CRD summary
The authors concluded that pharmacist interventions improved blood pressure control in out-patients, compared with usual care. This was a well-conducted review and the authors’ conclusions reflect the evidence presented, but the significant differences between trial effects should be borne in mind when interpreting the findings. Generalisability to the UK is uncertain.

Authors' objectives
To assess the effect of pharmacist interventions on blood pressure, by updating and combining data from two previous systematic reviews.

Searching
MEDLINE, EMBASE, CINAHL, and Cochrane Central Register of Controlled Trials (CENTRAL) were searched in September 2013; search terms were reported in the two original systematic reviews (see Other Publications of Related Interest).

Study selection
Randomised controlled trials (RCTs) were eligible for inclusion if they assessed interventions delivered by a pharmacist alone or in combination with other health care professionals, and compared them with usual care. Participants had to be adult out-patients who had any modifiable cardiovascular risk factor (hypertension, dyslipidaemia, diabetes, smoking, or obesity). Weighted mean differences in systolic or diastolic blood pressure had to be reported.

In the included trials, interventions took place in out-patient clinics or community pharmacies. They were patient education and counselling about lifestyle, medication and adherence; feedback to a health care professional; medication management; measurement of blood pressure, hypertension staging and risk stratification; a reminder system (telephone, web services, home visits or drug adherence system); or health care professional education. Sessions were monthly or more frequent in over a third of trials. In most trials, pharmacists led the intervention; in trials of collaborative care, the teams consisted of various combinations of pharmacist, physicians, nurses and dieticians. The mean follow-up was 8.3 months (range three to 13). The mean age of participants ranged from 48 to 77 years, and just over half of them were women. Most trials were conducted in the USA or Canada.

In the two original reviews, trials were selected by two reviewers independently; while it was not explicitly stated, this is likely to have been the case for this update.

Assessment of study quality
The Cochrane risk of bias tool was used to assess trial quality across six domains: random sequence generation, allocation concealment, blinding of outcome assessors, completeness of outcome data, selective outcome reporting, and other potential bias. A study was high quality if judged to be at a low risk of bias for four or more domains.

Two reviewers independently assessed trial quality.

Data extraction
Weighted mean differences in systolic and diastolic blood pressure, between intervention and control groups, were extracted.

In the two original reviews, the data were extracted by two reviewers independently; this was not explicitly stated, but was likely to be the case for this update.

Methods of synthesis
Pooled weighted mean differences, with 95% confidence intervals, were calculated using a random-effects model. In cases of substantial heterogeneity (not defined), 95% prediction intervals were also calculated. Heterogeneity was assessed using $I^2$. Publication bias was evaluated in funnel plots and the Egger test.

Several subgroup analyses were planned, including out-patient clinic versus community pharmacy, diabetic versus non-diabetic participants, and pharmacist-led versus collaborative care.

**Results of the review**

Thirty-nine RCTs (14,224 patients) were included; 31 of the 45 trials included in the original two reviews adequately reported blood pressure, and the updated searches identified eight new trials. Overall, trial quality was moderate, with 16 trials considered to be of high quality.

Pharmacist interventions were associated with a reduction in systolic (-7.6mmHg, 95% CI -9.0 to -6.3; 95% PI -13.9 to -1.4; 39 RCTs; $I^2=67\%$) and diastolic (-3.9mmHg, 95% CI -5.1 to -2.8; 95% PI -9.9 to 2.0; 36 RCTs; $I^2=83\%$) blood pressure. The effect was consistent when the analysis was restricted to high quality and larger trials.

Pharmacist-led care was associated with a larger effect than collaborative care on systolic and diastolic blood pressure; the difference only reached statistical significance for systolic blood pressure. Interventions delivered in community pharmacies and interventions delivered monthly or more frequently were associated with larger effects. No differences between groups were observed by country, type of intervention, and inclusion of people with diabetes. Heterogeneity remained substantial within the subgroup analyses.

Funnel plots indicated potential publication bias.

**Authors' conclusions**

Pharmacist interventions, delivered alone or in collaboration with other health professionals, improved blood pressure control in out-patients, compared with usual care. Interventions had differing effects, from very large to modest to none, and the reasons for these differences could not be identified.

**CRD commentary**

The review question and inclusion criteria were clear. Several databases were searched. No language restrictions were applied in the original two reviews; it was unclear whether this was the case for this update. Unpublished trials were not sought and a risk of publication bias was identified by standard methods.

Appropriate methods were used to minimise bias and error in the original two reviews and, while not explicitly stated, it is likely that these were used for this update. Trial quality was assessed and was used to inform the synthesis. Heterogeneity was explored in subgroup and sensitivity analyses.

This was a well-conducted review and the authors' conclusions reflect the evidence presented. As the authors highlighted, the significant differences between trial effects should be borne in mind when interpreting the findings. None of the included trials was conducted in the UK, so generalisability of the results to the UK is uncertain.

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

**Practice:** The authors stated that, given the large variation between trials, it was difficult to predict the effect size when implementing any intervention.

**Research:** The authors stated that comparative effectiveness trials, with a long follow-up, were needed to determine the most efficient, easy to implement and cost-effective, and least time-consuming intervention for improving blood-pressure control.

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**Bibliographic details**


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Linked records

- Impact of pharmacist care in the management of cardiovascular disease risk factors: a systematic review and meta-analysis of randomized trials
- Pharmacist interventions to improve cardiovascular disease risk factors in diabetes: a systematic review and meta-analysis of randomized controlled trials

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Other publications of related interest


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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.