return to results

Vol. 5 •Issue 12 • Page 30
Medical Expert Systems Update

Organizations that analyze systems and processes through evidence -based medicine and computerized physician order entry can greatly improve outcomes.

Health care marketplace pressures come from patients, employers and payers who insist on safe care with positive outcomes. Regulatory and watchdog organizations, such as the Leapfrog Group, are quickly moving to establish strong standards for patient safety, quality and information system use. Physicians and other clinicians, along with the integrated delivery networks that support them, also demand the finest care for their patients. However, the provider constituents firmly believe that they must also achieve a solid return on investment in solutions that enhance the care process.

As these financial, regulatory and consumer pressures mount, executives at many health care organizations are wrestling with how they can deliver safe, high-quality patient care efficiently and cost-effectively.

Their answer lies in optimizing the capabilities of IT, but it is crucial to incorporate the right technology system – a system with expert decision-making technology that assists a physician rather than impeding his or her approach to patient care.

Call to arms

In two studies – *To Err is Human: Building a Safer Health System* (1999) and *Crossing the Quality Chasm: A New Healthcare System for the 21st Century* (2000) – the Institute of Medicine (IOM) said IT solutions, access to clinical guidelines at the point of care, and support and redesign of clinical workflows are key to improving patient safety.

The IOM is not alone when it comes to advocating the benefits of IT in improving patient safety. A *Journal of the American Medical Association* (JAMA) study done by international medication errors expert Lucian Leape, MD, determined that lack of drug knowledge and patient history were the two most common causes of drug errors. Leape concluded that physicians, nurses and pharmacists all need ready access to the latest drug and patient information to prevent errors. He also noted, in his report, that computers were well suited to collect, retrieve and display needed information.

Meanwhile, at state and national levels, various groups are focused on the need to combat adverse drug events.

The Leapfrog Group, comprised of Fortune 500 companies and other large health care purchasers, established itself as a patient safety advocate by using its members' substantial power as health care purchasers to drive improvements in patient care. Toward this end, the group adopted several voluntary purchasing principles and is actively encouraging other large health care purchasers to join the crusade by committing to purchasing strategies and partnering to implement patient safety initiatives.

The group is initially focusing on three patient-safety measures: (1) computerized physician order entry; (2) ICU physician staffing; and (3) evidence-based hospital referral.

The group plans to gather hospital performance data on these three measures so that employers can share the results with their employees.

Despite overwhelming attention from regulatory advocates and the media, quality and patient safety have consistently taken a back seat as health care organizations struggle with declining reimbursement rates, staff shortages and increasing costs. However, increasing public interest in patient safety provides the health care industry with notice that bold and innovative measures must be adopted in order to satisfy consumers, payers, purchasers, providers and government entities while still meeting predetermined organizational financial requirements.

In addition to market pressures for improved patient safety, health care organizations must do more with less. The Balanced Budget Amendment of 1997, enacted in part to control the federal government's spiraling health care costs, substantially reduced reimbursement rates paid to participating organizations by the Centers for Medicare and Medicaid (CMS) and state Medicaid agencies. Insurers and other at-risk organizations followed suit and negotiated lower reimbursement rates for services. In some instances, provider organizations took on risk by signing fixed-fee and disease-specific contracts.

Compounding the problem, pharmaceutical costs have risen dramatically, with some managed care companies reporting drug cost increases of more than 20 percent per year for the past several years. Labor costs also continue to rise and staffing shortages worsen as mainstream industry attracts workers away from health care jobs in key areas such as nursing, pharmacy, therapy and IT. Increased recruiting and overtime labor costs also threaten financial stability. All of these factors put great economic pressure on health care organizations and, in turn, physicians to prescribe and deliver only services that are "necessary," or more specifically, only services that CMS or other payers cover. Additionally, organizations are trying to increase revenue while focusing on patient satisfaction, physician retention and loyalty, and expanding services.

Meanwhile, advances in medical technology promote the treatment of more patients on an outpatient basis. Fewer hospital beds are filled, but the patients who are admitted require more intensive acute care. This change in the composition of the inpatient population puts increased pressure on health care providers to improve operational efficiencies – a challenge that will only worsen as baby boomers age.

For more than 25 years, starting with work done by John Wennberg, MD, at Dartmouth College, researchers documented that the variability in health care delivery has produced a broad range of financial and health care outcomes. Although research shows the benefit of following standardized, evidence-based treatments, few physicians or organizations use these methods. Unlike other industries that continually re-engineer their processes to enhance performance, health care organizations often lack the infrastructure, technology solutions and organizational matrix to effectively change processes, particularly when physicians are involved.

For organizations to succeed, they must deliver safe and effective patient care at a cost that is less than the amount they are paid for providing it. Health care organizations that implement the best and most comprehensive solutions incorporating appropriate, proven technologies and effective processes will survive these difficult and ever-changing times.

Applying evidence-based medicine

Historically, physicians practiced medicine autonomously with almost complete sovereignty over their actions. Over the past half-century, this situation has progressively changed. Payers seek to control spending by intervening in the care process. Health care organizations search for tools that reduce the variability in the care process to improve quality and control the cost of delivering care. For example, Blue Cross of California recently established a bonus plan for physicians based upon specific quality measures. Patients also demand greater control over their treatments. All of these individuals and organizations have one goal in mind – to improve the quality of medical care. Applying validated

therapies through the application of evidence-based medicine is one proven way to improve health care outcomes while conserving resources.

However, access to clinical content at the point of care is as important as the development of useful and practical evidence-based medicine guidelines. Historically, guidelines have been deployed with limited results. The nature of clinician workflow requires that clinical content be presented in a format that matches workflow; otherwise the guidelines never reach the caregiver to affect care delivery. Heavy patient loads do not offer clinicians much time to access clinical content, whether in the form of paper guidelines, medical textbooks or Medline searches during care delivery.

With the advent of computerized physician order entry (CPOE) systems and the integration of legacy systems through new technologies and computer architectures, clinical decision makers are getting their first opportunity to effectively apply evidence-based guidelines to patient care. Using these tools, disease-specific, evidence-based guidelines can be presented proactively as part of the clinical decision process, thereby influencing the care that is delivered. Clinical content at the point of care matches the natural workflow needs of the clinician and allows for easy application to the current patient. In addition, these electronic versions of evidence-based medicine are automating many processes such as pharmacokinetic calculations, drug-error checking and CMS documentation compliance checking.

By incorporating evidence-based medicine at the point of care, clinicians have access to the best available clinical content when making treatment decisions. As medical treatments change, these same workflow interfaces can deliver new clinical content through revised evidence-based clinical guidelines. Clinicians are able to apply this new knowledge without changing their basic care processes. However, with the use of paper-based systems, extensive education and training would be necessary to affect behavior change and maintain those gains. Incorporation of evidence-based medicine at the point of care educates, while eliminating the need for special training. Without such an integrated approach to offering content, it is unlikely that the clinician would access and then apply most newly delivered evidence-based medicine guidelines.

Computerized physician order entry

The many definitions of CPOE make comparisons of clinical experiences with such technology difficult. The American Hospital Association provides the following definition of CPOE: "a system for direct entry of one or more types of medical orders by a physician into a system that transmits those orders electronically to the appropriate department."

CPOE provides numerous benefits including elimination of illegible orders, reduction in transcription, rapid routing of orders to the appropriate destination and, with decision support capabilities, verification against varied clinical knowledge bases. Decision support enhances care delivery by searching for potential treatment conflicts.

Alerts and reminders, automatically generated in real time, notify clinicians of therapeutic actions that may positively or negatively impact care. These automatic alerts free up clinicians to concentrate on collecting and synthesizing patient information in order to develop effective treatment plans rather than engaging in routine memory tasks.

To reduce variation and make outcomes more predictable, some organizations may deploy CPOE to implement standard orders and clinical guidelines. CPOE offers organizations a way to introduce evidence-based medicine quickly. By using these standardized, up-to-date clinical knowledge bases and automatic alerts and reminders, patient treatment plans can be regularly evaluated against accepted clinical practice, thereby increasing the probability of consistent care and reproducible outcomes across patients with similar disease processes.

Medical center experience

Since 1994, Vanderbilt University Medical Center (VUMC) has utilized a system with integrated clinical decision support to improve outcomes and enhance patient safety. The system, developed by practicing physicians at VUMC, provides point-of-care, disease-specific clinical support to physicians and other caregivers as they treat their acute-care patients. This clinical support originates from evidence-based medicine guidelines researched by clinical experts and tested and revised through use at VUMC.

CPOE systems are used in 600 out of the 650 beds at VUMC. Physicians order more than 70 percent of the 10,000-plus orders issued daily at VUMC, with the remainder entered by other members of the care team. This high level of physician use indicates widespread acceptance of the system by both attending physicians and residents.

From these orders, over 300 alerts are issued daily with about 25 percent resulting in a change in the physician's treatment plan. Examples of such alerts are inappropriate drug choices, drug-allergy problems and unnecessary laboratory testing. In addition, VUMC saves $3.5 million annually in pharmacy costs alone, not counting potential savings from preventing adverse drug events. VUMC continually evaluates the impact of its systems and clinical decision support guidelines to further advance positive clinical and financial outcomes.

To understand what is needed to improve outcomes, health care organizations must first identify the medical errors that occur, categorize the errors, examine the processes associated with the errors and rework the processes that are producing poor outcomes. Ignoring the problem by not measuring errors, denying their existence or blaming the individuals involved in the processes does nothing to eliminate the preventable morbidity, mortality and waste of resources that poor processes generate each day.

Organizations that conduct systematic analyses of their systems and processes will be able to identify weak points. With this knowledge, they can subsequently configure effective measures to improve solutions to reduce poor outcomes. Effective implementation of process changes and clinical tools (such as CPOE systems incorporating evidenced-based guidelines) greatly improve outcomes. Ease of use, customization, accessibility and preservation or enhancement of personal workflow will drive the acceptance of these medical expert decision-making tools. n

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