Clinical Decision Support Consortium

Principal Investigator:	Middleton, Blackford, M.D., M.P.H., M.Sc.
Organization:	Brigham and Women's Hospital
Contract Number:	290-2008-10010
Project Period:	March 2008 – July 2013
AHRQ Funding Amount:	$6,250,000

Summary: Despite evidence of the effectiveness of clinical decision support (CDS), only a small number of academic medical centers and integrated delivery networks account for the majority of CDS research and development. Wider CDS adoption has been limited by a variety of social, political, psychological, economic, and technical issues. These include: 1) a lack of widely adopted standards for representing and sharing clinical knowledge in a computable form; 2) difficulty developing clinical practice guidelines that can be readily and unambiguously translated into a computable form; 3) absence of a central repository or knowledge resource where computable guidelines can be stored and shared; 4) challenges integrating CDS into clinical workflow; and 5) limited understanding of organizational and social issues relating to CDS.

As demonstrated at sites where CDS is pervasive, these barriers are surmountable. The biggest challenges to widespread CDS adoption include the complexity of the CDS; a lack of understanding of how to create the initial builing blocks; identifying costs; and identifying the process for maintaining an up-to-date CDS. To address these challenges, investigators from Brigham and Women's Hospital, Harvard Medical School, and Partners HealthCare Systems (PHS) formed the CDS Consortium in collaboration with 24 organizations across the United States, including vendors, health care organizations, and academic institutions.

The goal of the CDS Consortium is to assess, define, demonstrate, and evaluate best practices for knowledge management (KM) and CDS in health information technology (IT) across multiple ambulatory care settings and electronic health record (EHR) technology platforms in pursuit of widespread CDS adoption. The CDS Consortium is developing a series of service-oriented CDS interventions focused on diabetes, coronary artery disease, and hypertension screening. In the first 2 years of the project, the team developed the service-oriented CDS interventions and piloted them in four ambulatory sites in Massachusetts. Currently, the team is expanding the interventions and continues to gather data and develop best practices.

Project Objectives:

- 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 a manner that facilitates the translation of knowledge into CDS within EHRs. **(Ongoing)**
- Build a prototype national knowledge repository to support access and use of knowledge artifacts and collaborative knowledge engineering. **(Achieved)**
- Build publicly-available cloud-based Web services to provide remote CDS. **(Achieved)**
- Build end-user CDS dashboards that would depict user's compliance with CDS and provide feedback to knowledge engineers on the efficacy of the CDS. **(Achieved)**
- Coordinate overall CDS Consortium evaluation activities. **(Ongoing)**
- Demonstrate the feasibility of a service oriented architecture-based approach through multi-site,

multivendor demonstration projects. **(Ongoing)**

- Disseminate results through a variety of traditional channels. **(Ongoing)**

2011 Activities: The CDS Consortium continued to pursue research and development, completing a series of deliverables including but not limited to: 1) a 6-month trial of Enterprise Clinical Rules Service with Regenstrief Institute's CareWeb and PHS's Longitudinal Medical Record; 2) the initation of the development of the dashboard prototypes using one of the OpenSource Dashboard programs; 3) publication of Structured Care Recommendations content on the CDS Consortium KM Portal; and 4) publication of the Advancing CDS project content. In addition, the CDS Consortium continued work with Next Gen and GE to implement cloud-based CDS into their EHR products.

Other work in 2011 included: 1) the development of a novel method for CDS performance assessment; 2) the development of a robust clinical content governance and editorial process; 3) the development of a legal framework to support the CDS Consortium activities; and 4) the development of the first prototype of the Knowledge Authoring Tool (CDSC-KAT) for creating knowledge artifacts at Level 3.

Dissemination activities in 2011 included a presentation of CDS progress and participation in a series of demonstration meetings with EHR and clinical content vendors at the American Medical Informatics Association (AMIA) annual symposium in October, and the annual Healthcare Information and Management Systems Society Meeting in February. The CDS Consortium also published six journal articles and three conference papers in 2011. These include a paper, published in the December 2011 volume of the *Journal of the American Medical Informatics Association*, describing a multi-layered knowledge representation framework for structuring guideline recommendations for implementation in a variety of CDS contexts. In addition, a paper describing a legal framework for developing agreements in support of sharing, accessing, and publishing content via the KM Portal, was presented at the 2011 AMIA symposium and received a Distinguished Paper nomination. The full list of publications is available on the CDS Web site.

Preliminary Impact and Findings: The CDS Consortium has solved critical technical challenges for sharing CDS, developed social and legal frameworks and model contracts to facilitate such sharing and, most critically, built a trusting community of CDS researchers, developers, and clinical information system vendors who are willing and ready to share their knowledge and expertise. This work has brought the CDS Consortium and the United States CDS community much closer to the Consortium's ultimate goal to assess, define, demonstrate, and evaluate best practices for KM and CDS in health care information technology at scale across multiple ambulatory care settings and EHR technology platforms.

In its 3 1/2 years, the CDS Consortium matured significantly, as demonstrated by increasing collaboration with outside parties, such as EHR and content vendors, that initially were reluctant to join. The CDS Consortium also showed, for the first time, that their services could work external to PHS. This index case sets the stage for a much broader and more rapid rollout of CDS services across multiple ambulatory care settings and EHR technology platforms. The research also indicated that a sound legal foundation was required for knowledge sharing and CDS services in order to address data sharing, intellectual property, accountability, and liability concerns. Therefore, the team developed a set of clinical content editorial and governance procedures, and a legal framework with component legal agreements to make the CDS resource useful.

Target Population: Adults, Coronary Artery Disease, Diabetes, Hypertension

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