ABSTRACT

General Terms
Grid Computing, Health Informatics

Keywords
Interoperable Systems, Knowledge Management, Public Health, Networks, Surveillance, Behavioral Research

Background

Great strides were made during the 20th Century to improve the diagnosis and treatment of many common diseases, but those strides are not enough. Millions die each year from diseases that are chronic and complex. To meet the challenge of combating these complex diseases, biomedical research in the 21st Century must take advantage of advanced discovery in information technology to create interventions that are predictive, personalized, and preemptive. [1] At the patient level, 21st Century medicine must use the precision of evidence-based diagnostic systems to deliver highly tailored treatment regimens in precise, effective ways. At the population level, 21st Century disease control must use the power of connective surveillance infrastructures to identify targets of opportunity early, and to apply current knowledge for intervention in rapidly diffusing ways. To achieve these goals, population health in the 21st century must rely on the connective power of powerful health informatics infrastructures, or cyberinfrastructures in health.[2]

One of the most compelling cases for applying the power of cyberinfrastructure to address the challenges of 21st Century medicine can be found in the area of cancer control and prevention. What we now know as cancer – lung cancer, colon cancer, breast cancer, cervical cancer, prostate cancer – can be addressed now, using current scientific knowledge.[4] It has been estimated that by simply delivering the benefits of current scientific knowledge to the population at large, the number of deaths due to cancer could be reduced by more than 50%. With cancer eclipsing heart disease as the leading cause of death among Americans under the age of 85 in 2004, the public health imperative for harnessing the power of cyberinfrastructure to prevent and control cancer has never been more important.[5]

The goal of the symposium will be to explore the ways in which new applications in cyberinfrastructure can be used to harness the power of discovery in cancer control and prevention. The symposium will bring together pioneers in the field who are creating applications to expand the capacity of the National Cancer Institute’s Bioinformatics Grid into areas of direct relevance to population health. The symposium builds on a similar panel convened during the 2005 meeting of digital government grantees, but expands the analysis by offering concrete examples of how applications in cyberinfrastructure technology can be leveraged to elevate research in public health.

Speakers

Peter Schad, Booz Allen Hamilton (on contract to National Cancer Institute): The cancer Biomedical Informatics Grid, or caBIG™

Stephen Marcus, National Cancer Institute: Developing cyberinfrastructure for public health surveillance systems (HINTS & ToBIG)

Shu-Hong Zhu, Associate Adjunct Professor, Family & Preventive Medicine, Cancer Prevention & Control Program,
Moores cancer Center, University of California at San Diego: A Database Infrastructure to Reach and Assist Underserved Smokers through Quitlines

Noshir Contractor, Professor, University of Illinois at Urbana-Champaign and Director, Science of Networks in Communities (SONIC), National Center for Supercomputing Applications: Using Cyberinfrastructure to Enable Networks in Public Health

Patty Mabry, Health Scientist Administrator/Behavioral Scientist, Office of Behavioral and Social Sciences Research, Office of the Director, National Institutes of Health: NIH Plans for Further Development of Cyberinfrastructure to Enable Behavioral and Social Sciences Research.

Symposium Summary

Peter Schad will begin the symposium with a description of the vision and architecture underlying the National Cancer Institute’s cancer Biomedical Informatics Grid, or caBIG™. The caBIG architecture is designed to bring the terabytes and petabytes of data being produced in cancer research onto a common, interoperable platform to enhance discovery, development, and delivery in the national program’s war on cancer.

Stephen Marcus will describe how the NCI is exploring the use of cyberinfrastructure to connect data from relevant cancer surveillance systems into a seamless thread of support for public health researchers, policy makers, and public health administrators. Dr. Marcus will explain how the NCI has been making data from its nationally representative Health Information National Trends Survey (HINTS) available to communication researchers through an online collaboratory, and he will describe plans to link national data systems on tobacco use to improve the effectiveness and reach of public health surveillance.

Shu-Hong Zhu will offer an example of how large scale databases and metadata repositories can be used to enable research on data collected through a national consortium of publicly funded “Quitlines” for smokers. Because smoking-related cancers kill more Americans than any other cancer, increasing the reach and effectiveness of cessation resources must remain a public health priority. Creating a cyberinfrastructure to connect here-to-fore disparate data systems should elevate the precision of scientific analysis in the area of Quitline research from a local to a national level.

Noshir Contractor, a current digital government grantee, will present a blueprint for connecting public health researchers through a distributed network of people, data, and resources in the area of public health surveillance and evaluation. Building on his work in social network analysis, Dr. Contractor will illustrate how members of a geographically distributed community of population scientists can use networked connections to shorten the time it takes to identify, and respond more efficiently and effectively to, public health perturbations.

Patty Mabry will complete the symposium by offering a glimpse of efforts underway to connect the biomedical research efforts supported by the National Institutes of Health (NIH) with the advanced computing initiatives sponsored by the National Science Foundation. Dr. Mabry, who works in the NIH Office of Behavioral and Social Science Research, is working with NIH leaders to improve knowledge management and to shorten time-to-discovery through cyberinfrastructure in the fields of biomedicine and public health.

References