Pharmacist services provided in general practice clinics: a systematic review and meta-analysis
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CRD summary
This review concluded that pharmacists, located in primary care general practices, delivered a range of interventions with favourable results for chronic disease management and quality use of medicines. This was a reasonably well-conducted systematic review and the conclusions are likely to be reliable, but they may be overstated.

Authors' objectives
To assess the effectiveness of clinical pharmacist services delivered in primary care, general practice clinics.

Searching
MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL) and International Pharmaceutical Abstracts were searched in May 2013; search terms were reported. Searches were restricted to randomised controlled trials (RCTs) reported in English. Conference abstracts were excluded. The reference lists of identified trials and relevant reviews were searched.

Study selection
Eligible for inclusion were RCTs of an intervention that included a pharmacist delivering clinical (non-dispensing) services, to improve prescribing or medication use or both, for patients attending a general practice clinic. The pharmacist had to have a regular and ongoing relationship with the clinic, and be present at the clinic for all or part of the intervention. Trials had to assess the appropriateness of prescribing, medication use, health service use, or clinical, functional, practice or economic outcomes. Trials of interventions that did not target individual patients, such as group education sessions, and those that did not report an a priori sample size calculation and included fewer than 50 people per group, were excluded from the review.

The included trials were conducted in the USA, UK, Canada, South America or Asia. Most trials included patients with specific medical conditions, such as cardiovascular disease, diabetes or depression; others included patients receiving multiple medications, at least one medication, or at risk of medication or adverse health problems, or any general practice patients. Most pharmacist interventions were medication review, either face-to-face with the patient, or using medical records. Other interventions were education, adherence assessment, physical assessment, and administering therapy. Communication between pharmacists and general practitioners was verbal in most trials; in others it was written, or not specified.

One reviewer assessed titles and abstracts of identified studies for eligibility. Two reviewers independently assessed full articles, and disagreements or uncertainties were resolved by discussion with all four authors.

Assessment of study quality
The quality of the included RCTs was assessed, using the Cochrane risk of bias tool, for randomisation, concealment of allocation, blinding of outcome assessment and completeness of outcome reporting. Blinding of participants and those delivering the intervention was not possible, so these were not assessed. Trial authors were contacted to clarify details, if required.

The authors did not report how many reviewers assessed trial quality.

Data extraction
Two reviewers independently extracted the sample sizes, means and standard deviations, using a standardised form. If these data were not reported, other data, such as probabilities, were recorded, where possible.

Methods of synthesis
Where two or more trials reported a similar primary outcome, random-effects meta-analysis was used to pool the mean
differences and 95% confidence intervals. Heterogeneity was quantified using $I^2$.

**Results of the review**

Thirty-eight RCTs were included, and 17 provided data for meta-analysis. Most trials described appropriate randomisation processes, reported outcomes according to the study protocol, and used an intention-to-treat analysis or reported attrition and exclusions or both. Around half of the trials described adequate methods to conceal allocation from outcome assessors. Out of 5 for quality assessment, 10 trials scored 5, 12 scored 4, nine scored 3, six scored 2, and one scored 1.

The pharmacist intervention had positive outcomes in 19 trials, mixed outcomes (some positive, some not) in six trials, and no significant effect in 13 trials. Positive effects were seen for medication adherence, resolution of medication-related problems and indicators of quality of life. There were limited or no effects on outcomes relating to symptoms, quality of life, patient satisfaction and medical costs.

For patients allocated to the pharmacist intervention, there was a statistically significant reduction in systolic (MD -5.72mmHg, 95% CI -7.05 to -4.39; 11 RCTs; $I^2=37.5\%$) and diastolic (MD -3.47mmHg, 95% CI -4.35 to -2.58; 10 RCTs) blood pressure. There was a statistically significant reduction in glycosylated haemoglobin (MD -0.88, 95% CI -1.15 to -0.62; five RCTs; $I^2=0\%$). Statistically significant improvements were seen for low-density lipoprotein (LDL) cholesterol and total cholesterol, but there was significant statistical heterogeneity (three RCTs, $I^2=77.4\%$ for LDL and 53.9% for total). There was a statistically significant reduction in 10-year Framingham risk score (MD -1.83%, 95% CI -3.66 to -0.00; two RCTs; $I^2=40.5\%$).

**Authors’ conclusions**

Pharmacists, located in primary care general practice clinics, delivered a range of interventions, most commonly medication review, with favourable results for chronic disease management and quality use of medicines.

**CRD commentary**

The review question and inclusion criteria were clearly stated. The search was limited to trials reported in English and conference abstracts were excluded – some relevant trials may have been missed. Appropriate methods to reduce error and bias were used for the selection of full articles and data extraction, but it was unclear if these methods were used for quality assessment.

Trial quality was assessed using appropriate criteria and the full results were reported; most trials were good quality. The synthesis appears to have been appropriate, including the brief narrative synthesis and meta-analysis where two or more trials reported a similar primary outcome. Some details were presented for all the included trials, but sample sizes, control groups and the full results were not presented.

This was a reasonably well-conducted systematic review and the conclusions are likely to be reliable, but they may be overstated, as there was no significant favourable effect for some outcomes.

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

**Practice:** The authors stated that locating pharmacists within general practices could be effective for the delivery of patient-centred interdisciplinary medication services, especially for patients with cardiovascular disease or diabetes. More support was needed, in the infrastructure, integration into the team, and sustainable funding, for the widespread adoption of pharmacists into general practices.

**Research:** The authors recommended research using outcome measures, such as hospitalisation and mortality, to confirm the benefits for patients and practitioners, as well as cost-effectiveness. They recommended adequately powered, multi-centre, cluster randomised trials, with sufficient follow-up, blinding of outcome assessment, objective outcome measures and explicit reporting of quality criteria, particularly allocation concealment.

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