A systematic review and meta-analysis of pharmacist-led fee-for-services medication review
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CRD summary
The authors concluded that fee-for-service pharmacist-led medication review services were beneficial on patient outcomes, specifically achieving clinical biomarkers (such as blood pressure and lipid targets) and improving hospitalisation rates. Although the evidence base was fairly substantial, potential for bias in the review process and considerable uncertainty in the findings suggest the authors’ conclusions may not be reliable.

Authors’ objectives
To assess the effects of fee-for-service pharmacist-led medication review on patient outcomes.

Searching
MEDLINE, EMBASE and IPA databases were searched from inception to February 2011. A learning-based search algorithm was used. Search terms were reported.

Study selection
Eligible studies were randomised controlled trials (RCTs) and non-RCTs (quasi-RCTs, before-and-after studies and controlled cohort studies) that assessed fee-for-service medication review (as defined in the review) in usual settings. Medication review had to form part of pharmacists’ usual services and be conducted in a pharmacy, patients’ homes, community health centres or GP clinics. Eligible trials had to compare medication review to usual care. Primary outcomes included hospitalisation and mortality, clinical biomarkers and markers of disease progress. Secondary outcomes included medication adherence, economic implications and quality of life. Trials in paediatric patients or patients unable to give consent were excluded from the review.

Most of the included studies were conducted in USA; others were in Canada, Europe (including seven UK studies) or Australia. Where reported, the mean age of patients ranged from 35.2 to 84.5 years. Medication review services included disease-specific interventions for patients with asthma, diabetes, hypertension, hyperlipidaemia, chronic disease and other conditions (such as stroke). Other services focused on interventions in the elderly, patients newly discharged from hospital or patients using multiple medications. Outcomes were measured using various methods.

A single reviewer screened studies for inclusion; where there was any uncertainty all four reviewers assessed the study. Excluded full-text articles were independently reviewed by all four reviewers and any disagreements resolved through consensus.

Assessment of study quality
Trials were assessed for risk of bias in accordance with Cochrane Collaboration guidelines.

The authors did not explicitly state how many reviewers assessed trials for risk of bias.

Data extraction
Success or failure in achieving primary outcomes were extracted and odds ratios and 95% confidence intervals were estimated. Where continuous outcomes (such as blood pressure) were reported as means and standard deviations, success in achieving targets were calculated if the data could be assumed to be normally distributed (as defined in the review). Secondary outcome data were extracted.

The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
Primary outcome data were pooled using a random-effects model where at least four trials reported these outcomes. Statistical heterogeneity was assessed using the X² test and I² statistic. Secondary outcomes were presented as a narrative synthesis due to differences between the studies.
Separate analyses were performed by type of medication review: adherence support, clinical medication review or clinical medication review and prescribing (as defined in the review). Subgroup analyses were performed by type of study design (RCT versus RCT and non-RCT). Sensitivity analyses were performed by removing one study at a time to assess the robustness of the results.

Publication bias was assessed using funnel plots, the Begg-Mazumdar statistic, classic fail-safe N and the trim-and-fill method.

**Results of the review**

Thirty-six studies were included in the review. Where reported, study sample sizes ranged from 40 to 7,018 participants. All studies were at risk of some bias.

**Primary outcomes**: There were 13 RCTs (five cluster RCTs), seven prospective cohorts and one retrospective cohort study.

Fee-for-service medication reviews were statistically significantly more successful compared to usual care in achieving target blood pressure (OR 3.50, 95% CI 1.58 to 7.75; six studies) and low density lipoprotein levels (OR 2.35, 95% CI 1.17 to 4.72; four studies). There were no statistically significant differences between treatment groups for hospitalisation and mortality. There was evidence of statistical heterogeneity for all outcome measures (I²=61 to 82%).

Subgroup analyses according to type of intervention showed a statistically significant reduction in hospitalisation rates in patients who received clinical medication review (OR 0.46, 95% CI 0.26 to 0.83; six studies; significant heterogeneity I²=53%). There were no significant differences between adherence support reviews and usual care. Subgroup analyses by study design did not significantly alter the findings except for hospitalisation in participants who received clinical medication review; findings were no longer significant when only RCTs were included. Other subgroup and sensitivity analyses findings were reported in the review.

**Secondary outcomes**: There were 32 studies. Eleven out of 19 studies (57.9%) reported a statistically significant improvement in adherence to medication with fee-for-service medication reviews. Findings for quality of life and economic outcomes were mixed.

There was evidence of publication bias for all outcomes according to funnel plots, Begg-Mazumdar and classic file-safe N but the authors did not consider that this would have a major impact on the findings.

**Authors' conclusions**

Fee-for-service pharmacist-led medication review services were beneficial on patient outcomes, specifically the achievement of clinical biomarkers (such as blood pressure and lipid targets) and improving hospitalisation rates.

**CRD commentary**

The review question and supporting inclusion criteria were clearly defined in the review. Appropriate sources were searched for relevant articles but only published studies were included in the review. There was some evidence of publication bias using various assessment methods. Screening of studies was performed in duplicate; this did not appear to be the case for data extraction and risk of bias assessment so reviewer error and bias could not be ruled out. All studies appeared to be at some risk of bias.

Primary outcomes were combined in meta-analyses. Secondary outcomes were presented as a narrative synthesis due to differences between studies. There was evidence of statistical heterogeneity for all primary outcomes, which questions whether meta-analysis was appropriate. It was unclear what impact converting continuous outcomes to dichotomous outcomes may have had on the overall findings. Confidence intervals were wide for some primary outcomes, which questions the robustness of the findings. The authors suggested that care should be taken when interpreting the results of the subgroup analyses. The authors acknowledged some limitations in combining primary outcome results (reported in the review) and such cautions should be heeded.

Although the evidence base was fairly substantial, potential for bias in the review process and considerable uncertainty in the findings suggest the authors’ conclusions may not be reliable.
Implications of the review for practice and research

Practice: The authors stated that health care providers needed to recognise the impact of different types of medication review on patient outcomes.

Research: The authors stated that further research was needed to directly compare the effects of different types of medication review on patient outcomes.

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