EvidenceBoost for Quality
A series of essays highlighting evidence-informed management and policy options for improving quality of care
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ELECTRONIC DECISION SUPPORT TOOLS BRING BETTER CARE TO THE BEDSIDE

The Issue: Doctors need help to provide the best healthcare

Clinicians work hard to provide high-quality care to patients. However, sometimes the best course of treatment is not followed, and sometimes there are unfortunate adverse events that can result in harm to patients, even death.

In Canada, 7.5 percent of hospital admissions are related to an adverse event, or a poor outcome related to the care provided rather than the disease, about half of which are preventable. More than 10 percent of these are diagnostic errors — either something wasn't diagnosed or it was misdiagnosed — and 23 percent are drug-related.[i] Furthermore, there are problems meeting standards for preventive care. In the province of Ontario, for example, more than one-quarter of eligible women are not screened for cervical cancer.[ii]

Strategy for Change

Clinical decision support systems link the observations of clinicians to the best available evidence, in the hopes of influencing their behaviour and improving the quality of patient care. For example, a well-designed and well-programmed computer system that has integrated data from various sources can help doctors reduce errors, misdiagnoses, and unmet needs. Decision support systems can remind doctors that their patients are due for preventive screening and tests. They can provide alerts to drug interactions and duplicate tests and offer alternative courses of action. And they can virtually eliminate transcription errors, such as when a doctor orders 0.5 mg of something and it is misread as 5 mg.[iii]

Research Base

Researchers have studied many different types of clinical decision support systems — including those which provide patient-specific reminders for preventive care; those which assist diagnosis; and those which help improve the use of prescription drugs. Results of these studies were compiled in two extensive systematic reviews by teams of Canadian researchers, once in 1998 and in an updated review in 2005.[iv, v]

Preventive care reminder systems have been shown to be effective when applied to routine tasks, such as blood pressure tests, Pap smears, and vaccinations, and are designed to reduce errors of omission. Studies looked at both systems that prompted doctors to call patients in for a procedure and which alerted them that a procedure was due when the patient was at the physician's office. Reminder systems are usually used in ambulatory care, and most studies found that doctors acted on these reminders to provide more preventive care to their patients.[iv, v]

Research has shown that clinical decision support can also assist the diagnosis and treatment of some clinical problems. First, researchers found improved diagnostic accuracy when identifying patients who were at high risk of post-surgery respiratory problems. Emergency room physicians were better able to diagnose low blood flow to the heart, which reduced unnecessary hospital admissions by 15 percent. Computers helped doctors diagnose acute bowel obstruction in one hour, versus 16 hours when no computer was used. Finally, diagnostic systems helped doctors increase mood disorder screening in a post-traumatic stress disorder clinic by 25 percent.[iv, v]

Finally, computerized entry of prescription drugs is often matched with decision support systems that can automatically react with a warning about potential problems. With these, doctors type their prescriptions directly into a computer rather than handwriting an order on a prescription pad or the patient's chart. While these are usually used in large hospitals, they have also shown their effectiveness in primary healthcare. One Canadian study found an

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18-percent improvement in primary healthcare prescribing, in terms of fewer potential drug interactions and other potential problems.[vi]

In hospitals, decision support systems warn doctors when there is a drug interaction or an allergy listed in the patient's file. These systems also alert doctors if they have ordered a higher dose of a drug than is normally called for or if they have ordered an unusual frequency. They are also notified of test results that followed on a previous prescription. One hospital found a 55-percent reduction in medication errors,[vii] and other studies have found improvements in the number of patients being treated according to standard guidelines.[iv, v]

Conclusion

Clinical decision support systems can help doctors practice better, but in order to do so they must be developed and adapted to suit the particular clinical context in which they are applied. There is no "one size fits all" system, particularly when they are implemented in complex healthcare environments with a great degree of variability.

Moreover, there is the challenge of convincing physicians that these systems are worthwhile. This can be difficult, given that many doctors may be reluctant to change their practice patterns and are not that computer-savvy — almost two-thirds of Canadian doctors don't even have Internet access in their offices, and only about 12 percent have the types of reminder systems and decision aids described above.[viii]

Properly implemented, though, these systems can reduce the need for clinicians to manually enter data by integrating information as automatically as possible. There are many other features that make these systems successful, including the challenging task of integrating them into the physician's workflow, providing effective recommendations for alternative treatments along with warnings, and providing support in real time.[ix, x]

For more information about improving quality of care, see the foundation's managing for quality and safety web page at ***www.chsrf.ca/research_themes/safety_e.php.***

References

i. Baker GR et al. 2004. "The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada." Canadian Medical Association Journal; 170(11): 1678-1686.

ii. Picard A. 2005. "Guidelines for cervical cancer updated." Globe and Mail; September 23: A25.

iii. Bates DW and AA Gawande. 2003. "Improving safety with information technology." New England Journal of Medicine; 348(25): 2526-2534.

iv. Garg AX et al. 2005. "Effects of computerized clinical decision support systems on practitioner performance and patient outcomes: A systematic review." Journal of the American Medical Association; 293(10): 1223-1238.

v. Hunt DL et al. 1998. "Effects of computer-based clinical decision support systems on physician performance and patient outcomes: A systematic review." Journal of the American Medical Association; 280(15): 1339-1346.

vi. Tamblyn R et al. 2003. "The medical office of the 21st century (MOXXI): effectiveness of computerized decision-making support in reducing inappropriate prescribing in primary care." Canadian Medical Association Journal; 169(9): 549-556.

vii. Bates DW et al. 1998. "Effect of computerized physician order entry and a team intervention on prevention of serious medication errors." Journal of the American Medical Association; 280(15): 1311-1316.

viii. College of Family Physicians of Canada. 2005. National Physician Survey. www.cfpc.ca/nps/.

ix. Kawamoto K et al. 2005. "Improving clinical practice using clinical decision support systems: A systematic review of trials to identify features critical to success." British Medical Journal; online publication.

x. Bates DW et al. 2003. "Ten commandments for effective clinical decision support: Making the practice of evidence-based medicine a reality." Journal of the American Medical Informatics Association; 10(6): 523-530.