An evidence-based review of patient-centered behavioral interventions for hypertension
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Authors' objectives
To assess the independent and incremental effects of three commonly performed patient education-based behavioural interventions on blood-pressure (BP) control: counselling, self-monitoring and training courses.

Searching
MEDLINE, PsycINFO, CINAHL, HealthSTAR, Sociological Abstracts, Social Science Abstracts, Ei Compendex, and Current Contents were searched. The search terms were listed. In addition, the references of identified studies were reviewed and references were obtained from experts in hypertension. Only peer-reviewed articles published in English from January 1970 to July 1999 were included.

Study selection
Study designs of evaluations included in the review
No clear inclusion criteria were given. Studies of less than 50 patients (or less than 25 patients in each study arm) were excluded. It appears that only comparative studies were included: 'between intervention' studies (i.e. with a comparator group) and 'single intervention' studies where the comparator was not one of direct interest to the review. No other information about the study design was given, although some studies appeared to be randomised controlled trials.

Specific interventions included in the review
The interventions included counselling techniques, structured training courses and patient self-monitoring of BP. Counselling was defined as individual or group discussion and teaching with a personalised approach, set in a nonclassroom format in which individuals or group members might often share their personal experiences. Training courses were defined as curriculum-based courses, aimed at teaching several people at once, that were less personal than group counselling and usually occurred in a classroom setting with one or more curriculum leaders. BP self-monitoring was defined as BP monitoring performed by the patient at home.

The interventions were assessed separately or in combination. Comparisons (where appropriate) were with usual care. Nurses, physicians, pharmacists, social workers and counsellors were amongst those delivering the interventions. The length of each episode of the intervention varied between 5 and 90 minutes, while the number of sessions ranged from twice daily to seven sessions in 18 months. The duration of the studies ranged from 1.25 to 72 months. Studies that were centred primarily on diet and weight loss were excluded, as were efficacy studies for drug therapy for hypertension.

Participants included in the review
The inclusion criteria for the participants were not defined. The participants in the included studies were men and women with a mean age of 57 years; the mean percentage of white participants was 34%. In 13 of the 15 studies the participants were taking concomitant antihypertensive medications.

Outcomes assessed in the review
The outcomes assessed were diastolic or systolic BP (DBP and SBP, respectively), the difference in the change in DBP or SBP, the change in either DBP or SBP, and the percentage of participants with hypertension control at follow-up. The outcomes were assessed using a sphygmomanometer or by chart review. Studies without a clinical outcome were excluded.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.
Assessment of study quality
A 100-point scale was developed to describe the internal and external validity of the studies, as well as the reporting of important study characteristics. The scale was based on items such as population description, intervention design, outcome description, methods of analysis and reporting of results. Two reviewers independently extracted data on the quality of the studies. Two reviewers adjudicated differences in quality ratings until they came to an agreement.

Data extraction
Data were abstracted on the content, quality and outcomes of studies using a structured abstraction instrument. Six reviewers participated in the literature abstraction, with two reviewers independently abstracting data on each article. Two reviewers adjudicated on any differences. General information (e.g. study participant characteristics, setting and design) was abstracted, as well as more specific characteristics of the intervention (e.g. leader of intervention, length of each session, frequency of sessions, duration of the entire study, and the criteria used for BP control).

Variances in the individual study results were calculated from standard errors when provided, from p-values or reported t-test results for studies for which raw data were not available, using the largest p-value consistent with the published data for studies not reporting exact p values (e.g. p<0.05 was considered to be p=0.05). For differences between the treatment and control groups, if the raw data were not provided then pooled variance estimates were calculated as described by Greenland (reference given).

Methods of synthesis
How were the studies combined?
A meta-analysis were performed. To include all the evidence available to evaluate the interventions, the authors assigned a study type to each article for the purpose of statistical analysis: single-intervention group analysis (cohort) or between-intervention group analysis (comparative).

Single-intervention group analysis: if an article described a study comparing more than one intervention, but not all of the interventions met the eligibility criteria for the review, the authors abstracted information on only the intervention groups receiving the interventions of interest. The authors analysed the abstracted results as if the study was designed to evaluate only that intervention (with no companion or control groups available for comparison). Single-intervention groups were treated as small separate prospective studies, and the results were pooled to obtain the magnitude of BP improvement among single groups from the beginning to the end of each intervention.

Between-intervention group analysis: studies that had suitable comparison intervention groups (either usual care or one of the three interventions of interest) were incorporated into a separate analysis, which evaluated differences between the treatment and control groups. For each analysis the results were pooled across the studies using both fixed-effect and random-effects models. A subgroup analysis for articles focusing on counselling was performed by categorising articles by the year of publication, leader of intervention, duration of intervention, age of the participants, percentage of white participants, and quality scores of the articles.

How were differences between studies investigated?
For the between-intervention analysis, the chi-squared test was used to test for homogeneity.

Results of the review
Fifteen studies (4,072 participants) were included: ten for counselling (3,459 participants), one for self-monitoring (136 participants), one for training (123 participants) and four for a combination of interventions (477 participants). One study compared counselling with training and was analysed as two studies. Nine studies (3,411 participants) were analysed as single-group studies with no comparative group; there were six for counselling, one for monitoring and two for combinations of interventions. Seven were comparative studies (784 participants); there were four for counselling, one for training and two for combinations of interventions.

The quality scores ranged from 20.1 to 81.1 out of 100.
Counselling offered significant improvement over usual care (2 studies, n=109), a 3.2 mmHg improvement in DBP (95% confidence interval, CI: 1.2, 5.3) and an 11.2 mmHg improvement in SBP (95% CI: 4.1, 18.1). Random-effects analyses were carried out as heterogeneity was found; these results showed a 5.4 mmHg (95% CI: -3.1, 13.9) improvement in DBP over usual care. Groups receiving counselling had a 5.0 mmHg (95% CI: 2.7, 7.2) change in DBP and a 6.2 mmHg (95% CI: 2.4, 10.0) change in SBP. The proportion of participants that had BP control at follow-up after counselling was 51% (95% CI: 34, 66).

Self-monitoring: in one study self-monitoring resulted in an 8.9 mmHg (95% CI: 5.2, 12.6) reduction in DBP.

Training courses: one study compared training courses with usual care and counselling. Counselling was favoured over training courses (decrease in DBP of 10 mmHg, 95% CI: 4.8, 15.6). Sixty-four per cent (95% CI: 48, 77) of the participants in the training course group attained hypertension control. This was not significantly larger than the magnitude of control afforded by counselling. Combinations of interventions: the only combination that showed a significant improvement over a single intervention was counselling plus training (in one study 95% achieved hypertension control, 95% CI: 87, 99).

Authors' conclusions
The evidence suggests that counselling offers BP improvement over usual care, and that adding structured training course to counselling may further improve BP. However, there was insufficient evidence to conclude whether self-monitoring of BP or training courses alone offer consistent improvement in BP over counselling or usual care. The magnitude of BP reduction offered by counselling indicates this may be an important adjunct to pharmacologic therapy.

CRD commentary
The aims of this review were described, but the inclusion criteria for study type were not defined clearly. The search strategy appeared comprehensive for English studies. The authors included studies of different design, but there was no clear description of the methodology of the included studies. Single arms from some studies were included in the analyses when the comparative group did not fit the inclusion criteria. Some studies appear to have been included in single- and between-group analyses. A quality assessment was carried out, but none of the studies appear to have been excluded despite the relatively low quality scores (20 out of 100 possible points). It would have been useful to have conducted a separate analysis of any included randomised controlled trials. Information about the participants in the included studies was missing (including the degree/severity of hypertension). This may affect the generalisability of the results. Overall, there was a lack of clarity regarding the designs of the studies included and in the reporting of the statistical methods and results. Thus, it is difficult to appraise the review. In addition, the results indicated that the authors' conclusions may not be valid.

Implications of the review for practice and research
Practice: The authors state that behavioural interventions can play an important role in improving BP management. The evidence supports counselling as an effective technique to further lower BP beyond the benefit afforded by medication alone.

Research: The authors state that there is a clear need for more focused research that addresses individual interventions separately. Improvements in descriptions of interventions (e.g. the leader of the intervention, the precise content of counselling, the length and duration of the interventions) as well as the provision of more standardised reporting mechanisms for outcomes will further strengthen the existing evidence for patient-centred interventions for hypertension.

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