Clinical Decision Support:
A Practical Guide to Developing Your Program to Improve Outcomes

Robert A. Jenders^ab, Jonathan M. Teich^cd, Dean F. Sittig^e

^aCenter for Biomedical Informatics, Charles Drew University, Los Angeles, California, USA
^bDepartment of Medicine, University of California, Los Angeles, USA
^cElsevier, Philadelphia, Pennsylvania, USA
^dHarvard University, Boston, Massachusetts, USA
^eSchool of Biomedical Informatics, University of Texas - Houston, Texas, USA

Abstract
This tutorial will provide attendees with a practical approach to developing and deploying clinical decision support (CDS) interventions that measurably improve outcomes of interest to a health care delivery organization. The speakers will address both foundational capabilities for building successful CDS program as well as practical details for selecting, configuring, deploying and monitoring outcome-improving interventions. This systematic approach to CDS implementation will be presented in an interactive, “case-oriented” fashion, incorporating examples provided by tutorial leaders and participant’s experiences. The course content is drawn from the tutorial leaders’ award-winning book, Improving Outcomes with Clinical Decision Support: An Implementer’s Guide, and prior successful tutorials at both the Medinfo conferences and the annual AMIA symposium. Tutorial faculty members will provide an international perspective through their work with standards development organizations and other leadership roles. In this light, the speakers will describe approaches to CDS that can be used by workers at health care organizations with clinical information systems ranging from the limited to the complex. A small-group exercise will allow participants to apply this knowledge to practical problems.

Keywords:
Decision support systems, clinical; Knowledge bases; Medical record systems, computerized; Hospital information systems.

Tutorial Description

General Topics
This tutorial will provide attendees with a practical approach to developing and deploying clinical decision support (CDS) interventions that measurably improve outcomes of interest to a health care delivery organization. The instructors initially will examine in detail the key building blocks of a CDS program, including creating and enhancing organizational structure for CDS success; identifying information systems for providing the data that drive CDS interventions; leveraging clinical workflow to optimize CDS interventions; processes and systems for measuring the outcomes of these interventions; and knowledge management to acquire and maintain the expert clinical and scientific knowledge that informs these interventions. The instructors then will show how to leverage these building blocks to address key steps in developing, implementing, managing and evaluating CDS interventions, including how to select interventions to deliver targeted improvements in health care; configuring those interventions in specific environments; putting the interventions into action; measuring the results of the CDS interventions and in turn refining the program based on the results.

Additional discussion will touch on the role of national programs relevant to CDS, including knowledge sharing; structured guidelines; quality indicators and measurement; special considerations for CDS for small clinical practices, for hospitals and health systems and for vendors; the role of CDS in the evolving concept of a learning health system; and medico-legal considerations pertinent to CDS. Further, following interactive presentations by the instructors, attendees will divide into small groups and participate in a highly interactive exercise in planning and designing a CDS project to address a specific clinical target, facilitated by the instructors.

The goal of the tutorial is to provide practical advice to address these challenges and to implement CDS, leveraging the experience of the presenters and the research literature. While the use of computer-based clinical decision support systems in this regard has received considerable attention in the literature, the presenters will stress that CDS consists in the main of identification of goals, creation of processes and development of interventions in a way that is tractable even in low-resource environments.

Overall, this systematic approach to CDS implementation will be presented in an interactive, case-oriented fashion, incorporating examples provided by tutorial leaders and participants’ experiences. The course content is drawn from the tutorial leaders’ popular and award-winning guidebook series on improving outcomes with clinical decision support published by the Healthcare Information and Management Systems Society (HIMSS), the last two volumes of which (in 2009 and 2012) were co-published by the American Medical Informatics Association (AMIA).
Outline of Topics

- Developing effective governance structures, stakeholder engagement and other key requirements for implementing a CDS program.
- Selecting CDS goals.
- Implementing goal-directed CDS interventions that improve outcomes, including the “CDS Five Rights”.
- Monitoring and measuring CDS interventions.
- Knowledge management and the refinement of CDS interventions based on results. The role of CDS in learning health systems.
- National and international programs relevant to CDS, including knowledge sharing, clinical guidelines and development of health information technology standards.
- Medico-legal considerations in the use of CDS.
- Implementation of CDS over a wide range of resource availability and information technology capacity.

Tutorial Structure

The first 90 minutes of the tutorial will be delivered as an integrated series of slide-based lectures by all of the tutorial faculty members, presenting the didactic material in the author’s book. In particular, the speakers will describe in detail the building blocks for implementing and maintaining clinical decision support. This will be followed by a division of attendees into small groups, each of which will apply this process with the assistance of faculty members against a sample clinical objective, putting the didactic material into practice. Faculty members will provide outlines, worksheets and other support material to facilitate this small-group training. In turn this will be followed by audience-wide discussion to distill important lessons in working through a practical challenge in clinical decision support.

Educational Goals

- Understand a systematic approach to addressing key health care organizational goals through a clinical decision support program.
- Understand the broad range of potential clinical decision support interventions, and opportunities to use them to accomplish specific objectives.
- Describe individual techniques and considerations for overcoming organizational and technical barriers to successful clinical decision support.

Expected Attendees

Clinicians and administrators from health care organizations interested in CDS deployment, including both those contemplating and undertaking the process, will find the tutorial valuable. Pertinent roles include those responsible for CDS such as managers and directors of clinical information systems, and clinicians and administrators associated with CDS projects. Representatives from organizations both with and without robust clinical information systems (e.g. EHR and CPOE) will benefit. CDS researchers and clinical information system vendors also will find the material of interest. Computer scientists, system developers, service suppliers and programmers interested in understanding applications of health information technology to CDS also will benefit.

Tutorial Speakers

Robert A. Jenders, MD, MS, FACP, FACMI: Dr. Jenders is an informatician and internal medicine specialist who teaches clinical medicine and medical informatics. He is co-director of the Center for Biomedical Informatics and professor of medicine at Charles Drew University and is professor of medicine at the University of California, Los Angeles, USA. As co-chair of the clinical decision support work group in Health Level Seven, he has led efforts to promote knowledge representation and related standards in the practice of clinical decision support. He has participated in numerous task forces related to national policy for clinical decision support in the USA. His work focuses on the development of clinical decision support within electronic health records. He is a co-author of the award-winning book, Improving Outcomes with Clinical Decision Support: An Implementer’s Guide.

Jonathan M. Teich, MD, PhD, FACMI: Dr. Teich is the Chief Medical Informatics Officer for Elsevier, the world’s largest publisher of scientific and health information. He helps lead the vision, strategy and design for knowledge-based tools and clinical decision support (CDS) supporting direct clinical practice and health care delivery. He is also a practicing emergency physician and assistant professor at Harvard and leads clinical design for health information systems in developing countries with the OpenMRS Community. Dr. Teich founded the Clinical Informatics R&D department at Partners Healthcare, developing two generations of innovative electronic health records, CPOE and CDS systems. Dr. Teich has authored over 100 publications including three books on CDS. He co-chaired the US Roadmap for National Action on Clinical Decision Support and works with numerous government and industry panels in this field. He has been a member of the board of directors of AMIA, HIMSS and the eHealth Initiative.

Dean F. Sittig, PhD, FACMI: Dr. Sittig is professor in the School of Biomedical Informatics at the University of Texas – Houston, Texas, USA. In this role he develops and studies the effect of clinical decision support interventions. A leader in clinical informatics who has authored numerous academic publications, he participates in a number of panels and national efforts focused on improving clinical outcomes with clinical decision support. He is a co-author of the award-winning book, Improving Outcomes with Clinical Decision Support: An Implementer’s Guide.