



Making the Connection

June 12-13, 2003
Bethesda, MD



Program Abstracts

The following are the abstracts for the conference presentations.

Thursday, June 12, 2003

9:45 AM

Defining Biomedical Informatics and its Relationship to Dental Research and Practice

Edward H. Shortliffe
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Department of Biomedical Informatics
College of Physicians and Surgeons
Columbia University

Biomedical informatics is the scientific discipline that deals with the storage, retrieval, sharing, and optimal use of biomedical information, data, and knowledge for problem solving and decision making. The field touches on all basic and applied fields in biomedical science and is closely tied to modern information technologies, notably in the areas of computing and communication. In this presentation, we suggest how the basic discipline of biomedical informatics relates to areas of application ranging from cellular and molecular processes (bioinformatics), tissues and organs (structural or imaging informatics), individual organisms (clinical informatics), and populations (public health informatics). Emphasizing the scientific questions addressed by basic researchers in biomedical informatics, we also highlight the relationship to the various health professions, including dentistry, and to their scientific base. We close with a discussion of the relationship between biomedical informatics and its component sciences, including computer science, decision science, information sciences, cognitive science, and management science.

10:30 AM

Mining the Literature: Trends in Dental Research

William C. Bartling

Fellow

Center for Biomedical Informatics

University of Pittsburgh

To date, no comprehensive quantitative analysis of the dental research literature has been performed. For instance, there is no information on how the volume of research publications is distributed across dental research topics, or on the trends in dental research as they change over time. In this project, we developed a comprehensive retrieval strategy for dental research papers from the MEDLINE database. Based on ratings of the retrieved abstracts by dental researchers, we established a gold standard set of dental research papers. We then trained a Bayesian belief network on the characteristics of dental research and other papers, and used the resulting program to filter our original set of papers retrieved from MEDLINE. At the conference, we will present the results of the different stages of this project, and discuss preliminary results of the quantitative analysis of the final set.

11:00 AM

Bioinformatics and Anticipated Developments in Dentistry

Isaac Kohane

Director

Informatics Program Children's Hospital

Associate Professor of Pediatrics

Harvard Medical School

Winston Patrick Kuo

Biomedical Informatics Research Fellow

Department of Genetics

Harvard University

The post-genomic era has brought with it a change in the way basic experiments are conducted, enabling biomedical researchers to examine biological systems more comprehensively. These approaches to comprehensive molecular analysis will provide opportunities to enhance our framework of knowledge of oral health, craniofacial development and malformation, and pathogenesis of oral diseases. Bioinformatics is a discipline that has become an essential part of the biomedical research community. Its role involves deciphering genomic, transcriptomic and proteomics data generated by high-throughput experimental technologies and organizing information gathered from traditional biology. In the future, we anticipate biomedical informatics (dental informatics and bioinformatics) and the incorporation of clinical data into the analysis of genomic information, can help further our understanding of the mechanisms underlying the

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biological challenges in dentistry. In this approach, we can eventually change the current practice of dentistry, including diagnostics, therapeutics, and prognostics of common oral diseases.

11:30 AM

Overview of Dental Informatics Research

Titus Schleyer

Associate Professor and Director

Center for Dental Informatics, School of Dental Medicine

University of Pittsburgh

Patricia Corby

Research Associate

School of Dental Medicine

University of Pittsburgh

To date, the dental informatics research literature has not been comprehensively reviewed. The purpose of this project was to (1) conduct a thorough search of the published literature for dental informatics research papers, and (2) summarize this literature in a comprehensive review. Because "dental informatics" is currently not a Medical Subject Heading (MeSH), we had to develop a relatively complicated retrieval strategy for articles about computer- or informatics-related topics in dentistry. We then refined the set by eliminating papers with characteristics and MeSH terms not related to our target set. At the conference, we will present an overview of dental research based on the analysis of the final set.

1:30 PM

Decision Support at the Point of Care: Challenges in Knowledge Representation, Management, and Patient-specific Access

Robert Greenes

Professor

Radiology and Health Science & Technology (Harvard Medical School)

Health Policy & Management (Harvard School of Public Health)

Many applications in a clinical information system can benefit from the incorporation of medical knowledge to provide patient-specific, point-of-care decision support. These include computer-based provider order entry, referral, clinical result interpretation, consultation, adverse event monitoring, scheduling, shared patient-doctor decision making, generation of alerts and reminders, among others. To be executable, knowledge must be represented in the form of rules, constraints, calculations, guidelines, and other logical/algorithmic formats. The main difficulty is that the integration of such knowledge

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in clinical applications, when it occurs, tends to be very system- and application-specific, often encoded in a programming language, or even in the formatting specifications of a user interaction display. Also the data references and services invoked are highly dependent on the system/platform and electronic medical record implementation. This makes it difficult and time-consuming to encode authoritative evidence-based knowledge, severely limits the ability to disseminate and share successes, and hampers efforts to review and update the logic as medical knowledge changes. Solutions to this problem involve the development of standards-based representations for medical knowledge, and tools for authoring/editing, dissemination, adaptation to local environments, and execution. A variety of approaches are being pursued, which will be described in this presentation.

1:45 PM

Informatics Challenges in Tissue Engineering and Biomaterials

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Director of Translational Research

Division of Biological Science, Medicine and Surgery

College of Dentistry

New York University

Both tissue engineering and biomaterials have made tremendous strides recently; some tissue engineered products have come to the market, and others are in development. Yet major questions remain unanswered. A fundamental issue that informatics could address is describing (and predicting) the cascade of biochemical and cellular reactions that occur as a function of time and implant material; surface texture; microporosity; pore size, density, and connectivity; and 3-dimensional configuration. Behavior of ceramics, a subset of tissue engineering scaffold materials and a mainstay of dental restorations, has been studied extensively for thicknesses greater than 2 mm or very thin layers. Until recently, little has been known about dentally-relevant thicknesses of 1-2 mm - and the results have been surprising and are continuing to develop. Still, at least one fundamental question remains, that could be addressed using informatics techniques: where along the spectrum of flat, polished material to 10-year clinical in-vivo study can we test to accurately predict clinical performance of all-ceramic crowns?

The Role of Informatics in Clinical Trials

Marjorie Jeffcoat
Professor and Chairman
Department of Periodontics
University of Alabama, Birmingham

The presentation will address the importance of informatics in clinical trials. Databases are important for registering each patient in the study, and for inputting study data, either from direct data entry or from case report forms. Also, informatics plays a role in determining the outcomes of a study. Several examples from periodontal research including probing attachment levels, and radiographic measures of changes in alveolar bone height and density will be discussed. Data formats for data entry, and statistical analysis may differ; several different formats will be discussed. Finally, HIPPA plays an important role in clinical studies today. Issues such as stripping identifiers from a database will be covered.

Health Services Research

Howard Bailit
Professor Emeritus and Director
Health Policy Center
University of Connecticut Health Center

Collecting population-based, dental services data is a major barrier to health services research. Primary data from dental clinics and practices is difficult to obtain since most dentists do not use electronic dental record systems; the electronic records available do not use a standard format; and the data is not aggregated regionally. Secondary data from paid insurance claims is also of limited value since dentists only code services delivered and not diagnoses, and it is difficult to obtain and merge claims from multiple insurance carriers. We are now involved in a national demonstration project of the impact of community-based dental education on the care provided to underserved populations. To collect primary service data, we have developed a simplified dental visit encounter system. Senior dental students and residents from fifteen dental schools (approximately 150 to 200 community delivery sites) will use laptops, PDAs or scannable paper forms to collect basic demographic and service data on several hundred thousand patient visits over a four year period. We will aggregate the data by provider, clinic, school, and region to evaluate the effectiveness of community-based delivery systems in increasing care to disadvantaged populations. We will also use the data to prepare management reports on the operation of the program. Within the next 10 years, most dentists will use electronic records and will have access to the Internet in their offices and clinics. To be of maximum value to researchers, these data need to be collected using a standardized record format and to be available from public or private organizations that capture data regionally across all delivery settings. In our current delivery system, these two issues represent formidable organizational, social, and technical challenges.

Biomedical Informatics Training for Dental Researchers

Lynn Johnson

Director

Office of Dental Informatics

University of Michigan

Dental researchers collaborating closely with biomedical informaticians have achieved many advances in oral health research, such as human genetics and oral health disparities. Advances will continue to increase as dental researchers and biomedical informaticians study each others' disciplines in order to increase the effectiveness of their collaborative research. The combined skills will greatly increase the effectiveness of dental research. The core of biomedical informatics knowledge, skills, and attitudes that a dental scientist requires includes: the analysis of a problem, project management, writing software specifications, relational database modeling, metadata development and validation, and communication and collaboration technologies. Not only will dental research and biomedical informatics make advances in oral health care, but they will also make advances in new methods of information dissemination that will impact dental education and patient care. Finally, strategies in which dental education institutions can collaborate to train dental researchers in biomedical informatics skills will be discussed.

2:15 PM

Clinical Research on Dental Restorative Materials

Kenneth Anusavice

Professor and Chair

Dental Biomaterials

University of Florida

Dental biomaterials are used clinically for one or more of the following purposes: to restore function, to enhance esthetics, or to prevent or arrest demineralization of tooth structure. Biomaterials used for these purposes fall into one of two classes, direct restorative materials (bonding adhesives, resin-based composites, cements, dental amalgam, and direct-filling gold) and indirect restorative materials (cast metals, wrought metals, ceramics, denture materials, and implants). Studies of the clinical performance of restorations and prostheses made from these materials have generally focused on quality assessment and survival statistics. Data from these studies should provide probabilities of specific treatment outcomes that are useful for practicing dentists. However, the utility of these data are limited by the lack of national and international standards for assessing these clinical outcomes. Furthermore, the results from clinical studies of restoration or prosthesis survival times and overall quality are variable because of changes in material composition and microstructure, the skill level of the dental lab technician and the dentist, the technique sensitivity of the materials, and confounding variables associated with human subjects. Standardized approaches toward clinical informatics and treatment-decision analysis are urgently needed to minimize the variability of clinical outcomes

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associated with direct and indirect restorative materials used for dental restorations and prostheses. Of particular importance is the need for translational research that links the outcomes from randomized and controlled clinical trials to those associated with private practice treatment that is provided under less ideal conditions.

Using Information Technology to Improve the Dental Health Care System

Kathryn A. Atchison

Professor and Associate Dean for Research & Knowledge Management

School of Dentistry

University of California, Los Angeles

While patient care in the United States ranks among the highest in the world, the U.S. health care system has been criticized for containing poorly organized and incomplete medical (dental) records, an unacceptable number of medical errors, and a system that is fragmented and not patient-friendly. The Institute of Medicine (IOM) recently issued recommendations for a redesigned health system that specifies that patient care be safe, effective, patient-centered, timely, efficient and equitable. Woven into their recommendations to achieve these goals are specific suggestions on increased use of information technology. Although the IOM recommendations do not mention dental care specifically, they are appropriate and timely as the profession is moving to electronic patient records. A plan will be presented that applies the 7 quality indicators to electronic dental record systems. Specific examples include that patient information be portable so that it is available to all treating members of the health care team. Care must be based on a “continuous healing relationship” where the patient can receive care when he needs it and in many forms, including electronic health education, communications with the health care provider, and laboratory results. The system should assist the health care provider to anticipate the patient’s future needs. It should facilitate improved use of evidence in clinical decision-making. A properly established electronic patient record provides an efficient means of accumulating data on an ongoing basis for programmatic review that will assure high quality dental care.

Issues and Strategies for Faculty Development

Michelle A. Robinson

Assistant Professor of Dental Public Health and Director of Informatics

Informatics Department

Marquette University School of Dentistry

The incorporation of informatics into dental education, and the subsequent use of technology for teaching, requires that faculty have some level of proficiency and knowledge of the appropriate tools and techniques available. Yet learning institutions, regardless of background, will find themselves faced with several issues as they attempt to integrate technology into the educational process. Some of these issues will derive from the individual faculty member’s attitude, willingness, and current competency levels with technology. Other issues emanate from the infrastructure and environment at the

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institution. Finally, difficulties arise due to the specific workflows and protocols in place at a particular institution. This presentation will discuss these issues and some plausible solutions for designing and implementing technology-based training programs for faculty in dental schools. Psychological factors affecting faculty participation will be highlighted and sample programs will be used to demonstrate various features and methods.

3:00 PM

Genetic and Molecular Characterization of a Dental Pathogen Using Genome-Wide Approaches

Luis A. Actis

Associate Professor

Department of Microbiology

Miami University

Actinobacillus actinomycetemcomitans causes localized juvenile periodontitis, a costly chronic infection that affects a large number of patients around the world. The pathogenesis of this dental infection is a multifactorial process that results in a serious degenerative disease of the periodontium. Although significant progress has been achieved after the identification of this gram-negative bacterium as the etiological agent of this infection, much remains to be done to understand in detail the bacterial factors and host-pathogen interactions involved in the pathogenesis of this disease. Classical research approaches have resulted in the identification of important virulence factors and cellular processes, although they have provided a rather narrow picture of the specific steps in this complex process. By contrast, a much wider picture could be obtained with the application of research tools such as bioinformatics and genomics. These tools have the potential of providing global information regarding the differential expression of genes encoding factors and processes that lead to the pathogenesis of this disease. Furthermore, comparative genomics has the potential of helping to understand the emergence and evolution of this human pathogen. This genome-wide approach should provide a more complete picture of the pathogenesis process of this disease, and will facilitate the development of efficient diagnostic, preventive, and therapeutic measures for this costly disease.

Dental Data Mining: Practical Issues and Potential Pitfalls

Stuart Gansky

Assistant Professor

Preventive and Restorative Dental Sciences

University of California, San Francisco

Knowledge Discovery and Data Mining (KDD) have become popular buzzwords. But what exactly is data mining, what are its strengths, and what are its limitations? Classical regression, artificial neural network (ANN), and classification and regression tree (CART) models are common KDD tools. Some recent reports (eg Kattan et al, 1998) show ANN and CART models can perform better than classical regression models: CART models excel at covariate interactions, while ANN models excel at nonlinear covariates. Model prediction performance is examined using validation procedures and evaluating concordance, sensitivity, specificity, and likelihood ratio. To aid interpretation, various plots of predicted probabilities are utilized, such as lift charts, receiver operating characteristic curves, and cumulative captured response plots. Oral health studies, such as a dental caries study, are used as motivating examples. With careful analysis (such as validating with sufficient sample size and using proper competitors), problems of naïve KDD analyses (Schwarzer et al, 2000) can be carefully avoided. Support: DHHS/NIH/NIDCR U54DE14251-01

The Role of Dental Informatics in the Patient-Dentist Relationship

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Broadly speaking, one of the goals of dental informatics is to enhance patient care. A model of patient care that has been suggested as an ideal is the patient-centered clinical method. A key element of patient-centered care is the relationship between the patient and the health care team. Dental informatics will play a significant role in the patient-clinician relationship. For the purposes of this paper dental informatics is considered in terms of the convergence of dental knowledge; medical informatics; cognitive science; computer science, and information and communication science and technologies. Based on this broad perspective, the intersections across the patient's dental experience are plotted in terms of dental informatics, computer-based applications and devices, and the roles they play in support of the patient-clinician relationship. Strengths, weaknesses, opportunities, and challenges are presented as entrées to better identifying the future of dental informatics in enhancing patient care through empowering the patient-clinician relationship.

Adaptive Hypermedia: A New Paradigm for Educational Software

Heiko Spallek

Assistant Professor

Center for Dental Informatics

School of Dental Medicine

University of Pittsburgh

Traditional online dental education courses follow the broadcast paradigm which centers around the teacher, not the student. This one-size-fits-all approach resembles a mass-production idea which cannot take individual learner characteristics into account. Adaptive hypermedia (AH) is an emerging research direction focusing on systems which try to overcome the problem that users with different goals and knowledge may be interested in different pieces of information presented about a topic. This learner-centered education begins with the selection of a learning goal, the evaluation of abilities and the determination of the individual learning style in order to structure and tailor the offered material in the most efficient way. The presented AH environment exploits various concepts of AH by collecting data in order to create a model of the individual user which is continuously refined based on test results throughout the course. The system adapts the learning material dynamically using active and passive curriculum sequencing and adaptive presentation.

3:30 PM

Spectrophotometric analysis and comparison of two ceramic materials

Varun Singh Barath

Doctoral Candidate

Department of Prosthetic Dentistry

Institute for Genetics of the University of Cologne

In the last decade, All-Ceramic materials have been the choice of esthetic restorations. Due to the translucency of the All-Ceramic Restorations, the color of the background (tooth/post) and the color of the luting agent may play an important role in the final appearance of the restoration. In this study, two ceramic materials Empress 2 (Ivoclar Vivadent AG, Schaan, Liechtenstein) and In-Ceram ALUMINA (Vita Zahnfabrik, Bad Säckingen, Germany) were analyzed along with the effect of luting agents Zinc Phosphate cement (ZP) (PhospaCEM PL, Ivoclar Vivadent AG, Schaan, Liechtenstein), Glass Inomer Cement (GIC) (ESPE Dental AG, Seefeld, Germany), and a Resin Luting Agent (RLA) (ESPE Dental AG, Seefeld, Germany), on the final color, using the CIE Lab system. The thicknesses of the samples In-Ceram ALUMINA a11-b1-EN1, a12-b3-EN2, a14-b4-EN3 were between 0.87 mm and 1.06 mm, and 1.38 mm and 1.44 mm without luting agents; and between 1.03 mm and 1.22 mm, and 1.48 and 1.59 with luting agents, for the two groups respectively. The thickness of the Empress 2 samples 100-110-S1, 300-320-S2, 500-520-S3 were between 1.37 mm and 1.50 mm without luting agents and between 1.50 mm and 1.62 mm with luting agents respectively. These thicknesses

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simulated the thickness of a veneer and crown respectively. Color differences (ΔL , Δa , Δb and ΔE), were calculated for samples with and without luting agents with standard white and black background using a spectrophotometer Luci 100 (Dr. Lange, Berlin, Germany).

Decision-supporting Web-agents in Dentistry: Middleware to support Discussion among Experts, Practitioners, and Patients

Ekkehard Finkeissen
University of Heidelberg

Developments in the AIDA-project (<http://aida.uni-hd.de>) have shown that a decision-supporting web-agent can sketch the individual treatment alternatives, assess their prognoses, provide a rationale for single decisions, and estimate the respective costs for each alternative in the future. In other words, such an agent should not be a “black box” providing strange outcomes but show a map of decision-making and, therefore, bring transparency into the discussion between experts, practitioners, and patients. Here, we have to ask the following questions: What can/has to be planned in dentistry (anticipation of decisions)? What parts of the dental planning can be generalized? What parts of these generalizations can be computer supported? How can overall process be optimized?

Designing Clinically Useful Systems: Examples from Medicine and Dentistry

Sabine Koch
Department of Medical Sciences, Medical Informatics and Engineering
Uppsala University, Uppsala, Sweden

Despite promising results in health and medical informatics research and the development of a large number of different systems, only few systems get beyond a prototype state and are actually used in practice. Amongst a number of other factors, one reason is the lack of explicit user focus. The research projects presented here follows a work-scenario oriented systems development approach based on extensive work analyses in interdisciplinary working groups. Medical and health care specialists together with researchers in human-computer interaction and medical informatics, work to specify future clinical work scenarios. Special focus is put on analysis and design of the information and communication flow and on the exploration of intuitive visualization of and interaction techniques with clinical information. An appropriate choice of a technical access device is made depending on the user's work situation. Selected projects based on the work-scenario oriented approach described above will be presented. They cover IT support for chairside work in dentistry and for homecare of elderly citizens.

Doing the Right Things with Technology in Dental Education

Charles Friedman

Professor of Medicine and Director of the Center for Biomedical Informatics

University of Pittsburgh

Information technology has been on the verge of revolutionizing health professions education for forty years, yet the field never seems to get beyond the verge. The much-vaunted benefits of personalized, round-the-clock, tireless, better managed, practice-intensive education have eluded us. Yet there are reasons to believe that the much anticipated revolution may be at hand, due to the maturity and ubiquity of the Internet and related technologies, as well as the general recognition of what are the “right” educational problems to solve. This presentation will examine the potential revolution: the reasons to expect it might happen, why it hasn’t yet happened, what is likely to occur when it does, and how we will know if we are better off as a result.

Friday, June 13, 2003

9:00 AM

Computational Models of Oral and Craniofacial Development, Growth and Repair

Peter Hammond

Professor and Head of Biomedical Informatics Unit
Eastman Dental Institute of Oral Health Care Sciences
University College London

For the past ten years, much of my research in biomedical informatics has focused on problems associated with the development, growth and repair of the oral and craniofacial complex. The informatics techniques I employ include computer-aided design, logic programming, machine learning and image analysis. The biomedical applications include: a) simulation of oral epithelial cell interactions; b) design of dental prostheses; c) analysis of abnormal facial growth in dysmorphic syndromes; d) audit and simulation of face shape change following hard tissue surgery. The involvement of neural crest cells in the developing face, heart and brain, means that abnormalities in one are often associated with anomalies in the others. Hence, models of oral and craniofacial form can contribute to studies of phenotype-genotype correlations and attract the interest of cell biologists, psychologists, clinical geneticists and embryologists, as well as dentists and surgeons. Thus, as well as highlighting the role of informatics research in each of the above projects, the talk will emphasize the expanding opportunities for multi-disciplinary research.

10:00 AM

Methods and Tools in Biomedical Informatics

John Zimmerman

Assistant Dean and Associate Professor
School of Dental and Oral Surgery
Interdisciplinary College of Physicians and Surgeons, Biomedical Informatics
Columbia University

Biomedical informatics evolved from the fields of biomedical science, information science, and computer science and has retained strong ties to these disciplines. Along with this multidisciplinary heritage comes the problem that many researchers fail to recognize the theoretical basis of the new discipline of biomedical informatics. Biomedical informatics has created its own set of methods, techniques, and theories. Using a curricular framework we will explore the methods, techniques, and theories that have broad applicability within the domain of biomedical informatics and which span a wide range of application areas: bioinformatics, imaging informatics, clinical informatics, and public health informatics. Examples of how these methods, techniques, and theories apply to dental and craniofacial research challenges will also be discussed.

11:00 AM

Standards in Dental Informatics

Robert H. Ahlstrom

Associate Clinical Professor & Private Practice

Restorative Dentistry, University of the Pacific

The American Dental Association (ADA) has had a long history of being very active within the Standards community. The ADA's Standard Committee on Dental Informatics (SCDI) was certified as a Standards Development Organization (SDO) by the American National Standards Institute (ANSI) in 2002 and as such is the only standards program whose scope exclusively represents dentistry. Four subcommittees make up the backbone of the SDO. Subcommittee 10 focuses on Dental Informatics Architecture and Devices with seven working groups. Subcommittee 11 deals with the Electronic Health Record and has 4 working groups. Subcommittee 12 deals with Informatics Component Interoperability and has 4 working groups. The last subcommittee (13), Electronic Dissemination of Dental Informatics, has 2 working groups.

11:30 AM

Biomedical Machine Learning

Marco Ramoni

Assistant Professor

Children's Hospital Informatics Program, Harvard Medical School

Since the beginning, biomedical informatics has played a critical role in the development of methods and applications in Artificial Intelligence. Over the past few years, pushed by the recent advances in genetics and genomics, a particular field of Artificial Intelligence - Machine Learning - has been acquiring an increasingly central role in biomedical research. This talk will review some of the machine learning methods most popular in biomedical applications, from supervised methods for classification and variable selection to unsupervised approaches to clustering and dependency discovery. The talk will describe applications in genetics and genomics, as well as in clinical databases, to address issues and opportunities in the area of oral medicine and biology.

1:30 PM

The Real-time Outbreak and Disease Surveillance System (RODS)

Jeremy Espino
Fellow, Center for Biomedical Informatics
University of Pittsburgh

The Real-time Outbreak and Disease Surveillance System (RODS) is a computer-based public health surveillance system for early detection of disease outbreaks. RODS receives de-identified clinical encounter data from hospitals in real-time using Health Level 7 (HL7) messages over private networks, classifies patients into one of seven syndrome categories using Bayesian classifiers, stores the data in a relational database, aggregates data using a data warehouse, analyzes the data for the presence of potential outbreaks and alerts users via email when possible outbreaks are detected. Using a web-based interface, users can examine surveillance data temporally as graphs or spatially as maps. RODS also analyzes data on aggregate, over-the-counter healthcare product sales but receives the data in batch mode. Successfully deployed for the 2002 Winter Olympics and currently operating in two states, Pennsylvania and Utah, RODS would not be possible without the existence and application of multiple informatics techniques and standards.

2:00 PM

Grand Challenges in Dental Informatics

Dean Sittig
Director
Clinical Informatics Research Network, Northwest Permanente and Center for Health Research
Kaiser Permanente

Grand challenges represent truly significant scientific challenges that if overcome would profoundly change the daily activities, as well as, the future research activities of everyone involved in the field. Identification and description of the grand challenges facing any scientific field offers multiple benefits including: helping funding agencies identify and prioritize projects for support, stimulating and encouraging new investigators to work on these intellectual and technological challenges, and providing a means of defining the field. In this presentation we will describe a synthesis of responses to questions, issues, and possible applications related to the grand challenges facing dental informatics today. The discovery of new techniques and technologies to help us overcome these challenges would enable the development of truly monumental applications such as a comprehensive electronic oral health record or an automated dental treatment planning system for all diagnoses or a system to profile patient risk for specific chronic oral diseases.