Effectiveness of continuing medical education

CRD summary
This review examined the effectiveness of continuing medical education, the comparative effectiveness of instructional designs and their impact on changing clinical practice outcomes. Most studies suggested that continuing medical education was effective in achieving and maintaining the objectives studied. The authors' conclusions were supported by the evidence, but their reliability was limited by poor quality and heterogeneous studies.

Authors' objectives
To examine the effectiveness of continuing medical education, the comparative effectiveness of instructional designs for continuing medical education, and their impact on changing clinical practice outcomes.

Searching
MEDLINE, EMBASE, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, DARE, PsycINFO and ERIC databases were searched for studies published in English from 1981. Thirteen journals were handsearched for articles published between February 2005 to February 2006.

Study selection
Studies that addressed a key question were eligible for inclusion. The questions that related to clinical effectiveness were: is there evidence that particular methods of delivering continuing medical education are more effective in imparting physician knowledge, changing attitudes and changing practice behaviour, acquiring skills or changing clinical practice outcomes; and do changes in knowledge, attitudes, skills, practice behaviour or clinical practice outcomes produced by continuing medical education persist over time (greater than or equal to 30 days). Studies had to include at least one of 16 educational techniques. A range of educational techniques and a diverse range of outcomes were reported in the included studies and these included: perceived parental demand for antimicrobial agents to treat paediatric respiratory illness; incidence of depression and mental illness/improvement in symptoms; medication compliance; arthritis pain; quality of practice; patient satisfaction; and smoking cessation.

Meeting abstracts, editorials, letters and commentaries, studies that did not include at least 15 fully trained physicians or in which less than 50% of the continuing medical education participants were fully trained physicians and there was not a separate analysis for fully trained physicians were excluded. Also excluded were studies that did not include training or education or did not evaluate educational activity, studies not conducted in the United States or Canada and studies that did not include data from a concurrent or historical comparison group or that involved quality improvement without an educational activity.

Studies were selected by two independent reviewers.

Assessment of study quality
Methodological quality of the clinical trials was assessed using a form based on the Jadad criteria (randomisation, blinding, withdrawals and drop-outs) to obtain a quality score out of 5. Validity assessment was performed by two independent reviewers. Differences were resolved by consensus.

Data extraction
The outcomes extracted were: the main outcome measure; type of objective; whether the learning objectives were met; qualitative summary of results; and the authors' conclusion. Data was extracted by one reviewer and checked by a second.

Methods of synthesis
The studies were combined in a narrative synthesis. Results pertaining to clinical outcomes were grouped according to continuing medical education, media methods, educational techniques and amount of exposure, and the short-term (less
than 30 days after educational intervention) and long-term effects of each of these. Tables of the primary studies were available for examination.

**Results of the review**
Thirty-nine clinical studies were included in the review (number of participants unclear). Twenty-eight studies had a control group.

Study quality overall was graded as low.

Fourteen studies found that continuing medical education intervention was associated with the desired effect on long-term clinical outcomes. Six studies reported direct measures of health status: arthritis pain and disability; depression; general health and function; emotional distress; and lost work due to back pain. Eight studies reported health behaviours or attitudes: percentage of patients taking medication; patient adherence with antibiotics; patients satisfaction with care; frequency of physician visits; hospitalisations; hospital length of stay; and smoking cessation rates. One study reported mixed results for the outcome quality of practice; 23 studies deduced no effect. There was no conclusive evidence regarding short-term effects of continuing medical education on clinical outcomes (four studies).

A print intervention was associated with improved adherence with beta-blocker use in one study that evaluated short-term effects of continuing medical education media methods on clinical outcomes.

Of the studies that evaluated long-term effects of continuing medical education media methods on clinical outcomes, one used an Internet-based continuing medical education achieved its objective. Twenty-two studies compared multiple media continuing medical education to control; four achieved their objective. Seven studies compared multiple media continuing medical education with single media continuing medical education; six achieved their stated aim, and they all found that multiple media continuing medical education was more effective than single media continuing medical education in improving clinical outcomes. Two studies that used print media did not achieve their objective.

Of the 15 studies that investigated short-term effects of continuing medical education educational techniques on clinical outcomes, one was compared with control; provision of educational readings was associated with increased use of beta blockers.

Three of five studies found that multiple simultaneous continuing medical education techniques were superior to the use of a single continuing medical education technique (reading). The authors reported that no conclusions could be drawn regarding the comparative effectiveness of single continuing medical education educational techniques or the differential effectiveness of specific educational techniques on long-term outcomes.

The authors reported that no conclusions could be drawn about the differential effectiveness of amount of continuing medical education exposure on short-term outcomes (one study) and that insufficient data were available to assess whether multiple continuing medical education exposures produced better clinical outcomes in the long-term than single exposure continuing medical education (seven studies).

Further results were available regarding key questions that did not address the clinical effectiveness outcomes of the continuing medical education intervention.

**Authors' conclusions**
Despite the generally low quality of the evidence, most studies suggested that continuing medical education was effective (at least to some degree) in not only achieving but also maintaining the objectives studied including improved clinical outcomes.

**CRD commentary**
The review addressed a clear research question with inclusion criteria for participants, intervention and study design and outcomes. Several relevant databases were searched. The authors did not report any attempt to find unpublished studies and studies published in languages other than English, which could have introduced publication and language biases. Only studies from North America were included and the results may not be generalisable to other types of healthcare systems. Validity assessment, data extraction and study selection were performed independently by two reviewers.
which reduced the possibility of reviewer error and bias. The authors assessed validity, but the tool used may not have been comprehensive considering the study designs assessed. The reliability of the authors' conclusions is uncertain in light of the poor quality and heterogeneous outcomes of the included studies.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that more randomised controlled trials of continuing medical education should be performed with measurement at multiple points of intervention. More standardised approaches to describe continuing medical education interventions, media techniques and exposure volumes should be developed. Emerging methods of continuing medical education that could be available to clinicians at the point of care should be examined. Future research should be based on a sound conceptual model of what influences the effectiveness of continuing medical education.

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