

# Best Practices in EMR Implementation: A Systematic Review

**K Keshavjee MSc, MD, MBA, CCFP<sup>1</sup>, J Bosomworth MD, CCFP, FCFP<sup>2,4</sup>, J Copen MD, FRCPC<sup>2,3</sup>, J Lai MD, CCFP, FCFP<sup>4</sup>, B Kucukyazici BA, MSc, PhD (candidate)<sup>5</sup>, R Lilani MBBS<sup>6</sup>, AM Holbrook MD, MSc, PharmD, FRCPC<sup>1</sup>**

<sup>1</sup>Centre for Evaluation of Medicines and McMaster University, Hamilton, Ontario <sup>2</sup>University of Victoria, Victoria, British Columbia, Canada, <sup>3</sup>Northern Ontario School of Medicine (Lakehead and Laurentian Universities), Thunderbay, Ontario, Canada, <sup>4</sup>University of British Columbia, Vancouver, British Columbia, Canada, <sup>5</sup>McGill University, Montreal, Quebec, Canada, <sup>6</sup>University of Buffalo.

**Abstract:** As experience with Electronic Medical Record (EMR) implementations increases, new knowledge is gained on how to make these implementations more successful. Recently, several new conceptual frameworks described in the literature provide a richer understanding of what makes an EMR implementation successful<sup>1,2</sup>. Using the systematic review process, we attempt to integrate the various frameworks into an over-arching framework that is comprehensive, yet pragmatic.

**Introduction:** Computerization of medical practices is an on-going reality. With increasing fiscal restraint and a greater demand by all stakeholders for demonstrated value, it is important to ensure that EMR implementations are successful. Currently, failure rates of EMR implementations are consistently high at over 50%.<sup>3</sup> This paper attempts to integrate multiple conceptual frameworks into a meta-framework that is an inclusive, yet pragmatic approach to EMR implementation.

**Methods:** A search of English language articles in MEDLINE, HealthStar, EMBASE and DARE was conducted from Jan 1, 1990 to May 31, 2006. Key terms included 'electronic medical records', synonyms and associated MeSH terms, and the text word 'implementation'. We used PubMed's 'related articles' option. Web sources for articles and papers were included by utilizing Google® Search Engine technology. Bibliographies of relevant articles were combed. Published abstracts and presentations from computers in medicine meetings (AMIA, IMIA, HIMSS and TEPR) were examined. Personal communication with recognized leaders in the field was used to complete the search for relevant articles. Included articles had to describe an actual implementation. Over 120 relevant articles were retrieved. Of these, 55 articles met inclusion/exclusion criteria.

**Approach:** We have developed a pragmatic conceptual framework that incorporates Ash et al's expert opinion matrix of success factors<sup>1</sup>, Berg's

socio-technical approach<sup>2</sup>, and several other frameworks.

Our integrative framework acknowledges the chronological nature of EMR implementations and considers 3 different stages of implementation: pre-implementation, implementation and post-implementation. The framework also acknowledges the people, process and technological issues inherent in technology implementations. We add a dynamic component to the model that allows for negotiation and dialogue as people, process and technology interact, taking into account the socio-technical aspects of change management.

Considerations in pre-implementation include choosing software carefully, involvement of multiple stakeholders, selling benefits and addressing barriers, early planning, project management, governance, and technology/usability factors. Implementation phase factors include data preload and integration with other systems, workflow redesign, training, implementation assistance, feedback and dialogue, and privacy and confidentiality considerations. Post implementation factors include presence of user groups, support, presence of a business continuity plan, and presence of ongoing incentives.

We will present preliminary results of our integrative approach, assessing over 50 EMR implementations in a variety of settings.

## References

1. Ash JS, Stavri PZ, et al. Principles for successful computerized physician order entry implementation. AMIA Annu Symp Proc. 2003;36-40.
2. Berg M. Implementing information systems in health care organizations: myths and challenges. Int J Med Inform. 2001 Dec;64(2-3):143-56.
3. Health information technology adoption in Massachusetts: costs and timeframe. Centre for Health Policy and Research [Online]. Accessed Mar 13, 2006; [www.umassmed.edu/healthpolicy/uploads/eHealthInformation.pdf](http://www.umassmed.edu/healthpolicy/uploads/eHealthInformation.pdf).