

## Evaluation of a Computerized Clinical Decision Support System and EHR-Linked Registry

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**Summary:** Hypertension affects millions of adults in the United States, many of whom are among the underserved populations that bear a disproportionate burden of chronic disease and illness. Community health centers (CHCs) are a major source of care for the underserved. This project was designed to analyze the efficacy of office-based electronic decision support and provider feedback in improving hypertension control in CHCs. Dr. Kopal and her team hypothesized that a clinical decision support system (CDSS) and electronic registry-linked performance feedback would be more effective at improving hypertension control than a standard-care electronic health record (EHR) in CHCs that serve low-income, primarily Latino patients.

Project collaborators included Partners Primary Care Development Corporation (PCDC); Open Door Family Health Center (Open Door), a not-for-profit organization that operates four primary care sites serving low-income, primarily Latino immigrants; New York University College of Dentistry and School of Medicine; and the Columbia University Mailman School of Public Health. The large number of minority and low-income patients served by Open Door CHCs, as well as the existing practice-based research infrastructure provided by PCDC and Open Door, offered a unique opportunity to target an underserved, hard-to-reach immigrant population and investigate the efficacy of these interventions.

The study team used qualitative and quantitative methods to meet three overarching goals: 1) assess the impact of health information technology (IT) on outcomes in ambulatory settings; 2) investigate novel methods and evaluate existing strategies for clinician use of health IT in ambulatory settings; and 3) devise strategies for safe, successful health IT adoption. Specifically, the team analyzed the effects of a multi-component, technology-driven quality improvement intervention on hypertension control. A pre- and post-intervention comparison on blood pressure (BP) outcomes and clinical process measures was conducted. On a monthly basis, the project team extracted data from the eClinicalWorks EHR and estimated the effect of the intervention using Autoregressive Integrated Moving Average modeling. The team evaluated changes in BP control using an ANOVA test for significance of the BP trends over the 36-month study period. Additionally, pre- and post-intervention surveys and structured interviews of providers were conducted.

### Specific Aims:

- Test whether an office-based EHR with decision support and registry-linked provider performance feedback is more effective in improving hypertension control than a standard EHR alone. **(Achieved)**
- Assess the implementation process, and delineate factors that influence adoption of the EHR-supported quality improvement intervention. **(Achieved)**

**2011 Activities:** Due to a minor delay in data analysis, the project was underspent in the latter part of 2010; therefore, the project team used a 12-month no-cost extension to complete the analysis and record the results. As last self-reported in the AHRQ Research Reporting System, project progress was on track and the budgeted funds were somewhat underspent. However, with the focus of activity in 2011 on completing the qualitative analysis, developing an implementation manual, drafting three separate manuscripts for potential publication, and developing a final report, the project spending was on track at the completion of the project in September 2011.

**Impact and Findings:** Patients had an average of 8.84 (SD=6.62) clinic visits during the 36-month study period (mean of five visits both pre- and post-intervention). Hypertension control was significantly greater post-intervention compared with the baseline period. Process measures also improved significantly. Logistic regression with generalized estimating equations showed that patients were 1.5 times more likely to have BP controlled post-intervention than pre-intervention. Participants found different components useful, but overall this study showed improved adherence to guidelines and more aggressive, systematic, and focused attention on a priority condition—hypertension—on the part of providers using CDSS.

Three aspects of this study appear to stand out as critical to improving hypertension care and outcomes:

1. A multicomponent intervention that included CDSS and provider performance feedback promoted adherence to hypertension clinical guidelines and was associated with improvements in blood pressure control. Among the CDSS features, there was something that worked for everyone. The evidence suggests it was the synergy of the intervention components that lead to the positive outcomes.
2. The process of working with providers and tailoring the intervention allowed for the best fit between the goals of the intervention and practice conditions. The project team selected features of the intervention that did not mandate practice patterns. Rather, features were selected based on how easy they would be to build within the current eClinicalWorks platform; on skills, resources, and preferences of the clinic; and the on usability, acceptability, and ease of use from the provider's perspective.
3. In an effort to improve health outcomes, this CDSS intervention was implemented in the context of a quality improvement effort, one component of practice change needed to reach the targets for each quality indicator. Several additional factors were also identified as facilitators of success. They included organization culture, leadership, rigorous implementation process, provider engagement, and the health care setting's ability to process patient data. Strength in these areas helps make health IT interventions successful.

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**Target Population:** Hypertension, Low-SES/Low Income\*, Medically Underserved, Racial or Ethnic Minorities\*

**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:** Implementation and Use

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\* This target population is one of AHRQ's priority populations.