

Posters

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Weights of criteria for evaluation of health resources on the web

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Introduction: System Rankmed a project supported by Ministry of Health is automated system for evaluation of health web resources. It facilitates a comparison of web pages of different health-related institutions based on a quality of presentation of information. The web resources are evaluated through 20 criteria. The choice of the particular criteria was based on the standards and guidelines of electronic information: GMDS – Qualitetskriterien für Elektronische Publikationen in der Medizin [1], HON Code Principles [2], EC Quality Criteria for Health Related Websites [3] and HIDDEN metadata vocabulary, part of a project MedCERTAIN [4]. One of the core aspects of a well-performed evaluation is usage of balanced evaluation criteria. The particular criteria are not of the same importance and they should not have the same assigned weight. The outcome of the evaluation would be otherwise biased. That is why the weight of particular criteria based on the importance for a user should be determined.

Methods: Firstly, we investigated the importance of particular criteria for web users. We used questionnaire. There were two sets of respondents: medical informatics experts trained in quality evaluation and common users (students of medical school). In the questionnaire the respondents chose the most relevant criteria up to 10 out of 20 possible. The results served as a basis for calculation of weight for each criterion. The opinion of the experts was favoured in the case of parameters that are not well known and for common user not clearly understandable (metadata, image alternative caption). Secondly, we analysed relations among the parameters. We searched for correlations that would cause overvaluation of certain aspects of the web resource. The following set of different health related web resources was used: 11 medical and pharmaceutical schools, 17 university and regional hospitals and 16 commercial companies operating in health care. Cluster analysis of particular criteria was made. The relations between criteria were expressed by correlation coefficient.

Results: 110 respondents took part in the trial. The weights are stated at each criterion in parenthesis. To make the list more comprehensible, they are expressed as percentage (sum of weights of all criteria is 100%). Average weight is 5 %, maximal 8.5%, and minimal 2.9%. A brief commentary is added, in the case the name of the criterion is not self-explanatory. The criteria are sorted in a descending manner. 1. Number of steps (8.5%) number of clicks needed to reach defined information. 2. Metadata (8.0%) presence of metadata (metatags) in the HTML source code (author, keywords, description). 3. Date of last updating (7.3%) 4. Availability (6.9%) availability of the homepage during a long period of time. 5. Speed of loading (6.7%) speed of loading of the homepage. 6. Number of inner links (5.5%) number of links from the homepage. 7. Internal search engine (5.2%) presence and reliability of internal search engine. 8. Dead links (5.0%) low number of deadlinks. 9. Authorship (5.0%) – clear authorship of presented information. 10. Date of publication (4.7%) 11. Faults of graphics (4.5%) character size and contrast of the text and background were evaluated. 12. Alternative captions (4.0%) presence of alternative text at images. It represents accessibility. 13. Faultless of HTML code (4.0%)

14. Back links (3.8%) presence of back links to the homepage. 15. Highlighting of links (3.7%) evaluation whether the links are clearly distinguishable from other text. 16. Uniformity of appearance (3.6%) evaluation whether the pages of the particular site have the same structure and appearance. 17. Covering of the screen (3.5%) overlapping of the content of the page out of the screen is a negative feature. 18. Site map (3.4%) 19. Marking of new (3.3%) clear identification of new information. 20. Foreign language version (2.9%). The data show users preferences. The users emphasize importance of a good navigation; the highest preference was assigned to a number of steps needed for reaching certain information. Other highly preferred feature is the information linked to how recent is the page. On the other hand the parameters related to the presentation (appearance) of the site were surprisingly marked as less important. 3 pairs of parameters that cluster together at the first level were found by cluster analysis (Site map Number of steps; Date of publication Date of last updating; Covering of the screen Speed of loading). Rational connections between the parameters in a couple seem to be obvious. Site map and Number of steps describe lucidity and structure of the resource. Date of publication and Date of last updating represent presence of time information. Covering of the screen and Speed of loading express different aspects of a file size.

Conclusions: The weights of quality criteria for presentation of information on health related web pages were determined by survey among experts and common users. The criteria and their weights are used in a project Rankmed, system for quality evaluation of internet presentation of health related institutions. Algorithms for automated processing of the evaluation were established. It enables time undemanding way of evaluation. Suppression of mutual influence of the particular criteria based on the cluster analysis is provided. Real, effective weights of evaluated criteria were gained.

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First Internet centre of distance education on antimicrobial therapy in Russia and former USSR

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Background: World experience shows that traditional forms of post-graduate education do not completely meet needs of professional development of physicians. It is especially evident in low-income countries with large territories. E-Learning (so-called distance education (DE) using Global Information Network) is of a priority setting and perspective form of improving physicians professional level.

Objective: To summarize experience in the development of first distance education Internet program on antimicrobial therapy (AT) in low income countries (Russia and former USSR) with support of international organizations and societies. **Materials and Methods:** First Internet centre of DE in Russia and CIS

was founded under the auspices of the Institute of Antimicrobial Chemotherapy (IAC), the Department of Clinical Pharmacology of the Smolensk State Medical Academy with support of the United States Pharmacopeia (USP) and the United States Agency for International Development (USAID) on the basis of the web-site for medical professionals Antibiotics and Antimicrobial Therapy (<http://www.antibiotic.ru>), recognized as conforming to the principles of the HON Code foundation in 2003. Linux and Solaris operating systems are used for organization of domains hosting www.antibiotic.ru; RDBMS PostgreSQL and MySQL are applied for management of the web-sites content. Java was used as a basis for creating the system. J2SDK 1.3.x and 1.4.x from Sun Microsystems Inc. served as a software basis on working stations, powered by the Intel x86 class processors. After building and adjusting the system, it was moved to the Sun Netra T1 target platform with the Sun SPARC processor, connected to the Internet. In both cases Jboss 3.x served as a EJB server, with Tomcat 4.x as a servlet controller. As a DBMS either hsqldb or PostgreSQL is used, and as to the target platform SAP DB was used. The out-of-box DE system supports Russian and English language interface.

Results: The program of DE starts with the preliminary testing on-line and consists of 20 questions randomly selected from database of 143 questions on antimicrobials, clinical microbiology, AT and ect. This testing allows to determine the basic level and detect the most crucial gaps in knowledge of AT in Russian health care professionals. The average percent of right answers on preliminary tests passed by 311 physicians was 61.9%. Less than 2% of doctors gave more than 80% right answers. The body of the DE program consists of 29 specially developed topics divided into 3 levels. Every topic is composed of the detailed study plan, educational materials (slide lection with comments, practical guidelines), control questions, tests and clinical cases. In addition to the specially prepared topics DE ground base utilizes 4 full-text practical guides, 14 issues of the journal Clinical Microbiology and Antimicrobial Chemotherapy, 31 practical guidelines and informational letters, 25 articles and presentations from Russian and international conferences from the www.antibiotic.ru library. After completion of each topic students are offered control tests so that tutors can assess the level of knowledge. Upon completion of each level an intermediate examination is conducted (on-line tests and practical tasks). In total 196 clinical cases and 710 test questions to be answered on-line, were designed. After successfully passing the final examination healthcare professionals are awarded official certificates confirming the improvement of knowledge in the field of AT. Since the implementation of the project (2002), 71 doctors have been trained using DE technology. Analysis of the DE results revealed the obvious increase in the number of the correct answers given by students during their preliminary test (65.8%), level tests (A, B, C) and the final exam (89.2% of correct answers), confirming the effectiveness of the DE.

Conclusions: 1. DE using mainly advanced informational technologies (e.g. Internet) is demanded form of improving medical knowledge of health care professionals. 2. Realization of such programs in low-income countries is possible with the support of international organizations and societies. 3. E-Learning program is effective form of increasing the level of physicians knowledge in AT.

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Genetics: Any questions?

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In the last years genetics has enormously expanded its boundaries, from the genome sequencing to the cloning of superior animals. More and more persons look for information and try to find them on the Net. Created in 2001 genetica.soloinrete.it is an Italian web site born with the aim to satisfy the growing

need of information. Since many Italians do not understand English and most of the information on the net are in such a language, this site assists navigators with a team of expert with PhD in Genetics, specialised in giving answers on any aspects of genetics.

The site acquired HON certification in 2003 and is part of a bigger organisation operating on the web giving answers in different fields. The site is divided in sessions each dedicated to a specific topic (Genetic and School, Genetic and Pregnancy, Genetic and diseases) so that users can choose the session in which they will find the expert best prepared in answering them. Genetic and School is mostly used by students or people in search of the latest news, curiosity or any other kind of general information on genetics.

Genetics and Pregnancy try to give an help to future parents facing problems of genetic diseases in prenatal diagnosis and in the interpretation of results of genetic tests. Genetic and Diseases assists people dealing with genetic diseases because affected themselves or with an affected relative or simply interested in knowing more about a specific syndrome. The Site futher than provide information on the different disease, can also supply a list of centres of diagnosis or treatment, which can be consulted. Experts do not make any diagnosis by e-mail. During these two years of activity the site has received an average of 150 visits per day and a total of 900 questions. 45% of questions were for Genetic and Pregnancy, 30% for Genetic and Diseases and 25% for Genetic and School. A database of answers is freely available from navigators. The site make consultable only those answers for which received the authorization for publishing from the questioners. The present work aims to present and analyze the site activity to understand people needs and improve the services for the public.

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The SALUT project: Cultural and ethical issues of medical information about eating disorders on the internet

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SALUT is an international project devoted to Eating Disorders (ED) and Information Technologies (IT), funded by the European Union and Swiss Federal Government, and involving partners- leading university hospitals and research centres- in both clinical and technical fields, from France, Italy, Spain, Sweden and Switzerland. SALUT is conceived as both a web portal which gathers information otherwise dispersed in ED, and a tool to bring the advantages and improvements of IT to the field of diagnosis, prevention and therapy of ED. As a web portal, SALUT stores information as complete and updated as possible in the main areas of ED: aethiology, clinic, prevention, treatment, social, cultural and ethical issues, etc. SALUT acts too as a bridge between users on one hand- professionals and patients or concerned people- and clinicians and researchers on the other hand, bringing a web based diagnostic and therapeutic tool whose description and preliminary results will be presented. One of the main objectives of SALUT is to gather and provide global information on all the aspects related to ED using the latest developments in IT. Since project partners and potential users come from different countries and backgrounds, the project has faced some questions concerning practical implementation apparently of a mere technical nature, but undoubtedly grounded in cultural issues as well, established after the European projects Babel and VICO (Demeester 1998). According to the same author, science and technology “miniaturise” complex situations through fragmentation and quantification of problems, and so “[they] are context-blind components of real life problems, but they can only affirm themselves in

a cultural context” (Demeester 1999). So, failed attempts to use IT in health may result not from technical problems, but from a lack of consideration of cultural issues (Demeester 1997). Even pure medical data are of a contextual nature (Berg 1999), but this is increased when we are dealing with complex information to be delivered to the public. Accordingly, an information structure has been designed respecting these different cultural, linguistic and geographical contexts of the partners. On this basis, a general SALUT web site in English has been implemented together with two regional web sites corresponding to the main linguistic areas in SALUT: French, for France and Switzerland – with an option to include information also in German considering the linguistic situation in Switzerland-, and Spanish for Spain. These regional websites will not be mere translations, but fully developed by the local partners according to the environment in each region. The common location of the project will be the English site, providing both general information about the project itself and information pertaining to the “Research Information Network” for experts on Eating Disorders. No specific Swedish SALUT web site will be developed, since our partner in Sweden runs his own web site at NAT – National Eating Disorders Resource Centre of Sweden- and co-operation can be very close, avoiding at the same time any unnecessary duplication of efforts. Besides the general audience of SALUT project – people concerned with eating disorders – the Research Information Network is specifically intended for a professionally or scholarly orientated audience which comprises: * Health professionals and psychotherapists, who treat people with eating disorders. * Teachers, social workers, and other people, who may have professional relations with people with eating disorders. * Researchers on eating disorders. These different groups will partly require different approaches regarding contents, language and policy. So, in its approach, SALUT is an international and intercultural project according to a multiaxial scheme. One main axis is geographical or cultural according to involved regions: Spain, France, Sweden and Switzerland. Superimposed is a linguistic axis corresponding to an information structure split in four areas: English, French, Spanish and Swedish. The second main axis corresponds to the “quality” of people engagement in ED in several levels: clinicians and researchers, politicians and social leaders, patients and families. In this engagement we face many ethical issues concerning both ethical clinics and ethics of information. These aspects will be discussed in the light of the classical principles of ethics.

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ALGA – a Web-based Gastrointestinal Endoscopy Learning Curve Evaluation System

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Introduction: Gastric cancer is still the second most lethal cancer in the world, and its prognosis clearly depends on early diagnosis [1]. Follow-up of high-risk individuals may lead to early gastric cancer diagnosis. Patients with lesions associated with gastric adenocarcinoma (ALGA – Associated Lesions of Gastric Adenocarcinoma), such as atrophy, intestinal metaplasia or dysplasia seem to be at a higher risk of gastric cancer [2]. Although no guidelines have yet been defined, it has been suggested that these lesions should, at least, be followed. Magnification chromoendoscopy patterns for gastric epithelial changes were developed, and evaluated for reproducibility and validity [3]. It may represent an important tool for these patients’ health management. We aim at building a web-based system to study the learning curve for this diagnostic instrument, and at auditing the current clinical practice concerning these individuals’ management.

Methods: Videotapes of endoscopic examinations on individuals with lesions associated to gastric cancer were reviewed. Twenty films with 5” duration were selected (two films for each magnification

chromoendoscopy pattern found) [3]. Invited endoscopists will answer 16 questionnaires (one per week) each composed of questions on 10 films classification. All films will be evaluated 8 times, by each gastroenterologist, to make the learning curve assessment. Endoscopy films are about 36 megabytes each. Initial tests indicated that using the Internet, the average download time of each film would be about 120 minutes (with a 56 Kbits), which was impracticable. This constraint along with user's physical location (doctors working in 2 different countries: Portugal and France), were decisive when choosing the system architecture. It was then decided to adopt a hybrid approach of Internet and CD-ROM technology, already tested on similar projects [4,5]. Server-side programming language should have the capability of database-communication, user session management and two-dimensional graphics creation.

After storing diagnosis classification, the correct answer is returned, allowing them to learn from their mistakes.

Results: The implemented system is composed of a set of CD-ROMs distributed by the application users, and a dynamic website connected to a database. The CD-ROM includes an "autorun" file, which triggers a local HTML frameset that references the remote HTML questionnaire, on the left frame. The right frame is used to play the films stored on the CD-ROM. The HTML questionnaire is stored on an Oracle database using a PHP script. The web-server is running on RedHat Linux 7.2 (Enigma), Apache 1.3, PHP 4.0 compiled with GD Graphics Library 1.8 and Oracle 8 DBMS. After each video clip classification, the user must lock that answer in order to advance to the next question, not allowing subsequent videos to influence previous responses. To analyse the learning curve a chart representing the agreement with the correct answer (reference) evolution through the number of observations made is generated using a PHP script. The agreement factor is calculated using kappa coefficient [4], which is implemented in PHP. Video clips access time has been greatly reduced, depending only on CD-ROM reading speed, therefore being almost instantaneous. The answers are centrally stored independently of user's physical location.

Discussion: The use of web-based technologies in these systems facilitates user interaction due to their previous Internet knowledge. Poor bandwidth network problems were solved reducing browser-server communication to login, questionnaire submission and correct answer retrieval, increasing the overall performance and user satisfaction. This solution can be applied to several situations where network connections don't allow distribution of large files. The system created is subject-independent enough to be used in other medical distant education projects. We aim to work on a solution that doesn't need permanent Internet connection, enabling off-line questionnaire evaluation and periodic remote synchronisation.

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Foro Bioquímico: Experience in Creation of a Biochemists' Virtual Community on the Web

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Abstract: Due to the scarce amount on the www of biochemical contents in spanish language, a group of Argentine biochemists have created a website for our spanish talking colleagues. The development of the site was done by telework. It soon showed an exponential evolution of attention and visits. After 3 years the site shows 5000 visits monthly and have been recognized by important international level institutions. Today, all offered services are free proving that the scientific knowledge is free. Here, we demonstrate that even Internet can maintain its original idea of share the information with no limits.

Introduction: Internet saw the light as a development in the university's sphere. The idea of the World Wide Web (WWW) was born in March 1989, when Tim Berners-Lee of the European Lab of Physical Particles proposed the project for being used as a way to broadcast investigations and ideas along the organization and through the web. From its origins the WWW came out as an ideal and very important implement for the development of scientific knowledge. The Web contents in spanish language are not abundant. Only a 1,5% of Web pages are in spanish. A very low number considering the 75% in english [1]. The rate is not like the number of people who speak those languages worldwide. Thus appears the need to produce scientific contents in spanish for the Web. In 1999 this idea started to shape the creation of a website named FORO BIOQUÍMICO dedicated to the latinoamerican biochemical activity.

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The specialist opinion: A personalised medical information service

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Background: As recent studies have shown, e-mail consultations are able to improve quality in the patients-doctors relationship. However, there is little information in Spain and in Spanish language about the characteristics of the questions made by patients or their relatives using the internet.

Methods: A retrospective analysis of the questions received at "The Specialist Opinion" service in the health site of the University Hospital of Navarra.

Results: 8796 questions and answers were collected. 73% came from Spain, 24% from America and 3% from many other countries around the world. The main subject of the question was gynecology and obstetrics in 20.45% of them, neurology (8.98%), oncology (8.76%), internal medicine (7.91%), endocrinology (7.18%), orthopedics (6.44%), urology (6.18%), gastroenterology (5.76%), pediatrics (5.19) and the rest of medical specialities which contributes with less than 5%. 57 % out of these questions were answered by a medical team of specialists in family medicine or internal medicine, whereas in the other 43% the collaboration of medical or surgical specialists was needed. Patients or relatives asked for many different subjects, including clinical, diagnostic, therapeutic and ethical aspects of the disease. Non surprisingly, conditions that affects a great number of people, such as pregnancy, breast cancer, viral hepatitis or back pain, account for an important number of questions.

Conclusions: Internet is becoming a new and potent communication tool between patients and physicians. There is scarce experience in Spanish language in the use of internet for medical information. A great number of legal, professional and medical aspects are object of present and future discussion.

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“Pain Area”: A specific microsite to help people to cope with their pain

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Background: Pain is the main symptom in most of the medical consultations. The management of chronic pain has become more and more complex, and in many hospitals specific Pain Management Units have been developed.

Methods: We have constructed a specific microsite in www.viatusalud.com the health site of the University Hospital of Navarra, to offer specialised information, educational and interactive tools to help users to understand and to live with their pain.

Results: In our Pain Area homepage a wide range of contents were shown. A collection of informative issues on pain, types of pain, tools in the management of pain and pharmacology of pain are presented. News about pain are incorporated from news agencies and specialised press. A tool to localize the pain and a pain diary has been designed specifically for this site. Moreover, in the personal password-protected area, a formulary has been included to allow users to ask for an specific and individualised information. A member of the Department of Anesthesiology and Pain Mangement has answered these questions. In the first three months on line, this microsite has become one of the most visited areas in viatusalud.com with near a thousand visits in June and more than forty questions received.

Conclusions: 1. Internet is becoming a new and potent communication tool between patients and physicians. 2. The segmentation and specialization of contents can be a useful way to improve communication between users and doctors. 3. New and prospective studies should be started to address whether these form of communication may help people. Supported by grant from Bayer Consumer Care.

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Analysis of online self-triage and patient-doctor communication services

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Abstract: The evaluation of a new medical service, consisting of online-triage, i.e. a symptom-oriented questionnaire based on binary decision algorithms, is presented. On demand, the triage leads to an online consultation (chat) with a physician. The result of the triage in terms of the differential diagnosis and the recommended disposition is not disclosed to the patient only to the physician. An exact transcript of the online dialogue is sent by e-mail to the patient. Data collected over a one-year period (9/2002-9/2003) was analyzed. 1500 users have registered for the service (free for members) during the period. 727 sessions have been opened. 520 (72%) have completed the triage questionnaire and 117 (16%) online consultations (chats) have resulted. Out of the 117 users who received an online consultation, 40% were female, 31% male and 29% didn't disclose their sex. 70% of the users used the service more than once (range 2–25 times). The topics included the complete spectrum of medicine.

[79]

SUPEREGO-CAFE.COM: The value of bulletin boards in creating online medical communities

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The Superego Cafe (www.superego-cafe.com) is a free-to-access website for trainee psychiatrists preparing for the examinations of the Royal College of Psychiatrists, England. Set up in 2001, it is the most popular online resource for these examination candidates. In January 2002 a bulletin board was added to the website to add an interactive component to the website. The aim was to form an online community of psychiatrists, exchanging information about the exams and helping each other to revise better. The software package used was a free downloadable Perl forum, YaBB (Yet another Bulletin Board, www.yabbforum.com). Between January 2002 and July 2003, over 1,500 people registered to use the discussion board. At any one time, about 1000 accounts are active; inactive accounts are deactivated after 6 months. Over 2000 posts have been made, creating a massive bank of past paper questions and experience. Page views over this period total in excess of 250,000. The bulletin board is divided into a number of boards, one for each component of the examination. There are additional boards for general chat and feedback on the website. The users themselves start most discussion threads. For revision purposes, questions are posted at regular intervals by the webmaster to generate discussion. The anonymity afforded by self-selected usernames allows users to post messages, questions and answers, which they may not have done otherwise. Discussion: Preparing for the postgraduate examination of the Royal College of Psychiatrists is an expensive, time-consuming process. Examination candidates often feel isolated, with little information in the public domain about the content of the examinations. The bulletin board of the Superego Cafe has created an online medical community with a common goal. It has helped to tackle professional isolation, offered valuable pearls of wisdom about the examination process and is a repository of experience. It has helped candidates to focus their revision strategies and improve their motivation. The response has been overwhelmingly positive. A bulletin board is a straightforward addition to any website and enables websites to tap into the almost unlimited resources of its users. Any website providing information to its users should seriously consider the benefits of allowing users to post their own experiences online. Free bulletin boards are available on the Internet.

[80]

TelePatient: An Ubiquitous Infrastructure for Remote Patient Monitoring

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Abstract: The application of wireless telecommunication and networking technology to health care has significant potential to increase the patients quality of life, and reduce mortality and morbidity. This work describes the implementation and design of a novel, open, patient-centric and environment independent portable medical unit, ushering the next generation of mobile Telemedicine systems for remote monitoring and consultation. The proposed system called TelePatient provides real time monitoring that can be achieved regardless of the patient location allowing the health care provider to be virtually present at the remote patients location 24/7. Our architecture achieves portability by exploiting the PDA and allows mobility through the use of cellular technology, enabling complete ubiquity. The design allows adaptability to different Telemedicine scenarios. We developed the software framework for such an architecture and prototyped it over real network conditions using standard communication networks, hardware components and software technologies. A performance evaluation of the system in terms of delay and power consumption has been presented.

Objectives: The aim of this work is to shift the medical acquisition and transmission unit into a versatile, light weight, portable unit, which can be carried anywhere by a patient allowing 24/7 monitoring capabilities. Such a system can have a great impact on environments such as home, elder communities, gymnasiums, schools, remote military bases, ships and the like. Apart from home health, such a lightweight mobile unit can find its use in hospital wards, ICU units and other critical care telemetry. Such a complete wireless remote monitoring system takes the form of medical sensors attached to the human body, capable of communicating wirelessly with a small portable handheld device, which connects to a health care provider through a wireless link. TelePatient provides a solution by which real time monitoring can be achieved regardless of location, offering freedom of movement to a patient.

Results: We show that drastic reduction in image sizes that can be obtained based on changing the number of pixels of the image and changing the quality factor, can significantly improve performance over low speed links in terms of both delay and power. We see vast difference in response times between our two scenarios, suggesting that for the CDMA, such image transformations are more beneficial and required. Similar to the delay curves, we show that the power is more affected by image dimensions rather than the quality factor. This information can be used to optimize on power and reduce delays, by choosing the appropriate transcoding parameters. We clearly indicate the benefits of transcoding for slow links, such as CDMA. To consider performance optimizations by transcoding, we attempt to create a decision graph, plotting energy consumed on the PDA and delay incurred for the various possible transformations.

Conclusion: A proof of concept mobile remote monitoring system was designed and implemented. The main contribution of the design was the use of a PDA as a communication gateway as well as a transcoding entity to create a low cost, small, light, autonomous, portable, patient centric monitoring unit. The design, which is based on open standards, is kept modular and can adapt to different Telemedicine needs. Several performance tests were done on the system to aid in embedding intelligence at the PDA and provide directions for further research. The modular design discussed in this paper is the first phase of the next generation portable remote monitoring units. With advancements in MEMS technology, it is not too distant in the future that the Artificial Patient discussed here will be replaced by small, unobtrusive, wearable, commercial sensors, and improvements in handheld technology will further make feasible such a system.

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The V-Trainer System: An Innovative Virtual Training System in Health and Biomedical Informatics for Healthcare Professionals

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Abstract: The practice and process of health care are inextricably intertwined with the management of information. Information technologies have become increasingly necessary for modern practices in medicine, efficient and effective management of health care, and health professionals education. Healthcare professionals recognize an urgent need for skilled scientists who are knowledgeable of both the health environment and information technologies. Distance learning technologies have been used for many years to provide medical education to rural physicians. The V-Trainer System is a self-developed

innovative virtual training system in health and biomedical informatics for healthcare professionals. The purpose of this study is to research and evaluate the utility and acceptability of a mixed learning technology approach for providing distance health and biomedical informatics education.

Objectives: The V-Trainer System objectives include: Assisting international medical schools in improving and advancing the process of health and biomedical informatics education. Advancing the international exchange of information in the health sciences and in medical education for healthcare professionals. Contributing to the promotion of international understanding and exchange among nations. Facilitating the life-long and distance learning for healthcare professionals in health and biomedical informatics.

Study: Our study team is interested in examining the usefulness of a mixed learning technology approach, which combines audio conferencing and web-based learning. Physicians and nurse practitioners can access instructional materials before, during, and/or after an audio teleconference through PCs with Internet connectivity. The purpose of this study is to research and evaluate the utility and acceptability of a mixed learning technology approach for enhancing audio teleconferencing instruction.

Methods: The main components of the web-based learning include web pages for presenting useful material to be included in audio teleconferences, asynchronous computer-mediated conferencing bulletin board, archived audio streaming files, online educational courses in health and biomedical informatics, useful links to online web sites for clinical and patient education material, literature search results and online evaluation forms.

Results: Education is one of the enabling technologies necessary to provide citizens of the world with access to appropriate and continuous health care services anywhere and anytime in the world. An on-line learning infrastructure is considered essential for the delivery of educational programs suited to all citizens and health professionals at different levels. Our team has built a virtual postgraduate level course that will be applicable to professionals working in a wide range of areas within healthcare. The focus of the course is on practical issues and very much aimed at persons wishing to retain their role with an increased knowledge and skill level rather than those wishing to specialise as informaticians. Healthcare professionals are not renowned for an abundance of free time or the option to leave their jobs easily to attend face-to-face courses, and so we looked at distance learning options for delivery of the course.

Conclusions: Internet technology has provided an exciting educational challenge and opportunity. Providing a web-based health or biomedical informatics course has not been without its frustrations and problems, including software compatibility issues, bandwidth limitations, and the rapid change in software and hardware. Despite these challenges, the use of internet technology has been interesting for both staff and students, and a worthwhile alternative for delivering educational material and advice to medical students or healthcare professionals working from their own homes.

[82]

Health related Websites by the example of pancreatic cancer

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This Website demonstrates that there is a high interest in Informations about a tumor related Webpage for patients, relatives and doctors in the same way. We demonstrate a free, easy to navigate Site which provides Informations equally to layman and professionals. The number of contact has risen since the sites we're on the server, and we think about building up a VPN (Virtual Private Network) to link the

surrounding hospitals and GP's to maintain a quicker flow of informations. This will also reduce the amount of unnecessary examinations to the patient.

Material and methods: For the creation of the Internet pages following hard and software components were applied: Hardware HTML: Apple G4 Titanium Powerbook, T-DSL modem software HTML: DreamweaverMX (Mac), Fireworks MX (Mac), Adobe Photoshop 7.0 (Mac), server hardware: Intel compatible x86 architecture. Server software: Operation system: Linux 2.4.x Web server: Apache 1.3.x with mod_php and mod_ssl Mail server: Exim 3.x statistics: Webalizer version 2.01 Binding to the Internet over the medical computing centre of the University of Gottingen (director Professor Dr. O. Rienhoff).

Results: In these Website we try apart from information to the pathology to give surgical options as well as conservative treatment. Also of patients asked questions (FAQ = frequently asked questions) are answered here. We present the scientific and clinical projects running with us. It exists a link collection, which passes both colleagues, and patients and relatives on e.g. to special centres or groups of self-helps-forums. A forum for patients and one for colleagues (Chat Room) was just created. With rising tendency this Website has monthly 1200–1400 Visits and 65.–75.000 hits. To most visited pages are in removing frequency FAQ-section, surgical techniques, basic research, clinical research and conservative therapeutic options. Most visitors came from Germany, in addition, from the Europe foreign country and oversea. It concerned private network visitors in particular in addition, around inquiries out of research Institutes and the industry.

Summary: We present a website, which offers more global information about pancreatic cancer. The site addresses itself equal to patients, interested laymen, physicians and scientists and is easily navigatable by the clearly arranged index site. By the rising tendency, on the average up to 1400 Visits per month, it seems to exist a large interest in such tumor-specific Websites. The number of hit/month (>70.000) prove that the majority our pages are extensively visited (53Hits/user) and an appropriate need for information is present. The proportion of international Visits of the German language presented pages, was surprisingly high with 18.54%/ month. The online consultation of doctors and patients show that a VirtulaPrivateNetwork to link the main surrounding Hospitals and GP's with our Department seems to be necessary. This will guarantee a quick and easy transfer of important Information's and findings vice versa and hopefully will reduce the amount of unnecessary investigations.

[83]

CITMED – system for searching and presenting health care related web resources based on quality criteria

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Introduction: Catalogues of Internet resources in healthcare mostly lack the quality evaluation. This fact makes the orientation in actual information explosion difficult. In the Institute of Medical Informatics a list of web documents focused on educational resources in health care was created. The main criterion for adding a resource to the list was a high link popularity (number of web links) of the resource [1–3]. Another marker of quality taken into consideration in the selection process was inclusion of the resource in one the following databases: HON, HardinMD, Medical Matrix [4–6]. The system operates automatically; a team of editors then edits the results. The output is a list of web resources provided with markers of quality and link popularity history.

This project is conducted under the auspice of the Ministry of Health of Czech Republic and is a part of the initiative of European Union “e-Europe+, Healthcare on-line”. At present time there are more 600 web resources in the system. It is presented at <http://www.citmed.cuni.cz>.

Conclusion: Several resources on the Internet evaluate citation popularity by means of links. However, in all cases the citation counting is performed without other evaluation. The described list of knowledge web medical resources presents an objective evaluation of their quality, useful for the selection of optimum education resources.

[84]

Web atlas in digestive endoscopy

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Since its widespread use in the late 1960's, the endoscopy has expanded the understanding of numerous gastrointestinal diseases thanks to a careful inspection of the mucosal surface and has thus greatly improved the ability to care affected patients. Almost no research bended over this medical domain in order to promote the conception of decision aid tools. This challenge is meanwhile ours with a computerized advanced adaptation of medical atlas-books on the web. Next to a classic illustration of diagnoses by means of noteworthy iconography, such an atlas must, in addition, integrate the similar case retrieval by the diagnostic hypothesis evaluation.

For the present, with respect to the endoscopic imagery, there is no question of exploiting the numerical content of images because such content would not be sufficient to “translate” the medical meaning of the situation. Indeed, physician's reasoning in endoscopy emphasizes two decision levels, the endoscopical findings (the lesions) and the diseases. An interaction connects these ones because inconsistencies in the disease decision according to other information (medical context, other endoscopical findings) must lead to doubt about the validity of finding diagnoses. That is why the followed approach consists in elaborating a model of the situations encountered with the imagery, that is to say a knowledge base of endoscopic diagnoses exemplified by an iconographic base.

Drawn from the Minimal Standard Terminology of the European Society of Gastro-Enterology (ESGE), a two-leveled description mode of the endoscopic imaging and of the gastro-enterology pathologies is illustrated by the concept of Scenes with Objects. Hence, a Physical Scene, i.e. the file of an image or of an image sequence, visualizes an interesting part of the endoscopical exam, showing findings, that are the Physical Objects. A Logical Scene represent a medical interpretation of endoscopic imagery, i.e. an endoscopic disease diagnosis, which associates a peculiar patient context, one or several Logical Object(s) and their eventual spatial relations. As abstractions of Logical Scenes, Conceptual Scenes are the extended definitions of the upper digestive tract pathologies. Patient context, reasons for the endoscopy, one or several Conceptual Objects with their possible spatial relations constitute the medical knowledge of these Scenes.

Lesions or any element of interest, i.e. the “endoscopic findings”, constitute the Objects to be depicted thanks to an exhaustive description mode So, each object is described with 31 features and 206 items. To each feature is associated a set of items, representative of all possibilities and judiciously defined by the expert. The Scene is depicted by the objects, possible spatial relations and the patient profile (demographic data concerning age and sex as well as a predefined whole of clinical contexts).

To sum up the Conceptual Scenes, form a two-leveled knowledge base. Inasmuch as an expert squeezes out his knowledge, using linguistic valuations and instilling uncertainty, vagueness or even doubt, the chosen way is supposed to do the same with interest valuations – not possible, without interest, of interest (first or second order) – and incidence valuations – essential, habitual, rare, exceptionnal, doubtful or excluded-.

The objects are marked by an ESGE code and a libel, and described on 31 features . The expert gives each feature a statute –impossible, interesting or without interest-, and valuations of interest degree and of incidence to each item of interesting features. For the scenes, the patient profile is composed by the sex and age prevalence features and by a predefined whole of clinical contexts, each judged in terms of interest and of incidence. In this way, the objects are assessed in accordance with their interest and incidence, but one of them must be essential. Potential spatial relations (into, in contact, around) between objects are also judged in terms of interest and of incidence. A code and a libel denom the diagnoses which are classified as main or not.

For the endoscopic case base, it is a whole of endoscopic examinations and a set of independent images, which must be indexed. Constituted of images or sequences and of a diagnostic report, each examination represents a set of Physical Scenes as well as a set of Logical Scenes. While a Physical Scene is a file where are visualized the objects, a Logical Scene represents an endoscopic diagnosis which consists of information concerning the patient (common to all the Logical Scenes of a same examination but unknown for the independent image) and of all the objects attached to the diagnosis. Moreover, the indexing must hold into account that Logical and Physical Scenes do not tally.

The relevant case retrieval is based on two approaches: a first step classifies owing to the knowledge base and, after, a similarity measure will complete the retrieval . At the moment, the application contains around 150 endoscopic images, 150 descriptions of diseases with 80 findings; it's accessible via internet at <http://i3se009d.univ-brest.fr/> – Password mednet- The knowledge and case bases can be consulted by findings or diseases. A questioning interface allows the user to depict an endoscopic scene, in other words the patient profile, the objects and possible spatial relations between objects. To avoid a boring description of objects, only 5 features (anatomical position, form, colour, relief and type) are wanted at first; the other ones, according to their discriminating power, will be selected to refine the object recognition. After the object classification, the whole description of the exam is analyzed to identify one or several Logical Scenes – i.e. the diagnoses of diseases -. This analysis of scene still allows perfecting the classification of the lesions – i.e. objects-. Indeed, as the level of the image (or of the sequence) generally represents the endoscopic lesion level, the classification should especially insist on the objects in order to select a subset of candidate cases (the similarity playing upon those), while, from a medical point of view, the level of interest should surely envisage the pathology diagnosis. The next steps will allow the knowledge base collaborative updating by an expert group and integrate the system in a learning tool for junior endoscopists.

[85]

Case-based simulated learning environment emphasizing Evidence Based Medicine

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Abstract: The rapid and constant development of medical knowledge, the distance of educational courses location, that prevents physicians from participation due to daily clinical practice duties, etc. make it more and more difficult to medical professional keeping itself competent. We have designed an educational tool that can constitute an alternative to the residential courses, allowing giving continuity to the education in oncology domain without space and time limitations, differentiating and personalizing the formative course on the basis of learner. Learning takes place most effectively when the learner is engaged and actively involved in decision-making. The most important session of our tool is focused on case-simulations. The virtual cases have been created on real patients data, treated according to the therapeutic strategies based on medical evidence, that are currently considered as valid. The data collection, planned through the experimentation phase in the next few months, will provide precise information in oncology education on the effectiveness of a case-simulation based tool emphasizing evidence medicine.

Methods: To our opinion a combination of the above mentioned methods (CD-Rom, Web pages, etc.) could carry to optimal opportunities of learning. We planned a formative course consisting of on-line and off-line modules. The learners in our experimentation are: general practitioners, students and specialists. The on-line module permits the learner to free access the educational updated material on melanoma available on the website of National Institute of Tumours of Milan (INT) [12]. The off-line module has been realized on CD-Rom placing the guidelines as core of the educational course. Two different educational courses have been created according to the different learning needs of the learners: a) a recommended course for general practitioners and students to favour a logical and sequential learning of knowledge and skills; b) a free access course for the specialists, to permit an immediate retrieval of the searched information. Moreover, every user can access to all the resource available at any time.

Results The off-line module consists of four learning sections: i) a section allows the direct consultation of specific material (guidelines, monographic course on melanoma, and glossary); ii) a section allows a directed connection with the INT website to obtain updated information through seminars, meetings, etc.; iii) a section for the visualization of the most important video on melanoma surgery (from sentinel lymph node biopsy to lymph node dissections); iv) a section is dedicated to the interactive learning based on case-simulations. The educational content of the simulation section is focused on the therapeutic procedures of melanoma. Our program is based on the discrimination learning process; the user progressively learns to differentiate among similar clinical cases of melanoma by a static simulation of 11 real clinical cases treated in compliance with the guidelines. Each case represents a patient with a set of data that permits the learner to have a clear diagnostic picture. According to case complexity they are asked one or more questions related to the surgical and/or systemic treatment of the lesion or related to the follow-up programming. Working with the simulation of a patient, the student may select from a constrained list of responses of which only one is valid in the current situation. If the answer is correct the system allows the learner to proceed with the case analysis. If the answer is wrong, the system supplies the scientific evidence underlying the correct answer, to allow the student to understand the weight of the error. The on-line module has been completely integrated in the existing website of INT. No further details are given in this context.

Conclusions: The development phase of the educational tool is going to be concluded and in the next few months the experimentation phase with approximately 50 learners will start. Information on user-satisfaction and on effectiveness of case-simulation approach emphasizing medical evidence versus the traditional methods will be collected. We believe that multimedia tools combined with case simulations are becoming an efficient teaching tool to help medical professionals in learning evidence-based medicine.

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[86]

A free web-based, full text drug information database

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Establishment: The drug information centres (RELIS) at the five university hospitals in Norway, funded by the Norwegian Health authorities. *Introduction:* In 1995, RELIS developed a full-text question-and-answer (Q&A) database (Microsoft Access), which served as internal documentation of the queries to RELIS and the referenced drug information given in response. An updated copy was exchanged between the individual RELIS centres on a monthly basis. During the years 2000–2001 RELIS in close collaboration with the database designer (Arnett AS) transformed this to a fully functional web-based SQL-database with separate external and internal interfaces and functionalities.

Objectives: 1) To continually offer a free searchable drug information tool on the Internet, intended primarily for Norwegian health professionals. 2) To share an internal network for both input and output of the work done, including access to work in progress, between the five regional centres. 3) To keep an updated documentation of the work done

Results: The original database (1995-2000) was converted into a fully functional external and internal Internet application. The searchability of the database was restructured and improved, and it is now possible to retrieve records with the use of the drug nomenclature in the Anatomical Therapeutic Chemical classification system (ATC), using either generic or brand names. All records are indexed by the Medical Subject Headings (MeSH), and they are also searchable by text words and self-made, indexed categories

such as; drug interactions, side effects, pregnancy etc. External interface: There are two separate search interfaces; one is a simple search for drug name with the possibility of combining the search with categories, the other allows one to combine all the mentioned searchable fields. Search results are presented in a printer friendly web page.

Internal interface: The internal functionality in addition includes searchability of the reference field. Every part of the process up to, and including, publishing the Q&A can be done online in the database. The basic parameters and standard registers (including ATC and MeSH) can be altered online by internal users with administrator privileges. The improved statistical functionality gives updated information of characteristics on the database content as well as a survey of the use by healthcare professionals. The external database has been available free of charge through a link at our homepage (www.relis.no/database) since October 2001. Now, two years later, the external database has 5000 Q&As available, each indexed manually for the RELIS database application.

Conclusions: The RELIS drug information database represents a free of charge, drug information database designed for interaction between drug information centres and the sharing of information with (Norwegian) healthcare professionals on the Internet. To our knowledge it was the first of its kind in Europe. All of the content is written in Norwegian only, though the application can be used for any language.

[87]

Use of the Internet for promoting health literacy in Bangladesh

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Objectives: The Internet has become one of the most widely used communication media. It presents a potential tool for preparing and promoting “Prescribing Information” or “Product Information”, to provide more information about a specific product for health services. The Internet provides reliable and credible medical and health information through the World Wide Web. Nowadays, use of the Internet to promote health literacy is increasing gradually in developing countries like Bangladesh. Many pharmaceutical companies use the Internet to prepare and promote prescribing information. The aim of the study is to assess the level of satisfaction for preparing and promoting prescribing information or product information by using Internet in the pharmaceutical companies in Bangladesh.

Study Design: A cross sectional study was conducted among 510 Internet users from 60 pharmaceutical companies who had internet facilities to assess their level of satisfaction for preparing and promoting prescribing information.

Methods: Interview administered questionnaires were conducted through interpreters by direct interview method. Data collected from the Internet users were at first manually coded and later tabulate for the purpose of data analysis. The data were processed and analyzed using SPSS software.

Results: Among 510 Internet users, 450/510(88.23%) were company employees, comprising 260/450(57.77%) pharmacists, 120/450(26.66%) non-pharmacists, and 70/450(15.55%) physicians. 60/510(11.76%) was owners of pharmaceutical companies. 234(52%) staff members were satisfied for getting adequate information, 135(30%) for update information, 54(12%) for saving time, 27(6%) for making good communication with physicians. 47(78.33%) owners were satisfied for saving money

for preparing and promoting prescribing information. 7(11.66%) for satisfied to market product quickly. 6(10%) for increasing skills of their personnel.

Conclusions: The findings of the study indicate that most employees are satisfied, getting adequate and update information. Owners are satisfied due to minimizing costs in preparing and promoting product information. Accurate and reliable web-based information will bring great success to the pharmaceutical sector in Bangladesh.

[88]

Pacific Telepathology Service at Fiji School of Medicine

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Introduction: Pacific Telepathology service has been established at Fiji school of Medicine with technical support from University of Basel. The service is designed for remote consultation, continuing medical education (CME) & health care research (HCR).

Methods: Telepathology server for Pacific Pathology Group has been set up at <http://telepath.patho.unibas.ch/> to bring together health care professionals in the Pacific to overcome limitations of distance, lack of resources and to improve quality of healthcare services. Accessed by a computer possessing internet and email connection, members send cases and questions, review and comment on other cases and receive consultation via web or email. Benefits are tremendous in terms of remote consultation, CME, HCR and improving quality of health care even at remote islands devoid of health care resources. Internet speed or reliability is not a limiting factor.

Results: This Service has been established at the FSM for student education with intentions to expand to other islands for consultations and CME. Presently the service is established in the Solomon Islands where there is no pathologist and pathologists in Australia, Switzerland and USA provide the consultation service.

Conclusion: Web based telepathology is currently the best option for improving quality of health care, providing distance education and forming a strong global Telepathology community.