This is an author produced version of *Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice*.

White Rose Research Online URL for this paper: http://eprints.whiterose.ac.uk/4911/

**Article:**

https://doi.org/10.1136/bmj.323.7325.1340
Primary care

Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice

Arnold G Zermansky, Duncan R Petty, David K Raynor, Nick Freemantle, Andy Vail, Catherine J Lowe

Abstract

Objective To determine whether a pharmacist can effectively review repeat prescriptions through consultations with elderly patients in general practice.

Design Randomised controlled trial of clinical medication review by a pharmacist against normal general practice review.

Setting Four general practices.

Participants 1188 patients aged 65 or over who were receiving at least one repeat prescription and living in the community.

Intervention Patients were invited to a consultation at which the pharmacist reviewed their medical conditions and current treatment.

Main outcome measures Number of changes to repeat prescriptions over one year, drug costs, and use of healthcare services.

Results 590 (97%) patients in the intervention group were reviewed compared with 233 (44%) in the control group. Patients seen by the pharmacist were more likely to have changes made to their repeat prescriptions (mean number of changes per patient 2.2 v 1.9; difference = 0.31, 95% confidence interval 0.06 to 0.57; P = 0.02). Monthly drug costs rose in both groups over the year, but the rise was less in the intervention group (mean difference £4.72 per 28 days, –£7.04 to £2.41); equivalent to £61 per patient a year. Intervention patients had a smaller rise in the number of drugs prescribed (0.2 v 0.4; mean difference –0.2, –0.4 to 0.1). There was no evidence that review of treatment by the pharmacist affected practice consultation rates, outpatient consultations, hospital admissions, or death rate.

Conclusions A clinical pharmacist can conduct effective consultations with elderly patients in general practice to review their drugs. Such review results in significant changes in patients’ drugs and saves more than the cost of the intervention without affecting the workload of general practitioners.

Introduction

Over 80% of drugs prescribed by general practitioners in the United Kingdom are repeat prescriptions—that is, they are represcribed without a consultation between the doctor and the patient. Repeat prescribing is poorly managed in the United Kingdom.1 In 1994, the Audit Commission suggested that the review of long term treatment might be inadequate.2 Zermansky subsequently found that 72% of repeat prescriptions sampled in 50 practices had not been reviewed in the past 15 months.3 He concluded that this is potentially both wasteful and dangerous. Purves and Kennedy expressed concern about the variation in the quality of review between practices.4

The Royal College of Physicians and the recent National Service Framework for Older People emphasise the need for regular review of treatment for elderly patients.5 6 In view of the increasing workload of general practitioners, it has been proposed that pharmacists should review patients. Several North American trials have shown the benefits of pharmacists reviewing long term prescriptions in community practice.7 11 In the United Kingdom, two limited randomised controlled trials suggest that regular review of treatment by pharmacists identifies more drug related problems than normal care.12 13

We tested whether pharmacists can effectively review the conditions and treatments of elderly patients in consultation with the patient.

Participants and methods

Design

The study was a stratified randomised controlled trial and was approved by local research ethics committees. We calculated the sample size on the secondary outcome measure of cost of repeat drugs. This was because we expected the primary outcome, number of changes over 12 months, to show larger differences. The predicted difference in costs was £24 per patient a year, based on a previous study.14 We needed a sample size of 600 per group to give 80% power to detect a cost difference at the 5% significance level with a possible 15% loss to follow up.

Selection criteria and randomisation

We recruited general practices by randomly selecting them from a list of all practices in Leeds Health Authority with four or more partners, computerised repeat prescribing, no previous or current clinical pharmacist involvement, and prescribing costs close to average. We approached practices in random order
Clinical medication review
Clinical medication review is the process where a health professional reviews the patient, the illness, and the drug treatment during a consultation. It involves evaluating the therapeutic efficacy of each drug and the progress of the conditions being treated. Other issues, such as compliance, actual and potential adverse effects, interactions, and the patient's understanding of the condition and its treatment are considered when appropriate. The outcome of the review will be a decision about the continuation (or otherwise) of the treatment.

Intervention
The pharmacist (DRP) invited patients to his clinic when their next review was due. Patients with no review date were invited to attend when convenient. Immobile patients were visited at home. Non-attenders were invited once more by telephone.

The intervention has been described previously and is summarised as an algorithm (fig 1).

Usual care
Patients in the control group continued to receive normal care from their general practitioner and primary healthcare staff. Patients were recalled for review of treatment by the general practitioner according to normal custom in the practice.

Outcome measures
The primary outcome measure was the number of changes to repeat prescriptions between baseline (June 1999) and the end of the 12 month study (June 2000).

The secondary outcome measures were changes in number and cost of medicines and frequency of dose and effect on healthcare workload (general practitioner consultations, hospital outpatient attendances, and acute admissions).

Collection of data
As well as the age and sex of patients, we recorded number of repeat prescriptions, number of times doses were taken a day, and net ingredient cost of 28 days' supply (based on Drug Tariff and Monthly Index of Medical Specialities for December 1998) at baseline and the end of the study. The number of consultations within the practice, outpatient attendances, and acute admissions were recorded for the duration of the study. We recorded drop out due to death, leaving the practice, or going into a residential home. We also collected data for six months before the intervention to allow us to test whether the pharmacist's presence contaminated the control group.

Statistical analysis
Analysis was by intention to treat.39 We compared prescribing rates using standard two group comparisons. Regression analyses that adjusted for stratification factors did not qualitatively affect the conclusions and are not reported.

Results
The four practices had a total list size of 28,202 (individual sizes 6,342, 7,647, 8,759, and 5,454) with 3308 patients aged 65 and over. In all, 2505 patients met our inclusion criteria, but 33 were excluded at their doctors' request. We contacted 2403 patients consecutively until the required number of participants was
Four patients were subsequently found not to be receiving a repeat prescription.

Table 3 Numbers (percentages) of patients whose repeat prescriptions were changed during the study. Some patients had more than one change

<table>
<thead>
<tr>
<th>Type of change</th>
<th>Intervention (n=581)</th>
<th>Control (n=550)</th>
<th>Total (n=1131)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New drug started</td>
<td>365 (64)</td>
<td>270 (49)</td>
<td>535 (47)</td>
</tr>
<tr>
<td>Drug stopped</td>
<td>238 (41)</td>
<td>180 (33)</td>
<td>418 (37)</td>
</tr>
<tr>
<td>Switched drug</td>
<td>119 (20)</td>
<td>93 (17)</td>
<td>212 (19)</td>
</tr>
<tr>
<td>Dose changed</td>
<td>98 (17)</td>
<td>61 (11)</td>
<td>159 (14)</td>
</tr>
<tr>
<td>Change to generic</td>
<td>64 (11)</td>
<td>37 (7)</td>
<td>101 (9)</td>
</tr>
<tr>
<td>Formulation changed</td>
<td>17 (3)</td>
<td>12 (2)</td>
<td>29 (3)</td>
</tr>
<tr>
<td>Frequency changed</td>
<td>6 (1)</td>
<td>0</td>
<td>6 (1)</td>
</tr>
<tr>
<td>Any of above</td>
<td>438 (75)</td>
<td>397 (72)</td>
<td>835 (74)</td>
</tr>
</tbody>
</table>

Records on drugs were unavailable for 11 cases: seven had died (six in the intervention group) and four (all intervention group) had left the practices in the interval between consent and examining the records.

Outcomes

By June 2000, 40 (3%) patients had died (15 intervention and 25 control group) and 17 (1%) had left the list (12 intervention and five control group). Records were unavailable for a further two patients (both intervention group), leaving 1131 patients with adequate data for inclusion in the principal analyses.

The mean number of changes per patient was 2.2 in the intervention group and 1.9 in the control group (difference = 0.31, 95% confidence interval 0.06 to 0.57; P = 0.02). Table 3 shows the numbers of patients who had at least one change to their treatment during the study. More patients in the control group than the intervention group started taking a new drug. There was no clear difference in the number of other changes.

Table 4 shows the differences between baseline and follow up in the numbers, costs, and doses of repeat prescriptions. Numbers of drugs and cost rose in both groups, but for each the rise was significantly less in the intervention group. The number of daily doses did not differ significantly. There was no evidence of any adverse health outcome in the intervention group as measured by need for consultation with a general practitioner or hospital treatment (table 5). The number of deaths was 15 (2.5%) in the intervention group and 25 (4.3%) in the control group (odds ratio = 0.56, 0.29 to 1.1).

In all, 590 (97%) intervention patients had a consultation with the pharmacist (one was seen twice). Of the 18 who were not seen, eight had died, four had moved, three declined, and three were not receiving repeat prescriptions. In the control group, 233 (44%) patients had a documented review with a doctor.

The pharmacist took an average of 20 minutes to conduct a review (excluding collection of research data). The gross cost of the pharmacist was £21 per
number in the year was not different from that in the
did increase immediately after the review, but the total
ment recommendations implemented. Consultations
by the pharmacist, to have tests done, or to have treat­
patients made appointments to confirm advice given
have increased general practice consultation rates if
interactions.
†
‡
and taking fewer drugs than non­participants.
previously that the participants tended to be younger,
 Validity
We recruited half of contacted patients. There was con­
cern that the participants might not be typical of the
practices' eligible elderly populations. W e have shown

Discussion
We have shown that a trained pharmacist can conduct
clinical medication reviews of elderly patients in the
general practice setting. The pharmacist’s review
resulted in more changes to treatment than normal
care and produced an important cost saving, even after
the cost of the intervention was deducted.

Validity
We recruited half of contacted patients. There was con­
cern that the participants might not be typical of the
practices' eligible elderly populations. We have shown
previously that the participants tended to be younger,
more likely to benefit from the pharmacist's interven­
tion, provided that they can be persuaded to attend a
review. Attendance would be more likely in the context
of care rather than a clinical trial.

The unit of randomisation was the patient. Thus
practices contained both intervention and control
patients. We collected data for the six months before
the study started in response to concern that contami­
nation could occur as a result of the pharmacist’s pres­
ence in the practice. Comparison of these data with
study data showed no evidence of contamination.

Reasons for difference between groups
The smaller increase in the mean number of repeat
prescriptions in the intervention group was mainly due
to these patients being more likely to have drugs
stopped. Intervention patients had more changes to
treatment in general, perhaps because the pharmacist
did a more detailed review than the general practition­
ers. This effect could be important because patients'
compliance has been shown to decrease with
increasing number of drugs. Stopping unnecessary
drugs may also reduce the risk of adverse effects and
interactions.

Review of drug treatment by pharmacists could
have increased general practice consultation rates if
patients made appointments to confirm advice given
by the pharmacist, to have tests done, or to have treat­
mendations implemented. Consultations
did increase immediately after the review, but the total
number in the year was not different from that in the
control group. The increase in consultations was due to

hour, or £7 per patient reviewed. The average
reduction in net cost of drugs per patient per 28 days
was £4.72 (£2.41 to £7.04).

What is already known on this topic
Review of patients on long term drug treatment is
important but is done inadequately
Evidence from the United States shows that
pharmacists can improve patient care by reviewing
drug treatment

What this study adds
Consultations with a clinical pharmacist are an
effective method of reviewing the drug treatment
of older patients
Review by a pharmacist results in more drug
changes and lower prescribing costs than normal
care plus a much higher review rate
Use of healthcare services by patients is not
increased
Funding: NHS Research and Development National Coordinating Centre for Health Technology Assessment.

Competing interests: None declared.


(Accepted 12 October 2001)