Pharmaceutical care services: a systematic review of published studies, 1990 to 2003, examining effectiveness in improving patient outcomes

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CRD summary
The aim of this review was to assess the effects of pharmaceutical care services on patient outcomes. Although there appeared to be some improvement in medication use and some intermediate outcomes, the primary studies did not consistently report the same measures of effect. The authors appropriately concluded that future studies should focus on outcomes relevant to this type of intervention.

Authors' objectives
To assess the effects of pharmaceutical care services on patient outcomes.

Searching
Electronic databases including MEDLINE (from 1990 to 2003), International Pharmaceutical Abstracts (from 1990 to 2003), Australasian Medical Index (from 1990 to 2003), Current Contents (from 1998 to 2003) and the Cochrane Library (Issue 4, 2003) were searched for studies published in English; the search terms were reported. The reviewers also examined the reference lists of papers retrieved by the search, as well as several systematic reviews of pharmacist services. Only full papers were included in the review.

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 pharmaceutical care services were eligible for inclusion. The intervention had to be provided by a pharmacist in the community, hospital out-patient or ambulatory care setting. The service had to include a one-to-one consultation with the patient (focusing on management of health and resolution of medication-related problems), development of a care plan, and follow-up consultation. The following services were excluded from the review: medication review services that did not include a one-to-one consultation with the patient; services provided by a multidisciplinary team, where the pharmacist's contribution could not be separated from that of other health professionals; and continuity of care services, which may have involved the elements described above, but were conducted at the hospital to community interface. In all of the studies included in the review, the comparison group received usual or standard care.

Participants included in the review
Studies conducted in patients at high risk of medication-related problems, and with specific medical conditions or risk factors for disease, were eligible for inclusion. Several of the included studies focused on a general population, sometimes restricted to elderly patients, with risk factors for medication-related problems. Risk factors included the number of medications taken. Other studies involved patients with specific diseases, including asthma, heart failure, diabetes and chronic obstructive pulmonary disease (COPD), or focused on patients who required management of risk factors for disease, such as hypertension or cholesterol.

Outcomes assessed in the review
To be included in the review, the studies had to assess at least one of the following patient outcomes: hospital admissions, adverse events, mortality, quality of life, symptoms, medication knowledge, changes in the quality of medication use, or surrogate outcomes (such as blood-pressure, cholesterol or blood glucose). Studies that only assessed patient or physician satisfaction with the pharmaceutical care service were excluded, as were studies that only measured overall changes in medication use or compliance, without assessing how this affected patient outcomes. The studies in the review measured a range of outcomes: quality of life (using a variety of standard and disease-specific
questionnaires), medication-related problems, adverse drug effects, disease symptoms, days of illness, absence from work or school, use of health resources, medication use, resolution of pharmaceutical issues, knowledge, compliance and surrogate outcomes (such as blood-pressure, glycosylated haemoglobin, blood glucose, cholesterol and peak expiratory flow rate). The length of follow-up ranged from 3 to 18 months.

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
Studies were rated according to a hierarchy of designs, with RCTs rated as 1++ if there was a very low risk of bias, 1+ if there was a low risk of bias, or 1- if there was a high risk of bias. The reviewers also stipulated that for studies to be included in the review, there had to be evidence that the implementation of the intervention was successful, in that pharmaceutical care services were provided to the majority of patients in the sample. Two reviewers independently assessed validity, with any disagreements being settled by discussion.

Data extraction
Two reviewers extracted the data. The reviewers appear to have extracted the results as reported in the primary studies, with information on effect sizes and statistical significance.

Methods of synthesis
How were the studies combined?
Details of the studies were presented in separate tables for each outcome. Within each table, studies were grouped according to the type of participants. The studies were also discussed in a narrative synthesis, grouped as in the tables.

How were differences between studies investigated?
The reviewers provided a qualitative description of differences between the studies in terms of patient characteristics, settings and how the outcomes were assessed.

Results of the review
Twenty-two RCTs were included in the review. The number of patients was not reported for all studies, but it was over 6,900.

Twelve studies were graded as 1+ and ten as 1-.

Quality of life (16 RCTs): 5 studies reported statistically significant differences between the intervention and control groups. In the subgroup of patients with asthma (4 RCTs), 3 studies reported a statistically significant difference in asthma-specific quality of life.

Combined all-cause mortality and nonfatal disease specific events (1 RCT): there were fewer events in the intervention group than in the control group, and this was statistically significant.

Adverse drug events (4 RCTs): all of the studies were conducted in a general patient population. One study used a validated questionnaire and found that significantly more patients in the intervention group showed an improvement than in the control group. In 3 further studies using patient self-reports, there were no significant differences between the intervention and control groups.

Disease symptoms (4 RCTs): improvements in symptoms were reported in two of the 3 studies in patients with asthma. No statistically significant difference was found between groups in a trial conducted in patients with COPD.

Days of illness (4 RCTs): all studies assessed patients with asthma. One study reported that the intervention reduced days of illness, while three found no significant difference between groups in the number of days absent from work or school.
Health resource use (9 RCTs): of the 4 studies conducted in general patient populations, only one found that the intervention had a statistically significant effect, reducing hospitalisation and emergency department visits. Only one of 4 trials in patients with asthma found a statistically significant reduction in hospitalisations. A further trial reported statistically significant reductions in resource use in patient groups with COPD and hypertension.

Surrogate outcomes (12 RCTs): of the 4 studies assessing patients with diabetes, two found statistically significant improvements in glycosylated haemoglobin in the intervention group. Five studies assessing patients with hypertension showed improvements in blood-pressure in the intervention group. Of the 4 studies conducted in patients with asthma, only one showed a significant beneficial effect of the intervention on peak expiratory flow rate. Three studies assessed lipid levels, with two showing a significant beneficial effect of the intervention.

Medication use (11 RCTs): six of the 9 studies assessing changes in medication use found significant improvements in the intervention group, and 2 studies reported improvements in the appropriateness of medication use. In a further study, the intervention group had a significant reduction in pharmaceutical care issues when compared with the control group.

Knowledge (6 RCTs): 4 studies found that the intervention group showed improved knowledge in comparison with the control group.

Compliance (9 RCTs): 2 studies reported improvements in compliance rate in the intervention group compared with the control group. A further study found that a higher proportion of patients in the intervention group who were non-compliant at baseline had improved compliance at follow-up.

Improvements in disease management (3 RCTs): 2 studies in asthma patients found improvements in inhaler technique, while one in patients at high risk of cardiovascular events found that significantly more of the intervention group had improved cholesterol risk management.

Authors' conclusions
There is evidence that pharmaceutical care services improve medication use and surrogate end points such as blood-pressure, cholesterol levels and glycosylated haemoglobin, but evidence for improvements in other outcomes is inconclusive.

CRD commentary
This review addressed a question that was well defined in terms of the participants, intervention, outcomes and study designs of interest. The authors searched several databases and reported the search terms and dates. Since unpublished research and non-English language papers were excluded from the review, some relevant studies might have been missed. Details of how the papers were selected for the review were lacking, therefore the potential for bias in this process cannot be assessed. Two reviewers performed both the validity assessment (independently) and data extraction, which helps to minimise reviewer errors and bias. Study quality was assessed using a hierarchy, but the reviewers did not provide full details of the factors used to grade the studies. The use of a hierarchy also makes it impossible for the reader to determine which individual quality items were present or lacking in each study.

Details of all but one of the included studies were tabulated. The narrative synthesis was appropriate as there were significant differences between the primary studies. The authors discussed differences in the study results, and attempted to relate these to differences in patient characteristics or outcome assessment. They also highlighted some methodological weaknesses in the primary studies. The possible effects of publication and language bias on the results of the review results were not considered. The authors' conclusions seem appropriate in view of the evidence presented.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that future studies assessing pharmaceutical care services should use blinded outcome assessment and ensure that different pharmacists deliver the intervention and comparator. The outcomes to be assessed
should be decided by consensus, and outcome measures should be used consistently. The authors suggested that adverse drug events and the resolution of medication-related problems should be used as the outcome measures, as these reflect the main focus of the provision of pharmaceutical care services. Furthermore, researchers should pay attention to the skill of pharmacists and the method of implementation as these may affect the study results. Future research should focus on obtaining optimum service delivery and uptake across multicentre trials, and targeting services to patients who need and will benefit from the intervention.

Bibliographic details

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Record Status
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.