

**Project Title:** Trial of Decision Support to Improve Diabetes Outcomes  
**Principal Investigator:** Cebul, Randall D., M.D.  
**Organization:** Case Western Reserve University  
**Mechanism:** RFA: HS04-012: Demonstrating the Value of Health Information Technology (THQIT)  
**Grant Number:** R01 HS 015123  
**Project Period:** 09/04 – 02/08, Including No-Cost Extension  
**AHRQ Funding Amount:** \$1,495,569  
**Summary Status as of:** February 2008, Conclusion of Grant

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**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

**Summary:** Diabetes mellitus (DM<sup>2</sup>) is an epidemic in the United States, and the most common cause of adult blindness, amputations, kidney failure, and cardiovascular disease. The disease and its complications are more prevalent among African Americans and Hispanic Americans than among Caucasian Americans. The Centers for Disease Control and Prevention estimates that 90 percent of these complications could be eliminated if the gap between what is possible and what is actually done in the care of diabetic patients is closed. Much of this care depends on physician decisionmaking in clinical settings, while a growing body of work also highlights the key roles of patient-centered self-management and contextual variables, such as the adequacy of health insurance. Whether electronic medical record (EMR)-integrated with clinical decision support (CDS) can help close the gap is unclear. This project examined the quality and utilization-related effects of CDS on patients with DM<sup>2</sup> in 24 practice sites of two large health care systems. Parallel 2-year cluster trials were undertaken that included a common feature (DM<sup>2</sup>) as well as patient-centered Web portal access (PA) CDS that can be enhanced by disease-specific features (PA-E).

### Specific Aims

- Estimate the incremental effects of DM<sup>2</sup> on patient quality measures, including changes in hemoglobin A1c levels and a composite eight-item American Diabetes Association (ADA) score, further divided into sub-scores related to patient-centered standards (ADA-5) and physician-centered standards (ADA-3). **(Achieved)**
- Estimate the effects of insurance on baseline glycemia, adjusting for patient demographics, clinical co-morbidities and adherence-related measures, census-derived contextual measures, and site of care. **(Achieved)**
- Estimate the incremental effects of DM<sup>2</sup> on patient quality measures in specific sub-groups, including race/ethnicity and insurance status (Medicare, Commercial, Medicaid, Uninsured). **(Achieved, subject to limitations of the dataset)**
- Estimate the incremental effects of DM<sup>2</sup> on health services utilization overall and in categories divided according to desirability. **(Achieved)**
- Estimate the incremental effects of DM<sup>2</sup> on health services utilization in specific subgroups, including race/ethnicity and insurance status, as above. **(Achieved, subject to limitations of the data set)**
- Examine adoption of the CDS interventions, including physician adoption of and satisfaction with DM<sup>2</sup> and patient adoption of PA, PA-E, and PA-E plus DM<sup>2</sup>. **(Achieved)**
- Describe general and intervention-specific unintended consequences of interventions, including consequences related to patient safety and care for co-morbid illnesses. **(Achieved)**

**2008 Activities:** Data collection was complete by the beginning of 2008 and the primary focus during the year was analyzing data and developing conclusions.

**Impact and Findings:** There were no significant cross-group changes in hemoglobin A1c levels associated with DM<sup>2</sup>, but there were borderline improvements in the ADA-8 score, and significant 25 percent relative improvements in the three-item physician-centered sub-score ( $p < 0.001$ ). DM<sup>2</sup> was associated with a 20 percent reduction in hospitalizations ( $p = 0.01$ ), but no significant reductions in emergency department or primary care visits. Successive logistic regression models examined the insurance effect on “poor glycemic control” after sequentially adding: 1) age and sex; 2) race, show rate, and comorbidity count; 3) census tract characteristics; and 4) site of care. Commercially insured patients were used as the referent to examine the multivariate odds ratios associated with having Medicare, Medicaid, or no insurance. Uninsured patients had 49 percent increased odds of poor glycemic control (MOR 1.49,  $p < 0.01$ ) and Medicare patients had 21 percent decreased odds of poor control (MOR 0.79,  $p < 0.01$ ). There was more Web portal adoption among patients in the PA-E and PA-E plus DM<sup>2</sup> groups as compared to PA alone. Thus, CDS substantially improved physician-centered, but not patient-centered, quality measures, and it appears to have reduced hospitalization rates. Disease-enhanced features may increase patient Web-portal use.

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### Selected Outputs

Love TE, Cebul RD, Einstadter D, et al. Electronic medical record-assisted design of a cluster-randomized trial to improve diabetes care and outcomes. *J Gen Intern Med* 2008 Apr;23(4):383-91.

Cebul RD. Using electronic medical records to measure and improve performance. *Trans Am Clin Climatol Assoc* 2008;119:65-76.

Cebul RD. Real-Time Decision Support in the EMR Era. 28<sup>th</sup> Annual Meeting of the Society for Medical Decision; Boston, MA; October 2006.

Cebul RD, Dawson NV, Love TE. Cluster-randomized trials and their relevance to health care research. In: Machin D, Day S, Green S, eds. *Textbook of Clinical Trials*. Wiley, Inc; 2006.

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**Grantee’s Most Recent Self-Reported Status:** All primary aims were achieved.

**Milestones:** Progress is completely on track.

**Budget:** On target.