Human Factors Guidance to Prevent Healthcare Disparities with the Adoption of Electronic Health Records

ABSTRACT

EHRs hold significant potential; however they present many accessibility challenges: People with disabilities and chronic diseases, as well as the rapidly growing senior population need direct access to their EHRs. Current healthcare systems do not respond effectively to these challenges. NIST leads the government in accessibility and usability research and is providing best practices and comprehensive technical guidelines that will ensure widespread EHR accessibility to minimize the likelihood of creating or exacerbating healthcare disparities among an increasingly diverse population of potential users.

BIOGRAPHY

M. Chris Gibbons
Associate Director
Johns Hopkins Urban Health Institute

Assistant Professor
School of Medicine
Johns Hopkins University

Dr. Gibbons is an Associate Director of the Johns Hopkins Urban Health Institute and is an Assistant Professor at the Johns Hopkins' Schools of Medicine and Public Health. Dr. Gibbons is a physician informatician whose expertise is in using Consumer Health Informatics Technologies to improve healthcare disparities. He is an advisor and expert consultant to several state and federal agencies and policymakers in the areas of urban health, eHealth, minority health and healthcare disparities. Dr. Gibbons has been named a Health Disparities Scholar by the National Institutes of Health and has authored/edited 4 books including "Digital Homecare" and "eHealth Solutions for Healthcare Disparities". Dr. Gibbons obtained his medical degree from the University of Alabama. He then completed residency training in Preventive Medicine and earned a Master of Public Health degree focusing in health promotion among urban and disadvantaged populations both from Johns Hopkins.

Lana Lowry
Human Factors Lead for Healthcare IT
Information Access Division
National Institute of Standards and Technology

Lana Lowry is NIST's expert and project lead on usability for health IT. Lana has conducted extensive applied research in usability and accessibility for several government agencies, most recently on voting systems in the United States for the National Institute of Standards and Technology (NIST). The goal of her research is to improve systems by developing usability and accessibility standards and testing protocols for laboratories to apply to the certification of the systems. Lana has published and presented extensively in the areas of human factors and ergonomics worldwide. Her expertise is in the design of complex systems and software for mission-critical and real-time environments; in the application of human reliability analysis and human error analysis to complex human-machine interactions in automated systems and software; and in the development of standards and methods for evaluating, testing, and improving system and application interfaces.

Lana served as a senior research scientist on a program providing human factors for the Earth Observing System Data and Information System (EOSDIS) Core System, part of the National Aeronautics and Space Administration's (NASA) Mission to Planet Earth. Later on, at NCR Corporation's Government Systems Division, Lana led a team of usability engineers for ten years, applying her knowledge and expertise in HCI and usability through product innovation in the retail markets, e-commerce solutions, and government systems environments.

Matthew Quinn
Special Expert, Health IT
Agency for Healthcare Research and Quality (AHRQ)

Matthew Quinn is a Special Expert in the AHRQ Healthcare IT group. Before joining AHRQ, Mr. Quinn was the Healthcare Program Manager for Teradata, the global leader in data warehousing and analytic technologies, and was responsible for healthcare strategy and partnerships for the company. Prior, he led marketing for Quantros, a patient safety and clinical outcomes improvement software company, managed GE Healthcare's "Six Sigma for Healthcare" clinical outcomes performance improvement consulting services and data analytic products, helped build an early Personal Health Record (PHR) company, and served as an Army Engineer Officer.

Mr. Quinn's published work can be seen in a variety of healthcare and technology publications and journals, and he has spoken at the World Health Care Congress, eHealth Initiative's HIT Summit, and other national and international venues.
Matthew Quinn earned a B.S. from the United States Military Academy at West Point and an M.B.A. from Colorado State University.

Bettijoyce B. Lide
Senior Advisor for Health Information Technology
Information Technology Laboratory
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Bettijoyce B. Lide is the Senior Advisor for health information technology (health IT) in NIST's Information Technology Laboratory. She serves as program lead for NIST's health IT responsibilities outlined in the American Recovery and Reinvestment Act (ARRA) and for the NIST-Department of Health and Human Services (HHS)/Office of the National Coordinator for Health Information Technology (ONC) collaboration. She leads a NIST team in a broad range of initiatives to help enable the majority of Americans to have electronic health records and the development of a nationwide health information network by 2014.

Prior to that, Bettijoyce Lide was with the Advanced Technology Program (ATP), serving as both Competitions Manager and Program Manager, designing, implementing, and managing the Information Infrastructure for Healthcare Program. Earlier, she served as Scientist, Programmer, and Group Leader of the Data Systems Development Group, Standard Reference Data, leading cutting-edge applications of computer technology to the storage, analysis, retrieval, and dissemination of evaluated chemical and physical data.

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Promise and Potential

EHR's offer significant promise to improve efficiency, enhance effectiveness and reduce healthcare costs.

Challenge

The potential of EHR's will only be achieved if the systems are usable by all target end users.

Potential Problem

Differential usability
+
Differential benefit
=
Differential outcomes
(Healthcare Disparities)

Reality

EHR End Users

Clinicians*
Patients
Caregivers

Task

To provide technical guidance regarding the design and development of EHR systems, which will help to prevent the creation or exacerbation of healthcare disparities with the national adoption and utilization of EHR systems.

Task

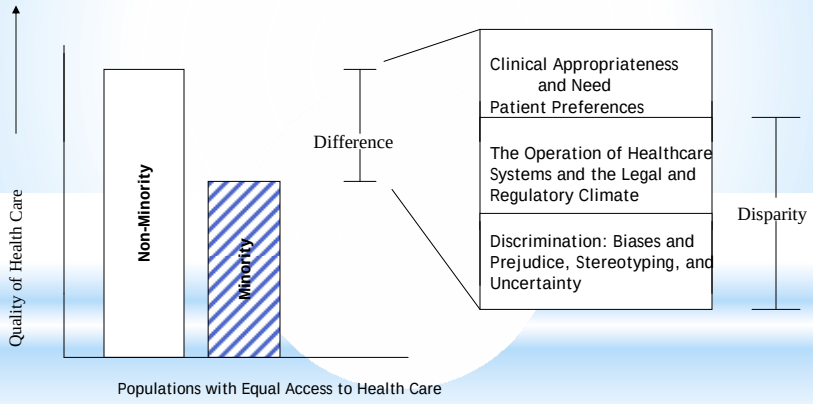
This goal was accomplished
through identification and application
of best practices, guidance and standards
in software usability and accessibility

Healthcare Disparities

Race/Ethnicity
Socioeconomic Status
Disability
English proficiency

Premature death
Excess illness
Increase costs

Healthcare Disparities



Methodology

Task #1

Determine target EHR users and identify EHR Related Human Factors Risk Characteristics among Target Populations at Highest Risk for Healthcare Disparities

Methodology

Target EHR users

Clinicians
Healthcare workforce

Patients
Caregivers
Consumers

Methodology

Populations at High Risk for the development of EHR associated Healthcare Disparities

1) Low Socioeconomic Status
2) Non Native English Speakers or those with Limited English Proficiency
3) People Living with Disabilities
4) Seniors and the Elderly
5) Racial and Ethnic Minorities

Methodology

EHR Related Human Factors Risk Characteristics among Target Populations at Highest Risk for Healthcare Disparities

High Risk Populations	*HF Risk Categories*
Low Socioeconomic Status	User Context
Non Native English Speakers/LEP	Information Architecture,
People Living with Disabilities	Human-System Interface User Context Information Architecture
Seniors and the Elderly	Human-System Interface User Context Information Architecture
Racial and Ethnic Minorities	Human-System Interface User Context Information Architecture Culture*

Methodology

Task #2

Derive HF technical guidance from existing widely recognized international standards and the current scientific literature.

1) International Standards Organization Reports
2) International Ergonomics Association Reports
3) Human Factors and Ergonomics Society Reports
4) National Institute for Standards and Technology Reports
5) Other US Federal Agency Reports
6) Scientific Literature
7) HF Expert Testimony and Feedback

Methodology

Technical Guidance

EHR Design and Development Guidelines

1) Conduct Comprehensive Formative and Summative Testing with a Reasonable Set of Representative End Users
2) Report Results of the Tests in Common Industry Format (CIF) for EHR Usability Test Reports
3) Accommodate as Many EHR Users as Possible Using Universal Design Principles
4) Include Healthcare Disparities Oriented Use Cases as Part of the EHR Design and Development Process

Methodology

Technical Guidance

EHR Evaluation Guidelines

1) Require Documentation of Formative and Summative Testing with a Reasonable Set of Representative Target Users as a Prerequisite for EHR Evaluation
2) Require Documentation of Product Features Designed to Increase Usability and Accessibility or Documentation of a Lack of Need for any Accommodation among a Reasonable Set of Target Users
3) Require the Development of EHR Operation, Safety, Customer Support and Educational Materials that are Culturally and Linguistically Appropriate for a Reasonable Set of Representative Target Users as a Prerequisite for EHR Evaluation Process
4) Include User Requirements in Product Specifications as a Prerequisite for EHR Certification

Methodology

Technical Guidance

EHR Post Market Evaluation and Monitoring Guidelines

1) Include Evaluation of EHR Impact on a Target Set of Healthcare Disparities Indicators as a Part of the EHR Effectiveness, Post Adoption and Health Impact Evaluation

2) Implement a National EHR Product Registry

Methodology

Technical Guidance

EHR Research Guidelines

1)Support ongoing Human Factors Research Regarding the Potential Impact, Opportunities and Barriers for EHRs to Reduce Healthcare Disparities
2)Evaluate the Human Factors Implications of Integrating Patient-Oriented Functionality into EHRs
3)Support the Development of Evidence-Based Criteria for Voluntary Population-Oriented Product Certifications
4)Evaluate Potential Differences in Information Design Needs, the Impact of These Differences and Opportunities for Accommodation across User Populations
5)Evaluate the Human Factors Implications of Increased Stress (Workload Induced, User Environment Induced, Rural/Urban Residence etc.) on EHR Accessibility, Usability, User Experience and Health Outcomes
6)Evaluate the Human Factors Implications of the Emerging EHR Health IT Workforce Working in Non Clinical Practice Settings (Home, Long Term Care Facility etc.) on EHR Accessibility, Usability, User Experience and Health Outcomes.

Conclusions

1) Significant intractable healthcare disparities exist and associated with increased healthcare costs, premature morbidity and excess mortality.

2) Wide adoption and meaningful use of EHRs could improve Disparities, if EHR use and benefits, are equitably distributed across user populations.

3) Disparities could worsen, if some providers are not able to use EHRs or some patients not able to benefit from them.

Conclusions

1) HFE has made considerable contributions to our understanding of the possible barriers and potential solutions needed to ensure broad accessibility and usability of emerging EHR systems.

2) HFE knowledge and expertise is not routinely considered during the EHR design and development process.

3) There is also need for federal policy leadership, in this area, to help ensure that
a) all providers are able to use EHRs and
b) all patients are able to benefit from EHR use.

4) EHR product enhancements can be made by addressing key disparities-related design issues and by incorporating human factors engineering principles into the EHR design and development process.

5) Significant progress along these lines will inevitably
a) improve provider EHR adoption
b) help lead to reductions in healthcare disparities among affected populations
c) catalyze improvements in healthcare quality for all.