Clinical Decision Support

Key Points

- CDS has traditionally been used to support clinicians at the point of care.
- PHAs have specific content knowledge and techniques to contribute to the CDS community, and should make those resources available to improve CDS capability and accuracy overall.
- As CDS becomes more and more effective for *individual* patients, it will become more useful in examining *populations* of patients.

As health information technology in both healthcare and public health settings matures, it is expected to provide tools to support decision making, whether applied to an individual patient in a clinical setting or to groups of patients who might share certain conditions or exposures. While decision support in public health agencies (PHAs) focus on a wide variety of data, from case data, to environmental data, to community-based data, *clinical* data continues to be an important input into the public health decision support process. PHAs will need to become savvier about using tools and techniques for Clinical Decision Support[1] (CDS) to assist in data mining and analytics, as well as to provide CDS services to the clinical community to improve healthcare outcomes and population health. While there are other types of decision support systems and tools that are also important to a PHA's operations (e.g., financial decision support), CDS represents a special capability unique to healthcare.

CDS has traditionally been used to support clinicians at the point of care. Through a number of techniques, CDS systems bring medical knowledge to bear in the context of a specific patient's medical history to assist in diagnosing a patient's condition and recommending treatment options. Many, though not all, CDS systems are rule-based; by evaluating patient data against a specific set of rules that leverage published medical knowledge, they help the clinician determine a diagnosis and often suggest a course of treatment. Though commonly used for applications like drug-to-drug interaction, CDS is also used to support classic public health functions, like immunization forecasting and detecting cases of notifiable disease that should be reported to public health.

The CMS EHR Incentive Programs (Meaningful Use) are focusing more attention on CDS. One of the core set of measures in both stage 1 and stage 2 of Meaningful Use involves implementation of CDS to support clinical quality. All indications suggest that stage 3 will raise the bar even further and expect even more use of CDS. This added focus will provide richer opportunities for PHAs to leverage both increasingly-digitalized medical knowledge and CDS capabilities that will become more dominant features in clinical systems. They also provide an important opportunity for public health to translate

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[1] The Health Information Management and Systems Society defines CDS as "a process for enhancing health-related decisions and actions with pertinent, organized clinical knowledge and patient information to improve health and healthcare delivery."

expert knowledge about disease/condition prevention, detection, diagnosis, and treatment into computable rules that can be used by CDS systems.

As one example of public health providing expert resources to improve CDS capability and accuracy overall, the following is a screen image from the business rule editor for ICE – the open source Immunization Calculation Engine being developed by the NYC Department of Health and Mental Hygiene and its partners. Built upon the open source OpenCDS product, this editor allows for the development and maintenance of complicated rules defined by the Advisory Committee on Immunization Practices (ACIP). ICE provides a bi-directional interface to its CDS engine and rules via an Internet-based web service which accepts a patient's immunization history, date of birth, gender, and disease immunity and then returns the validity of each immunization in the history, as well as a forecast of immunizations due or overdue. Though developed initially for PHAs and immunization information systems, ICE has already been incorporated into a major ambulatory EHR product used heavily in NYC, thereby promoting a CDS assessment consistent with that provided by the Citywide Immunization Registry (CIR), and saving the EHR vendor from having to develop a completely new immunization forecast product.
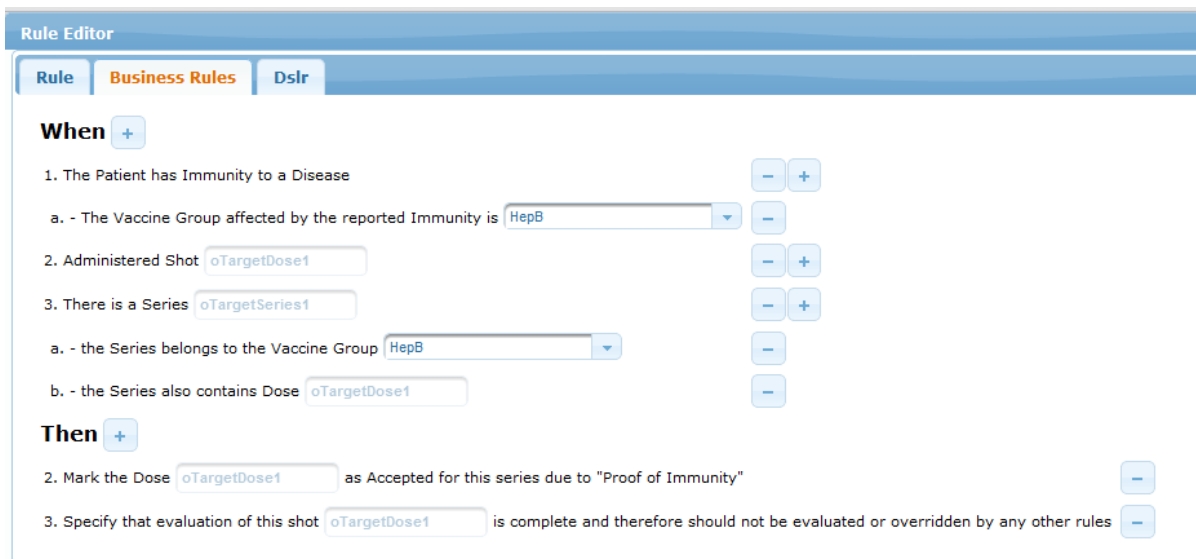
As CDS becomes more and more effective for *individual* patients, it will become more useful in examining *populations* of patients. Over time, interactive use of CDS tools within systems will be supplemented by "batch" use of CDS; taking a set of person-specific data for a cohort, cluster, or geographic region and applying CDS rules to determine if certain characteristics are present in the group. In this way, a PHA could assess a defined population for immunization up-to-date status, identify the proportion of a population at-risk for diabetes or some other chronic condition, or even perform syndromic surveillance if the data markers were present. This new type of data mining goes beyond simple observation and aggregation of data by applying CDS techniques to reach conclusions more rapidly. Emerging requirements for quality measures to support Meaningful Use, the movement to Accountable Care Organizations (ACOs), chronic disease initiatives, or other elements of health care

reform increase the pressure on healthcare organizations to understand population health metrics which can be driven at least in part by the outcome of CDS-enabled analysis.

Action Steps for State and Local PHAs

- Examine your portfolio of data systems and determine how they could benefit from CDS services. The marketplace – as well as the open source community – will increasingly provide software objects that can be integrated effectively into existing systems and should be considered for use within the agency.
- Consider defining data mining and analysis in CDS terms and determine if some of your objectives can be better satisfied with a CDS approach.
- Managing CDS knowledge and rules is a shared responsibility between public health and the clinical community, so partner with local medical societies, academic clinical informatics groups, and clinicians to collaboratively maintain rules that meet your jurisdiction's needs.
- Develop a strategy for how a CDS becomes part of a larger decision support "system of systems" to serve your overall public health decision process. This could involve examining your broader public health decision process requirements, including where information/data is coming from and going to, and how those data are used to support decision making.

Leadership Steps for National Agencies and Organizations

- Explain and promote the use of CDS technology to your programs and members.
- Identify areas where national guidance and standards for various CDS capabilities would be beneficial, and organize collaborative projects to develop materials to support its use.

More Information

http://www.opencds.org/
http://www.cdc.gov/vaccines/programs/iis/interop-proj/cds.html
http://www.partners.org/cird/cdsc/default.asp
Dixon BE, et al. *Towards public health decision support: a systematic review of bidirectional communication approaches*. J Am Med Inform Assoc 2013;20:577-583. [requires subscription]

This paper is part of a series of information briefs for local and state public health officials and managers, developed by the Joint Public Health Informatics Taskforce in partnership with HLN Consulting, LLC. The full series of seven briefs can be downloaded at no cost from www.jphit.org.