

**Project Title:** Clinical Decision Support Consortium  
**Principal Investigator:** Middleton, Blackford, M.D., M.P.H., M.Sc.  
**Organization:** Brigham and Women's Hospital  
**Contract Number:** 290-08-10010  
**Project Period:** 03/08 –03/10  
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**Summary Status as of:** December 2008

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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:** Despite the overwhelming evidence of clinical decision support (CDS) effectiveness, CDS use and adoption are limited, and a small number of academic medical centers and integrated delivery networks account for the bulk of CDS research and development. Wider CDS adoption has been held back by a variety of social, economic, and technical issues, including, but not limited to: lack of widely adopted standards for representing and sharing clinical knowledge in a computable form; difficulty developing clinical practice guidelines that can be readily and unambiguously translated into a computable form; absence of a central repository or knowledge resource where computable guidelines can be shared and stored; challenges in integrating CDS into the clinical workflow; and limited understanding of organizational and social issues relating to CDS.

These barriers are surmountable, as evidenced by a small number of sites where CDS is pervasive. We believe that the biggest challenge to fostering widespread CDS adoption is in documenting, generalizing, and finally translating the experience from these advanced sites to broader community settings. To address this challenge, investigators from Brigham and Women's Hospital, Harvard Medical School, and Partners HealthCare Information Systems (PHIS), have formed the Clinical Decision Support Consortium (CDSC) in collaboration with the Regenstrief Institute, Kaiser Permanente Northwest Research Group, the Veterans Health Administration, Masspro, GE Healthcare, and Siemens Medical Solutions.

The goal of the CDSC is to assess, define, demonstrate, and evaluate best practices for knowledge management and CDS in health information technology (IT) at scale—across multiple ambulatory care settings and electronic health record (EHR) technology platforms. The CDS Consortium is confident that working together, with Agency for Healthcare Research and Quality (AHRQ) support, significant progress toward widespread adoption of CDS can be made quickly.

The CDSC project is mid-way through its initial 2-year period. Our full interim report was submitted to AHRQ on March 4, 2009. The initial clinical focus points of the Consortium are diabetes, coronary artery disease, and hypertension screening within ambulatory care sites in Massachusetts. This project pursues knowledge management as the primary health IT strategic goal.

We plan to implement CDS in ambulatory EHR systems. In the first 2 years, we will perform our demonstration in the Partners HealthCare Longitudinal Medical Record System, which is certified by the Certification Commission for Healthcare Information Technology (CCHIT). In future years, we will implement the demonstrations in General Electric's (GE) Centricity system and NextGen's EMR, both of which are also CCHIT-certified, as well as the Veteran Administration's (VA) VistA system and the Regenstrief Institute's Regenstrief Medical Record System (RMRS). VistA and RMRS are proprietary, non-CCHIT-certified systems. VistA is available as open source, and RMRS is related to OpenMRS which is also open source.

We are using a variety of analytical methods to address our specific aims. We have conducted a series of qualitative evaluations consisting of interviews and ethnography carried out by qualified qualitative researchers. We will also evaluate the effectiveness and performance of the decision support interventions we are developing using quantitative methods.

If successful, we anticipate that we will build decision support systems that will be useful for improving quality and patient safety across multiple disparate EHR systems. We anticipate that these methods will be effective compared to other decision support methods, but that our innovations in collaborative knowledge engineering and service-oriented delivery of decision support will allow them to be developed, maintained, and implemented much more efficiently, and employed much more widely, than conventional decision support resident in individual medical record systems.

### **Specific Aims**

- Assess and define best practices for knowledge management and CDS in ambulatory care. **(Ongoing)**
- Define a novel, practical knowledge representation scheme that allows users to access knowledge in the manner most useful to them to facilitate translation of knowledge into CDS within EMRs. **(Ongoing)**
- Build a prototype national knowledge repository to support access and use of knowledge artifacts, and collaborative knowledge engineering. **(Ongoing)**
- Build publicly available Web services to provide remote CDS. **(Ongoing)**
- Build end-user CDS dashboards depicting user compliance with CDS, and provide feedback to knowledge engineers building the CDS knowledge artifacts and Web services on the efficacy of the CDS. **(Ongoing)**
- Coordinate overall CDSC evaluation activities. **(Ongoing)**
- Demonstrate the feasibility of this approach through multi-site, multi-vendor demonstration projects. **(Upcoming)**
- Disseminate our results through a variety of traditional channels. Traditional channels include journal publications and conference presentations, while less traditional channels include the AHRQ Web site; white papers; education modules for physicians; and reports to trade associations, standards bodies, and certifying authorities. **(Upcoming)**

**2008 Activities:** The Consortium's Knowledge Management (KM) Lifecycle Assessment Team completed its KM and CDS-reviewed consortium sites' CDS activities and practices. The team also completed a site visit to Partners HealthCare System. The Knowledge Translation and Specification team completed its work on the semi-structured and structured representations. The KM Portal team delivered eRoom as a collaborative environment for the Consortium's activities, developed a self-service training module for the facilitator and participants, completed the conceptual and physical architecture for the knowledge portal architecture, and finalized the hardware.

During this same period, the Vendor Generalization and CCHIT Team developed guidelines for IP sharing among Consortium members, notified CCHIT and the Healthcare Information Technology Standards Panel (HITSP) about the CDSC project, reviewed the current CCHIT and HITSP requirements and standards for CDS and KM, and completed capability reviews of nine EHR systems' decision support features through customer interviews. The CDS Services Development team completed a CDS literature review on current service-oriented architectures and made the decision to use the PHS Enterprise Clinical Rules Services. Finally, the Joint Information Modeling Work Group selected standard terminologies and a decision support model, and recommended use of the Continuity of Care Document (CCD) as the core data exchange framework. All teams have completed preliminary evaluation plans and are working with the CDS Evaluation team to finalize these plans.

**Preliminary Impact and Findings:** We aim to disseminate our findings and work products widely, through the AHRQ National Resource Center for Health IT.

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### **Selected Outputs**

Wright A, Bates DW, Middleton B, et al. Creating and sharing clinical decision support content with Web 2.0: issues and examples. *J Biomed Inform* 2009 Apr; 42(2):334-46

Sittig D. Clinical decision support: What is it? Why is it so hard? What can we do about it? Grand Rounds at University of Texas; December 2008; Austin, TX.

Middleton B, Sittig D. Why is CDS so hard? Office National Coordinator; September 2008; Washington, DC.

Middleton B. AHRQ Clinical Decision Support Consortium; September 2008. AHRQ National Teleconference. Available at: Partners Healthcare. Clinical Decision Support Consortium. <http://www.partners.org/cird/cdsc>. Accessed May 2009.

AHRQ 2008 Annual Conference presentation: Clinical Decision Support Consortium ([PowerPoint® File](#), 2.2 MB; [Web Version](#)) Blackford Middleton, Harvard Medical School CDS contract.