

Impact of Health Information Technology on Primary Care Workflow and Financial Measures

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Summary Status as of:	December 2010

Target Population: Adults, Pediatric*

Summary: Little is known about the impact of commercial off-the-shelf electronic health record (EHR) systems on primary care workflow and financial measures, or about the financial and non-financial costs of implementation and maintenance of these systems. Given the goal of universal EHR use in the United States, such knowledge is of immediate and critical importance for the multiple stakeholders in the health care delivery arena.

The HealthTexas Provider Network (HTPN), a large fee-for-service ambulatory care physician network affiliated with an integrated health care delivery system in North Texas, began a staggered 3.5 year roll-out of GE Centricity, an “off-the-shelf” Certification Commission for Health Information Technology-certified ambulatory EHR system, in mid-2006. Using billing and administrative data, the investigators are prospectively examining the impact of the implementation and maintenance of the ambulatory EHR on 26 primary care practices’ workflow and financial measures. Investigators are also examining the financial resources consumed and the non-financial time and effort costs of the HTPN implementation team and practice physicians, nurses, and office staff preparing for implementation. Due to the staggering of the EHR implementation, comparisons will be both cross-sectional (between EHR and non-EHR practices at set points) and longitudinal (between measures collected at the same practice pre- and post-EHR implementation).

The study will contribute to knowledge regarding frequently-cited perceived barriers to ambulatory EHR adoption, including uncertainty regarding financial and non-financial costs of implementation, loss of productivity during implementation, interference with workflow, and return on investment. Reducing uncertainty in these areas should inform real-world health information technology (IT) implementation decisions and stimulate more comprehensive health IT implementation research in ambulatory care settings. Understanding the workflow and financial impacts, as well as financial and non-financial costs related to implementation of health IT, is important for stakeholders at all stages in the ambulatory EHR decision process, including adoption and implementation.

Specific Aims:

- Estimate the effect of the EHR on workflow outcome measures. **(Ongoing)**
- Estimate the effect of the EHR on financial measures. **(Ongoing)**

- Quantify financial and non-financial costs of implementation and maintenance, providing information regarding perceived barriers and facilitators to adoption and implementation of the EHR. **(Achieved)**

2010 Activities: Dr. Fleming and his team completed the work for the third aim, quantifying the financial and non-financial costs of implementing the ambulatory EHR. Financial costs included those pertaining to purchases of hardware, software, and system resources. Non-financial costs related to time and effort of the HealthTexas EHR implementation team; time the physician champions, nurse superusers, and office managers spent overseeing EHR implementation tasks (e.g., planning, workflow reengineering, and training); and time spent by individual physicians, medical staff, and office staff preparing for EHR use (e.g. pre-loading charts, training). As part of this work, the project team engaged in key informant interviews with operational leadership, including the vice president of informatics and the manager of training and workflow, to understand and quantify the implementation and maintenance costs for activities during the 120 days pre- and 60 days post-“Go Live” from three perspectives: 1) the physician network’s implementation team; 2) the individual practice implementation teams consisting of the physician champion, EHR practice manager, and both clinical and non-clinical staff; and 3) the end-users.

Dr. Fleming and his team made considerable progress in preparing the dataset for the first two aims, including the collection of administrative data containing the covariates and outcome variables for the statistical models. Their covariates will reflect summarized practice characteristics including average number of years with HTPN, specialty, average patient age, and percentage of female patients. The analytic dataset is complete and the team has begun to design and construct the data analytical platform in MS-SQL Server, MS-Access, and SAS that will be used to test the impact of the EHR implementation through comparisons of pre- and post-implementation data. The patient level visit-related data from the administrative system have been coupled with the individual physician and practice-level data. The analytic variables have been constructed regarding the implementation (2006-2007 versus 2008) and time in relation to implementation (prior to implementation, 1 to 6 months, 7 to 12 months, and greater than 12 months post-implementation). The Non-physician Staff per Physician Full time Equivalent is the last variable to be constructed with attention being made to the consideration of primary care effort. The outcome data are now being reviewed for potential outliers.

Grantee’s Most Recent Self-Reported Quarterly Status (as of December 2010): Project progress is reported as on track in some respects but not others and budgeted funds are somewhat underspent, by approximately 5 to 20 percent. However, Dr. Fleming and his team received a 3 month no-cost extension and the project is on target to complete within the new grant time frame. Slippage occurred due to the difficult nature of modeling the complex inter-relationships within these data. As the relationships between the independent variables of interest and the outcome variables are non-linear, it has taken more time than anticipated to estimate these relationships.

Preliminary Impact and Findings: The project team completed the work for the third aim and results were published in the March *Health Affairs*, [“Financial and Non-financial Costs Associated with Electronic Health Record Implementation in the Primary Care Setting”](#). The analysis takes into account both hardware and software purchases and the time and effort invested in implementation. They estimate the EHR and practice teams spent 611 hours per practice for implementation, and end-users spent 134 hours per physician. For a five physician practice, implementation cost an estimated \$162,000, with \$85,500 in maintenance expenses during the first year. These results highlight the often hidden costs of EHR implementation, in terms of the time and effort required by individuals at both the leadership and practice level.

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

* *AHRQ Priority Population*