard MZ ČR – verze 4, 2013. [On-line]. Available at WWW: <http://www.ciselniky.dasta.mzcr.cz/>.
[17] HL-7 Standard. [On-line]. Available at WWW: <http://hl7standards.com/>.
[18] HL-7 Česká republika. [On-line]. Available at WWW: <http://www.hl7.cz/cz/hl7/about.html>.
[19] DICOM. [On-line]. Available at WWW: <http://medical.nema.org/>.
[20] Pilný M. Systémy PACS z hlediska databázových informačních systémů. [On-line]. Available at WWW: <http://www.systemonline.cz/it-pro-verejny-sektor-a-zdravotnictvi/systemy-pacs-z-hlediska-databazovych-systemu.htm>.
[21] Shortliffe EH, Perreault LE. Medical Informatics: Computer applications in healthcare and biomedicine. Springer-Verlag: Heidelberg 2000. ISBN 0 387-98472-0.
[22] Münz J. Informační technologie ve zdravotnictví – informační systémy. ČVUT v Praze 2011.
[23] Dvořák M. Informační systém pro podporu rozhodování vedoucích pracovníků ve zdravotnictví. In: Sborník příspěvků MEDSOFT 2004: 33-38. ISBN 80-86742-04-0.
[24] Špunda M, Dušek J. Zdravotnická informatika. Karolinum: Praha 2007.
[25] VZP – číselníky. [On-line]. Available at WWW: <http://www.vzp.cz/poskytovatele/ciselniky>.
[26] World Health Organization. Mezinárodní statistická klasifikace nemocí a přidružených zdravotních problémů ve znění desáté decenální revize (MKN-10). Ústav zdravotnických informací a statistiky: Praha 1992.
[27] Kirsten W. Von ANS MUMPS zu ISO M. Epsilon-Verlag: Darmstadt Hochheim 1993. ISBN 3-9803214-1-X.

6TH YEAR OF THE MEFANET CONFERENCE BROUGHT NEW IDEAS FOR THE EDUCATION OF FUTURE HEALTH PROFESSIONALS

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ABSTRACT — *The 6th year of the MEFANET conference was held in Brno, Czech Republic, from Tuesday 27th to Wednesday 28th November 2012. This conference provides a regular opportunity for teachers and students from medical faculties from all over the Czech Republic and Slovakia to meet experts in health care informatics and providers of electronical support in the education. Apart from methodical and educational aspects of e-learning at medical faculties in general, this year's conference has again dealt with the impact of this phenomenon on a specific medical specialty: a thematically focused symposium addressed the fields of orthopaedics, rheumatology and physiotherapy.*

The opening ceremony was started with a welcome speech given by Dr. Ladislav Dusek, Chairman of the Coordinating Council of the MEFANET project and Director of the Institute of Biostatistics and Analyses at the Masaryk University (IBA MU), who reminded the participants that this annual meeting of teachers and students from all Czech and Slovak medical faculties has already become a tradition which significantly facilitates the implementation of modern teaching methods into the education of medical disciplines. Dr. Jaroslav Sterba, vice-dean for the education of clinical disciplines at the Faculty of Medicine at Masaryk University (FM MU), then expressed his delight at the ever growing number of conference participants and appreciated its substantial benefits for the education of medical students in both countries (Czech Republic and Slovakia).

In his introductory lecture on the state of the MEFANET (MEdical FAculties NETwork) project, Dr. Dusek pointed out that all medical faculties in the Czech Republic and Slovakia (i.e., 8 Czech and 3 Slovak faculties) have agreed to participate in the project, representing more than 35,000 potential users (teachers and students). In addition, several non-medical faculties dealing with the education of future health care workers have recently joined the project. Dr. Dusek demonstrated a steadily growing number of educational materials on the "central gate" of the MEFANET project[1] and compared it to the previous – almost exponential – increase at the time of emergence of this portal, when almost nobody was concerned with the quality of involved articles. This inevitably led to flooding the portal with thousands of contributions and making its contents much less comprehensible. Therefore, the process of the so-called "mentally active check" was introduced more than one year ago: according to the new rules, all contributions which do not meet strict criteria on quality and extent of educational materials are moved from the central gate to the "sandbox"[2]. The recent trend, which prefers quality and reviewed contents of educational materials to their quantity, should be maintained in future. Many internet project have already documented that results from clinical practice have

[1] http://portal.mefanet.cz
[2] http://sandbox.mefanet.cz

Figure 1: "Mobile" issues dominated in the plenary lectures

Figure 2: Dr. Luke Woodham, St George's, University of London

been increasingly utilized in the education of future health care professionals[1].

POCKET-SIZE VIRTUAL PATIENT

E-learning in education as well as the programme of the MEFANET conference quickly respond to recent developments in modern information and communication technologies. For example, the concept of "virtual patients" (see Note) was introduced at the MEFANET 2010 conference; two years later, the question of latest mobile devices (smartphones, tablets) and their utilization in medical education was addressed at the same forum. In a joint lecture, Dr. Daniel Schwarz and Mr. Martin Komenda from IBA MU summarized available platforms for the creation of interactive teaching materials and e-learning courses.

Two UK experts in electronical support in the education of clinical disciplines accepted the invitation to the MEFANET 2012 conference: Dr. Adrian Raudaschl from the NHS Greater Glasgow and Clyde, and Dr. Luke Woodhome from St George's, University of London. Utilization of modern mobile devices (smartphones and tablets in particular) in the education of medical students was the common denominator of their lectures. Dr. Woodham described an original way of motivating medical students to practising their knowledge: researchers from St George's made use of popularity of smartphones among students and developed an iPhone application that simulates virtual patients and nowadays contains dozens of clinical cases. The concept of virtual patients has been finding its way into the curriculum of Czech and Slovak medical faculties only recently, but students from both countries might soon improve their knowledge using their smartphones, too.

In his videoconference presentation, Dr. Raudaschl introduced another iPhone application which simulates virtual patients and common clinical cases, but is rather getting closer to a thrilling computer game. Researchers from the NHS Greater Glasgow and Clyde put great emphasis on this aspect, which has been recently referred to as the "gamification". It is obvious that students will be much more interested in an attractive educational application than in a tedious transcription of a textbook. Gamification is the use of game thinking and game mechanics in a non-game context in order to engage users and solve problems. The Ward Round application was officially launched towards the end of 2011 and has since attracted a lot of attention from medical students from all over the world.

E-LEARNING IN MEDICAL DISCIPLINES DEALING WITH HUMAN MUSCULOSKELETAL SYSTEM

A minisymposium on e-learning in medical disciplines dealing with treatment of musculoskeletal system was chaired by Prof. Jiri Gallo, MD, head of the Department of Orthopaedics at the University Hospital Olomouc. Prof. Gallo emphasized that treatment of musculoskeletal disorders requires a multidisciplinary approach and that e-learning might present a promising way of raising awareness of this varied group of medical conditions among physicians of specialties other than orthopaedics itself (rheumatologists and general practitioners in particular) and

[1] e.g., www.mefanet.cz, www.wikiskripta.eu, moodle.mefanet.cz, www.akutne.cz, www.sepsis-q.cz and many others
[2] www.mededcases.com
[3] www.wardroundapp.co.uk

Figure 3: Prof. Karel Pavelka, PhD, director of the Institute of Rheumatology in Prague

Figure 4: Practical workshop on the latest trends in electronic testing

among non-medical health care professionals (mostly physiotherapists). The minisymposium was thematically focused on the osteoarthritis of hip and knee, which presents a serious health problem in most economically developed countries and puts a significant strain on their health care systems. Prof. Karel Pavelka, MD, director of the Institute of Rheumatology in Prague, accepted the invitation to the minisymposium, and informed the audience about the guidelines on osteoarthritis of hip an knee as recommended by the European League Against Rheumatism (EULAR). The spectrum of lecturers was extraordinarily varied: apart from physicians dealing with these issues in their everyday clinical practice, representatives of technical universities or departments talked about their research into biomechanics and related disciplines. Although the research focus of speakers was very heterogeneous, Prof. Gallo appreciated it as an example of meeting which should take place more frequently if an interdisciplinary cooperation is to be established and deepened.

PRACTICAL ISSUES

Practically-oriented workshops are a regular component of the MEFANET conference programme, and this year's conference involved two of them. The first workshop, which was led by Prof. Ales Ryska, MD, PhD, and Ilja Tacheci, MD, PhD, from the Faculty of Medicine in Hradec Kralove, was focused on practical issues in the development of virtual case reports, or virtual patients. Unequal chances of medical students to see a specific condition during their internships in a hospital became the driving force for the development of virtual patients. The simulation of treatment options is very similar to the real clinical practice. During the diagnostic procedure, the student prescribes additional examinations based on the acquired information; an assessment is then made on the correctness of sequence of diagnostic steps and on the effectivity of treatment procedure (both from the view of strain on patient and from the economical point of view).

The second workshop was prepared by a team of authors from the 1st and the 3rd Faculties of Medicine at the Charles University, the Faculty of Medicine at the Masaryk University, and the Institute of Computer Science at the Academy of Sciences of the Czech Republic, and was focused on modern trends in electronic testing. In the first part, the authors summarized general procedures and principles applicable in the process of test development and described a possible way of analyzing results of individual

Figure 5: Audience

Figure 6: Session of the MEFANET Coordination Council

students. The second part of the workshop was dedicated to various activities aimed at the education of teachers in testing procedures. A publication dealing with the development and analysis of tests used at medical faculties is being prepared, and a travelling seminar on these issues has been approved and is under preparation.

NON-MEDICAL HEALTH DISCIPLINES ARE ON THE RISE

Several faculties ensuring the education of non-medical health care workers have recently joined the MEFANET project. A separate Coordinating Council for these faculties has been appointed and expert guarantors for educational materials from individual specialties were chosen during the MEFANET 2012 conference. A separate block of lectures was reserved for non-medical disciplines, demonstrating a huge number of sources and various materials available for the electronical education in these disciplines. Moreover, development of these materials has been financially supported by grants in both countries, and therefore many contributions can be soon expected to be published in the MEFANET project, too. Lecturers and discussion participants agreed that these activities need to be coordinated in order to prevent various authors from working on the same materials, and that it is essential to look for gaps in electronical teaching tools.

CHAIRMAN OF THE COORDINATING COUNCIL RE-ELECTED

As usual, the conference was concluded by a public session of the Coordinating Council of the MEFANET project, where plans for near and more distant future were discussed; on this occasion, Dr. Ladislav Dusek was re-elected to be the Chairman. The seventh year of the MEFANET conference will be held on the same premises and organized by the same team as this year's conference. If you are interested in the latest developments in modern education of medical disciplines, you will be very welcome at the MEFANET 2013 conference.

Mgr. Lenka Šnajdrová, Ph.D.

MEFANET JOURNAL PROFILE

Aims and Scope

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.

Subjects of interest

- E-health and telemedicine
- E-learning
- Information science
- Innovative teaching methods
- Medical educational informatics and learning analytics
- Modeling and simulation
- Multimedia
- Social media pedagogy
- Evidence-based medicine in education

Indexing

MEFANET journal is going to be indexed in:

- Bibliographia Medica Czechoslovaca
- Bibliographia Medica Slovaca

On-line access

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PUBLISHER

Facta Medica

The Facta Medica Ltd. publishing house, based in Brno, was founded in 2008 by Dr. Boris Skalka, Dr. Eliška Skalková, and Assoc. Prof. Zdeněk Susa. The publishing house was founded with the aim of focusing on the publication of specialized literature from the field of medicine and health care – both periodical and non-periodical, but also medicine-related literature of fact and that of fiction. Since 2009 the publishing house has been represented by B. Skalka and E. Skalková.

The scientific standards are guaranteed by the publishing house's Scientific Board, whose members are listed below:

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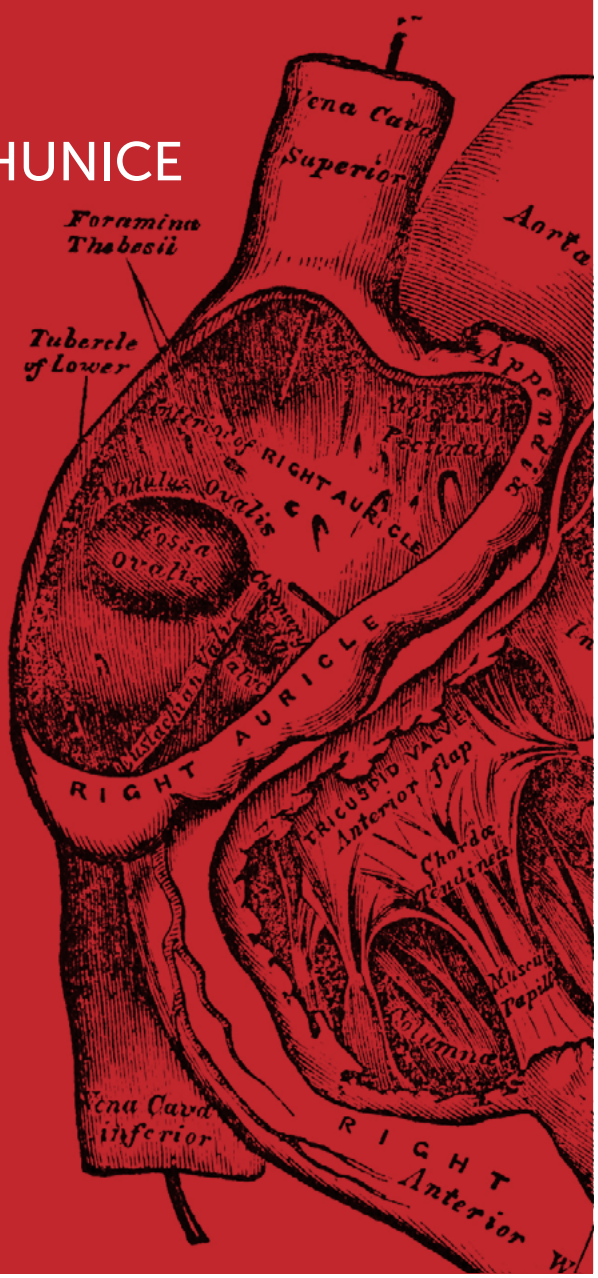

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