

**Frail older people with multi-morbidities in primary care: a new integrated care clinical pharmacy service**

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## **Abstract**

*Background:* Older people confined to their own homes due to frailty, multiple long-term conditions and/or complex needs, are known to be at risk of medicines-related problems. Whilst a health and social care team approach to supporting these patients is advocated, there is limited evidence regarding how pharmacists can best contribute.

*Objective:* To describe a new specialist pharmacy service (called the integrated care clinical pharmacist) in terms of how it works, what it achieves and its policy implications.

*Setting:* Patients' own homes in Lambeth, London, UK.

*Method:* Community matrons identified patients who were experiencing medicines-related problems. These were referred to the integrated care clinical pharmacist who undertook a full medication review and recorded activities, which were independently analysed anonymously.

*Main Outcome Measure:* Medicines-related problems and the associated interventions.

*Result:* 143 patients were referred to the service over a 15-month period. A total of 376 medicines-related problems were identified: 28 (7%) supply issues, 107 (29%) compliance issues, 241 (64%) clinical issues. A diverse range of interventions were instigated by the pharmacist, requiring the coordination of community pharmacists, primary and secondary health and social care professionals.

*Conclusion:*

This project demonstrated that including an integrated care clinical pharmacy service as part of the health and social care team that visits frail, older people in their own homes has benefits. The service operated as part of a wider inter-professional community team. The service also supported current health policy priorities in medicines optimization by identifying and addressing a wide range of medicines-related problems for this vulnerable patient group.

## Keywords

Multi-morbidities, frailty, older people, integrated care, pharmacy, medicines optimization, United Kingdom

## Impact of findings on practice:

- This project described a potential model for pharmacy services which reflects current UK policy priorities.

- It attempts to address the medicines optimization agenda, focussing on a frail, vulnerable population at high risk of medicines-related problems and their potential consequences.
- It is an example of integrating specialised clinical pharmacy services with wider health and social care agencies in the community.
- It promotes enhanced involvement of community pharmacists in the UK, by encouraging collaboration with a specialist pharmacy service - the integrated care clinical pharmacist - when, and if, needed.

## **Introduction**

Older people living independently with multiple long-term conditions, complex needs and taking many medicines, frequently experience medicines-related problems (MRPs) [1, 2]. Wide-ranging problems have been described, including adverse drug reactions, non-adherence and treatment failures, which are important contributors to hospital admissions [3, 4] as well as compromising treatment outcomes and quality of life [5, 6].

As our population ages, and pressures on health care resources increase, it is to be expected that more people will need to be cared for in their own homes. Examining the ways in which healthcare is delivered can reveal opportunities to develop services so to enhance patient safety [7]. For example, in Australia, a government-funded service model (the Home Medicines Review) has demonstrated the benefits of pharmacist-led medicines review with people in their own homes following referral from the general practitioner [8, 9]. In the UK, despite wide documentation on the sub-optimal use of medicines by patients at home, routine service provision does not provide a framework to meet the pharmaceutical needs of these patients. Pharmacist-led medicines use reviews, which operate in many countries and settings, often do not extend to patients who are housebound in the UK.

A number of interventions to respond to the MRPs experienced by older people has been investigated, however, there is limited evidence of clinical impact [10]. There is no consensus on how service models can be improved, nor on the selection of sensitive outcome measures to document their impact. Few interventions have described sustained support to patients with complex needs in their own homes. Whilst optimal service models are unclear, a multidisciplinary approach that includes pharmacist involvement has been identified as more effective than other models in detecting MRPs [11].

### Establishment of a community-based integrated care clinical pharmacy service

Lambeth Primary Care Services recruited community matrons (CM) to offer 6-week case management to vulnerable patients. Case management is where a named coordinator, such as a CM, manages an active list of about 50 patients who are most at risk of unplanned/emergency services and synchronises a personalised care plan. A small pilot of 19 patients (unpublished report) explored the impact of integrating clinical pharmacy services for those case managed patients with complex medicines-related needs. Evaluation of this pilot showed that this enhanced model of case management was positively received by staff and there were benefits to patient care. Consequently, a new service model of pharmaceutical care for frail, older patients with complex

medicines-related needs living in their own homes was initially funded for two years. CMs identified and referred those patients from their active caseload who were experiencing actual medicines-related problems or those who had other challenges affecting medicine-taking, to an integrated care clinical pharmacist (ICCP). There were no exclusion criteria. These patients were then visited at home by the ICCP and an in-depth, medicines assessment was conducted examining problems regarding obtaining, or use of, medicines by patients, and concerns regarding clinical appropriateness. The ICCP then devised and implemented a personalised pharmaceutical care plan to address these problems and achieve medicines optimization.

### **Aim**

The purpose of this service evaluation was to describe the new integrated care clinical pharmacy service and to provide information regarding the medicines-related support provided to frail and complex patients with multiple long-term conditions, living in their own homes. This paper reports on the how the service worked and what it achieved, in terms of the MRPs identified and the subsequent interventions made by the ICCP.

### **Ethics approval**

This project was a retrospective description of a new service in which anonymised data gathered as part of service provision were evaluated. In accordance with guidance set by the UK Health Research Authority, NHS ethical approval was not required.

### **Method**

Systematic anonymised data were recorded regarding full operation of the service in its first fifteen months. A data collection form was designed to record MRPs experienced by patients in terms of supplies, administration, barriers to compliance/adherence and clinical issues. For all MRPs identified by the ICCP, details of interventions were also recorded.

### Data analysis

Data processing and analysis were undertaken by independent researchers who were not involved in service provision. All data collected were coded and descriptive analytical procedures were employed to report the details of referrals, characteristics of patients, the prevalence and range of problems regarding obtaining

medicines, problems in their administration, barriers to compliance/adherence and clinical concerns regarding safety and appropriateness of therapy.

## **Results**

### Reasons for referral and characteristics of patients

In-depth medicines assessments were conducted with 143 patients, of whom 87 were female (61%). The patients' mean age was 78 years (range: 37-100); 96(67%) were over 75 years, 37(26%) over 85 years. The mean number of conditions per patient was 9 (range: 3-26; n=139) (see Table 1).

Table 1 here

Most often, patients were referred because of their advanced age, multiple long-term conditions, being prescribed multiple medicines with a high number of daily doses, recent addition of new medicines, adherence problems, problems associated with use of complex devices, taking a number of high risk drugs (such as warfarin, insulin) and a history of falls. Personal situations such as poor eyesight or being blind, suffering hearing loss, having confusion, memory loss or dementia, being housebound or having poor mobility and unable to read or write English were also identified as factors leading to a referral to the ICCP.

### Current medication

The number of medicines recorded per patient (n=115) ranged from 5-26, with a mean number of 14. This included 68(59%) patients who were prescribed one or more medicines that have been linked with a high risk of admission to hospital [4]: warfarin, non-steroidal anti-inflammatory drugs, diuretics, antipsychotics, insulin or tricyclic antidepressants. 87(76%) patients were prescribed at least one medicine that is listed on the Anticholinergic Burden (ACB) scale [12]; 83(72%) patients were taking at least one analgesic medicine, including those for neuropathic pain; 68(59%) patients were prescribed an inhalation device. 52(45%) patients were reported as having a medication allergy.

### Medicines-related problems (MRPs) identified by the ICCP

The ICCP identified a total of 376 MRPs: 28(7%) supply issues, 107(29%) compliance issues and 241(64%) clinical issues, which informed the personalised pharmaceutical care plans.

### *Supply issues*

Problems that could impact on patients obtaining their medicines are reported in table 2.

Table 2 here

The most commonly reported factors were being unable to order repeat prescriptions without assistance, being unable to leave the house unaided and those without regular appointments with the GP or district nurse. For 115/139 (83%) patients, the pharmacy collected repeat prescriptions from the doctor's surgery and took them to the pharmacy to be dispensed. In 90(65%) cases, the pharmacy staff then delivered the medication to the patient's own home. For patients who were housebound, had poor eye-sight, were at risk of falls or were dependent on a wheelchair, these services were essential to ensure safe and continuous supplies of medicines. However, difficulties did arise in ensuring timely supplies, especially if medicines were prescribed at different times or in different amounts, when attendance at the doctor's surgery was required prior to prescription issue (e.g. acenocoumarol, repaglinide) and when over-the-counter (OTC) medicines needed to be bought.

Supply problems included running out of current medicines, receiving a medicine that had been stopped, incorrect doses of current medicines in monitored dosage system (MDS) trays, not receiving a supply of an unlicensed medicine and a lack of supplies of products in the community that had been started at the hospital. Patients' preferences were also not being met with regards to easy opening packaging and dosage forms, which could hinder their ability to take medicines. Other patients relied on a carer to assist with medicines supplies, which led to missed doses when the carer was unavailable. Additionally, Medicine Administration Record (MAR) charts (upon which carers may depend) were not always up-to-date.

### *Compliance issues*

101/142 (71%) patients reported administering their own medicines, whilst others named those that helped them: 27(19%) patients received help from family/friends, 20(14%) from formal (paid) carers, 6(4%) patients named the district nurse and 1(<1%) patient named their pharmacy.

According to their own medication profile, the ICCP assessed each patient's ability to self-administer. Table 2 shows that most often problems were due to an inability to break/cut tablets in half, to instill ear/eye/nasal drops, and to read labels on medication containers correctly. Specific observations recorded by the ICCP included

incorrect dosage of insulin being drawn up, incorrect medicines in a self-filled dosette box, poor inhaler techniques, and having difficulty swallowing tablets. Patients had further problems with opening/closing packaging. Mobility, dexterity or cognitive problems were also documented. For example, mobility was a problem for 92/110 (84%) patients who were unsteady on their feet, slow to move or bed/chair bound.

Over half of patients (61/109; 56%) had some sight problems which led to losing medicines that were dropped on the floor, difficulty in seeing an insulin dose, being unable to see labels on medicine bottles. 25(23%) patients had speech difficulties and 16(15%) had poor hearing. 44(42%) patients had problems with memory and 50(38%) reported that they often needed to be reminded to take their medication. 29(27%) patients had difficulties with reading or writing or understanding medication instructions. 27(25%) patients needed assistance to take their medicines or did not take them at all.

The majority of patients (103; 75%) reported currently using a multi-compartment container to aid compliance. Of these, 35(34%) required further assistance. 10(10%) reported confusion or forgetfulness and 6(6%) found the container difficult to operate. In 87(87%) cases, the pharmacy filled the compliance aid, but 9(9%) filled the aid themselves and 4(4%) named family members. Many problems were compounded by patients using large numbers of different medicines and formulations.

Patients' beliefs regarding the need for medicines and concerns about their medicines are recognised as important determinants of medication adherence [13]. When asked to report any concerns regarding the use of their medicines, 61(43%) patients reported one or more concerns. Most commonly, patients thought that they were taking too many medicines, others reported that they forgot to take their medicines and the third most common concern was difficulty in swallowing some tablets. Further concerns about the need for and/or adverse effects of their medicines caused patients to query taking them, and in some cases, stop taking them altogether without discussion with the prescriber.

### *Clinical issues*

Problems in obtaining medicines, administration or adherence could compromise clinical effectiveness. In addition to the problems described above, the ICCP identified a further 241 clinical problems in relation to 80 patients. For example, medicines were not always managing symptoms, were sometimes causing adverse effects

or contributing to the risk of falls. Patients were either lacking, or did not understand how to use monitoring equipment, or equipment was broken (e.g. nebulizer). There were examples of sub-therapeutic doses being prescribed. The clinical need for some medicines was unclear. Other medicines were not being monitored, e.g. lithium or aminophylline. Prescribed medicines were not being adjusted in response to clinical data, e.g. poor renal function, abnormal thyroid function tests. For some patients, current needs such as mental health problems, leg dressing supplies, an autoinjector of epinephrine for nut allergy, request for smoking cessation therapy and incontinence were not being addressed.

There was evidence that recommendations made in hospital had not followed the patient to the community e.g. an appointment for the warfarin clinic, course of steroids not prescribed, clinic results to inform prescribing decisions. New medications started at hospital and revised discharge medication, were not being continued in the community. The ICCP had concerns regarding long term use of some medicines such as benzodiazepines and one medicine was being used outside its licensed use.

#### Interventions to address the medicines-related problems (MRPs)

The ICCP implemented a diverse range of interventions to address the 376 MRPs identified (see Table 3).

Table 3 here

The data presented in table 3 clearly indicates the intense liaison required with a wide range of health care providers (especially community pharmacists and general medical practitioners (GPs)) and carers in order to address the medication-related problems identified by the ICCP. Further interventions included complete medication review, therapeutic recommendations, clarification and provision of information and practical support for patients and carers.

#### *Further follow-up and return visits to patients*

For 63(44%) patients, the ICCP had to follow-up her first intervention with at least one other agency: a further 160 contacts. Most commonly this was with the GP (56; 35%), CM (36; 23%) and/or community pharmacist (32; 20%); others included social services and carers. The ICCP also conducted an additional 39 follow-up visits to the person's home to provide support such as training in the use of new devices, introduction of a monitored dosage system or to update MAR charts.

## **Discussion**

This paper describes a new service model of pharmaceutical care for frail, older patients with complex needs living in their own homes in the UK: the integrated care clinical pharmacist (ICCP). Patients were first identified by a community matron (CM) and referred to an integrated care clinical pharmacist (ICCP) for an in-depth medication review. A personalized pharmaceutical care plan was jointly developed between the ICCP and patient, involving the coordination of a wider pharmacy and multidisciplinary team; a key role of the ICCP was to ensure implementation and sustained support for the pharmaceutical needs of the patient. On reviewing the medication of 143 patients, the ICCP identified a total of 376 MRPs: 28(7%) supply issues, 107(29%) compliance issues and 241(64%) clinical issues. These data provide an insight into the range of interventions that are required to address the pharmaceutical care needs of this vulnerable patient group. The interventions also offered continuity of pharmaceutical care across different health issues and accountability in terms of ensuring medication-related problems were addressed across different health settings. As other studies have shown, this project confirmed challenging personal circumstances and a high prevalence of MRPs in this population of frail older people living in their own home with complex needs [1, 14].

In this model, the ICCP was supported by a consultant pharmacist (with specialist knowledge and skills in the care of older people) and referred to a multidisciplinary network of community pharmacists, nurses, clinicians, and specialist health and social care practitioners. The complex nature of this patient group required the ICCP to have the skill set and knowledge to respond to the issues identified, and the ability to access expert advice and support. Presently community pharmacists in the UK are not routinely involved in supporting housebound patients with complex needs in the use of medicines, and their practice can be limited by having little opportunity to leave their premises. However, it is believed that community pharmacists' knowledge and skills are underutilized. This project is an example of how community pharmacists may be able to support the care of a vulnerable population with significant pharmaceutical care needs by having a referral pathway to the ICCP, thereby accessing a specialist clinical pharmacist that can visit people at home when, and if, needed. Initially, a grant obtained from the Guys and St Thomas' Charity supported the development of the ICCP service and its evaluation. However, the ICCP position is now fully funded by the Clinical Commissioning Group for the local area, and continues to be an ongoing clinical service.

Future development of this service would include wider involvement of current community pharmacy services. Once the initial needs have been resolved by the ICCP, a long-term plan for medicines optimization could be transferred to a local community pharmacist, with the opportunity for continued support from an ICCP. If adopted more widely as a service model, a full evaluation in terms organisation, delivery, integration and impact would be required. However, it has the potential to address many policy priorities in the context of current UK NHS provision including: advancing local capacity and sustainability for medicines optimization and safety in frail older people [15], building clinical community pharmacy teams [16], developing innovative models of care involving health care teams [17], and contributing to the local South-Lambeth Integrated Care Model [18] for personalized care, improved independence, multi-disciplinary care coordination. Further successful examples of integrated community care models have been reported [19, 20] collectively providing a growing body of evidence supporting the development of integrated care clinical pharmacy services for frail older people with multi-morbidities in primary care.

A limitation of this project is that it was not set up as a research study but, its description and independent evaluation highlights the potential value in this model of pharmaceutical care. Referral to the service relied upon identification of medicines-related needs as identified by the CMs and so only those older people receiving services by CMs had access to this enhanced pharmaceutical intervention. This may also be perceived as a strength of the project as it provides a mechanism by which the service may be targeted to those people with the most significant health needs. The service was delivered by one ICCP, with many interventions enacted following liaison with community pharmacists. This demonstrates the scope of specialist and community pharmacy practice required to plan and develop this and alternative service models. Clear paths of communication such as shared care records would enable robust patient care. Given that only one pharmacist was involved in the ICCP service provision, there has to be caution in terms of generalizability, as replicating the specialist service would require assurances that any future ICCP has the appropriate knowledge and skills for its delivery. However, the evidence suggests that the model could work more widely.

## **Conclusion**

Including an integrated care clinical pharmacist as part of a wider inter-professional community team, who visits frail older people at home, showed benefits. Through this service, a wide-range of medicines-related problems were identified and addressed for this patient group with complex pharmaceutical needs. This project also led to

a proposed model for enhanced involvement of community pharmacists in the UK: where community pharmacists collaborate with a specialist pharmacy service that assesses vulnerable people in their own homes and collectively devise and deliver a personalised pharmaceutical care plan.

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**Authors' contributions:** LO designed and was awarded funding for the new service and its evaluation. CL was the initial ICCP, followed by SQ and were responsible for delivery of the new service and collection of anonymized data. SAF and FS were commissioned to undertake an independent evaluation of the service. SAF and FS planned and executed the evaluation and prepared this manuscript. All authors are responsible for the interpretation and critical revision of the final manuscript. The datasets analyzed during this project are available from the corresponding author on reasonable request.

**Conflicts of interest:** LO, CL and SQ were involved in service design, delivery and data capture. Whilst listed as authors, they were not involved in the plan and execution of the evaluation or preparation of the final report, from which this manuscript was prepared. This was undertaken independently by SAF and FS.

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**Table 1: Patients' conditions as reported in the referral letter**

<b>Condition</b>	<b>Number of patients (%) for whom condition was noted in referral letter (n=139)</b>
Cardiovascular conditions defined as hypertension, atrial fibrillation, angina, ischaemic heart disease, myocardial infarction, stroke, transient ischaemic attacks, cardiovascular accident, cardiovascular disease, deep vein thrombosis or pulmonary embolism	118 (85%)
Asthma or chronic obstructive pulmonary disease	71 (51%)
Diabetes	57 (41%)
Chronic pain or osteoarthritis	54 (39%)
Falls, risk of falls or osteoporosis	39 (28%)
Depression	27 (19%)
Memory loss, cognitive decline, dementia or Alzheimer's Disease	19 (14%)
Urinary incontinence	10 ( 7%)

**Table 2 Potential factors identified by the ICCP that could affect the continuous supply and self-administration of medicines**

<b>Supply issues</b>	<b>Yes Number (%)</b>	<b>No Number (%)</b>
Does the patient live with others? (n=113)	53 (47%)	60 (53%)
Is the patient able to answer the door independently? (n=138)	92 (67%)	46 (33%)
Is the patient able to use the telephone unassisted? (n=138)	109 (79%)	29 (21%)
Is the patient able to leave the house unaided? (n=138)	50 (36%)	88 (64%)
Does the patient have regular appointments with the GP or district nurse? (n=136)	57 (42%)	79 (58%)
Can the patient visit the GP independently? (n=137)	59 (43%)	78 (57%)
Does the patient order repeat prescriptions for themselves without assistance? (n=135)	30 (22%)	105 (78%)
Does the patient always remember to order their prescriptions? (n=52)	48 (92%)	4 ( 8%)
Does the patient always have complete supplies? (n=135)	107 (79%)	28 (21%)
<b>Patients' abilities to self-administer</b>		
Break/cut a tablet in half (n=60)	24 (40%)	36 (60%)
Ability to instill ear/eye/nasal drops or spray correctly (n=33)	15 (45%)	18 (55%)
Able to read labels and directions on medication containers (n=132)	71 (54%)	61 (46%)
Correct administration of insulin (n=28)	15 (54%)	13 (46%)
Open and close a childproof container (n=87)	48 (55%)	39 (45%)
Correct use of diagnostic agents (n=31)	19 (61%)	12 (39%)
Able to understand labels and directions on containers (n=132)	85 (64%)	47 (36%)
Pour liquid medication from a bottle (n=72)	47 (65%)	25 (35%)
Open and close a non-childproof container (n=97)	70 (72%)	27 (28%)
Correct use of an inhalation device (n=78)	57 (73%)	21 (27%)
Correct administration/application of external preparations (n=49)	36 (73%)	13 (27%)
Open and remove a tablet from a blister pack (n=131)	101 (77%)	30 (23%)
Pick up a tablet from a table/counter (n=132)	110 (83%)	22 (17%)

**Table 3: Range of interventions by Integrated Care Clinical Pharmacist (ICCP) in response to problems of access to medicines, day-to-day administration and compliance, and clinical issues**

<p><b>Improving access to medicines</b></p> <ul style="list-style-type: none"><li>• Set-up a prescription collection and delivery service</li><li>• Set up medication delivery services</li><li>• Set up repeat ordering systems</li></ul>
<p><b>Supporting day-to-day administration and compliance</b></p> <ul style="list-style-type: none"><li>• Re-package medication to meet patient's needs</li><li>• Introduction / changing of compliance aids</li><li>• Arranging large font labels</li><li>• Obtaining preferred brands of medication</li><li>• Initiating supply of devices to help with medication administration e.g. aerochamber, Opticare device, spacer device</li><li>• Training to administer medicines correctly</li><li>• Training to monitor therapeutic outcomes</li><li>• Provision of Medication Administration Record (MAR) Charts to patients</li><li>• Reviewing patients for adherence and understanding</li><li>• Advising patients on safe storage of medicines</li></ul>
<p><b>Addressing clinical issues</b></p> <ul style="list-style-type: none"><li>• Organise urgent monitoring</li><li>• Disposal of unwanted medicines from home</li><li>• Removal of old medicines from repeat list</li><li>• Reducing pill burden for individuals, rationalizing doses of medicines, therapeutic recommendations</li><li>• Resolving medication errors</li><li>• Liaison with specialist health care providers including diabetic nurse, mental health team, speech and language therapist, hospital anticoagulation clinic, Older Person's Assessment Unit (specialist team of doctors, nurses and therapists who help with issues affecting independence and wellbeing)</li><li>• Monitoring recommendations e.g. blood pressure, haematological and biochemical blood profiles, urine test sticks, spirometry</li></ul>