ARTICLE

Nursing Home Outreach Clinics show an improvement in patient safety and reduction in hospital admissions in residents with chronic conditions

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Abstract

Background: In an environment of an ageing population, with patients exhibiting multiple co-morbidities and taking multiple drugs, as well as attending emergency departments with preventable admissions, the project team aimed to implement and evaluate nursing home outreach clinics.

Objectives: To demonstrate the benefit of holding consultant pharmacist-led medication review clinics in nursing homes; improve medication appropriateness and assess if a reduction in the number of hospital admissions was achievable.

Methods: Patients were reviewed in outreach clinics in the nursing homes. Data on patient age, number of drugs taken and clinical interventions made was collected for all patients seen. Monthly emergency department attendances were tracked and hospital admissions monitored. More detailed data was collected for 100 patients on type and significance of clinical interventions made, medication appropriateness, using the medication appropriateness index (MAI) and drug costs.

Results: Over a 12-month period, in 16 homes, 727 patients were reviewed and an average of 2.9 clinical interventions made per patient. Over the project duration, the average number of hospital admissions from these homes dropped from approximately 3.5 to 1.5 per month. Total estimated drug cost savings for the project over a 2-year time period were estimated at £213k. Individual and total MAI scores for 100 patients, evaluated in more detail, showed a highly significant improvement after clinic review (Wilcoxon Signed Rank test, p<0.001), indicative of more appropriate prescribing.

Discussion: Nursing home outreach clinics have resulted in cost-effective and safer patient care \textit{via} significant clinical interventions and increased appropriateness of drugs prescribed for vulnerable older patients with complex needs.

Keywords

Chronic conditions, consultant pharmacists, hospital admissions, medication review, nursing homes, outreach clinics, person-centered healthcare, polypharmacy

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Accepted for publication: 22 July 2016

Introduction

The proportion of elderly people within the population is increasing. It is projected that by 2021 the number of persons aged 85 years and over in Northern Ireland, UK will increase by 67% to a figure of 47,900 [1]. Older people are three times more likely than younger people to be admitted to hospital following attendance at A&E; once there, they are more likely to stay and suffer life-threatening infections and falls. Furthermore, older people take a number of medicines related to their co-morbidities resulting, in most instances, in polypharmacy, which may be defined as the administration of more medicines than
clinically indicated [2]. Previously, the term had been used to indicate the use of more than four medicines daily. It has been suggested that nursing home residents take an average of seven medications per day [3]. Polypharmacy is associated with an increased number of adverse drug reactions, increased hospital admissions and increased drug costs. Recently, the UK-based Kings Fund defined polypharmacy as being either “appropriate” or “problematic”, it is the latter that is most concerning [4]. Undesirable aspects of medication, particularly in the elderly, have resulted in increased morbidity, institutionalization and costs [5].

Hanlon et al. showed that between 11% and 12.7% of 349 hospitalized elderly patients were taking one or more potentially inappropriate medicines with high-severity outcomes [6]. Drug-related admissions in the general population have been reported as ranging from 2.5% to 25.3%, with 31.3-85.7% judged as preventable [7].

The Care Homes Use of Medicines Study (CHUMS) found that 70% of care home residents experienced at least one medication error which was described as “unacceptable” [8]. It is also known that unintentional medication reactions accounted for 6.5% of hospital admission of which 70% could have been avoided [9].

A recent Health Foundation project in Northumbria, UK demonstrated a cost-effective model where pharmacists carried out medication reviews in Care homes [10]. It has been suggested that multi-disciplinary case conference meetings at nursing homes can lead to an improvement in medication appropriateness [11].

Within the Northern Health and Social Care Trust (NHSCT), Northern Ireland, UK, there are 2,000 attendances per year at the Antrim Area Hospital Emergency Department from nursing homes. The admission rate is 64%, meaning these patients are 2.5 times more likely than average to be admitted to hospital. There is then a clear need to try to address the issues that result in so many emergency department attendances and hospital admissions.

In the present study, we aimed to demonstrate whether there is benefit of holding outreach clinics in nursing homes with a consultant pharmacist (working alone or with a geriatrician), to rationalise the use of medicines and improve appropriateness of prescribing and to assess if a reduction in the number of A&E attendances and hospital admissions by nursing home patients could be achieved.

**Methods**

A 2-year service development and evaluation was carried out in the Northern Health and Social Care Trust (NHSCT), Northern Ireland, UK, focussing on consultant pharmacist-led comprehensive medication review within outreach clinics for patients living in nursing homes. Patients were reviewed at outreach clinics which were conducted by either the consultant pharmacist working alone, or in collaboration with a consultant geriatrician. Clinics were followed up via a subsequent meeting with nursing home staff 6 weeks later to assess uptake of recommendations which had been made to identify staff educational needs.

Data on patient age, number of drugs taken and clinical interventions made, were collected for all patients seen at outreach clinics between April 2012 and March 2014. Additionally, for all nursing homes included in the project, the monthly presentations to NHSCT A&E, together with hospital admissions, were tracked and recorded for the duration of the project.

To enable comparisons to be made between clinics where the consultant pharmacist worked alone and those where they worked together with a consultant geriatrician, more detailed data were collected for 100 patients on:

- the type of clinical interventions made by the consultant pharmacist;
- medication appropriateness using the Medication Appropriateness Index (MAI) [12].

Grading of interventions was carried out using the well-recognised Eadon scale (Table1) [13]. Drugs were costed by kardex calculation using the NHS Dictionary of Medicines and Devices [14]. A total of 50 patients seen by the consultant pharmacist alone in two nursing homes (n=25 per home) were compared with 50 patients reviewed by the consultant pharmacist and geriatrician together in two different homes (n=25 per home).

**Table 1 Eadon Criteria for scoring of Clinical Pharmacist Interventions**

<table>
<thead>
<tr>
<th>INTERVENTION</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention which is detrimental to a patient’s wellbeing</td>
<td>1</td>
</tr>
<tr>
<td>Intervention is of no significance to patient care</td>
<td>2</td>
</tr>
<tr>
<td>Intervention is significant but does not lead to improvement in patient care</td>
<td>3</td>
</tr>
<tr>
<td>Intervention is significant and results in improvement in the standards of care</td>
<td>4</td>
</tr>
<tr>
<td>Intervention is very significant and prevents major organ failure or adverse reaction of similar importance</td>
<td>5</td>
</tr>
<tr>
<td>Intervention is potentially life saving</td>
<td>6</td>
</tr>
</tbody>
</table>

**Results**

By March 2014, 16 homes had been completed with 4 of these having been reviewed by the consultant pharmacist working alone. Data on the number of patients seen, whether the pharmacist worked alone and total clinical interventions made, were recorded. A total of 2121 interventions were made across all clinics for 727 patients equating to an average of 2.9 interventions per patient reviewed.
Drug cost savings

Across the 16 homes, a net number of 963 drugs were discontinued for a total of 727 patients. Drug kardex costing prior to and after the outreach clinics yielded estimated projected annual average cost savings of £299.04 per patient when seen by both consultant pharmacist and consultant geriatrician together. Similar drug kardex costing for patients seen by the consultant pharmacist working alone yielded estimated projected annual average cost savings of £273.75 per patient for the remaining 178 patients seen by the pharmacist alone. This extrapolates to project duration savings of £48 727.50 for these patients.

Hospital Admissions

The average monthly admissions to trust hospitals from 13 nursing homes in receipt of nursing home outreach clinics were monitored throughout the duration of the project. On average there was a reduction in admissions of 2 per month (Figure 1).

Comparison of clinics held by the consultant geriatrician and consultant pharmacist versus the consultant pharmacist alone

Of the 50 patients (mean age 85.3 ± 9.7 years) analysed in more detail and reviewed by the consultant geriatrician and consultant pharmacist, 40 (80%) were female. The number of medicines taken by these patients prior to the outreach clinic was 10.8 ± 4.3. Of the 50 patients (mean age 86.8 ± 9 years, n=43) evaluated in more depth and seen by the pharmacist alone, 42 (84%) were female. The number of medicines taken by these patients prior to the outreach clinic was 13.1 ± 4.7. The patients seen by the consultant pharmacist alone (n=50) versus those seen by both the geriatrician and pharmacist (n=50) did not differ significantly in terms of their age (Mann-Whitney U, p=0.6), but did differ in terms of the number of drugs taken prior to the outreach clinic, with those seen by the pharmacist taking significantly more drugs (Independent samples t-test, p=0.011).

Medication Appropriateness

The appropriateness of medications before and after pharmacist intervention was assessed using the Medicines...
Table 2 Individual drug MAI and total MAIs for drug regimens

<table>
<thead>
<tr>
<th>Clinic held by both consultant geriatrician and consultant pharmacist</th>
<th>Individual Prior to clinic Mean + SD (Range)</th>
<th>Individual After outreach clinic Mean + SD (Range)</th>
<th>Total Prior to clinic Mean + SD (Range)</th>
<th>Total After outreach clinic Mean + SD (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic held by both consultant geriatrician and consultant pharmacist</td>
<td>1.4 + 2.4 (0-9)</td>
<td>0.3 + 0.7 (0-7)</td>
<td>14.9 + 11.1 (0-47)</td>
<td>3.6 + 3.6 (0-18)</td>
</tr>
<tr>
<td>Clinic held by consultant pharmacist only</td>
<td>0.8 + 1.5 (0-9)</td>
<td>0.13 + 0.473 (0-5)</td>
<td>9.8 + 7.1 (0-30)</td>
<td>1.6 + 2.3 (0-11)</td>
</tr>
</tbody>
</table>

Table 3 Clinical Interventions made together with data on whether pharmacist worked alone and the numbers of drugs started/stopped

| Home | CP alone (yes/no) | No. of patients | No. of Drugs stopped | No. of Drugs started | Blood Tests requested | Meds Info Supplied | Dose Adjusted | Kardex issues | Refer to other specialties | Product switch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | no | 52 | 134 | 15 | 34 | 9 | 24 |
| 2 | no | 27 | 50 | 9 | 4 | 1 | 4 |
| 3 | yes | 39 | 23 | 6 | 17 | 2 | 16 |
| 4 | no | 49 | 40 | 11 | 30 | 4 | 16 |
| 5 | no | 59 | 106 | 12 | 18 | 25 |
| 6 | yes | 57 | 89 | 3 | 25 | 2 | 22 |
| 7 | no | 58 | 97 | 17 | 12 | 3 | 26 |
| 8 | no | 34 | 64 | 6 | 21 | 3 | 20 |
| 9 | no | 40 | 24 | 5 | 12 | 10 | 14 |
| 10 | no | 35 | 47 | 5 | 8 | 10 |
| 11 | no | 70 | 165 | 2 | 27 | 1 | 49 | 6 | 3 | 11 |
| 12 | no | 35 | 63 | 8 | 14 | 16 | 6 | 6 | 7 |
| 13 | no | 55 | 116 | 15 | 18 | 1 | 18 |
| 14 | no | 35 | 50 | 7 | 21 | 19 | 3 | 5 | 2 |
| 15 | yes | 40 | 14 | 5 | 21 | 1 | 12 | 1 |
| 16 | yes | 42 | 83 | 3 | 18 | 14 | 1 | 3 |
| Total | 727 | 1165 | 202 | 300 | 27 | 301 | 17 | 17 | 92 |

Appropriateness Index (MAI) [12]. This instrument requires assessment of both medical history and appropriateness of the prescribed medicine, that is, each patient in the questionnaire is related to both the individual medication and the patient. A previous study by Burnett et al., showed significant improvements in appropriateness of medication after pharmacist intervention [16].

Table 2 summarises both the individual and total MAI scores for all 100 patients analysed in more depth. Total MAIs prior to and after the outreach clinics held by the consultant pharmacist and geriatrician together were significantly higher than those calculated when the pharmacist was working alone (Mann Whitney U, p<0.05). For all clinics, individual and total scores dropped by a significant amount (Wilcoxon Signed Rank test, p<0.001) after clinic review, indicative of more appropriate prescribing a total of 125 Eadon Grade 4 interventions, 6 Eadon Grade 5 and 2 Eadon Grade 6 interventions. In the homes visited by a consultant pharmacist alone (50 patients) there were 139 Eadon grade 4 interventions, 7 Eadon grade 5 and 2 Eadon grade 6 interventions made. All the interventions were significant and led to an improved standard of patient care, with those graded 5 or 6 regarded as potentially lifesaving. A breakdown of the type of interventions made is shown in Table 3.
Conclusions

These results show that medication review by a consultant pharmacist leads to significantly improved use of medicines, together with a downward trend in admissions. Appropriate polypharmacy may include introduction of a medicine to manage a previously undiagnosed or poorly managed condition, clinical medication reviews were based loosely on guidance on deprescribing [17,18], the PREVENT tool [19] and the STOPP/START criteria available [20]. Systematic reviews of pharmacist-led medication reviews have not previously shown an effect on clinical outcomes such as hospital admissions [21,22].

Hospital admissions are multifactorial and ongoing education of nursing home staff during the clinics and afterwards where education needs were identified may also have been an influencing factor. It is estimated from this work that over a 2-year period there could be an approximately £212,900 reduction in drug costs plus a 14.4% reduction in hospital admissions, leading to potential opportunity cost savings of between £334,900-£420,900 over a 2-year period for the 727 patients included in the study.

In light of the reproducibility of this model, the project team now feel that the way forward is pharmacist-led medication review outreach clinics throughout the whole of the region from which appropriate referrals for full medical review may be made to community geriatricians. Patients with difficult medication problems would be added to the case load of the consultant pharmacist for further management.

Acknowledgements and Conflicts of Interest

This work was supported by DHSSPSNI, Regional Innovations in Medicines Management Programme, with the funder playing no part in the work. We declare no conflicts of interest.

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