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SHORT COMMUNICATION

Pharmacist-independent prescriber deprescribing in UK care homes: Contextual factors associated with increased activity

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Aims: The Care Home Independent Pharmacist Prescriber Study (CHIPPS) process evaluation hypothesized that contextual factors influenced the likelihood of deprescribing by pharmacist-independent prescribers. The aim of this paper is to test this hypothesis.

Methods: From CHIPPS study data, medications deprescribed totalled 284 for 370 residents in UK care homes. Regression analysis was used to describe the relationship between the number of medicines stopped and contextual factors (number of residents cared for, pharmacist employment within associated medical practice, previous care home experience, hours active within trial, years' experience as a pharmacist and as a prescriber).

Results: Number of residents and pharmacist-independent prescriber employment within a medical practice were positive predictors of deprescribing.

Conclusion: Previous experiences were not related to deprescribing likelihood. Increasing the number of residents increases the opportunity for deprescribing and therefore this relationship is intuitive. The location within a medical practice is an interesting finding that requires further exploration to understand its exact nature.

KEYWORDS
deprescription, long-term care facilities, medication review, medicines optimization, nursing home, polypharmacy, residential home

1 | INTRODUCTION

It is estimated that up to half of care home residents are prescribed a medicine that is no longer optimum for them. Over time, it may become inappropriate[3] predisposing them to adverse drug reactions, reduced quality of life and avoidable hospitalization.[3] Addressing inappropriate prescribing is central to the World Health Organization's Global Patient Safety Challenge: Medication Without Harm.[4] Deprescribing is the process of stopping medicines that have, or may, become inappropriate and can be undertaken reactively in response to an adverse drug event, or proactively to prevent future adverse drug events.[5]

In 2006, the UK introduced regulations allowing pharmacists with additional postgraduate qualifications to independently prescribe

Professor David Wright is the Principal Investigator for the research underpinning this paper.

(or deprescribe) without medical authorization for any condition within their clinical competence[6,7] This extended role means that pharmacist-independent prescribers (PIPs) are well placed to deliver a full medication management service to care homes.[8] Care Homes Independent Pharmacist Prescribing Study (CHIPPS) was a UK National Institute for Health Research-funded programme designed to estimate the effectiveness and cost-effectiveness of PIPs assuming responsibility for all aspects of medicines management in care homes. The cluster randomized controlled trial involved 22 PIPs managing medication in 40 intervention site care homes across England ($n = 15$), Northern Ireland ($n = 14$) and Scotland ($n = 11$).

Deprescribing was the most frequently recorded activity undertaken within CHIPPS,[9] with substantial variation identified in the rate of deprescribing between PIPs.[9] It was hypothesized that 1 or more contextual factors might be prominent in causing the variation and understanding this could be used to inform future interventions and policy recommendations to promote deprescribing in care homes. During the development phase, employment of PIPs within medical practices was identified as the preferred model for CHIPPS. A medical practice is an organization consists of 1 or more of general practitioners (GPs) who provide primary care to a particular group of patients.[10] This study aimed to quantify and characterize deprescribing activity performed by PIPs in terms of proactive or reactive deprescribing and identify any relationships between contextual factors and deprescribing.[5]

What is already known about this subject

- Medicine discontinuation or *deprescribing* is the most frequently reported outcome resulting from medication review by pharmacists in care homes.[1]
- Deprescribing interventions in care homes have been shown to be associated with a reduction in the number of potentially inappropriate medications being administered.[2]

What does this study add

- According to this study, deprescribing in UK care homes by pharmacist independent prescribers is more likely if the prescriber is a member of the medical practice team.

2 | METHOD

For the trial process evaluation, English ethical approval was obtained from East of England Cambridge Central Research Ethics Committee 17/EE/0360 (28.11.2017) and Scottish ethical approval was obtained from Scotland A Research Ethics Committee 17/SS/0118 (07.12.2017). The authors reanalysed medicines management interventions performed by 22 PIPs within the CHIPPS intervention arm.[9] Only those interventions ($n = 284$) associated with a medication being stopped by PIPs were included in our analysis.

Our analysis comprised characterizing deprescribing interventions according to whether they were proactive or reactive and identifying any relationships between contextual factors and rate of deprescribing.

2.1 | Phase 1: characterizing deprescribing activity

Deprescribing interventions were extracted from the CHIPPS trial database including the medication name, British National Formulary (BNF) medication classification,[11] dose and the rationale for the intervention documented by the PIP.[9] Two clinical pharmacists (M.A. and S.S.) independently categorized PIP medication discontinuation interventions as *reactive* or *proactive* deprescribing according to the accepted definition.[5] Medication deprescribed had been classified according to BNF.[11] Medication discontinuation activities related to a change from *regular* to *when required* dosage and those stopped at the end of a short treatment course, such as an antibiotic, were excluded as these do not meet the criteria for reactive or proactive deprescribing.[5] Scott et al. defined proactive deprescribing as deprescribing a medication when future benefits are unlikely to outweigh future harms, and reactive deprescribing as deprescribing a medication in response to an adverse clinical trigger.[5]

Inter-rater reliability on deprescribing categorization was assessed using Cohen's κ, with $\kappa = 0.6$–0.8 considered good and $\kappa > 0.8$ excellent.[12] Any disagreements were resolved through discussion and referral to a third reviewer (D.W., pharmacist).

The authors also checked whether deprescribing activities had been sustained at the end of the CHIPPS trial (6 months).

2.2 | Phase 2: identifying relationships

We explored any relationships between the deprescribing activities characterized in phase 1 and all contextual factors captured in the CHIPPS trial[13]:

- Number of years qualified as a pharmacist
- Number of years qualified as an independent prescriber
- Number of residents for whom the PIP was responsible in assigned care home
- Total number of hours undertaking medicines management intervention
- Whether the PIP had worked in a care home before the CHIPPS trial
- Whether the PIP was employed by the medical practice associated with the care home

TABLE 1 Summary of pharmacist-independent prescriber contextual factors ($n = 22$)

Contextual factor	Result
Number of years qualified as a pharmacist, mean (SD), range	20.3 (9.9), 8–40
Number of years qualified as an independent prescriber, Median (interquartile range), range	3.5 (1.5–7.3), 0.17–16
number of residents in assigned care home, mean (SD), range	17.7 (5.9), 6–24
Total number of hours undertaking medicines, mean (SD), range	63.9 (32.4), 12–145
Management intervention	
Previous care home experience, *n* (%)	11 (52.4), 1 data point missing
Employed in a medical practice, *n* (%)	15 (68.2)

SD, standard deviation

TABLE 2 Contextual factors predicting deprescribing activity

	Result	
Contextual factors	**β (95% confidence interval)**	***P*-value**
Constant	−4.139 (−12.267, 3.988)	.299
Number of residents in assigned care home	0.788 (0.433, 1.142)	<.001
Employed in a medical practice	5.355 (0.916, 9.795)	.021
Adjusted R^2		.5055

The total deprescribing activities and the total proactive and reactive deprescribing activities for each PIP were explored to find the association with the contextual factors of the PIPs using multiple regression analysis with backward elimination. Categorical factors were fitted with dummy variables and continuous factors were assumed to be linear. As the number of observations was small, it was not possible to consider nonlinear associations. Additionally, a nonparametric bootstrap was used to assess if the distributional assumptions of the contextual factors were correct.

3 | RESULTS

From the 566 medicines management interventions undertaken by PIPs in the CHIPPS trial, 284 (50.2%) met the criteria for a medicine being deprescribed on 166 residents, of which 276 (97.2%) remained deprescribed at 6 months.[13]

3.1 | Phase 1: characterizing deprescribing activity

The number of deprescribing interventions categorized as proactive was 249 (87.7%), and 30 (10.5%) were categorized as reactive. For 5 (1.8%) interventions, there was insufficient information documented to categorize the rationale for deprescribing. The inter-rater agreement was high, with Cohen's $\kappa = 0.8$.

The number of medicines deprescribed according to the BNF classification[11] is provided in Table S1. The classifications of most medicines deprescribed were central nervous system $n = 68$ (24%), gastrointestinal system $n = 43$ (15.1%), cardiovascular system $n = 38$ (13.3%), blood and nutrition $n = 32$ (11.2%) and respiratory system $n = 15$ (5.3%).

3.2 | Phase 2: identifying relationships

A summary of contextual factors across the population of PIPs is provided in Table 1. The number of PIPs that conducted the medication review interventions in the CHIPPS trial is 22. Most PIPs were employed by a medical practice and had previous care home experience.

All 6 contextual factors were entered into the regression analysis. Following backward elimination, only the number of residents in assigned care home and whether the pharmacist was employed in a medical practice were significantly associated with increased deprescribing interventions (see Table S2 for full analysis). The resulting model predicted 50.5% (adjusted R^2) of variance in the number of deprescribing interventions. The contextual factors predicting a PIP performing deprescribing interventions are provided in Table 2. The full regression analysis is provided in Table S3. Because the bootstrap results were similar to the parametric modelling, the results were resistant to deviations from distributional assumptions, and only the parametric modelling is provided for brevity.

4 | DISCUSSION

This study found that PIPs' interventions were dominated by deprescribing that was proactive in nature, that is, to prevent future medication-related harm. Interestingly medicines for use for conditions associated with the central nervous system were the most commonly deprescribed and that experience of the PIP either as a pharmacist, prescriber or of working with care homes were not predictors of deprescribing activity.

Increasing the number of residents to be reviewed will understandably increase deprescribing activity as the opportunity for deprescribing increases. The most interesting finding however was the fact that those PIPs already employed in medical practices were more likely to deprescribe medicines that those whose main employment contract was elsewhere.

This analysis is based on a small number of PIPs working within a relatively small number of care homes. Furthermore, the PIPs were self-selected for the trial and received specific training which, while

largely generic, encouraged discontinuation of antipsychotic medication.[14] Consequently, the results may not be generalizable to other locations where pharmacists are providing similar services to care homes.

Medicines targeting the central nervous system were the top ranked priority for deprescribing by a group of experts in a 2015 Delphi study.[15] Whilst these medicines carry significant risks when prescribed for older people, practitioners report that they are notoriously difficult to deprescribe owing to the high chance of adverse drug withdrawal events.[16] Despite this, PIPs focused on deprescribing of central nervous system medicines in the CHIPPS trial due to the known link of these medications with falls risk.

The dominance of proactive deprescribing by PIPs in care homes contrasts with other settings where deprescribing is largely reactive, such as a hospital setting.[5] In 2018, the authors conducted a study to quantify and describe the nature of admission medication deprescribing practice in a large UK hospital and found that 84.1% deprescribed reactively while only 15.19% deprescribed proactively.[5] Proactive deprescribing requires a complex weighing up of future potential harm *vs*. benefit and patients need to be subsequently monitored for adverse drug withdrawal events.[5]

Factors most associated with increased likelihood of deprescribing were identified as being the number of residents in assigned care home, and the PIP being employed by the care home's medical practice. This suggests that PIPs who are employed by alternative organizations may require support and encouragement to develop relationships and integrate with a care home's medical practice team to facilitate deprescribing.[17] It was evident that those care homes with a higher number of residents resulted in more deprescribing intervention activity by PIPs. This is intuitive given that more residents present more opportunities for deprescribing interventions.

A good working relationship between PIPs and GPs would seem to be conducive to encouraging intervention activity, since the pharmacist's employment in a medical practice was found to be 1 of the factors most associated with increased likelihood of deprescribing. A preference for employment of PIPs within medical practices was identified during the initial development phase as it was believed that it would enhance their effectiveness.[18] However, this was not always possible and thereby enabled this *posthoc* analysis.[18] Identifying the characteristics of this arrangement that facilitate deprescribing may yield strategies that can be replicated across other models of employment. A 2021 systematic review exploring barriers and enablers to pharmacists integrating into healthcare teams found that social support from other professional groups was a powerful enabler.[17] This includes recognizing the pharmacists' role, being trusted to make independent decisions about patient care and equity of access to patient medical records. In fact, trust and personal relationships have been found to be key. It could be that PIPs who were employed by medical practices had established relationships with the care homes and this contributed to more effective deprescribing. The training for this study included limited time to develop relationships between PIPs, GPs and the care home, but this was perhaps not sufficient.[14]

PIPs assuming responsibility for medicines management in care homes are able to deprescribe high-risk medicines with the aim of preventing iatrogenic harm. Fostering interprofessional relationships between PIPs and a care home's medical practice seems to be key to effective deprescribing. Future work should focus on designing and testing evidence and theory-based strategies to foster these interprofessional relationships so that all PIPs working in care homes, irrespective of the model of employment, are supported to deprescribe.

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COMPETING INTERESTS

The authors have declared no conflict of interest.

CONTRIBUTORS

The overall research design was created by D.W. and S.S., who also provided feedback on the data extraction and analysis from pharmaceutical care plans. M.A. extracted and analysed the data, and D.W., S.S. and A.C. provided feedback on the results of the analysis. M.A. wrote the manuscript under the supervision of D.W. and S.S. and support from A.C. All authors provided feedback on the manuscript's draft, and all agreed on the final version.

DATA AVAILABILITY STATEMENT

The analysed datasets used in the current study are available upon reasonable request from the corresponding author.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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