iSHIMR 2006 – Advancing Health Information Management and Health Informatics: Issues, Strategies, and Tools

Raza Abidi, Peter Bath, and Vlado Keselj

(Editors)

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The Centre for Health Information Management Research, The University of Sheffield, Sheffield, UK

Editors' Details

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Edited by

Syed Sibte Raza Abidi and Vlado Keselj
Faculty of Computer Science, Dalhousie University,
Halifax, Nova Scotia, Canada

and

Peter Bath
Centre for Health Information Management Research,
Department of Information Studies,
University of Sheffield, Sheffield, UK

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Foreword

We wish you a very warm welcome to Dalhousie University, Halifax, Nova Scotia, Canada for the eleventh international Symposium on Health Information Management Research (ISHIMR). This is the first time that iSHIMR has been held outside Europe and this development presents exciting challenges and opportunities for extending the success of the ISHIMR conference series across to North America. Having celebrated the tenth ISHIMR conference in Greece last year, it is an exciting time to look forward to this year's iSHIMR and to developments in health information management and health informatics research.

The Programme and Proceedings reflects the theme of this year's conference: "Advancing Health Information Management and Health Informatics: Issues, Strategies and Tools". Within this broad overall theme, fifty papers, posters and presentations will be made covering a wide range of topics within Health Information Management and Health Informatics. Prominent within this year's symposium are sessions on diverse themes such as healthcare information management systems, knowledge management in healthcare, clinical decision support systems, health information behaviours, e-health, and issues affecting implementation of systems.

As well as a diverse range of topics being presented this year, it is encouraging to see the wide range of countries represented at the conference. In addition to presentations from within the host country, Canada, there are presenters from Germany (Schwarte et al.), Greece (Pappa et al., Spyrou et al.), Iran (Piri et al.), Ireland (O'Sullivan et al.), Malaysia (Haslina et al.), New Zealand (Norris et al.), Romania (Jäntschi et al., Bolboaca et al.), Slovenia (Welzer et al.), Sweden (Åhlfeldt et al.), and the UK (Al-Busaidi, Beverley, Capel, Fitch, Ganas, Harland, Ivins, Millen, Naseer, Sissons et al.). This geographical diversity has been an increasingly important feature of the ISHIMR series, and it is gratifying to see the trend for international papers developed further this year. It is also very encouraging to see the extensive range of presentations from Canada, representing the strengths in health information management and health informatics research in the host country. In addition to an extensive range of presentations from our host, Dalhousie University, there are presentations from numerous academic institutions and professional organisations across Canada, including the Nova Scotia Office of Economic Development, the University of Victoria, the Public Health Agency of Canada, the University of Alberta, the University of Toronto, the Center for Evaluation of Medicines, the University of Sherbrooke, the University of Waterloo. We thank all those who are sharing their developments with us at this symposium.

ISHIMR is an excellent opportunity for researchers and information professionals at all stages of their careers to present their work. Once again, the standard of submissions to ISHIMR has been extremely high. The selection of papers was rigorous but difficult, and we would like to thank all those on the Programme Committee for their time and hard work in participating in the peer review process.

While the high quality of work presented enables us all to broaden our knowledge and understanding of health information management, the lively discussion and informed debate discussion in the formal and informal sessions that is an important hallmark of the ISHIMR conferences, gives us an opportunity to deepen our understanding, as well as develop new acquaintances and friendships. We trust that this year's conference will continue in this vein and hope that you enjoy the eleventh international Symposium on Health Information Management Research.

Peter Bath & Syed Sibte Raza Abidi (Programme Committee Co-Chairs)

Table of Contents

Computer-Assisted Training and Evaluation System in Evidence-Based Medicine

Sorana-Daniela Bolboaca[1], *Lorentz Jäntschi*[2]

[1]"Iuliu Hatieganu" University of Medicine and Pharmacy, 13 Emil Isac St, 400023 Cluj-Napoca, Romania, sbolboaca@umfcluj.ro

[2]Technical University of Cluj-Napoca, 15 Constantin Daicoviciu St, 400020 Cluj-Napoca, Romania, lori@academicdirect.org

AIM: According with the national trends in improving health care services a computer-assisted system was developed as a training and evaluation environment in evidence-based medicine.
METHODS: Thirteen tutorials, six supplemental resources on evidence-based medicine topics, and an evaluation system were developed and integrated into a portable application by the use of Microsoft HTML Help program. Forty students were enrolled voluntary into the study. The students' knowledge and skills were assessed at the beginning and at the completion of self-directed training by the use of computer- and tutor-assisted multiple-choice questionnaires.
RESULTS: The computer assisted training and evaluation system proved to be effective in evidence-based medicine education, improving students' knowledge as well as theirs abilities in decisional process for specific medical situations.
CONCLUSIONS: Evidence-based training strategy improved students' knowledge, giving them the information needed to use of best available evidence in medical decisions. The strategy can be use in continuing medical education, offering to physicians a reliable and flexible training in EBM.

Keywords

computer-assisted training and evaluation environment, continuing medical education, evidence-based medicine (EBM)

Abbreviations: EBM (evidence-based medicine); 95%CI (95% confidence intervals); CPGs (clinical practice guidelines)

1. Introduction

The cardinal premise of evidence-based medicine refers the importance of using best available evidence in daily medical decision [1]. The concept of evidence-based medicine was introduced in modern medicine by Gordon H. Guyatt [2] and is recognized all over the world as an instrument useful in improving quality of health care [3] and in controlling the costs [4].

First step of best available evidence integration in daily decisions is represented by the access to evidence-based medicine knowledge and acquiring of specific skills. Courses on EBM topics are offered by universities as traditional [5] and computer-assisted [6] trainings and are created for undergraduate students [7], residents [8], and practitioners [9,10].

According with European Union trends in development of eHealth [11], with international and national trends in evidence-based medicine education for students [12,13] and for physicians [14,15], an evidence-based training and evaluation system was developed and evaluated.

2. Programs characteristics and evaluation methods

The main objective of the study was to create, develop and assess a computer-assisted education and evaluation environment useful in evidence-based medicine training.

2.1 Evidence-based medicine curriculum

The curricular components included a set of *training and supplemental resources* as are presented in table 1 and 2. The title of the module and remarks regarding the order of theirs completeness are in table 1. The structure of the module is standardized and includes the following chapters: Objectives, Prerequisites, training materials structured in sections, clinical-based problems, and references.

Table 1 Tutorials in evidence-based medicine.

Module	Remark
Introduction in evidence-based medicine	It is important to respect the accomplishing order for complete understanding of the evidence based medicine concepts
Asking answerable clinical questions	
Evidence. Hierarchy of evidence	
Finding the evidence	
Apply the evidence in daily practice	
Medical decisions based on evidence*	Can be completed in any order with one exception (*) *Assessment of Decisional Trees Studies approaching must be made after the accomplishing of Medical Decisions Based on Evidence
Assessment of an evidence regarding ■ a therapy intervention; ■ a diagnostic or screening test; ■ a prognosis; ■ an etiology study; ■ an economic analysis; ■ a decisional process*	
Assessment of evidence-based CPGs	Must be approached at the end of the training

The supplemental resources (see table 2) incorporated into the system were included in order to help give the users the access to a glossary of EBM terms (structured alphabetically from A to Z) and to other resources in native language necessary in acquiring the practical skills needed for practicing evidence-based medicine.

Table 2 Characteristics of supplemental resources.

Resource name	Specification	References
CATROM	An online software for creation critical appraised topics	[16-18]
GUIDELINES (ONLINE)	A software tool for assisted creation of guidelines models and CPGs	[19]
Binomial Distribution	Online software which provide confidence interval boundaries and experimental true errors for proportions (useful for sample sizes from 2 to 506)	[20-29]
Diagnostic and Treatment Guidelines	20 diagnostic and treatment guidelines published by the Romanian College of Physicians	[30]
Prove Based Medicine	17 materials of proved based medicine published by Stetoscop Journal	[31]
Glossary	120 explained terms used in evidence-based medicine	

2.3 Method of system implementation

Training materials, supplemental resources, and knowledge evaluation system were integrated by use of HTML Help Workshop (version 4, Microsoft ®, free to use) into a Windows help application. The HTML Help Workshop (HHW) generates CHM files (from Compiled Hypertext Markup language) using HTML (Hyper Text Markup Language) and other dependency files. The CHM files are supported and displayed nowadays on both Linux and Windows - like platforms.

2.4 Assessment of the computer-assisted training and evaluation system

The students at Faculty of Medicine, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania were the target population of the study. Applying an aleatory method a series of fourth-year students was choused to participate to the study. The aim and the objectives of the study were presented, and the students enroll voluntary to the study. We chouse to let the students to decide if he/she enroll in evidence-based medicine education because participating at the study supposed to allocate time for a topic that is not included into the obligatory curriculum. Forty fourth-year students decide to participate. The students received a CD-ROM with computer-assisted training and evaluation system for self-directed study in evidence-based medicine. The enrolled students completed a tutor-assisted test which evaluated theirs evidence-based medicine knowledge at beginning and completion of the three-month self-directed training. Data were analyzed with Statistica 5.5 software, by the used of Wilcoxon test.

3. Programs evaluation results

3.1 Computer-assisted training and evaluation application

The EBMROM application was created as self-learning support in evidence-based medicine in Romanian language and is available at: http://vl.academicdirect.org/medical_informatics/EBM_Rom/
The methodological specifications of the self-evaluation and a tutor-assisted and the differences between them are in table 3.

3.2 Self-directed learning in evidence-based medicine: results

Eighty-five percent of students performed the tutor-assisted at the beginning as well as the completion of the study. The number of questions at which students gave an answer at the final test (range from 32 to 42) was significant greater comparing with the number of questions with answer at the initial test (range from 3 to 15) (n_{valid} = 35, Z = 4.46, $p < 0.001$).
The results obtain by applying the Wilcoxon Test sustain that there are significant differences between the correct answers obtained to the initial and final test (n_{valid} = 35, Z = 5.16, $p < 0.001$). The same results are obtained for the wrong answers (n_{valid} = 35, Z = 5.16, $p < 0.001$).
The number of correct answers is significantly lower comparing with the number of wrong answers obtained for the initial test (n_{valid} = 40, Z = 5.51, $p < 0.001$), while the number of correct answers is significantly higher comparing with the number of wrong answers obtained for the final test (n_{valid} = 35, Z = 5.16, $p < 0.001$).

Table 3 The methodology of evaluation tests.

Item	Specification for self-evaluation	Specification for tutor-assisted evaluation
Type of evaluation	Offline and/or online Self-evaluation	Online Tutor-assisted
Number of questions	Five At least 2 problem-based questions	Forty-five At least 12 problem-based questions
Questions	Every question has five possible answers (lettered from A to E) and at least one correct answer	
Chousing the question	For each module there were defined five-questions which are the same at a new test	The questions are chouse randomly from a database
Avoiding of a question	Not allowed	Allowed
Test results	Displaying for each question the rightness of answer (defines as correct or wrong) Displaying the score obtained by the user	Displaying the final mark, the text of the avoided questions, and of the wrong answered questions
The score methodology	Based on the *all or nothing* rule: every question with a correct answer has one point Example: if the correct answer items for a question are B and D and the user choused A, or any other combinations, the question does not has any point	
The range of the score	from 5(A) to 0(F)	from 45 to 0
The mark	N.A.	The final mark is compute based on the following formula: Final mark $= 1 + n_{ca} \bullet 0.2$ where the n_{ca} is the number of the questions at which the user gave a correct answer
The range of the mark	N.A.	from 10 to 1
Condition for pass the final exam	N.A.	Every student must prove that he/she acquired at least 80% of presented information in order to pass the exam

N.A. = not applied

4. Discussions

It is accepted that the half-life of scientific information in nature sciences is about five years [32]. This means that half of knowledge acquired in six years of faculty will not be up-to-date when the students graduate. Starting with this point of view, the aim of medical educators is to train the students in the spirit of use of best available evidence in daily medical decisions.

By creation and assessment of EBMROM application, the main objective of the study was reach. In accordance with international trends in evaluation of EBM courses [33], the EBMROM application allows to the user to evaluate theirs knowledge at the end of each modules.

Because the questions for self-evaluation are not randomly choused, the user can learn the correct answers and can obtain the maximum scores without learning the associated material. In order to perform an objective final evaluation and to avoid the cheating (example: performing the test by another person, collaboration between students, consulting the training materials, etc.) it was imposed that the final evaluation to be computer- and tutor-assisted. The possibility of learning the answers for the final evaluation was discarding by

imposing of the aleatory chouse of forty-five out of one hundred and eighty questions. A simple mathematic calculus, supposing that the order of the questions is not relevant, give a total number of distinct tests equal with *one-hundred and eighty chouse forty-five* which is equal with $6.24 \cdot 10^{42}$.

Improving the online evaluation system is possible through imposing the time for the final test (for example at one hour) and the time between two evaluations for a specific user identified by his/her personal data, computer IP, or any other identification information. This improvement opens the path to an online physician's evaluation system.

The self-directed strategy in EBM training proved to be useful in deepens understanding of EBM concepts and principles. The characteristics of EBMROM application which sustain its usefulness in EBM continuing medical education are:

- Provide a full environment of training and evaluation (teaching materials, supplemental resources, self-evaluation tests, glossary) in EBM;
- Friendly, easy-to-use application: there are required minimal knowledge of computers using (opening an application, Internet browsing, basic searching skills);
- Accessibility and portability: any windows based computer can run the application and most of the all other computer platforms if it is use an emulators;
- Multi-tasking: allow simultaneously the use of application with other applications;
- Multi-user: if the application is use online, it can be use simultaneously by more than one user;
- Updating: any changes, which must be made in the body of materials or system structure, are done easy and in real time by recompiling the application file;

The EBMROM application offers at least four advantages on EBM continuing medical education. First, a self-directed study on EBM allows to the user to chouse the proper time and place of continuing medical education, without interrupting of daily activity and moving into another city for a strict imposed period of time, being less expensive comparing with traditional continuing medical education courses. Second, the application allows adapting the EBM training to personal needs and speed of new knowledge accumulation. Third, development of a self-evaluation environment allows to the user to identify the gaps in EBM knowledge and to familiarize with the final evaluation methodology. Fourth, computer-assisted final evaluation allows an objective evaluation of users' EBM knowledge and skills, providing the final mark and final scores in real time.

The future plan of EBMROM application development is represent by obtaining the accreditation from the Romanian College of Physicians, by including the courses in the national distance-learning continuing medical education strategy.

5. Conclusion

The self-directed EBM training strategy can be a real solution on EBM continuing medical education, offering the possibility of archiving and evaluating the knowledge without the interruption of practical activity, by choosing the proper time, place and method of learning. Studies which to evaluate the self-directed EBM training as well as long-term changes of physicians daily behaviors by integrating the best available evidence in medical decisions are required.

6. Acknowledgement

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