Computer-generated patient education materials: do they affect professional practice? A systematic review

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Authors' objectives
To assess the effect of computer-generated patient education materials (PEM) on health professional practice and on patient outcomes.

Searching
MEDLINE (from 1966 to 2000), EMBASE (from 1980 to 2000), CINAHL (from 1982 to 2000), Best Evidence (from 1991 to 2000), the Cochrane EPOC Register of trials (from 1966 to 2000), the Cochrane Controlled Trials Register (from 1947 to 2000) and the Science Citation Index (from 1987 to 2000) were searched. Details of the search strategy were presented. The reference lists of reviews were also examined. Publications in any language were eligible.

Study selection

Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and controlled trials were eligible for inclusion. The included studies lasted 1 or 2 years.

Specific interventions included in the review
Studies in which PEM were stored in or delivered by computer (including interactive packages) were eligible for inclusion. The information could be general or tailored to the individual patient, and could be delivered with or without the involvement of a health professional. The information could be delivered before, during or after a consultation. Simple patient reminders were excluded. The included studies were all based in primary care settings, and in all of the included studies patient-specific computer-generated PEM was provided as part of a multi-component intervention. The studies compared the following interventions:

- computer-generated coronary artery disease risk profile PEM given 2 weeks after the first consultation versus profile given at 3 months' follow-up;
- computer-generated reminder of cancer screening tests for patients and doctor plus booklet-based PEM versus usual practice; and
- patient-specific computer-generated PEM and chart reminders of the prevention of cancers of the breast, cervix, colon, rectum and oral cavity plus nurse liaison versus usual practice.

Participants included in the review
Studies of health professions who were responsible for patient care were eligible for inclusion. Studies of researchers who were not clinically responsible for the patients were excluded. The participants in included studies were general practitioners (GPs) or workers in primary care practices. In one study the participating physicians received a reduction in malpractice insurance.

Outcomes assessed in the review
Studies that reported objective measures of health care professional practice (primary outcome for the review) or patient outcomes were eligible for inclusion. Studies that did not report measures of effect of practice were excluded. The individual studies assessed the ratio of high-risk to low-risk patients seen at 3 months' follow-up and the change in proportion of eligible patients having cancer screening tests.

How were decisions on the relevance of primary studies made?
At least two reviewers scanned the abstracts, and full-text reports were obtained of all potentially relevant articles. At least two reviewers then selected the studies, with any disagreements resolved by discussion.
Assessment of study quality
Validity was not formally assessed, although some aspects of validity were mentioned in the text of the review. The authors do not state how the papers were assessed for validity, or how many reviewers performed the validity assessment.[A: Four authors agreed on study validity.]

Data extraction
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction. [A: At least two authors extracted data and resolved disagreements through discussion.]. The following information were tabulated: author and year of publication, sample size, study duration, study design, age of patients, details of intervention, and main outcomes assessed. To provide a summary of multiple results from each individual study, the Mann-Whitney statistic was calculated for dichotomous data and the Z-statistic was calculated for continuous data (see Other Publications of Related Interest nos.1-2).

Methods of synthesis
How were the studies combined?
A narrative synthesis was undertaken.

How were differences between studies investigated?
The mean Mann-Whitney statistic for each study was plotted on a graph with the size of the point proportional to the inverse of the variance.

Results of the review
Three RCTs were included (the sample sizes were reported in different units; see Results of the Review).

No study adequately described the methods used to allocate treatment.

Overall, the Mann-Whitney statistics indicated benefit from the intervention (range: 0.48 to 0.66; equivalent to a risk difference of -4 to +32%).

One RCT (253 GPs) found that PEM as part of a multi-component intervention significantly increased the proportion of high-risk coronary heart disease patients being reassessed at 3 months compared with low-risk patients (difference in ratio 0.46, 95% confidence interval: 0.08, 0.87). The RCT used a different unit for allocation and analysis; this can lead to an overestimation of the treatment effects. Over all outcomes, the Mann-Whitney statistics indicated benefit from the intervention (0.52; equivalent to a risk difference of 4%).

One RCT (40 GPs) found that PEM as part of a multi-component intervention significantly increased the completion rates for rectal examination, Papanicolaou smear, smoking assessment, smoking counselling and diet assessment (all P=0.05), and stool occult-blood test, pelvic examination and diet counselling (all P=0.01). It found no significant difference between the active intervention and control for the rate of uptake of sigmoidoscopy, breast examination and mammography. Over all outcomes, the Mann-Whitney statistic indicated benefit from the intervention (0.57; equivalent to a risk difference of 14%).

Patient outcomes: one RCT (58 primary care practices) found that PEM as part of a multi-component intervention significantly increased the uptake rates for breast screening mammography and clinical breast examination in women aged 50 years and older (P<0.05). It found no significant difference between the active intervention and control for the rate of uptake of screening for cancers of the cervix, colon, rectum and oral cavity. Over all outcomes, the Mann-Whitney statistic indicated benefit from the intervention (0.54; equivalent to a risk difference of 8%).

Authors' conclusions
Computer-generated PEM appears to slightly improve professional practice, but the small number of studies prohibits a
definitive conclusion.

**CRD commentary**
The review question was clear in terms of the study design, participants, intervention and outcome. A number of relevant databases were searched, no language restrictions were applied, and the procedure for selecting studies was described. No information was given on the procedures used to assess validity or to extract the data. Validity was not formally assessed, but some methodological flaws in the individual studies were highlighted. [A: At least two reviewers assessed validity and extracted data and this reduced the potential for bias and errors]. Relevant characteristics of the included studies were tabulated. The results from the individual studies were generally presented as the significance of Mann-Whitney tests, but the clinical significance of the results was not clear; reporting absolute percentages of patients for each outcome would have been more meaningful. A narrative synthesis was appropriate given the small number of studies. The conclusions were based on three studies. Hence, the evidence presented was very limited, as the authors correctly acknowledge.

**Implications of the review for practice and research**
Practice: The authors state that further evidence is required before purchasers invest in computer-generated PEM aimed at improving professional practice.

Research: The authors state that further good-quality research into the effect of computer-generated PEM on improving professional practice and the attitude of professionals towards PEM is required. They state that intervention studies should be well-defined and should be costed.

**Bibliographic details**

**PubMedID**
12087116

**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Humans; Medical Informatics Applications; Patient Education as Topic /methods; Primary Health Care; Primary Prevention; Professional Practice; Randomized Controlled Trials as Topic; Statistics, Nonparametric

**AccessionNumber**
12002001758

**Date bibliographic record published**
30/09/2003

**Date abstract record published**
30/09/2003
Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.