

OPTIMIZING THE ELECTRONIC HEALTH RECORD FOR CARDIAC CARE

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Background

- The electronic health record (EHR) was expected to transform the delivery of health care services in the United States; reducing costs and improving health outcomes through standardizing practice and reducing medical errors.
- However, EHR adoption has not consistently lowered healthcare costs or improved patient care. As a result, the physician adoption has been slow.
- There is a growing body of evidence that adoption has been delayed, in part, by the negative impact of current EHRs on clinician workflow, communications, and patient safety.

Proposed Research

- This is a UNO – UNMC partnership project to improve EHRs in hospitals funded by the National Institute of Health.
- The grant amount is \$2.5 million and the duration of the project is 5 years.
- This project proposes to study the usability of the electronic health record using clinical scenarios that closely emulate the real patient care environment.
- In this research, ISO definition of usability is used, “the effectiveness, efficiency and satisfaction with which specific users can achieve a specific set of tasks in a particular environment”. The ISO definition is chosen as it is a better fit for the conceptual frame work.
- The study involves measuring how cardiologists at diverse health care systems use their EHRs. Sites are: Duke Medical Center in Durham, N.C.; Christiana Health, Delaware, Parkview Health, a community-based hospital system in Ft. Wayne, Ind.; and Faith Regional Health Services in Norfolk, Neb.

Significance

- Attention to usability for EHR system designs that support the cognitive work of clinical users is recognized as a requirement by the Healthcare Information and Management Systems Society.
- In this model, improving efficiency reduces cognitive overload (good for the patient safety) and short cut necessary safety checks. Thus workflow, information flow and patient safety will be components of each segment of usability, efficiency, effectiveness and satisfaction.
- By layering patient safety with workflow and information flow on top of efficiency, effectiveness and satisfaction, patient safety can be explored in a more holistic manner.
- Improving the efficiency, effectiveness and satisfaction of the EHR will lead to improved adoption and acceptance of the EHR, and will ultimately lead to improved, safer patient care.
- This research project is also a strong candidate to improve the knowledge of what providers want and the need to improve the health and safety of their patients.

Innovations

Innovation 1: This research project tests multiple existing EHR systems across a diverse set of clinical sites (health care disparities, traditional academic and private health centers). Most prior studies have tested usability on a single EHR system, which has established computer-user interface, workflows and information flows that may be difficult to modify. This project gives a more comprehensive view of current providers and their needs.

Innovation 2: We use simulated patients in this research, to evaluate the EHR. The use of simulated patient gives a significant degree of freedom to demonstrate how providers use their installed EHRs. Thus the provider can chose to perform or not chose to perform tasks, to document or not document aspects of the patient history, to review or not review previous studies and the ability to make independent, non-scripted decisions.

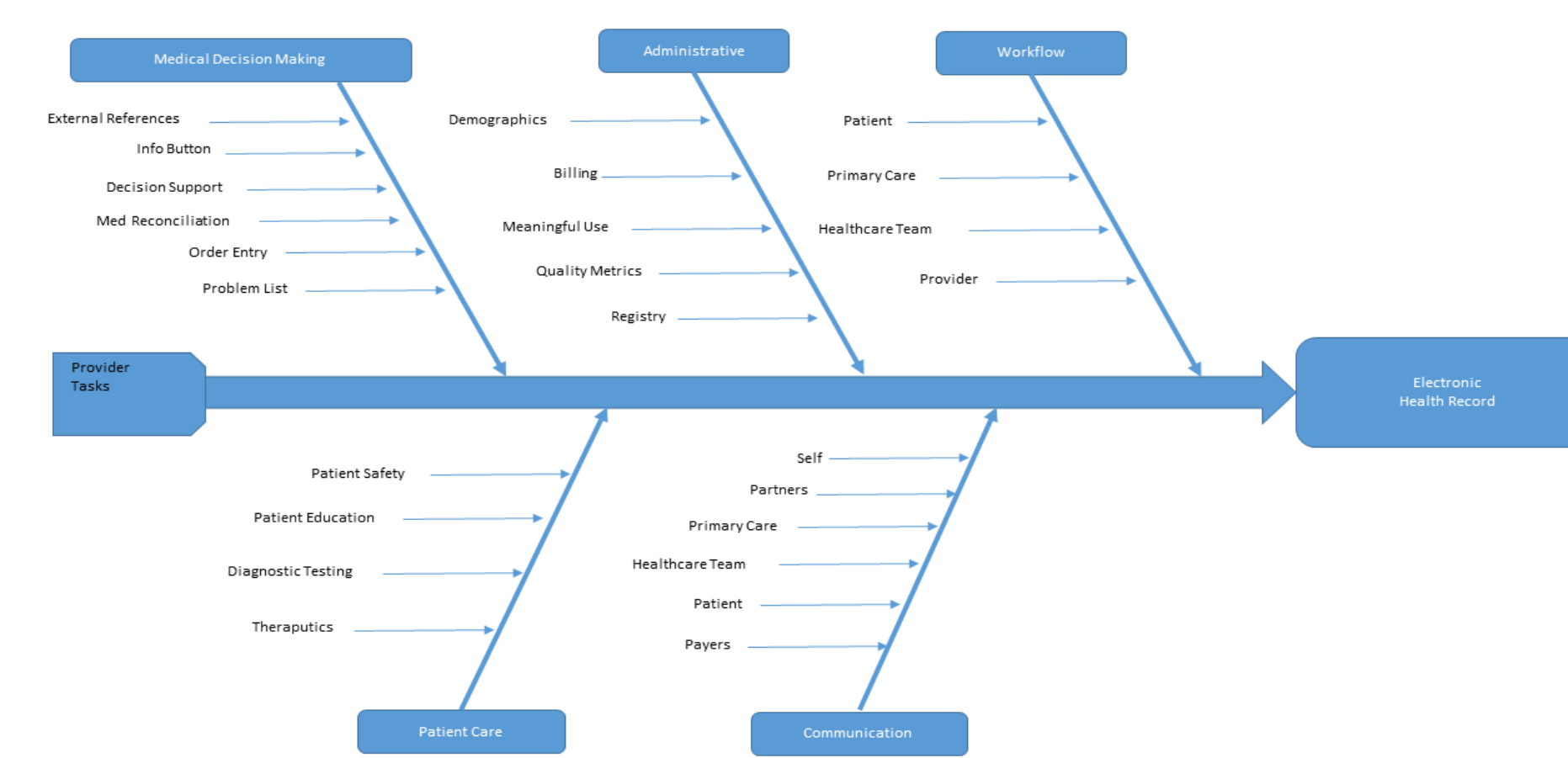


Fig: Fishbone diagram

Innovations

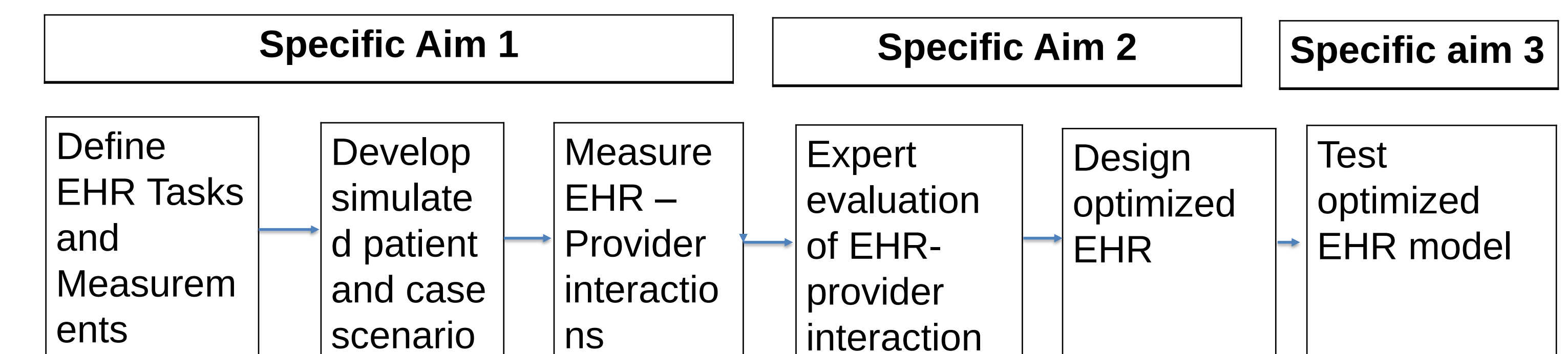
Innovation 3: This project partners experienced computer scientists, measurement science experts, and clinical content experts to build credible clinical scenarios that closely emulate the complexity of a patient moving through the healthcare system.

Innovation 4: This study measures usability as defined by efficiency, effectiveness and satisfaction of the EHR through use of convergent parallel mixed methods. To understand the best practices, different methods are used and brought together in this project. Prospective task lists measure the efficiency of a system. Cognitive walkthroughs determine workflow, information flow, satisfaction and provide understanding of provider rationale. An expert evaluation is used to capture different patterns of workflow and information flow.

Innovation 5: In this project, the University of Nebraska’s association with the American College of Cardiology is a unique opportunity to control all aspects of data and information use.

By creating a robust yet constrained EHR testing environment, this study intends to challenge assumptions of current EHR design and to fully explore the significance in human-computer interactions.

Study design



Specific Aim 1: Determine the usability of the electronic health record as measured by provider-defined usability (efficiency, effectiveness and satisfaction):

- Develop complex clinical scenarios using trained simulated patients.
- Measure provider-EHR interactions using “Cognitive Walkthrough” and “Think-Aloud” methods.
- Data collection using the Portable Usability Lab.

Study design

Specific Aim 2: Use value-based software engineering principles and agile development methods to link providers with clinical content and human-computer interface expertise to build and test wireframe models of desired EHR functionality.

- Expert evaluation of provider – EHR interactions using ‘heuristic evaluation’ of the current EHRs to assess usability.
- Wireframe modeling: Use “wireframes” as a part of user interface design process.

Specific Aim 3: Use information obtained through specific Aims 1 and 2, synthesize the characteristics of users’ preferences (clinical setting, clinical expertise and learning style, etc.) and demographics (age, gender, race/ ethnicity, and comfort with technology) and propose a set of best practice designs to guide EHR developers.

- Test the optimized EHR model: Present the “expert-optimized models” back to providers who were not part of agile development team for their evaluation.

Credentials

- Dr. John Windle
- Dr. Ann Fruhling

References

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