

## BEME Spotlight 29

### Educational interventions to improve the meaningful use of Electronic Health Records: A review of the literature

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#### Keywords

Electronic health record, implementation, educational intervention, training, meaningful use.

#### Headline conclusions

- Our review suggests that a combination of classroom training, computer-based training and feedback is most effective to improve meaningful use.
- Healthcare educators should take into account the differences in computer literacy among trainees; the intervention should be flexible with regard to when, where and at what pace the material is completed.
- However, more studies of high methodological quality with standardized outcome measures are needed to support general recommendations on how to optimize meaningful use in healthcare professionals.
- Therefore, the educational research field has to start using standardized educational protocols and assessment tools, allowing for reliable comparisons both within and between studies.
- Governments and other policymakers should invest significantly more in the funding of this research. We believe that this will pay off in terms of improved quality of care and patient safety as well as with respect to limiting the ever-rising costs of healthcare.

#### Review objective

To help educators and policymakers design evidence based educational interventions and training we summarized all evidence regarding the efficacy of different educational interventions to improve meaningful use of EHRs.

#### Background and context

Rising healthcare costs, inefficient delivery of care and unsatisfactory quality of patient care are problems faced by many governments of industrialized countries (Emanuel et al., 2012, Hass et al., 2012, Keehan et al., 2012, Vavken et al., 2012). The widespread implementation of Electronic Health Records (EHRs) is widely regarded as an essential component of government policies to address these problems (Watson, 2012).

Many western countries provided funding to support the implementation of (national) EHR systems. These tremendous government and hospital efforts will inevitably result in high adoption rates of EHRs (Blumenthal and Tavenner, 2010). However, now that the first cost-effectiveness results of countries and hospitals that successfully implemented the EHRs are published, it is becoming clear that the increased adoption of EHRs does not necessarily result in a reduction of healthcare costs or an increase in the quality of care. Indeed, the introduction of EHRs has been accompanied by an increase in medical errors and mortality in some settings (Koppel et al., 2005, Han et al., 2005, Sittig et al., 2006). There is widespread consensus among EHR experts that the inability of healthcare professionals to use the available EHRs in ways that contribute to healthcare improvements is an important factor that precludes the realization of the full potential of EHRs.

Therefore it is important that governments, hospitals or private companies provide education to stimulate meaningful use among healthcare professionals. Healthcare educators have the important task to develop and evaluate the effectiveness of educational interventions to improve meaningful use. However, the design of evidence based interventions is hindered by scarcity of primary studies and meta-analyses evaluating the effect of educational interventions on meaningful use.

## Review methodology

**Search Strategy:** We conducted searches in Medline, PsychINFO, ISI Web of Knowledge, EMBASE, Ovid, Eric and CINAHL for articles published from 2000-2012. Our first search strategy combined the search term "Electronic Health Record" and all its synonyms with the Boolean operator OR. The second search strategy combined the term "Educational intervention" and its synonyms, including the term training, with the Boolean operator OR. Finally, we combined the searches with the Boolean operator AND. This was translated for all databases, using the appropriate vocabulary. In addition, we hand-searched four medical educational journals. We identified a total of 4507 articles of which only eight studies met the in- and exclusion criteria (Stromberg et al. 2011, Kushniruket al. 2009, Lemmetty et al. 2009, McCain et al. 2008, Badger et al. 2005, Kirshner et al. 2004, Porcheret et al. 2004 and Lusignan et al. 2002).

**Inclusion and Exclusion Criteria:** We considered all studies published between 2000 and 2012 that used an educational intervention to improve EHR use in healthcare professionals providing direct patient care. Studies that did not use an educational intervention (i.e. pay for performance programs) and studies that included participants that did not provide direct patient care were excluded.

**Data Extraction:** An adjusted version of the BEME systematic review coding sheet was used by two teams of two reviewers to independently scrutinize the characteristics and methodological quality of the eight eligible studies. The reviewers used a five point scale to rate the evaluation methods, the strength of the findings, the appropriateness of the study design and their overall impression of the quality of the article. Discrepancies in coding were resolved by discussion, a third reviewer was involved if necessary. The study of Badger et al. did not specify a study design or a method for analyzing the results. Therefore, the results of this study could not be interpreted in a meaningful way and the study was excluded from this review. The studies included for final analysis were further classified according to type of intervention, Kirkpatrick level of evaluation, and research design of these studies.

**Data Synthesis:** The seven included studies are discussed as a mini case report in a narrative about reactions and learning of healthcare professionals to educational interventions and training.

## Implications for practice

Our review results suggest that classroom training with additional course material that healthcare professionals can complete in their own time is the most effective educational intervention. This can serve as a starting point for the design of future interventions. Future interventions have to take place in a research setting to generate more high quality data by using standardized outcome measures.

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