

Information Technology Implementation by Cognitive Engineering of Organizational Routines

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Summary: Successful implementation of health information technology (IT) systems requires substantial attention to workflow processes. This project examines the change that must occur for successful adoption of health IT and how to best reengineer workflows. The Department of Family Medicine at the University of Michigan and the Michigan Primary Care Association have identified three federally qualified health centers (FQHCs) to implement Crimson Care Registry (formerly known as Cielo Clinic™), a commercial clinical quality management system developed by family medicine physicians at the University of Michigan. The use of Crimson Care is being tailored to each participating FQHC's interest and priorities. Each clinic is using an iterative process to choose the screening, prevention, chronic disease management, and outreach components of the Crimson Care software that fit their quality improvement priorities best.

Dr. Green and his research team are examining the change process needed for successful adoption of the quality management system by using an advanced set of tools as part of cognitive task analysis (CTA) to guide the implementation and reengineering work. Each practice has an existing electronic health record (EHR), but EHR functional component use varies. Implementation focuses on training site staff to work in teams to understand and modify organizational routines using Crimson Care. Clinics are working on implementation until they achieve success, or until several plan-do-study-act (PDSA) cycles without progress make it clear that implementation will not succeed. Practices have been evaluated to determine whether the Crimson Care clinical system increases adherence to evidence-based practice and whether CTA-guided implementation is advantageous to the health centers. The study is using a mixed-methods, stepped-wedge research and evaluation design to allow analysis of data across time within sites and to make across-site comparisons. The project collected qualitative data on the implementation process, including the barriers and facilitators encountered, which will help health care leaders implement new technology in ambulatory safety-net settings.

Specific Aims:

- Identify the barriers and facilitators to implementing clinical quality management systems in safety-net ambulatory care settings. **(Ongoing)**
- Measure the impact of using cognitive engineering tools during implementation of a clinical quality management system (Crimson Care – formerly Cielo Clinic™). **(Ongoing)**

2012 Activities: By design, each of the three clinical sites implementing Crimson Care Registry is in a different stage of the implementation process so that lessons learned can be applied successively across

the sites. The first site installed the Crimson Care software and participated in onsite meetings with the research team. After implementing and operating the software for 3 months, the center decided to cease implementation of Crimson Care for reasons that were foreseen in the CTA and addressed but not acted upon in the project's recommendations. In 2012, the research team was able to analyze the full transcription of interviews from these site visits to produce rich qualitative data to describe the factors that resulted in halted implementation.

The second site had continued difficulty in installation of Crimson Care due to the data being installed on the wrong server and a delay in identifying this problem. Although this was corrected, it slowed implementation for this site by a few months. Later in 2012, this same site had difficulty loading data from Patient Electronic Care System (PECS), their prior registry system, into Crimson. This was ultimately resolved by Dr. Green writing code to facilitate the data transfer, but it further slowed implementation of the Crimson software.

The third site launched Crimson Care in the summer of 2012 and has had several months of successful implementation. This practice has been participating in onsite meetings and responding to feedback to guide implementation, such as creating a leadership plan. They have conducted several cycles of PDSA since implementation. After launch of the software the research team conducted a site visit to shadow particular staff, understand their roles, and glean information on their use of the Crimson Care. In addition, they reviewed the patient encounter form and reporting process. Data gathered from the third site followup visit will be analyzed and the research team will present CTA interview findings to leadership in 2013.

A 1-year no-cost extension was used to extend the time frame for software implementation and data collection on the implementation process of Crimson Care. As last self-reported in the AHRQ Research Reporting System, project progress is mostly on track and the project budget funds are somewhat underspent. The implementation process of Crimson Care has been delayed at the remaining two clinical sites for various reasons, and this has delayed some spending of the budget. Dr. Green is working with each site to overcome their implementation challenges and, as part of the research process, is documenting those challenges and what is learned.

Preliminary Impact and Findings: The results of CTA interviews were presented to the clinic leadership. The analysis discovered areas of reliance on tacit knowledge that have potential implications for implementing health IT. For example, CTA revealed differing assumptions and expectations among providers who believed they were in agreement about guideline implementation. As the implementation process has progressed and challenges have arisen, the research team identified the need for a liaison between the health centers and the software vendor to ensure issues are resolved in a timely manner. Health center staff may not have the resources or experience to resolve software installation problems with vendors.

The research team completed "[Cognitive Task Analysis: methods to improve the patient centered medical home, by understanding and leveraging its knowledge work](#)," (AHRQ Publication Number 13-0023-EF), a monograph on the implications of their results on medical home transformation. The research team plans to write several papers describing the implementation of health IT in safety-net provider organizations. A specific component of the discussion will be the implementation of health IT by a safety-net provider in comparison to an organization that has the resources for in-house consultants and Lean process-thinking coaches. Other paper topics include description of the change management process and methodological

approach of the research team.

Target Population: Medically Underserved, Safety Net, Uninsured

Strategic Goal: Develop and disseminate health IT evidence and evidence-based tools to improve health care decisionmaking through the use of integrated data and knowledge management.

Business Goal: Knowledge Creation
