

Project Title:	Evaluating Smart Forms and Quality Dashboards in an Electronic Health Record (EHR)
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Organization:	Brigham and Women's Hospital
Mechanism:	RFA: HS04-012: Demonstrating the Value of Health Information Technology (THQIT)
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Strategic Goal: Develop and disseminate health IT evidence and evidence-based tools to support patient-centered care, the coordination of care across transitions in care settings, and the use of electronic exchange of health information to improve quality of care.

Business Goal: Knowledge Creation

Summary: The Evaluating Smart Forms (SFs) and Quality Dashboards (QDs) in an electronic health record (EHR) project aim to improve the management of patients with acute and chronic medical conditions through the creation of clinical decision support (CDS) tools integrated with clinical documentation workflow and through provision of physician performance feedback on quality and benchmarks in the EHR. The nearly completed grant seeks to provide value to the clinician, as well as to increase patient safety and quality, and address the combined needs of clinical workflow support and decision support with innovative EHR technology.

The project examines two EHR-based interventions. The first intervention focuses on the impact of a forms-based, clinical documentation-centric approach to decision support (Smart Forms). The SFs incorporate on-screen patient chart review, effective coded data capture, note generation, and actionable CDS at the point-of-care to help physicians with chronic and acute disease management, including coronary artery disease (CAD), diabetes mellitus (DM), and acute respiratory infection (ARI). In addition, patient education materials regarding self-management skills can be generated from the same screen. The second EHR-based intervention focuses on providing clinician-specific performance reports regarding guideline compliance and quality benchmark achievement (Quality Dashboards). The QDs are a helpful tool for physicians, medical directors, and practice leaders as they provide a report to the physicians on their patients regarding adherence with recommended clinical guidelines. The QD graphical displays allow for comparison with other physicians within a practice as well as with local and national benchmarks. This project aims to demonstrate that use of the SFs and QDs in chronic and acute conditions will significantly improve patient clinical outcomes.

In order to evaluate the SF and QD technology integrated with a pre-existing EHR system (the Longitudinal Medical Record [LMR], a CCHIT-certified EHR developed in-house at Partners HealthCare), the following randomized, controlled trials are being implemented: Acute Respiratory Infection Smart Form Randomized Controlled Trial (ARI SF RCT); Coronary Artery Disease/Diabetes Mellitus Smart Form Randomized Controlled Trial (CAD/DM SF RCT); Acute Respiratory Infection Quality Dashboard Randomized Controlled Trial (ARI QD RCT); and Coronary Artery Disease Quality Dashboard Randomized Controlled Trial (CAD QD RCT). In each RCT, Partners-affiliated primary care practices were randomized to receive either usual care, or the SF, or the SF plus QD. Data collected from the RCTs and physician surveys will be used to answer the following questions: 1) can a usable EHR-based intervention be developed that provides CDS in the context of clinical documentation workflow,

and that integrates population-based performance feedback to the physician; and 2) do such tools improve the quality of clinical documentation, capture of key clinical data for CDS and quality assessment, and compliance with best practice guidelines? This project will answer these fundamental value questions, which are critical to the broad adoption of information technology (IT) in practice. If the end-user does not perceive the value of these tools primarily in the clinical workflow, health care IT adoption will be severely limited, and secondary gains in patient safety, quality, and costs will be hindered.

Specific Aims

- Design and implement an integrated documentation-based CDS and physician feedback system provided in an EHR to improve the management of patients with acute and chronic medical conditions. **(Ongoing)**
- Determine the effectiveness of documentation-based CDS with respect to documentation and the clinical management of patients with CAD and ARI for the following:
 - ARI SF RCT **(Completed)**
 - CAD/DM SF RCT **(Completed)**
 - Analysis of surveys related to CAD/DM SF RCT. **(Ongoing)**
- Assess the usefulness of QDs by clinicians and their marginal impact over SFs on compliance with best practices in ARI and CAD for the following:
 - ARI QD RCT **(Completed)**
 - Data retrieval and analysis of ARI QD RCT. **(Ongoing)**
 - CAD QD RCT **(Ongoing)**
 - Data retrieval and analysis of CAD QD RCT. **(Upcoming)**

2008 Activities: The ARI SF RCT intervention was completed in 2006. Data analysis is completed and manuscript development is currently underway.

The CAD/DM SF RCT was completed in May 2008; 159 physicians at Partners-affiliated primary care clinics participated in this RCT. Data retrieval was completed and data consolidation has begun in order to facilitate data analysis. Results of a post-RCT survey for the CAD/DM SF RCT were also collected and analyzed.

In August 2007, the ARI QD RCT was completed along with data retrieval. Data analysis and manuscript development are still underway.

In March 2008, the CAD QD RCT began in 15 clinics and is still underway. The RCT was expected to be completed in March 2009. A post-survey RCT was planned for 78 CAD QD users in April 2009, and data analysis will be conducted.

Additionally, multiple manuscripts for the SFQD study have been published. See below in “Selected Outputs” for a list of current publications.

Preliminary Impact and Findings: Pilot evaluation results of the ARI SF showed that clinicians found the tool to be useful and effective. Sixty percent of respondents would recommend the ARI SF to their colleagues unchanged, and 80 percent reported that the ARI SF was either time-neutral or time-saving.

Analysis of a post-RCT survey for the CAD/DM SF RCT found that 45 percent of the physicians who responded believed that the CAD/DM SF CDS features changed what they normally would have done to treat blood pressure and cholesterol levels, and over half believed the tool helped them comply better with CAD/DM guidelines. Additionally, 66 percent of the respondents found the “Patient Instruction Handout” feature to be helpful, and 56 percent found the “Patient View” feature helpful.

Pilot evaluation results of the ARI QD indicate that clinicians find antibiotic prescribing reports using both medications and billing data for ARIs useful and insightful. The ARI QD has the potential to reduce inappropriate antibiotic prescribing for ARIs.

The CAD QD application has been rolled out, and the RCT is scheduled to be completed in March 2009. To date, this tool has been primarily accessed by practice managers.

Selected Outputs

Linder J, Rigotti N, Schneider L, et al. Electronic health record-based intervention to improve tobacco treatment in primary care: a cluster randomized control trial. *Arch Intern Med* 2009 Apr 27;169(8):781-7.

Schnipper J, Linder J, Palchuk M, et al. “Smart Forms” in an electronic medical record: documentation-based clinical decision support to improve disease management. *J Am Med Inform Assoc* 2008 Jul-Aug;15(4):513-23.

Linder JA, Rose AF, Palchuk MB, et al. Decision support for acute problems: the role of the standardized patient in usability testing. *J Biomed Inform* 2006 Dec; 39(6):648-655.

Cheston, E, Schnipper J, Linder J, et al. Can Smart Forms Change Physician Habits Regarding Chronic Disease Management? Results of a Physician Survey. Accepted as Poster Presentation at Society of General Internal Medicine Conference; Miami Beach, FL; May 2009.

Schnipper J, McColgan, K, Linder J, et al. Improving management of chronic diseases with documentation-based clinical decision support: results of a pilot study. *AMIA Annual Symposium Proceedings*; November 2008.

Palchuk M, Postilnik A, Olsha-Yehiav M, et al. User interface accelerators for clinical documentation in Smart Forms. *AMIA Annual Symposium Proceedings*; October 2007.

Melnikas A, Schnipper J, Linder J, et al. Can a “Smart Form” increase physicians’ satisfaction with managing patient health behavior risks? Results of a physician satisfaction survey. *AMIA Annual Symposium Proceedings*; October 2007.

Linder J, Schnipper J, Volk L, et al. Clinical decision support to improve antibiotic prescribing for acute respiratory infections: results of a pilot study. *AMIA Annual Symposium Proceedings*; October 2007.

Linder JA, Schnipper JL, Tsurikova R, et al. Barriers to electronic health record use during patient visits. *AMIA Annu Symp Proc*; 2006:499-503.

EHR-based Applications:

ARI SF: application integrated into an EHR that provides a forms-based, clinical documentation-centric approach to decision support at the point-of-care for diagnosis and treatment of ARIs.

CAD/DM SF: application integrated into an EHR that provides a forms-based, clinical documentation-centric approach to decision support at the point-of-care for diagnosis and treatment of CAD and DM.

ARI QD: application integrated into an EHR that provides clinician-specific performance reports regarding guideline compliance and quality benchmark achievement specifically for diagnosis and treatment of ARIs.

CAD QD: application integrated into an EHR that provides clinician-specific performance reports regarding guideline compliance and quality benchmark achievement specifically for diagnosis and treatment of CAD.

Grantee's Most Recent Self-Reported Quarterly Status: Overall, the project is mostly on schedule with some slippage. Specifically, the intervention portion of the CAD QD RCT was delayed. The main reasons were the complexity of the QD application itself and unexpected complications during the implementation process. Additionally, implementation was slowed as roll-out of the application had to occur one practice at a time due to the intricate randomization schema. Although all milestones have not been met, there is a viable plan for achieving those that remain.

Milestones: Progress is on track in some respects but not others.

Budget: Spending is roughly on target.