Tufts Managed Care Institute—May/June 2002

Quality and Clinical Decision Support Systems

In this month's piece we briefly examine clinical decision-support systems: their prevalence and role in improving the quality of care and reducing the occurrence of medical errors.

Background

The pursuit of quality in medicine is not but a "performance gap" still exists between recognized best practices and clinicians' practice patterns. Pervasive overuse, underuse, and misuse of various interventions have been demonstrated. Variations in care, the persistence of medical errors, and escalating health care costs are among the factors contributing to the emphasis on quality measurement and improvement. (For more information on quality of care, please visit TMCI's online courses, Definitions and Measurement of Quality, Quality Improvement Techniques, and Quality Oversight in the Marketplace.).

Increasingly, information technology (IT) in the form of clinical decision-support systems is seen as a solution to improve clinical performance and potentially generate cost savings. Clinical decision-support systems (CDSS) have been described as "systems that can synthesize and integrate patient-specific information, perform complex evaluations, and present the results to clinicians in a timely fashion" (Hunt, et al., 1998).

Systems that provide knowledge, logic or analysis for the care process generally fall under the umbrella of clinical decision support. CDSSs also offer help in non-clinical areas such as administration and expense management.

CDSSs offer the potential to improve the quality and reduce the cost of care by influencing medical decisions at the time and place decisions are made. By matching patient-specific information with guidelines, they create dynamic programs that offer real-time management advice. CDSSs have been used in a variety of health care settings to address clinical problems, aid physicians in diagnosis, and manage therapeutic treatments.

Types of Systems

Clinical decision support systems (CDSSs) vary greatly in their complexity, function, and application. In the *Journal of Healthcare Information Management* (Perreault, 1999), the four key functions of CDSSs were outlined as follows:

1. Administrative: Supporting clinical coding and documentation, authorization of procedures, and referrals.

2. Managing clinical complexity and details: Keeping patients on research and chemotherapy protocols; tracking orders, referrals follow-up, and preventive care.

3. Cost control: Monitoring medication orders; avoiding duplicate or unnecessary tests.

4. Decision support: Supporting clinical diagnosis and treatment plan processes; and promoting use of best practices, condition-specific guidelines, and population-based

management.

CDSS applications can also be grouped into three types of clinical decisions: preventive and monitoring tasks, prescribing drugs, and diagnosis and management. Applications in the first two categories are simpler to design and implement, and consequently have shown the greater success so far. The complexity of the CDSS depends on the system design, the information that is entered and made available, and the needs of the users. Simple CDSSs, such as drug-dosing calculators, have no inherent logic systems; they calculate appropriate doses of medications based upon minimal input data. More complex CDSSs, such as diagnostic decision support tools, require extensive patient-specific data entry, and a detailed systems architecture with a complex logic system.

The most successful use of CDSSs has been to improve compliance with guidelines in many clinical areas. While CDSSs have been show to improve drug dosing, the use of CDSSs to improve the other aspects of prescribing drugs (i.e., limiting interactions and adverse side effects, proper drug selection) have been curtailed by the lack of access to comprehensive electronic medical records. Due to the limited implementation of computer-assisted diagnostic and management tools so far, only a few evaluations have been conducted and no definitive conclusions have been reached regarding these form of CDSSs.

Implementation and Barriers

Payers, providers, and managers are advocating for the dissemination and implementation of clinical decision support systems.

- According to Modern Healthcare's 12th Annual Survey of Information Trends, health care executives of single-hospital and multiple-facility systems replied for the eighth consecutive year that improving decision support for clinicians was one of their top three Information Technology priorities.

- In a March 2000 survey of hospital and health care systems executives by Gartner, an information technology research and advisory firm, nearly half of respondents stated they intend to add a clinical decision-support system to their health care IT infrastructure within the next two years; nearly 60% intend to add a physician-order entry system.

- Another recent health care IT survey conducted by McKinsey & Co. indicates that overall hospital spending on IT will increase 6% to 7% per year through 2004, and clinical IT spending will grow 13% to 15% annually during the same period.

Despite this interest, diffusion of CDSS has been limited, in large part because of the expense.

- A majority of respondents to the Modern Healthcare survey reported that their organization's overall IT spending remains at a modest 3.5% of their entire operating yearly budget; most IT spending has focused on upgrading and expanding basic business functions such as billing and accounting for patient services.

- Decision support systems usage in ambulatory practice settings is also extremely low, as revealed by a 2000 survey of nonhospital-based specialty and nonspecialty groups with five or more physicians (FitzHenry et al).

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Robust computerized decision-support systems remain quite costly and may remain out of the reach of smaller hospitals and physician offices. Even large integrated delivery systems have a limited IT budget and must carefully scrutinize their computerized decision-support system purchase. Considerations include ensuring that the system will last at least 3-5 years, return a certain level of investment, and be capable of integrating within the provider's existing IS system. In addition, systems must comply with the patient confidentiality regulations in the Health Insurance Portability and Accountability Act (HIPAA).

A recent article (Sim et al, 2002) recommends the following technologies for a computerized decision-support system to improve workflow and be methodologically rigorous:

- Computer-understandable clinical research databases
- Electronic medical records (EMRs) and other clinical systems that use a standardized clinical vocabulary to ensure that systems are able to communicate with one another
- Standardized interfaces among clinical and practice management systems that facilitate communication among multiple systems
- New and higher-performance technologies (e.g., speech recognition and wireless computers) to make it easier for physicians, clinicians, and administrators to enter data and enable better workflow compatibility.

Unfortunately, a number of these technologies are not yet widely available and many electronic data information standards not yet been adopted industry-wide. One of the most difficult barriers is the development of a standardized EMR. HIPAA defined a set of recommendations for an EMR but did not legislate an industry-wide standard EMR.

Sample CDSS products

A number of vendors and organizations, ranging from software companies to professional societies, are offering CDSS products. Systems and sponsors include:

- American College of Physicians-American Society of Internal Medicine (ACP-ASIM): The ACIP-ASIM has recently developed a new Web-based decision-support tool, The Physicians' Information and Education Resource (PIER). PIER's authors comb through the medical literature to provide distilled bullet lists under six different topics: diseases, screening and prevention, complementary/alternative medicine, ethical and legal issues, and procedures and drug resources. Each topic is further subdivided into specific modules that can be easily searched, and relevant evidence-based treatment recommendations are ranked on a "letter grade" basis by PIER's authors. PIER is currently in a prototype version, and access is restricted to ACP-ASIM members. http://pier.acponline.org/index.html?jhp
- Institute for Medical Knowledge Implementation (IMKI): IMKI is a non-profit organization that is developing and maintaining a library of medical knowledge applications for use in clinical information systems. IMKI's Medical Knowledge Content Library™ will use well-established and defined data structures to enable vendors or organizations to incorporate Library content in its operational CDSSs. Any

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interested organization or individual may contribute, use the Library, and assist in its maintenance. Recently, the Robert Wood Johnson Foundation awarded a grant to the IMKI to develop a process for writing, evaluating, and disseminating Clinical Decision Support rules. http://www.imki.org/

- MedicaLogic: MedicaLogic's Logician® is an electronic medical record system that documents clinical information, supports administrative functions, and also serves as a decision support tool. Besides medication checking and formulary compliance, Logician aids physicians by reminding them when patients are due for a certain procedure or test, providing patients with educational handouts, and having a component that guides clinicians through a patient encounter in accordance with the Center for Medicare and Medicaid Services guidelines. http://www.medicalogic.com/products/logician/

- Zynx Health Inc.: Zynx Health's Clinical Pathway Constructor™ is a Web-based, systematic clinical content tool with a compendium of evidence-based guidelines focusing on 23 different inpatient conditions. For each condition, all peer-reviewed medical literature for the past ten years was summarized and graded using specific criteria. Within each condition, there are numerous topic headings with guideline recommendations; if the evidence does not indicate a definite superior intervention, the guideline statement defers to the users' clinical judgement. Access is available to institutions through a subscription fee. http://www.zynx.com/Products/products-cpc.htm

Summary

There is growing evidence that computerized decision-support systems can enhance quality, reduce errors, particularly with drug dosing issues, and achieve cost-savings. As computerized decision-support systems are more widely adopted by health care providers, they will serve as a tool that supplements clinicians' decision-making processes. Still, clinicians will serve as the final authority on care decisions and certain limitations will exist with decision-support systems, especially with diagnosis-related tools.

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