

# Evidence-based Decision-making in the Era of Electronic Health Records

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## Background

Electronic health records (EHR) are often promoted as a health technology breakthrough in terms of advancing the efficiency and quality of care. Canada's Office of Health and the Information Highway has stated "...EHR is a key priority for Health Canada as a key element of a Canadian health infostructure." {Office of Health and the Information Highway}

Evidence-based decision-making has been similarly endorsed by leaders in health care provision and planning as the route to optimal cost-effective health care. Not surprisingly, the health informatics movement has devoted considerable time and resources to marrying these two advances, by creating evidence-based computer decision support systems (CDSS). However, neither innovation has been proven to routinely improve efficiency or patient outcomes. {Hunt DL et al.} The literature on this topic is difficult to synthesize for several reasons. First, there are differing definitions of what constitutes an electronic health record or a CDSS. Second, lower quality research designs are frequently used to study the impact of complicated interventions such as CDSS which typically affect whole health care groups and processes and are difficult to randomize, blind or turn on and off quickly. Finally, no validation exercise appears to have been carried out to determine the most relevant economic or patient outcomes. Since Canada seeks the "holy grail" of electronic, secure, integrated health care, a process requiring fundamental changes in provider and patient behaviour as well as billions of dollars, it seems reasonable to rigorously evaluate the ongoing computerization of health care.

The COMPETE study (Computerization of Medical Practices for the Enhancement of Therapeutic Effectiveness) is the first study in Canada to systematically evaluate evidence-based decision support for prescribing using electronic health records in community primary care. We have been systematically evaluating the determinants of success and failure of EHR implementation, its impact on the medical practices and patient concerns as well as the development of rigorous, patient-specific CDSS for prescribing.

## Presentation Outline

Our presentation will highlight the following themes of our research and experience:

1. *What evidence do decision-makers at the clinical and policy level need and will EHRs help?* Clinicians and policy makers apply evidence daily in their work but it often is not the best quality evidence available. A key assumption in the evolution of electronic health records has been that computerization will promote rapid access to best evidence and best practice information and that EHR data will be instrumental to influencing both clinicians and policy makers to improve the efficiency of the health care system. This segment will:
  - a. review levels of evidence as applied to issues of benefit, harm, utilization and economics
  - b. review sources of relevant data
  - c. demonstrate why Canada is well placed to become an international leader in health surveillance research and practice.
  - d. examine critically the role for EHR in this new paradigm of health care.
2. *What constitutes effective CDSS?* Our systematic overview of the factors that predict success of CDSS suggests that little attention has been paid to this topic. {Holbrook AM, Sullivan S et al.} The literature available and our own experience indicate that promotion of optimal decision-making via

electronic health records requires careful consideration of the messenger, the message and the message recipient.

a) **The Messenger** (computer hardware and medical record software) ideally:

- i. is readily available and fast
- ii. encourages use by physicians themselves so that real time interventions can be applied
- iii. is robust (minimal down time) and easily upgraded
- iv. allows electronic integration of the encounter record with billing and scheduling, laboratory results, prescription reassessments, consults and referrals
- v. provides structured data for key fields such as diagnoses, medications and diagnostic testing
- vi. has a data architecture able to handle time-dependent analysis of a longitudinal record as well as an audit log of keystrokes and screens
- vii. allows the database to be queried and decision support modules to be easily incorporated
- viii. is affordable
- ix. ensures confidentiality of patient and provider and maintains a data audit trail.

b) **The Message**. Information, feedback or advice works best if it is:

- i. patient-specific and takes into account the individual patient's relevant past medical history, previous and current medications, lab results, etc.
- ii. delivered in real time, for example at the time of prescribing
- iii. prioritized by clinical importance
- iv. developed by a recognized, trustworthy source
- v. simple and straight-forward
- vi. easily and quickly acted upon, for example the desired outcome of the message is set as the default response.

c) **The Message Recipient**. Physicians are motivated to switch to electronic records to advance their practice in terms of efficiency and quality of care. Currently the incentives to computerize the typical small fee-for-service community family practice in Canada are not sufficient to interest more than a small percentage of physicians. Our focus groups, structured questionnaires, willingness-to-pay exercise and practice management reviews of computerized practices indicate that these physicians prefer systems that {Keshavjee K et al}:

- i. are flexible in terms of data entry from point-and-click to detailed text entry to dictation
- ii. allow a wide breadth and depth of detail of charting
- iii. automatically formulate a well organized chart summary or cumulative patient profile
- iv. can manage both encounter-based care, e.g., patient-generated appointment for specific complaint, and practice management, e.g., determining eligibility of patients for influenza vaccination clinics, establishing a practice profile, participating in clinical trials
- v. have information resources one click away,
- vi. are portable from office to hospital to home,
- vii. require little training both for themselves and their staff.

Meeting each of these needs and preferences poses major challenges.

3. **How to evaluate electronic decision-making and the quality of care?** EHRs and CDSS are not entering health care as a new intervention applied to a static, controlled environment. Standards for health care provision are constantly evolving as are benchmarks for quality of care and the EHR and CDSS interventions themselves. In addition, EHRs and CDSS need to be implemented as part of a change management strategy to be effective; they **have no** magical powers of their own. {Troyan S et al} All of these factors greatly complicate evaluation. We will review:

- a. the standards for evaluating electronic decision support and electronic measures of quality of care
- b. our work on an electronic tool to measure the quality of prescribing and to trigger patient-specific feedback messages to physicians which highlights several issues [Holbrook AM, Keshavjee K et al]:
  - i. computers do not cope well with uncertainty
  - ii. most details of prescribing are not supported by high quality evidence
  - iii. quality of care has many definitions depending on the stakeholders involved
  - iv. development work is tedious and requires multiple rounds of testing
  - v. dedicated clinical, methodologic and informatics expertise is required

## Summary

Although electronic health records offer great promise, they are expensive, require considerable training and support and currently do not readily support many quality of care initiatives. They are unlikely to enter the mainstream of Canadian health care until these disincentives are rectified. A coordinated effort towards data standardization, governmental cost sharing, implementation protocols, medical informatics training, health data privacy legislation, and clinical and policy decision support priorities, is key to addressing these current deficiencies.

## References

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