# Incorporating Health Information Technology into Workflow Redesign

**Principal Investigator:** Carayon, Pascale, Ph.D., and Karsh, Ben-Tzion, Ph.D.
**Organization:** University of Wisconsin
**Contract Number:** 290-08-10036
**Project Period:** January 2009 – December 2010
**AHRQ Funding Amount:** $494,028
**Summary Status as of:** December 2010, Conclusion of Contract

**Target Population:** Not Applicable

**Summary:** Health information technology (IT) systems provide computerized clinical information to clinicians and/or patients and are seen as beneficial to health care quality and patient safety. However, evaluations of the impact of health IT on quality and safety show mixed results. The main reason for unfavorable results seems to be related to difficulty integrating health IT into clinical workflows across organizations (e.g., between a clinic and community pharmacy), within a clinic, during a visit, or into the cognitive work of the clinician. It is clear that health IT must be designed to fit specific contexts if it is to work.

The University of Wisconsin's Center for Quality and Productivity Improvement developed a toolkit that small- and medium-sized ambulatory practices can use to assess workflow and determine how health IT may be implemented and used in this context. The work was conducted by a multidisciplinary team of researchers in human factors and ergonomics, industrial and systems engineering, sociology, psychology, health informatics, and medicine.

**Project Objectives:**

- Assess existing research and evidence on the impact of health IT on workflow in outpatient settings and how health IT can be used to assess workflow in these settings. **(Achieved)**
- Identify resources for workflow assessment in health care as well as proven workflow analysis methods and instruments used in the fields of human factors and ergonomics that could be applied in health care settings. **(Achieved)**
- Synthesize information in a toolkit. **(Achieved)**

**2010 Activities:** In 2010, the team synthesized the information submitted to the request for information (RFI) in a report and summarized the information identified in the literature review and environmental scan in a final report. The information submitted in response to the RFI and the information identified in the literature review and environmental scan were synthesized into a Web-based toolkit. This toolkit explains the importance of analyzing workflow when implementing and using health IT applications and summarizes commonly used methods for workflow assessment, explaining the purpose, advantages, disadvantages, how to use it, and where to get more information for each method. It also includes stories drawn from the literature that describe the health IT implementation experiences of small- and medium-sized ambulatory practices. From the comprehensive list of workflow analysis methods included in the toolkit, the project team selected a small group of basic tools that they consider to be most helpful to the

end users. These include checklists, flowcharts, interviews, observations, risk assessment, benchmarking, and usability.

The RFI report, Incorporating Health IT Into Workflow Redesign: Request for Information Summary Report, and the final report, Incorporating Health Information Technology into Workflow Redesign, are available on the National Resource Center Web site. The toolkit became available in mid-2011.

**Impact and Findings:** From the literature review and environmental scan, the research team found that although awareness has been increasing about the value of workflow analysis to ensure successful health IT implementation, evidence about the relationship between health IT and workflow is lacking. Relatively few published articles focus on the topic of clinical workflow change related to health IT implementation. There is also a lack of standard definitions of workflow and types of health IT, making comparisons and generalizations difficult. Despite the limitations of the research, a great deal of information was uncovered about how health IT can impact workflow in small- and medium-sized ambulatory practices and how health IT can be used to study workflow in these practices. The team categorized workflow by: 1) patient workflow; 2) clinic provider or staff workflow; 3) workflow between organizations; and 4) workflow taking place during or between clinic encounters.

Findings from the literature review show that implementing an electronic health record or electronic medical record changes the interaction and communication between providers and patients, the work time and workload of physicians and clinic staff, access to information, legibility of records, ease of data extraction, and documentation. Among decision support system implementations, effects were found on guideline adherence, length of consultations, communication between provider and patient, providers' time, team coordination, and access to information. The implementation of electronic prescribing systems also affected the efficiency of processes and processing time. Telemedicine implementations were described as having an impact on the time of providers and patients, collaboration, coordination, communication, role flexibility, and workload. For each type of health IT application, there were also changes related to acceptance and usability.

The environmental scan also uncovered concerns among providers about how workflow would change with health IT implementation. Specifically, providers were worried about being required to change the way they practiced medicine, how they interacted with patients, the time they would have to spend in front of a computer, and the general flow of their work. It is assumed that when a health IT system is implemented, changes—positive and negative—result. However, it is important to consider that the impact of any health IT implementation can be confounded by additional variables, including but not limited to, system functionality and usability, training, technical support, and the timeline of the implementation.

---

**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:** Synthesis and Dissemination