A Community Based Interventional Program to Reduce Polypharmacy in The Elderly: A Pilot Study in Rural Australia

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Abstract

Introduction: Polypharmacy is common in the elderly. The mean number of drugs used by patients older than 60 years of age has been reported as 4.1 for women and 3.5 for men. Residents of aged care facilities have been reported as being prescribed an average of 7 drugs and some patients taking up to 22 different drugs.

Polypharmacy is associated with an increased risk of adverse drug reactions and interactions. Adverse drug events are one of the most significant causes of morbidity in the Australian population, with rates reported as high as 10.4%. In Australia, it is estimated that 2-3% of all hospital admissions are medication-related, costing an estimated $660 million per year.

The aim of this study was to determine the feasibility of a cost-effective multidisciplinary community intervention to reduce polypharmacy in the elderly.

Methods: This was a non-randomised, open, uncontrolled, interventional cohort study. From the 294 patients in the practice, aged 70 years or greater, and on three or more medications, 105 agreed to participate. These patients were reviewed in a multi-disciplinary clinic (General Practitioner, Physician, Pharmacist). Medication reductions and alterations were made only by consensus with all the clinicians and the patient. All patients were followed up at the clinic to determine the safety and efficacy of the medication reduction interventions.

Results: At initial consultation, the 105 patients were collectively on 875 drugs (average 8.3, range 3-18) of which 147 were ceased (728 drugs, average 6.9, range 2-14). After the initial consultation 34 patients had 48 (range 1-3) follow up consultations which resulted in 7 drugs being reinstated. Over a third of drugs ceased were cardiovascular agents mostly anti-hypertensives. There was one adverse event associated with cessation of esomeprazole and the patient had a gastrointestinal haemorrhage, that required hospital admission and endoscopy, with reinstatement of the drug.
The combined saving in pharmaceutical costs was estimated to be $36,415 versus the three clinicians 35.3 hours spent doing the clinic.

**Conclusion:** Management of polypharmacy in a multi-disciplinary community-based setting is cost-effective and safe with a saving of $1,031 per clinic hour.

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<thead>
<tr>
<th>The Known</th>
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<tr>
<td>Polypharmacy in the elderly is common and expensive. It can also lead to medication-related adverse events.</td>
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<tr>
<th>What we did</th>
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<tr>
<td>In a pilot study in a rural setting we did a prospective open cohort study to reduce the number of drugs taken by the elderly by a patient centred multi-disciplinary clinic.</td>
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<tr>
<th>What we found</th>
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<tr>
<td>On average, we reduced the number of drugs by 15% with a cost saving of $1,031 per clinic hour</td>
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</table>

**Keywords:** Polypharmacy, Rural medicine, multi-disciplinary research

**Introduction**

The aged Australian population is destined to cause a significant strain on the Australian healthcare system. It is estimated that by 2050, the proportion of Australian’s aged over 65 will increase to 22.6%, from 13.5% in 2010 (1). One of the areas of increasing concern is the large number of medications that elderly patients are prescribed. The number of prescriptions written for patients aged 65 years or older is twice as many for those patients aged 25 years or younger (2). In Australia, we spend $18.8 billion on medications per year, representing 14.2% of total health expenditure (3). In 2013, the pharmaceutical benefits scheme (PBS), cost the government in excess of $7 billion (4). This allowed for more than 197 million prescriptions to be dispensed, an increase of 1.2% from the previous year (4).

Polypharmacy is commonplace in the elderly. The mean number of drugs used by patients older than 60 years of age has been reported as 4.1 for women and 3.5 for men (5). A study that followed Australian war veterans and war widows over a six-month period showed that 20% of this population received more than 10 different drugs, and 6.9% received more than 15 (6). Those patients living in Australian residential aged care facilities have been reported as being prescribed an average of 7 drugs and some patients taking up to 22 different drugs (7, 8).

Polypharmacy is associated with an increased risk of adverse drug reactions and interactions (9, 10). Adverse drug events are one of the most significant causes of morbidity in the Australian population, with rates reported as high as 10.4% (11). In Australia, it is estimated that 2-3% of all hospital admissions are medication-related, costing an estimated $660 million per year (12). Furthermore, medication-related events are the second most common type of reported hospital adverse event, after falls (12).

Programs aimed to reduce the number of medications that elderly patients are taking have been of recent interest both in Australia and internationally. While the effectiveness of pharmacist review of patient medications (13, 14, 15) and geriatrician interventions have been studied in nursing homes (16) and long-term residential facilities (17), there is limited published research on physician-run medication review clinics in the community (18). It has been argued that for many physicians, ideal medication reviews and adherence assessments are an improbable reality given the time pressures of office-based practice (19,20).
There were two aims for this study. First, to demonstrate a viable cost-effective multidisciplinary community-based intervention to reduce polypharmacy in the elderly, and second to develop pilot data to allow for the development of item numbers for the Medical Benefits Schedule (MBS) for such an intervention.

**Methods**

**Study design and ethics**

This was a non-randomised, open, uncontrolled, interventional cohort study. Ethics approval to undertake this study was granted by the University of Tasmania Health Research Ethics Committee (H0014074).

**Setting**

Saunders Street Clinic in Wynyard, is located on the North-West Coast of Tasmania. It is a General Practice that has over 6000 patients on its active database. This is a teaching General Practice with the University of Tasmania Rural Clinical School and the Tasmanian General Practitioner specialist training program. Several medical specialists and allied health professionals conduct clinics in the practice that enable primary and secondary health care integration.

**Participants and recruitment**

All patients in the practice over 70 years of age and on three or more medications as listed in the practice electronic database (Medical Director) were identified and contacted by mail seeking participation in the study. Patients who responded by wanting to participate in the study were contacted by the practice and then booked into a special study clinic.

**Intervention**

On a weekly basis, a half day multi-disciplinary clinic was held to assess the study patients. This clinic was run by the community pharmacist (KD, Dixon’s Pharmacy, Wynyard), a practice general practitioner (LS, JB and CH) and a specialist physician (MB). Each study participants completed a consent form before the medication schedule was reviewed. Medication reductions and alterations were made only by consensus with the all the clinicians and the patient. All patients were followed up at the clinic to determine the safety and efficacy of the medication reduction interventions.

**Measurements**

1. Change in number of medications prescribed (to be expressed as a ratio to both total medications per patient and attempts at medication reduction)
2. Number of consultations (and time taken) to achieve medication reduction
3. Medication cost saving as per the Pharmaceutical Benefits Schedule (PBS).
4. Adverse events that were associated with changes in a patient’s medication schedule

**Data Collection and Analysis**

Data collection was undertaken by the investigators after each patient consultation for the four measurements listed above and entered into an Excel spreadsheet. For this pilot study only simple descriptive statistics were used.

**Results**

There were 446 patients identified from the electronic medical record who were aged 70 years or older and who were on 3 or more medications. From these 294 were invited to participate (not deceased or inactive) in the study and who were active patients in the practice. Of these 105 patients agreed to participate in the study and
attended the special clinic. The thirty-six patients who were nursing home residents were reviewed by the research team at the nursing home. The average age of participants was 77 years (range 70 to 102) and 60% were female.

At the initial consultation, the 105 patients were collectively on a total of 875 drugs (average 8.3, range 3-18) of which 147 were ceased (728 drugs, average 6.9, range 2-14). After the initial consultation 34 patients had 48 (range 1-3) follow up consultations which resulted in 7 drugs being reinstated. Over a third of drugs ceased were cardiovascular agents mostly anti-hypertensives agents (table 1). There was one adverse event associated with cessation of esomeprazole and the patient had a gastrointestinal haemorrhage, that required hospital admission and endoscopy, with reinstatement of the drug.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Count</th>
</tr>
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<tbody>
<tr>
<td>Cardiovascular</td>
<td>58</td>
</tr>
<tr>
<td>Hypolipidemic</td>
<td>14</td>
</tr>
<tr>
<td>Analgesic</td>
<td>12</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>9</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>6</td>
</tr>
<tr>
<td>Respiratory</td>
<td>3</td>
</tr>
<tr>
<td>Rheumatological</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>147</td>
</tr>
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Table 1. Classification of Drugs with held at initial multi-disciplinary assessment.

The total annual saving from the 140 drugs ceased in 105 study patients was estimated to be $36,415. This saving came at the cost of the three clinicians time spent doing the clinic of 35.3 hours (or $1,031 per clinic hour)

**Discussion**

**Main Findings**

In this study, we have demonstrated that approximately 15% (140/875) of drugs prescribed to patients over 70 years of age who are on 3 or more drugs can be ceased. In our pilot study, there was only one (1%) major adverse event and with only seven drugs (0.8%, 7/875) needed to be reinstated. The cost saving of this intervention was $1,031 per clinic hour, which would need to cover the costs of the physician, the general practitioner and the pharmacist as well as a share of the clinic on costs.

**Box 1. Case Example**

A 90-year-old female only on three drugs had been prescribed phenytoin 22 years earlier as peri operative seizure prophylaxis for the removal of a meningioma. As follow up in the Neurosurgical centre was geographically difficult the drug was not ceased. At study review the medication was ceased with no evidence of

**Study limitations**

First, the most important limitation of this study was that of no long term follow up. Essentially this was because there was only limited funding to undertake the study, and the costs of the pharmacist and physician time for the study were pro bono. However, the cost savings generated would at least offset the creation of Medicare item numbers to compensate for these professional services. The lack of follow up meant that many of the drugs ceased may have been reintroduced at some point by other medical practitioners once the study had completed. Second, another important limitation of the study was that we did not examine patient outcomes. Anecdotally many patients
were enthusiastic to work with the research clinicians to reduce their medication burden, however there was obvious selection bias with these study participants. Third, the determination of the drug cost saving was approximate due to the complicated way these costs are determined in Australia. Also, the extrapolation to a per annum saving assumed that the patients did indeed stay off the ceased medications for a year. Fourth, no specific validated criteria were used to objectively determine the rationale for drug cessation. Often, it was just the case that neither the patient nor the clinicians could understand why the patient was on the drug in the first place (Box 1).

**Study Strengths**

This pilot study has demonstrated the feasibility in a small rural Australian of a patient-centred multidisciplinary approach to medication rationalisation in elderly patients. The study provides pilot data to power a much larger study to determine the costs and benefits of such an intervention in Australia. These findings are similar to two recent but different studies (21, 22). In a randomised controlled study of medication therapy management by a physician and a pharmacist, in geriatric patients in Taiwan over a 16-month period, a cost saving of $127,015 (USD) in the intervention group (87 patients versus 91 patients in the usual care group) was demonstrated (21). The second study (22) from Atlanta GA, was a non-controlled pilot study of a multidisciplinary team managing the medications in small group (28 patients, older than 85 years) of male Veterans who were on 10 or more drugs. Over the six-month study period there was a cost saving of $64 (USD) per month per Veteran, and a high degree of satisfaction with the program reported.

**Conclusion**

Management of polypharmacy in a multidisciplinary community setting is cost-effective and safe with a saving of $1031 per clinic hour.

**References**