Diabetes patient education: a meta-analysis and meta-regression
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CRD summary
This review evaluated the effectiveness of patient education on glycaemic control in adults with diabetes. The authors concluded that educational interventions have a modest improvement in glycaemic control, while face-to-face delivery, cognitive reframing teaching and exercise content increase the likelihood of success. The lack of a validity assessment and details of the control interventions weaken this conclusion.

Authors’ objectives
To determine the effectiveness of patient education in adults with diabetes.

Searching
MEDLINE, CINAHL, HealthSTAR, ERIC, the Science Citation Index, PsycINFO and CRISP were searched from 1990 to December 2000 for studies published in the English language; the search terms were given. The web-based database of the American Association of Diabetes Educators was also searched.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
Studies of educational interventions delivered primarily in an out-patient setting were eligible for inclusion. Educational interventions were considered as those that used physical, intellectual or psychosocial means to improve a patients’ condition. The included studies used a variety of techniques including didactic teaching, dictated or negotiated goal setting, situational problem-solving and cognitive reframing. The content varied and included dietary, exercise, glucose self-monitoring, knowledge, medication adherence and psychosocial topics. The duration of the intervention ranged from 1 month to 1 year, and the number of sessions ranged from 1 to 36.

Participants included in the review
Studies of adults with diabetes were eligible for inclusion. The included studies were of participants with only type I diabetes or only type II diabetes, or either type I or type II. The age of the participants, where reported, ranged from 24.6 to 67.2 years.

Outcomes assessed in the review
Studies that reported pre- and post-intervention glycated haemoglobin (HbA1c) at least 12 weeks post-treatment were eligible for inclusion. The review assessed HbA1c the first time it was reported post-treatment in the included studies (range: 3 to 15 months in primary studies).

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity. However, they stated that only RCTs were included to assure the inclusion of higher quality studies.

Data extraction
Two independent reviewers extracted the data from each included study. Any disagreements were resolved by...
consensus. Pre- and post-intervention HbA1c values were extracted and used to calculate a net glycaemic change for each individual study. Data were also extracted on study characteristics, so as to identify variables associated with treatment success.

Methods of synthesis
How were the studies combined?
The studies were combined using fixed-effect (when no evidence of heterogeneity was found) and random-effects (if heterogeneity was found) meta-analyses. A pooled net change in HbA1c with 95% confidence intervals (CIs) at first point of measurement post-intervention was calculated, weighted by the inverse of the standard error of the difference between treatments. Separate analyses were performed for 3, 6 and 12 months post-intervention, where data allowed. Egger's test was used to investigate the possibility of publication bias.

How were differences between studies investigated?
Differences between the studies were assessed using Galbraith plots and statistical tests of heterogeneity. Meta-regression was used to investigate the effect of components of educational interventions on glycaemic control. The variables investigated were setting, type of delivery, content, teaching method, provider, tailoring of intervention, modifying the intervention during follow-up, and the intensity or dose of the intervention.

Results of the review
Twenty-one RCTs (n=2,439) reporting 28 educational interventions were included in the review.

The change in HbA1c was greater in the education group than the control (net change -0.32, 95% CI: -0.571, -0.069). There was no evidence of statistical heterogeneity (P=0.78) and no evidence of publication bias (Egger's test coefficient -0.88, P=0.12).

Analysis at different time points found that the change in HbA1c was significantly greater in the education group than the control at 24 weeks (net change -0.49, 95% CI: -0.92, -0.05), but not at 12 weeks (net change -0.29, 95% CI: -0.68, 0.09) or 52 weeks (net change -0.33, 95% CI: -0.76, 0.10) post-intervention.

There was a statistically significant drop in HbA1c from baseline at the first post-treatment measurement (-1.14, 95% CI: -1.48, -0.79). Significant statistical heterogeneity was found (P<0.001).

The meta-regression found that interventions that included face-to-face delivery (P=0.009), cognitive framing teaching method (P=0.028) and exercise content (P=0.038) were more likely to improve glycaemic control.

Authors' conclusions
Patient education interventions modestly improved glycaemic control in adults with diabetes. Interventions that included face-to-face delivery, cognitive reframing teaching and had an exercise content appear to have had an increased likelihood of reducing HbA1c.

CRD commentary
The review addressed a clear research question and used inclusion criteria that appeared appropriate. Several sources were searched for relevant studies, although inclusion was restricted to English language publications. However, the authors did not find any evidence of publication bias among the studies included in the analysis. The methods used to minimise selection bias were not reported, but methods were used to minimise reviewer error and bias in the data extraction process. However, the absence of a systematic quality assessment meant that it was not possible to assess the validity of the included studies on which the results were based.

The details of the interventions and results of the included studies were adequate, although there were no details on the content given to control participants. This is of importance as it is feasible that the control participants received some form of education, which thus makes it difficult to ascertain the full impact of the intervention relative to the control group. The methods used to combine the studies appear appropriate and differences across the studies were assessed.
The authors explored factors of educational interventions that were associated with a change in HbA1c from baseline. The authors’ conclusions seem likely to be reliable.

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

Practice: The authors stated that diabetes patient education could improve glycaemic control, and that the incorporation of specific domains could increase the likelihood of improvement.

Research: The authors did not state any implications for further research.

**Bibliographic details**


**PubMedID**

14729296

**Other publications of related interest**

This additional published commentary may also be of interest. Chyun DA. Review: patient education interventions improve glycaemic control in adults with diabetes mellitus. Evid Based Nurs 2004;7:79.

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

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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.