Defining Clinical Decision Support

Population Health Sciences

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Healthcare information technology is transforming every area of care. In healthcare informatics, Clinical Decision Support (CDS) has become a widely used term. CDS seems to hold many promises, including improvements in safety, quality, outcomes, workflow, cost, and more. While this all very encouraging, this describes what CDS can achieve, but not what CDS actually *is*.

If you have struggled to define CDS or even if you have never given it a moment's thought, you are in good company. In 2010, Richardson et al interviewed 183 healthcare informatics professionals from leading research centers in the U.S. The study demonstrated a lack of consensus, even among experts, on the meaning of CDS. Since the electronic medical record (EMR) largely supports CDS, perhaps the current capabilities of the EMR limit the ability to define it. Interview subjects described CDS primarily in one of three categories: alert, workflow, and cognitive support. Some subjects, though not all, described CDS as a combination of the three.

CHOP Care Assistant

At The Children's Hospital of Philadelphia (CHOP) three research groups - PolicyLab, Clinical Futures, and the Department of Biomedical and Health Informatics (DBHi) - have been collaborating on new forms of CDS for many years. The foundation of this work is the CHOP Care Assistant, a CDS programming framework developed by Dr. Robert Grundmeier and Dr. Alex Fiks. While the Care Assistant is highly technical, its purpose is easy to describe. The Care Assistant allows CHOP researchers to enhance the EMR with a wide variety of information tools that expand its CDS capabilities. Each Care Assistant project demonstrates new examples of effective CDS.

A brief history of Care Assistant projects can help demonstrate this evolution. Similar to the subject responses in the CDS interviews, early Care Assistant projects were based on a combination of alerts, workflow, and cognitive support. For example, the Immunization Assistant was developed in 2004 to improve childhood

vaccine rates by enhancing the EMR's capabilities in multiple ways. Cognitive support via real-time analysis of patient data and CDC vaccine schedules is provided. System alerts notify the physician which vaccines are due, or overdue, and offers recommendations on the appropriate combination of vaccines. Workflow is enhanced by allowing the physician to order vaccines with a click or two. Studies demonstrated the Immunization Assistant was highly effective in improving vaccine rates in children under age two.

In 2010 the Immunization Assistant was applied to a related, though more challenging, form of decision support – HPV vaccines. In this project, CDS was expanded to include education and performance feedback. Various forms of education content were provided to clinicians and parents to support shared decision-making, and providers received performance data comparing their vaccination rates to their peers. Studies of this CDS intervention also demonstrated a significant improvement in vaccine rates.

The most comprehensive Care Assistant was developed in 2011-2012 to support primary care practices in the care of premature infants with a combination of CDS approaches to address multiple clinical domains critical to the care of these vulnerable patients (growth, nutrition, development, blood pressure screening, retinopathy of prematurity, and respiratory syncytial virus). The Preemie Assistant provides a combination of alerts, cognitive tools such as clinical calculators and information displays, parent education tools specific to the patient's age and diagnosis, documentation tools to support workflow and more consistent record keeping, and real-time analysis of patient data applied to multiple clinical guidelines. In addition, the system not only supports providers, but nurses who manage detailed care coordination tasks important to these complex patients. Analysis and publications demonstrating the effectiveness of this intervention are currently in progress.

Currently, PolicyLab, CPCE, and DBHi are developing Care Assistants for new clinical issues and even new types of users. For example, parents of asthma patients, parents and teachers of children with ADHD, and primary care pediatricians receiving genetic testing results. These projects build on the experience gained from all previous Care Assistants and are already demonstrating new approaches to CDS.

Summary

The CHOP Care Assistant research demonstrates potentially limitless approaches to achieving CDS including alerts, workflow, cognitive support, clinician education, patient education, shared decision making, data visualization, clinical calculators, guideline translation, documentation tools, performance feedback, patient reported information, care plans, care coordination and more. The complexity and variability of clinical decision-making are so vast; the methods to support decision-making are equally vast. In effect, CDS is the effective delivery of information in any form to everyone involved in patient care – not exactly a precise definition. Acknowledging the unlimited approaches to achieving CDS might not lead to a universal definition, but can serve as a guide in exploring new and innovative approaches in achieving it.

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