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Systematic review and narrative synthesis of pharmacist provided medicines optimisation services in care homes for older people to inform the development of a generic training or accreditation process

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Abstract

Objectives To develop a training programme to enable pharmacists with prescribing rights to assume responsibility for the provision of pharmaceutical care within care homes, a systematic review and narrative synthesis was undertaken to identify reported approaches to training pharmacists and use this literature to identify potential knowledge requirements.

Methods A PROSPERO-registered systematic review was performed using key search terms for care homes, pharmacist, education, training and pharmaceutical care. Papers reporting primary research focussed on care of the older person within the care home setting were included. No restrictions were placed on methodology. Two researchers independently reviewed titles, abstracts and papers. Agreement on inclusion was reached through consensus. Data on titles, training and activities undertaken were extracted and knowledge requirements identified. Findings were synthesised and reported narratively.

Key findings Fifty-nine papers were included, most of which were uncontrolled service evaluations. Four papers reported an accreditation process for the pharmacist. Thirteen papers reported providing tools or specific training on a single topic to pharmacists. The main clinical and therapeutic areas of activity (requiring codified knowledge) were dementia, pain, antipsychotic and cardiovascular medication. Provision of pharmaceutical care, effective multidisciplinary working and care home staff training represented the main areas of practical knowledge.

Conclusions Information regarding training and accreditation processes for care home pharmacists is limited. This study provides insight into potential codified and practical knowledge requirements for pharmacists assuming responsibility for the provision of pharmaceutical care within care homes. Further work involving stakeholders is required to identify the cultural knowledge requirements and to develop a training and accreditation process.

Background

The Care Homes' Use of Medicines Study (CHUMS) reported in 2009 that almost 70% of UK care home residents experienced at least one medication error on any given day.[1] The authors proposed that the fundamental failings were largely due to the fact that no single healthcare professional had overall continuing responsibility for medicines management.[1] The UK Department of Health Immediate Action Alert arising from CHUMS required

primary care organisations, general practitioners (GPs) and pharmacy contractors to establish effective joint working strategies to address the identified concerns.[2] The resultant predominant model of care was that of a pharmacy team undertaking medication reviews in care homes on a yearly or twice-yearly basis. A recent Cochrane review conducted by Alldred *et al.*,[3] which considers the international literature where similar pharmacy services have been described, suggests that current models are sub-optimal and more effective approaches to medicines optimisation in this setting are required.

Changes in UK legislation, enabling suitably trained pharmacists to prescribe,[4] provide an opportunity for pharmacist-independent prescribers (PIPs) to assume the proposed central role in the care home environment. Evidence from the UK[5] and other countries[6] suggests that pharmacist-independent prescribers can prescribe safely and provide patient benefit.[7]

The model of a pharmacist assuming responsibility for medicines-related activities in care homes would be similar to that mandated in the United States whereby a pharmacist is required to be an integral part of the care home team where they develop, implement and monitor individualised medicines-focussed (pharmaceutical) care plans.[8] However, in the United States, the pharmacist is not responsible for prescribing and is reliant on the care home physician to implement identified medication changes.

To achieve prescribing status in the UK, pharmacist-independent prescribers (PIPs) are required to demonstrate competency against a national framework which consists of generic competencies that are applicable to all prescribing activities.[9] During the training and accreditation process, PIPs are also expected to identify their clinical area of defined practice, develop competence within the area and practise within it.

In 2012, the UK National Institute for Healthcare Research (NIHR) funded a programme to develop and test the concept of PIPs assuming responsibility for the provision of pharmaceutical care within the care home environment (CHIPPS) via a randomised controlled trial.[10] The service was planned to involve, as a minimum, the pharmacist working closely with a resident's GP to enable them to assume responsibility for authorisation of repeat prescriptions. This responsibility would then enable PIPs to support all medicines-related processes within the home (medicines ordering, storage, administration, review and monitoring) as envisaged by the National Institute of Health and Care Excellence (NICE),[11] Royal Pharmaceutical Society (RPS)[12] and researchers.[1]

To enable PIPs to operate safely and effectively within care homes and enhance intervention fidelity,[13] a training programme and accreditation process were required with content based on the education and training needs for the role identified from the published literature. Eraut separates workplace knowledge into three distinct types, and these were used to structure our approach: codified (that written down); practical (skills required to perform tasks); and cultural (that required to work effectively within the location, that is understanding of local expectations, standards and practices).[14]

Thus, the aim of this systematic review, regarding international literature relating to the employment of pharmacists within care homes, was to capture previously reported approaches to training and use this literature to identify potential codified, practical and cultural knowledge requirements for the role.

Method

The systematic review was registered with PROSPERO (CRD42015026693) and is reported according to PRISMA.[15] Papers and abstracts were selected for review in order to inform both content and design of any future pharmacist training package.

The target population was registered pharmacists providing a medication-related intervention to care homes. For controlled studies, any comparator, for example usual care or enhanced medication management provided by another healthcare professional, was eligible. Papers reporting any primary research of any study design and any secondary research were included.

Synonyms for care home (population), pharmacist (intervention), education and training (outcome) and pharmaceutical care (intervention) were used. Dates of publications were until 31 July 2019.

Inclusion criteria were as follows:

- Description of education and training of pharmacists prior to service/intervention delivery in a care home, OR
- Description of expertise of the pharmacist, for example title denoting additional expertise or training to perform role, OR
- Training provided by pharmacists to care home staff for which they would need to have sufficient knowledge to deliver, OR
- Materials provided to support the pharmacist in service delivery in care homes, AND
- English language publication.

Exclusion criteria were as follows:

- Studies not primarily focussed on provision of services to older people residing in care homes, that is palliative care services, children services or HIV, those not primarily based within the care home setting, OR

- Studies located in care homes where the primary focus was to determine the effectiveness of an individual drug rather than a pharmacy service, for example pharmacological studies, OR
- Papers without empirical data, for example editorials, opinion pieces, commentaries, OR
- Abstracts, OR Systematic reviews and narrative syntheses.

Databases searched were Academic Search Complete, EbscoH, Ovid MEDLINE(R) and EMBASE, OvidSP, ASSIA (Applied Social Sciences Index and Abstracts), CSA, ProQuest XML, Cochrane Database of Systematic Reviews, Cochrane Reviews, E-theses online service (EThOS), Ingentaconnect.com (Ingenta), Wiley Online Science, EPOC Group Specialised Register, Reference Manger, Ageline (EbsoH), CINAHL (Cumulative Index to Nursing and Allied Health Literature), EbsoH, International Pharmaceutical Abstract (OvidSP) and PsycINFO (EbsoH).

No date limit was used for article selection. Our protocol search strategy is provided in Appendix S1.

Titles, abstracts and full papers were screened for eligibility against inclusion and exclusion criteria, independently, by two authors. Decisions were compared and differences resolved by consensus. The need for a third independent reviewer did not occur.

For the purposes of the search, we defined a care home as being somewhere, other than the individual's home, which provides community-based accommodation and 24-hour care for people who are unable to live independently.

The number of titles, abstracts and papers identified at each stage was recorded to populate the PRISMA diagram15 and Kappa coefficient[16] calculated at each stage.

The quality of included papers was not appraised. As this was a narrative synthesis focussed on learning from the content of published care home interventions, we were not interested in outcomes of the intervention per se or the development of an understanding of the relationship between the two.

In line with Cochrane guidance, the following information was extracted: from papers and abstracts by two independent researchers:

- Year study reported
- Study design
- Location, for example country
- Setting as described within the paper
- Description of the main findings
- To provide insight into accreditation, training and support provision (where provided):
  - Description of pharmacist expertise
  - Description of education and training provided to pharmacists
  - Description of tools used to support service delivery
- Description of training of care staff provided by pharmacist (codified knowledge)
- Clinical area(s) of focus, for example dementia (codified knowledge)
- Therapeutic area(s) of focus, for example antipsychotics (codified knowledge)
- Intervention description, that is what they did and focus, for example medicines reconciliation (practical knowledge)
- For therapeutic and clinical areas, up to three of the most commonly reported in each paper were extracted.

The clinical and therapeutic areas were developed as data extraction proceeded; that is, as new areas were identified, they were added to the database. Results were compared and again agreed by consensus by two independent reviewers.

One reviewer (DW) additionally read the background and discussions in all papers to identify any additional comments relating to education and training of the pharmacists, which could be used to either provide insight into cultural knowledge requirements or further information relating to codified or practical knowledge requirements.

Analytical approach

Data were themed by Eurat domains and collated to inform the development of a care home pharmacist training plan. All training methods were extracted. The results were then narratively synthesised.

Results

Paper selection and description

Figure 1 provides a summary of the paper identification process. The level of agreement between independent reviewers at title, abstract and paper stage was 90.8%, 81.2% and 92.3% with Kappa values of 0.117, 0.134 and 0.839, respectively.

Table 1 summarises the characteristics of the 59 included papers. The majority of studies were located in the United States,[17–41] UK[42–49] and Australia[50–56] with smaller numbers from the Netherlands,[57–59] Canada[60–62] and Belgium.[63–65] Twelve papers reported randomised controlled trials,[27,32,39,44–46,48,50,53,54,66,67] and five were non-randomised controlled studies,[21,38,41,56,64,68,69] with the remainder pre-/post-uncontrolled interventions conducted as service evaluations. Papers ranged in publication dates from 1978 to 2019, and all services reported positive outcomes with respect to their main aim.

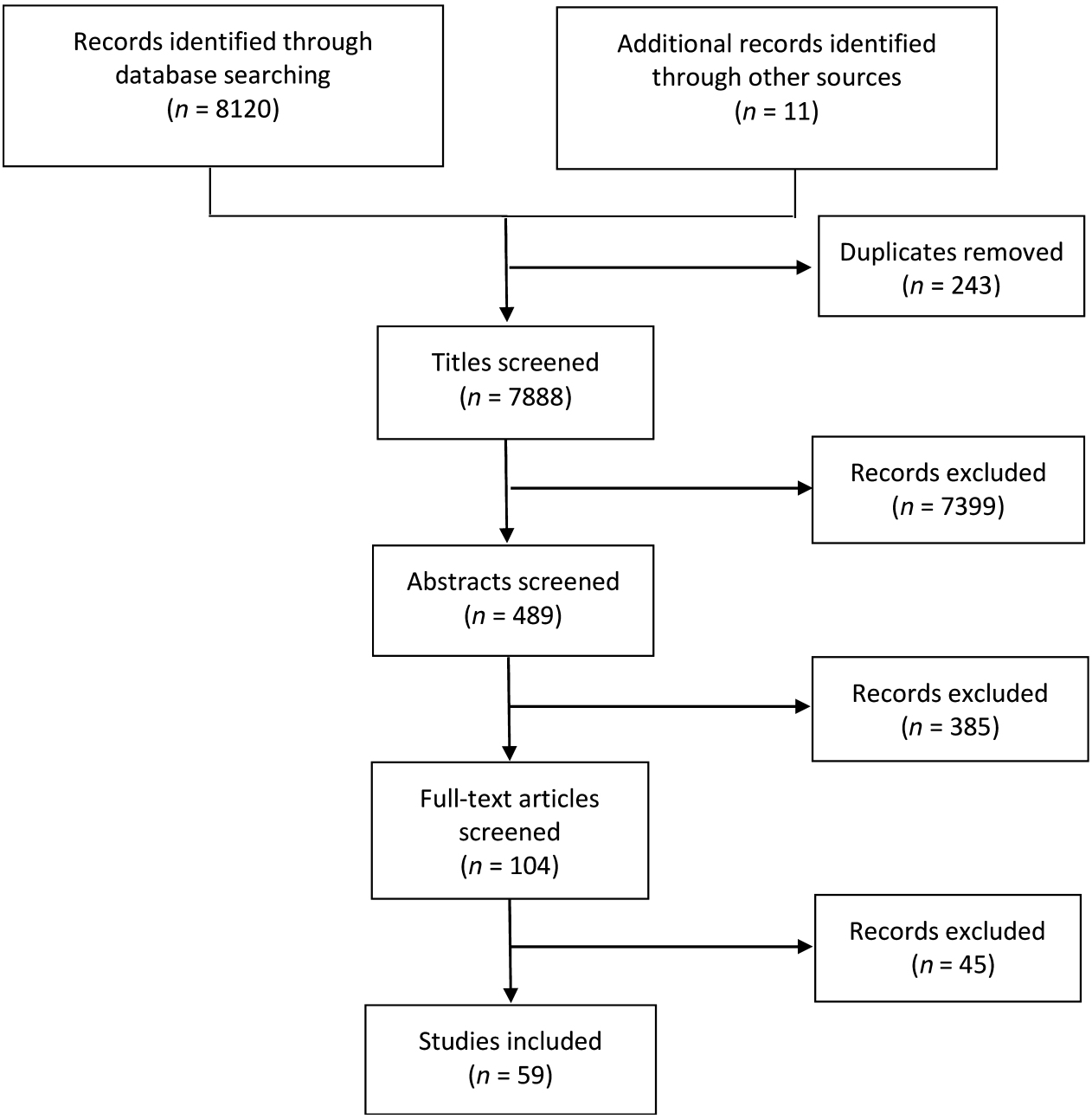

Figure 1 PRISMA diagram for literature review process.

Pharmacist, education and training characteristics

Thirteen papers stated that the pharmacist delivering the service was a 'consultant',[18,19,21,22,25,29,30,32,39–41,60,69] and twelve papers noted that the pharmacist was described as 'clinical'.[18,20,23,33,35,36,38,56,58,62,64,70] Five papers reported that the pharmacist had completed an accreditation process,[24,27,52,56,65] one of which[65] described the training as consisting of consultation skills, identification of drug-related problems, guidelines and how to create pharmaceutical care plans. Two papers stated that the pharmacist had a postgraduate clinical qualification.[46,50]

Six papers reported the pharmacists being provided with a tool to support the service, and these included the medication stopping (STOPP) and medication initiation (START) tools[64,66], Geriatric Risk Assessment MedGuide (GRAM) software,[32] Dader method of pharmacotherapy

Table 1 Summary of studies, services and outcomes included within the review

Author	Location	Year	Setting	Study type	Service	Main outcome
Roberts, MS, et al.[50]	Australia	2001	Nursing home	Randomised controlled trial	Medication review	Reduction in number of medicines
King, MA, et al.[51]	Australia	2001	Nursing home	Service evaluation	Medication review	Non-significant reductions in medication orders, cost and mortality
Smith, MA, et al.[52]	Australia	2002	Nursing home	Service evaluation	Medication review	Significant reduction in number of doses of regular medicine prescribed
Crotty, M. et al.[53]	Australia	2004	Residential aged care	Randomised controlled trial	Pharmacist-supported patient transit from hospital	Improved pain control and hospital usage in intervention arm
Beer, C. et al.[54]	Australia	2011	Residential aged care	Randomised controlled trial	Withdrawal of one target medicine	Trial acceptable to patients
Khalil, H.[55]	Australia	2011	Aged care facility	Service evaluation	Medication review	Clinical recommendations implemented
McDerby, N, et al.[56]	Australia	2018	Residential care home	Controlled trial	Medication administration enhancement service	Significant reduction in inappropriate dosage form modification
Verrue, CL, et al.[63]	Belgium	2010	Nursing home	Service evaluation	Training on medication administration	Reduction in medication administration errors
Verrue, C, et al.[64]	Belgium	2012	Nursing home	Controlled study	Medication review service	Modest improvement in medication appropriateness
Foubert, K, et al.[65]	Belgium	2019	Nursing home	Service evaluation	Medication review	Majority of recommendations implemented
Soon, JA.[60]	Canada	1985	Nursing home	Service evaluation	Adverse drug reaction monitoring programme	Earlier detection and resolution of adverse drug reactions
Kroger, E, et al.[61]	Canada	2015	Nursing home	Service evaluation	Medication review	Service to optimise medicines use is feasible
Tandun, R, et al.[62]	Canada	2019	Long-term care facility	Service evaluation	Proton pump Inhibitor deprescribing intervention	Increased proportion of residents had their proton pump inhibitor discontinued
Norgaard, LS. et al.[74]	Denmark	2015	Residential care setting	Service evaluation	Medication review and medicines reconciliation	Reduction in drug-related problems
Legueline, G. et al.[68]	France	2013	Nursing home	Controlled study	Medication review	Significant reduction in adverse drug event risk
Frankenthal, D, et al.[66]	Israel	2014	Chronic geriatric facility	Randomised controlled trial	Medication review with STOPP/START	Significant reduction in number of medicines
Finkers, F, et al.[57]	Netherlands	2007	Nursing home	Service evaluation	Medication review	Significant reduction in drug-related problems
Stujit, CCM, et al.[58]	Netherlands	2008	Residential home	Service evaluation	Medication review	Significant improvement in medication appropriateness
Stujit, CCM, et al.[59]	Netherlands	2013	Nursing home	Service evaluation	Training in medication administration for patients with dysphagia	Significant reduction in medication administration errors
Connolly, MJ, et al.[67]	New Zealand	2014	Long-term care facility	Cluster randomised controlled trial	Nurse-led staff education Multi-professional review	No effect on hospitalisations and mortality. Fewer acute admissions.
Ruths, S, et al.[87]	Norway	2003	Nursing home	Service evaluation		
Bellingan, M, et al.[86]	South Africa	1996	Elderly care facility	Service evaluation	Medication review	Significant reduction in drug-related problems and polypharmacy.
Jodar-Sanchez, F, et al.[69]	Spain	2014	Nursing home	Controlled study	Medication review	Number of medicines significantly reduced.
Bergman, A, et al.[88]	Sweden	2006	Nursing home	Service evaluation	Medication appropriateness review	70% prescriptions potentially inappropriate
Kuo, CN, et al.[70]	Taiwan	2013	Nursing home	Service evaluation	Medicines reconciliation	Reduction in medication discrepancies
Newman, GR.[89]	UK	1982	Residential aged care	Service evaluation	Medication handling intervention	Positive feedback on scheme from participants

Table 1 Continued

Author	Location	Year	Setting	Study type	Service	Main outcome
Narula, N, et al.[42]	UK	1992	Residential home	Service evaluation	Review of medication administration problems	Problem report form developed
Rees, JK, et al.[43]	UK	1995	Residential home	Service evaluation	Medication review	Clinical recommendations implemented.
Furniss, L. et al.[44]	UK	2000	Nursing home	Randomised controlled trial		Significant reduction in medicines. No effect on mortality.
Zermansky, A, et al.[45]	UK	2006	Care home for elderly people	Randomised controlled trial	Medication review	Significant difference in number of drug changes per patient
Alldred, DP, et al.[46]	UK	2007	Care home for elderly people	Randomised controlled trial	Medication review	Clinical recommendations implemented.
Saaed, M, et al.[47]	UK	2010	Nursing home	Service evaluation	Audit medication administration records	Reduction in medication errors
Patterson, SM, et al.[48]	UK	2011	Nursing home	Randomised controlled trial	Medication review	Significant improvement in antipsychotic medication appropriateness
Hampson, N.[49]	UK	2012	Care home	Service evaluation	Medication review	Reduction in medication costs
Cooper, JW, et al.[17]	USA	1978	Long-term care facility	Service evaluation	Medication review	Number of medicines reduced
Cooper, JW.[18]	USA	1985	Long-term care facility	Service evaluation	Medication review	Reduction in drug use
Andolesk, K.[19]	USA	1987	Long-term care facility	Service evaluation	Medication review	Number of medicines reduced
Pucino, F.[20]	USA	1988	Long-term care facility	Service evaluation	Therapeutic drug monitoring service	Anecdotal improvements in patient control
Cooper, JW.[21]	USA	1995	Nursing facility	Controlled study	Medication review	Significant reduction in hypoglycaemic and hyperglycaemic events in home where pharmacist authorised to make changes independently
Cooper, JW.[22]	USA	1997	Geriatric nursing facility	Service evaluation	Medication review	Clinical recommendations implemented
Jeffrey, S, et al.[23]	USA	1999	Long-term care facility	Service evaluation	Medication review	Reduction in number of unnecessary medicines
Elliott, RA, et al.[24]	USA	1999	Nursing home	Service evaluation	Medication review	Reduction in medication costs
Lai, LL, et al.[25]	USA	2001	Nursing home	Service evaluation	Antibiotic medication review	Clinical recommendations implemented
Christensen, D, et al.[26]	USA	2004	Nursing home	Service evaluation	Medication review	Reduction in polypharmacy
Crotty, M, et al.[27]	USA	2004	Long-term care facility	Randomised controlled trial	Medication review	Significant improvement in medication appropriateness
Buhr, GT, et al.[28]	USA	2006	Nursing home	Service evaluation	Quality improvement project to improve pain management	Staff pain management knowledge improved
Cooper, JW, et al.[29]	USA	2007	Geriatric nursing facility	Service evaluation	Medication review	Clinical recommendations implemented
Hursh, D, et al.[30]	USA	2010	Nursing facility	Service evaluation	Improving antipsychotic medication use	Reduced antipsychotic medication use
Gunning, K et al.[31]	USA	2010	Assisted living facility	Service evaluation	Integration of pharmacists into team	Students valued the experience, felt valued as medication experts
Lapane, KL, et al.[32]	USA	2011	Nursing home	Randomised controlled trial	Implementation of Geriatric Risk Assessment MedGuide	Significantly lower rate of potential delirium onset
Motycka, C, et al.[33]	USA	2012	Long-term care facility	Service evaluation	Warfarin medication review	Significantly greater proportion of patients in therapeutic range
Zarowitz, BJ, et al.[34]	USA	2012	Nursing home	Service evaluation	Quality improvement project to improve methotrexate administration	Reduction in methotrexate administration errors
Nye, A.[35]	USA	2012	Nursing home	Service evaluation	Medication review	Clinical recommendations implemented

Table 1 Continued

Author	Location	Year	Setting	Study type	Service	Main outcome
Phillippe, HM.[36]	USA	2012	Long-term care facility	Service evaluation	Anticoagulation service	Improved time in therapeutic range
Lemay, CA, et al.[37]	USA	2013	Nursing home	Survey	Education needs for staff regarding antipsychotic medication	Multifaceted intervention to improve care home staff knowledge regarding antipsychotics required
Kane-Gill, SL, et al.[39]	USA	2016	Nursing home	Randomised controlled trial	Adverse drug reaction management training	Improvement in physician assessment of consultant pharmacist importance and performance
Gemelli, MG, et al.[40]	USA	2016	Long-term care facility	Service evaluation	Medication review focussed on anxiolytics and hypnotics	Dose reduction and treatment discontinuations seen
Sasson, E, et al.[38]	USA	2017	Nursing home	Service evaluation	Pharmacy-led psychopharmacology round	Reduction in antipsychotic medication use seen
Bach, LL, et al.[41]	USA	2017	Nursing home	Service evaluation	Medication review focused on antipsychotic medication	Decline in antipsychotic medication use observed

follow-up,[69] Beers criteria,[71] GheOP-S tool,[72] antipsychotic use survey tool[73] and other unspecified toolkits.[26,74]

Two papers described the pharmacists being trained in inter-professional relationship development[31,47] and in how to perform medication review.[46,65] Individual papers described using an online package focussed on the use of methotrexate,[34] training on falls prevention,[32] medicines administration[63] and the use of antipsychotics.[30] Training provided to staff in care homes by pharmacists included use of antipsychotics,[30,37] medicines administration,[59,63] pain management[28,43,50] and inter-professional communication.[47]

Codified and practical knowledge

Table 2 provides a summary of the main clinical and therapeutic areas identified and the most commonly cited activities. The main areas of 'codified knowledge' regarding appropriate use of medicines and management of conditions used by pharmacists are reported in order of frequency of appearance. The main activities reported and coded as 'practical knowledge requirements' related to the service are similarly listed and included medication review, discontinuation, change, monitoring and initiation. The ability to work in a multidisciplinary manner and train others were also commonly cited activities which require practical knowledge. The importance of good inter-professional working skills and development of effective relationships with homes were identified in four papers[40,52,62,64] and with general practitioners in one.[43] Care home staff training was identified as an important element in developing those relationships.[24,50]

Cultural knowledge

Care home staff training was seen as important for changing care home medicines-related cultures, for example requests for medication such as antibiotics, antipsychotics, analgesia and laxatives[50] and willingness to implement changes in therapy. Care home culture was cited in one paper as a reason for medicines changes not being implemented.[50] Watching medicines administration and providing feedback on errors[56] as well at routine attendance at ward rounds to discuss antipsychotic medication use[38] were seen as effective at changing cultures.

Discussion

This is the first paper to systematically identify the reported training associated with pharmacists employed in care homes for older people and to then identify their potential knowledge requirements. Whilst pharmacist

Table 2 Identified codified and practical knowledge requirements

Codified knowledge		Practical knowledge
Therapeutic area (*n*)	Clinical area (*n*)	Activity (*n*)
Psychotropic (18)	Dementia (9)	Medication review (46)
Cardiovascular (11)	Pain (5)	Medicines discontinuation (31)
Gastrointestinal (7)	Diabetes (4)	Medicines change (26)
Benzodiazepines (6)	Cardiovascular disease (4)	Monitoring recommendations (21)
Analgesia (4)	Stroke (2)	Multidisciplinary intervention (22)
Nutrition and blood (3)	Dysphagia (3)	Medicines initiation (12)
Anticoagulants (2)	Infection (1)	Care home staff training (13)
Antimicrobials (2)	Behavioural problems (2)	Error management (7)
Urinary tract (1)	Pulmonary disease (1)	Medicines reconciliation (4)
	Falls prevention (1)	Use STOPP/START tool (2)

activity within care homes has been reported in a large number of countries, there seems to be relatively limited evidence describing how they have been supported or developed for this role. There was some recognition of additional expertise or training required for the role within a number of papers but how this was achieved or accredited was largely not described.

The results suggest that knowledge related to an ageing population, for example regarding the effective management of dementia and pain, would be required for a pharmacist undertaking a central medicines management role in care homes. Additionally, they would need to be able to routinely provide pharmaceutical care, demonstrate an ability to work in multidisciplinary teams and train care staff. Researchers have also suggested that understanding local cultures and an ability to influence them would be required.

The review was performed with a wide remit for inclusion of papers with any content providing insight into pharmacist training in the care home environment. This may explain the lack of initial agreement between reviewers in the first two stages. There was, however, good agreement when the final papers were reviewed, and the researchers were not required to make a subjective judgement on paper content from the limited information available in titles and abstracts. The large number of papers from a wide variety of settings, countries and years provided a good overview of the research evidence but may miss the more mundane activities routinely undertaken by pharmacists within care homes which may not be believed to be worthy of publication. Similarly, the clinical and therapeutic areas identified may reflect those which are believed to be of greatest need or providing greatest patient benefit, and therefore, frequency of report is unlikely to align with frequency of activity within different areas. Without a time restriction on the search, we have included some relatively old papers where knowledge requirements for pharmacists may differ and we have not considered the effect of this in our analysis. Similarly, literature reviews, by definition, look backwards and therefore provide little or no insight into future activities. New models of pharmaceutical care within care homes include the involvement of pharmacy technicians in some countries to undertake some of the routine tasks and improve use of skill mix within this setting.[75] We have not considered this model of care or its impact on the training needs of pharmacists. Increasingly, pharmacists are undertaking clinical assessments and physical examinations[76] and this knowledge may be necessary in this environment in the not-too-distant future.

The lack of reported training suggests that there has been limited consideration to date of training and accrediting pharmacists to provide pharmaceutical care within care homes either for service delivery or trial design purposes. Taking into consideration the frailty of the care home population and the complexity of their needs, it is surprising that additional training for the role has not been largely considered. When designing evaluations of complex interventions of this nature, careful consideration of intervention fidelity to standardise intervention dose (as far as is possible) is recommended.[77]

Similarly, due to a recent pharmacist-based study to improve patient adherence resulting in significant patient harm,[78] as with the development and testing of any new complex intervention, it cannot be assumed that they are safe. Within the proposed CHIPPS model, there is no third party to moderate pharmacist interventions and therefore it is important for both scientific and ethical validity that pharmacists are appropriately trained and accredited prior to service implementation. Where accreditation was reported as a requirement for service provision, a description of the process was largely not provided. [24,27,52]

Individuals delivering the reported services were frequently described using the terms 'consultant' and 'clinical'. Interestingly, neither term within the pharmacy

profession has internationally recognised education, training and accreditation processes to underpin them. In the United States, there is a requirement for pharmacists working within care homes to hold 'consultant' status; however, there are no nationally recognised additional education requirements above the Doctor of Pharmacy (PharmD) held by pharmacists as standard.[79] The lack of description of pharmacist training for operating within care homes in the US literature may be due to the fact that usual pharmacist training largely prepares them for operating in this environment and the PharmD provided in the United States, where students are taught to undertake clinical roles,[80] may well be appropriate. The American Society of Consultant Pharmacists does provide board certification in geriatric pharmacy, which consists of undertaking a written examination, but does not require this for an individual to adopt the title of consultant pharmacist.[81] This is perhaps an implicit recognition of the need for certification but recognition that it may be impractical to impose it.

During the screening process, we chose to include papers where the term 'clinical pharmacist' was used assuming that it may denote additional training. The term, however, in a similar manner to 'consultant pharmacist' is more commonly used to describe the role of the pharmacist rather than their underpinning knowledge and training.[82]

When considering the codified knowledge requirements, it is unsurprising that many interventions are focussed on diseases related to ageing such as cardiovascular and gastrointestinal conditions. Such topics are central to pharmacist education and training, and therefore, additional training may not be required. The inappropriate and potentially harmful use of antipsychotic medication in care homes to manage the behavioural symptoms associated with dementia has been widely reported.[82–85] The initiation and safe discontinuation of antipsychotic therapy in older persons may not form part of generic pharmacist training. Similarly, the recent recognition of the need to effectively manage pain in residents with dementia to improve quality of life and minimise agitation[85] may also explain the importance of focussing on this topic within care homes, and is another area where specific training may be required. The other areas that may be more specific to the care home population and require bespoke additional training are the management of falls (linked to medication) and medicines administration for residents with dysphagia.

Where training was described, it usually focussed on the delivery of one activity.[30,32,34,63] Similarly, tools and toolkits were frequently provided to pharmacists to standardise the service or intervention.[26,32,40,41,64–66,69,74] Provision of activity-focussed training and tools was therefore generally without consideration of any additional training which may be required to enhance implementation in this environment. Impact can potentially be enhanced through better inter-professional relationships, understanding of the barriers to improving practice and the implementation of enablers to address them.[24,50]

Although it was not a focus of this paper, a commonly reported outcome was the number of pharmacist interventions accepted and implemented by the responsible primary care physician.[21,22,24–26,29,35,40,41,43,45,49,55,58,65,69,74,86] The reliance on another professional to accept and implement a pharmacist's recommendations may partially explain the focus on the development of inter-professional relationships within pharmacist training in two of the papers. [31,47] The deployment of a pharmacist with prescribing rights within care homes removes the reliance on another profession; however, within the CHIPPS model, the resident's GP is still ultimately responsible for their care. Consequently, it will be necessary for the pharmacist and GP to work together effectively in order to both minimise duplication of effort and prevent potential conflict.

Conclusion

Accepting that the systematic review did not include the grey literature and is entirely dependent on published literature with empirical data, the information provided here can only be used to form the basis of a training plan for pharmacists operating within the care home environment. Insight into the types of knowledge required by pharmacists is provided but is limited by the fact that research publications, which by definition report novel and interesting activities, may not include descriptions of routine activities undertaken by pharmacists in this environment. A pharmacist assuming the central medicines management role would be expected to contribute at all levels, and therefore, extensive input from all relevant stakeholders is now required to fully develop a training and accreditation process, which is likely to be both practical and acceptable.

Declarations

Conflicts of interest

David Wright regularly undertakes consultancy work and receives research funding from a pharmaceutical company, which manufactures generic liquid medicines.

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Authors' contributions

DPA, CMB, JD, RCH, NN, and DJW: Conceived the original project idea and are co-applicants on the grant application. AB, VM, and DJW: Undertook the systematic review process. DJW: Prepared the first draft of the manuscript and all authors commented on each draft as it developed.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1. Example search strategy from study protocol.