



The development of a comprehensive medicines management approach for persons with dementia in primary care

EXECUTIVE SUMMARY

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Contents

EVIDENCE BRIEF	3
Background	5
Aim and objectives.....	6
Methods.....	7
Phase 1.....	7
Phase 2.....	8
Phase 3.....	10
Personal and Public Involvement (PPI)	11
Findings	12
Phase 1.....	12
Phase 2.....	13
Phase 3.....	14
Conclusion.....	15
Practice and Policy Implications/Recommendations.....	16
Acknowledgements.....	17
References	18

EVIDENCE BRIEF

Why did we start?

People with dementia (PwD) experience unique challenges when managing their medicines, due to the difficulties they have with their memory and not being able to communicate as well with others. This may affect the way in which doctors and other healthcare professionals prescribe and care for these patients. There has been limited research on how medicines are managed in PwD, particularly for those living in their own homes and being cared for by general practitioners (GPs) and other members of the primary care team. The aim of this project was to develop an approach (intervention) to improve medicines management for PwD, with help from patients, carers and healthcare professionals.

What did we do?

The project comprised three phases of work. **Phase 1:** Using a large prescribing database we looked at what medicines were being prescribed for PwD by their GP, and we used a tool that helped us to assess the quality of prescribing. **Phase 2:** We interviewed PwD, their carers, GPs and community pharmacists to discuss medicines management from each individual's perspective. We analysed these interviews and from the results, we developed an intervention in which GPs, community pharmacists, PwD and carers could work together to improve medicines management. **Phase 3:** We tested this intervention in a small number of community pharmacies to see how it worked in reality.

What answer did we get?

From the database study, we found that PwD were receiving many medications, and that patients were receiving drugs or combinations of drugs that were not always considered to be clinically appropriate. Whilst GPs were mindful about prescribing appropriately for PwD, they sometimes lacked confidence prescribing certain drugs. Community pharmacists were concerned about how well PwD took their medicines. Both GPs and pharmacists felt it was important to review PwD's medication, but struggled to find time to do this thoroughly. PwD and carers did not report any problems with medicines management at the time of the interviews. An approach was devised for community pharmacists to undertake a face-to-face medication review with PwD and their carers, and to communicate any suggested medication changes to the patient's GP. Whilst we attempted to try this out in three community pharmacies, none of the pharmacists was able to recruit PwD or carers to the

study, which in part was due to a lengthy screening and recruitment process. Therefore, the approach was unable to be tested.

What should be done now?

Further work is needed to test and evaluate the developed approach to see how well it can be implemented in clinical practice and if it can have a positive impact on patient outcomes. Consideration will have to be given as to how best to screen, recruit and consent PwD in a future study. The project has provided useful information about the appropriateness of prescribing for PwD, and this should be considered by healthcare professionals involved in prescribing and/or dispensing medications for PwD in the future. It may also help inform future work in this area by helping researchers to focus their attention on potentially inappropriate classes of drugs found to be commonly prescribed for PwD.

Background

Medicine taking is a common occurrence, particularly for older people. For example, in 2017 there were nearly 42 million prescription items issued in Northern Ireland (Business Services Organisation, 2018). Medicines management, which is a term that we used throughout this project, is an umbrella term used to describe all of the activities that occur at each stage of the medicines journey. It is defined as *'encompassing the entire way that medicines are selected, procured, delivered, prescribed, administered, and reviewed to optimise the contribution that they make to producing informed and desired outcomes of patient care'* (Audit Commission, 2001). The main activities that the research team thought about in relation to medicines management were: **prescribing** of medicines by a patient's general practitioner (GP); **dispensing** of medicines by the community pharmacist; **administration** (i.e. the patient taking their medicines); **adherence** (or compliance) with the medication regimen; and **review** of medicines by a healthcare professional, which could be done by a GP or pharmacist. Medicines management can be summarised as *'the right medicines for the right patient at the right time'*, with the ultimate goal of optimising the benefits that treatment offers and attaining the best outcome for each patient (Department of Health, 2019).

Medicines management in people with dementia (PwD) has been the focus of this project. A significant proportion of the world's population is living with dementia, and as the population grows and ages it has been estimated that the prevalence of dementia will increase further over the next number of decades (World Health Organisation, 2017). Many PwD will suffer from at least one other long-term or chronic health condition, which is termed *'multimorbidity'*. It has been reported in the literature that approximately 95% of PwD have another chronic disease, commonly coronary heart disease, depression and diabetes (Barnett *et al.*, 2012). This can result in such patients being prescribed a number of different medications for each condition, which may be complex and difficult to manage. Patients prescribing multiple (more than four) medications (termed *'polypharmacy'*) are at greater risk of receiving drugs or combinations of drugs that are considered to be potentially inappropriate; this may be because the risks of their use outweigh the benefits, a dose or duration of use of a drug may be excessive, or there may be a more favourable choice of drug, dose or duration of use (O'Mahony and Gallagher, 2008; Bradley *et al.*, 2012). PwD may have additional difficulties managing complex medication regimens due to difficulties with their memory and ability to communicate with others, which may result in them not taking the medicines as prescribed (non-adherence). Doctors may face challenges when prescribing for PwD, such as when trying to manage patients' pain or behavioural symptoms (Wood-Mitchell *et al.*, 2008; Jennings *et al.*, 2018). The literature shows that PwD receive increasing amounts of help with their medicines from carers (such as a family member),

and they too may struggle to encourage patients to take their medicines (Alsaeed *et al.*, 2016; Maidment *et al.*, 2017).

Despite awareness of the benefits of optimising medicines management for PwD, at the time of project planning there had been very little research published in this area, and most of the studies focused on PwD living in care homes or nearing the end of life. In particular, there was insufficient focus on PwD living in their own homes in the community, which is where the majority of dementia patients reside (Prince *et al.*, 2014). Such patients are known to frequently access primary healthcare services and professionals, such as GPs and community pharmacists (Browne *et al.*, 2017). The lack of knowledge in this area impedes the development of new approaches to help PwD manage their medicines, for which there had been calls for in the literature (Maidment *et al.*, 2012; McGrattan *et al.*, 2017). Therefore, we wanted to undertake this project to understand medicines management in PwD from a broad perspective and to find a way to improve medicines management for PwD, involving all key stakeholders (i.e. PwD, their carers, GPs and community pharmacists) in the process.

Aim and objectives

The overall aim of this project was to develop an approach (intervention) to improve medicines management for PwD in primary care in Northern Ireland.

The specific objectives were to:

1. Investigate the medicines being prescribed for PwD and assess the appropriateness of prescribing for PwD in primary care in Northern Ireland using a large dispensing database;
2. Undertake interviews with PwD, their carers, GPs and community pharmacists in order to explore the most important aspects of medicines management from each perspective and to identify the barriers and facilitators to successful medicines management for PwD;
3. Use the information gathered to develop an intervention that would seek to optimise medicines management in PwD;
4. Test this intervention on a small scale with PwD, carers and healthcare professionals, to see if it would work in the primary healthcare setting (i.e. feasibility testing).

Methods

The project comprised three phases, the structure of which was informed by the Medical Research Council guidance on complex intervention development (Craig *et al.*, 2008) and previous research undertaken by some of the investigators (Duncan *et al.*, 2012; Cadogan *et al.*, 2015; Cadogan *et al.*, 2016; Cadogan *et al.*, 2018; Patton *et al.*, 2018). The Medical Research Council guidance helps to make the process of developing interventions more methodical. It emphasises the importance of developing an intervention based on the available evidence base (i.e. published information), and it also states that key stakeholders should be involved in the intervention development process. The diagram below summarises the structure of the project:

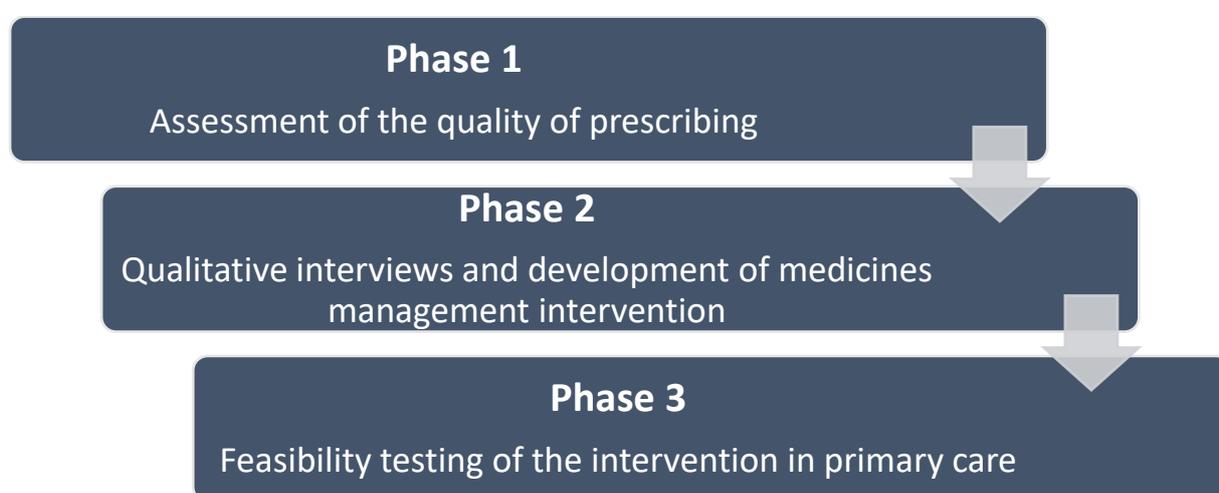


Figure 1. A summary of the three phases of work conducted during this project

Phase 1

We used information from a database (called the Enhanced Prescribing Database) that is held by the Business Services Organisation, which processes all prescriptions dispensed by community pharmacies in Northern Ireland. This database has been used by some of the investigators in previous studies looking at prescribing in older people (Bradley *et al.*, 2012). The research team did not have access to any patient-identifiable data. We looked at prescribing during a one-year period, which ran from 1st January to 31st December 2013. The database contained limited information about patients, and it did not hold any information about the conditions that patients had been diagnosed with (such as dementia), so we had to assume that a person had dementia if they had been prescribed one of four dementia drugs (called donepezil, galantamine, rivastigmine or memantine) during 2013. This analytical approach had been used previously (Bradley *et al.*, 2012). As we only wanted information

about patients who were living in their own homes, we excluded anyone who was living in a care home, and also anyone who died during the study period. The information we extracted from the database included data on all prescribed items, the month and year each item was dispensed by the pharmacy, patients' gender, and their age. We then used a tool, called STOPP (which stands for Screening Tool of Older Person's Prescriptions) to help us assess the quality of prescribing (O'Mahony *et al.*, 2015). This tool was developed by experts in the use of drugs in older people, and lists 80 recommendations of drugs or classes of drugs that should not be used in older people (O'Mahony *et al.*, 2015). Again, due to the limited information that the database held about patients, we were not able to apply all of the STOPP criteria during the analysis. The analyses that we conducted was used to mostly describe the sample of patients included in the study, the number of and types of drugs they were prescribed, and the prevalence of potentially inappropriate prescribing. In addition, we also conducted some additional analyses to see if potentially inappropriate prescribing was linked with other patient characteristics such as their gender or if they were prescribed more than four repeat medicines (polypharmacy).

Phase 2

We conducted face-to-face interviews with PwD, their carers, GPs and community pharmacists. We sampled participants in a number of different ways. We used two memory clinics in the Belfast Health and Social Care Trust to approach patients and their carers when they were attending outpatient review appointments with a consultant geriatrician. In order to be eligible to participate in the study, patients had to have a diagnosis of dementia, be living at home, receiving four or more regularly prescribed medications, and be capable of taking part in an interview. Carers were eligible to participate if they had contact with the patient at least three times a week and helped the patient with their medicines. We set out to recruit between 15-20 patient/carer pairs. We also recruited 10 GP surgeries across Northern Ireland (two surgeries in each of the Health and Social Care Trust areas of which there are five). In each surgery, we tried to recruit one PwD who was living *alone* in their own home and who was prescribed four or more regular medications. Later on in the study, we also used the Join Dementia Research Database to try and recruit patients living alone, as we found it difficult to recruit PwD through GP surgeries. The GPs from each of the recruited surgeries were invited to take part in an interview, and based on our previous experience we tried to recruit between 15-20 GPs. We then asked the practice managers from each of the recruited GP surgeries to identify the local community pharmacies which dispensed most of their prescriptions. The pharmacists working in these pharmacies were approached and invited to take part in the study, again with a view to recruiting between 15-20 community pharmacists.

Participants were interviewed on one occasion only, and interviews were scheduled to last up to one hour in duration. All participants were asked to provide written informed consent before the interview began. We used a theoretical framework, called the Theoretical Domains Framework (TDF), to devise the questions asked during the interviews. This framework is made up of 14 'domains' which help us to better understand individuals' behaviour (Cane *et al.*, 2012); in the context of this study we were aiming to better understand medicines management – the main behaviours being prescribing, dispensing, administration, adherence, and review. For example, one of the domains in the TDF is about knowledge, so we constructed questions to ask participants about the knowledge they needed to have in order to successfully manage medicines for PwD. Each interview started with the researcher explaining what was meant by the term 'medicines management'. Patients were asked about their experiences of medicines management, the problems they faced when managing their medicines, and things that helped them with their medicines. Carers, GPs and community pharmacists were asked about their views on how PwD manage their medicines.

All of the interviews were recorded and typed up word-for word. We used the TDF when we were analysing the interview data to identify the barriers and facilitators within each domain to successful medicines management from the perspective of each participant group (i.e. PwD, carers, GPs and pharmacists). The rest of the analysis focused on the information provided by healthcare professionals, as PwD and their carers did not identify many barriers to medicines management (see later under 'Findings'). The key theoretical domains were then identified and mapped to behavioural change techniques (BCTs) which are considered to be the 'active ingredients' of an intervention. The way in which we did this was guided by previous research (Cadogan *et al.*, 2015; Patton *et al.*, 2018), and we also referred to published tables which map TDF domains to BCTs (Michie *et al.*, 2008; Cane *et al.*, 2015). This process involved a lot of discussion between the different members of the research team as we had to consider if, and how, BCTs could be applied in a practical way in a GP surgery or community pharmacy setting, and within the time left to complete the project. We developed two draft interventions for healthcare professionals – one for GPs and one for community pharmacists. These intervention outlines were presented to two small groups of healthcare professionals who had taken part in the earlier interviews, and we gathered their feedback and recommendations based on their professional and practical experience. Using this information, and the expertise within the research team, we then had a final discussion between the investigators to decide what the final intervention would be.

Phase 3

The aim of this phase of work was to test the intervention developed in the previous phase to find out if it could be feasibly implemented in clinical practice, and if it was acceptable to PwD, carers and healthcare professionals. We sought to recruit two community pharmacies, and in order to do this we approached pharmacies where some of the pharmacists who had taken part in the earlier interviews worked. Unfortunately, one of the recruited pharmacists had to withdraw from the study, and so another pharmacy was recruited as a replacement.

We asked each pharmacist to recruit five PwD/carer pairs. To be eligible to participate, patients had to have a diagnosis of mild-moderate dementia (which would need to be confirmed by their GP), be living at home, receiving four or more regularly prescribed medications, and have a carer who helped them with their medicines. In addition, the pharmacy had to have twelve months' of information on their computer system about the medications dispensed to the patient during that time. We decided to exclude patients with severe dementia from the study as they may not have been able to consent to take part in the study, and their issues with medicines management may be different to those we had identified during our earlier interview study. Similar to the eligibility criteria in Phase 2, carers were eligible to participate if they had contact with the patient at least three times a week and helped the patient with their medicines.

When our study was reviewed by the research ethics committee, they asked us to carry out a two-stage screening process to assess if PwD would be eligible to participate in the study. This meant that the community pharmacist first had to use their computer records in the pharmacy to identify patients who had been dispensed one of the drugs used for dementia (called donepezil, galantamine, rivastigmine or memantine) and were taking four or more regular medications. The pharmacist then would have to wait until the PwD and their carer next came into the pharmacy to tell them about the study, and if they were interested in taking part, the pharmacist would give them written information about this screening/identification process. If patients and carers wanted to go ahead with the screening, then the pharmacist would have to obtain the patient's written consent in order to send a letter to the patient's GP to confirm their dementia diagnosis was of a mild or moderate severity as the pharmacist would not have this information. If the patient's GP confirmed this, then the pharmacist would have to contact the PwD and their carer to tell them, and to arrange to send them written information about what taking part in the study would involve. The pharmacist would contact the PwD and their carer after one week to see if they wanted to take part in the study and, if so, to arrange a date for them to come in to the pharmacy for a review appointment.

The intervention is outlined in further detail under 'Findings'. The research team used an online system to deliver the intervention (comprising a video and some written material) to pharmacists. The participating pharmacists would have to log in to the system in order to view the intervention material before any of the review appointments would take place with patients and carers. During the medication review appointment, the pharmacist would be expected to complete a written form to note down any changes they recommended to the patient's medication. With the patient's permission, a copy of this form would be sent to the patient's GP after the review appointment.

We planned to collect information about PwD recruited to the study, both at the start of the study and two weeks after the review appointment to see if there had been any changes made to the patient's medication. We planned to use the STOPP criteria (which we had used in Phase 1 of the project) to assess the quality of prescribing in recruited patients before and after the medication review, and we also wanted to see if we could use other measurement instruments to gather information about patients' adherence to their medication and quality of life, for example (Thompson *et al.*, 2000; Smith *et al.*, 2005; Lu *et al.*, 2008). We also wanted to collect information to assess how easy or difficult it was to recruit community pharmacists, patients and carers. We planned to conduct interviews with pharmacists, patients and carers to find out in more detail how they felt about participating in the study, and if they had any suggestions to improve the intervention in the future.

Please see the full academic report for this project for further detail of the methodologies used throughout the project.

Personal and Public Involvement (PPI)

While we were planning this project and applying for the funding, we sought the advice and opinion of research volunteers from the Alzheimer's Society, carers and PwD who attended a regional memory clinic in the Belfast Health and Social Care Trust, GPs and community pharmacists. The input of Dr Hilary Buchanan – the PPI representative on the Project Management Group – benefitted the project immensely. Dr Buchanan is a retired GP, a former carer for a PwD, and was a research volunteer with the Alzheimer's Society. She was involved in the planning and development of the project from the outset, and was able to provide a wealth of advice and experience throughout the course of the project with regard to our approach to the recruitment of PwD and carers, development of study materials (such as patient information sheets and interview topic guides), and the analysis and

interpretation of the data. During the intervention development stage, Dr Buchanan was able to advise both from her experience as a carer as well as that of a primary healthcare professional. In addition, the input of PwD, carers and healthcare professionals throughout the intervention development process helped to ensure that the final intervention was co-designed with key stakeholders, incorporating their views and opinions, which we feel is a particular strength of this work.

Findings

Phase 1

There was a total of 6,826 patients included in the database study. The majority of these patients (64%) were female, and the average age of patients was 80 years. We found that a large proportion of patients (82%) received four or more repeat medications (polypharmacy). On average, patients were prescribed seven regular medications (i.e. a medication for which a patient had received three or more prescriptions during the study period). The most commonly prescribed drug classes were statins (used to lower cholesterol), selective serotonin re-uptake inhibitors (SSRIs; used for low mood), antiplatelet drugs (used to thin the blood), non-opioid analgesics and compound preparations (used to relieve pain), and proton pump inhibitors (PPIs; used to reduce the amount of stomach acid).

We also found that a high proportion of patients (65%) were receiving drugs or combinations of drugs that are not always considered to be clinically appropriate. Some examples of the most commonly found instances of potentially inappropriate prescribing are explained below:

- Drugs with 'anticholinergic' activity, which are used to manage many common medical conditions such as depression and overactive bladder, are not recommended to be used in PwD as they are linked with a decline in physical and mental functioning. However, we found that 25% of patients in our database were prescribed these drugs.
- Proton pump inhibitors (PPIs), which are used to reduce the amount of stomach acid, are not recommended to be prescribed at their full dose for more than eight weeks. However, we found that 23% of patients were prescribed these drugs for more than eight weeks.
- There is a class of anti-anxiety drugs called benzodiazepines, which are not recommended to be used for more than four weeks. However, we found in our database that 11% of patients were prescribed these drugs for more than four weeks.

- It is recommended that patients who are prescribed strong opioid painkillers on a regular basis should also be prescribed a laxative, as these drugs can be constipating. However, we found that 11% of patients were prescribed these painkillers without a laxative.

Female patients and those prescribed four or more regular medications were at a higher risk of receiving potentially inappropriate drugs or combinations of drugs.

The findings from this study have been published (Barry *et al.*, 2016).

Phase 2

We conducted 63 interviews with participants between October 2015 and November 2016. This included 18 PwD, 15 carers, 15 GPs and 15 community pharmacists. Interviews lasted between 30 minutes to one hour.

Patients felt that their responsibility was to ensure that they took their medicines as prescribed, and adhered to the medication regimen, whilst carers talked about their role in supporting patients to do this. Patients believed themselves to be competent in managing their medicines, and did not report any issues with medicine-taking or adherence at the time of the interview. Most of the patients had strategies in place to help them to remember to take their medicines; many had their medicines dispensed in a weekly pack. Carers appeared to play a key role in monitoring patients' adherence and all of the patients interviewed had a carer to help them with their medicines. Patients and carers highlighted the support provided by local community pharmacies with prescription ordering and delivery, and placed great trust in primary healthcare professionals. Carers did express concern about the potential decline in patients' cognitive functioning and how this would impact upon their ability to take their medicines in the future. Carers anticipated that they may have to take on a more supportive role with regard to medicines management in the future. We found it difficult to recruit PwD living alone in their own homes, and therefore we still do not know how these patients are coping with their medicines.

Both GPs and pharmacists felt that as well as having a good clinical knowledge in relation to the use of medicines in PwD, it was also important to have a good understanding of the patient's personal situation, living arrangements and support network. GPs were mindful about prescribing appropriately for PwD, but they sometimes lacked confidence prescribing certain drugs (such as dementia medications, painkillers, and medicines to help with behavioural problems experienced by PwD). Pharmacists were very concerned about how well PwD took their medicines and adhered to the

medication regimen, and they described feeling a loss of control over the medicines management process once the PwD left the community pharmacy. Both GPs and pharmacists recognised the value of medication review for PwD, but struggled to find the time to thoroughly review patients' medication due to a number of work-related pressures (such as lack of time).

Two draft interventions were developed comprising seven selected BCTs; each intervention targeted either GPs or community pharmacists. Following our discussions with the healthcare professional groups, which identified a number of strengths and limitations for each intervention, and with other investigators within the research team, we decided to select the community pharmacist intervention for further feasibility testing in Phase 3. The intervention targeted community pharmacists to conduct a medication review and check adherence in PwD, using an online video which demonstrated (using actors assuming the roles of patient and carer and a real-life pharmacist) what pharmacists would have to do during the review. The video included feedback from each 'character' to reinforce the positive outcomes of conducting the medication review and adherence check. Pharmacists were encouraged to schedule appointments with PwD and their carers in order to complete the medication review, and they were provided with extra written material to assist them in conducting the review.

Phase 3

We were able to recruit two community pharmacies to the study, but both of the pharmacists experienced considerable difficulties with patient screening and recruitment. This was due to a number of competing factors – for example one of the pharmacists moved to a different pharmacy where she did not have as good a knowledge of the patient population. This pharmacist also struggled to find time to complete the screening process due to an increased workload in a new role. The other pharmacist worked part time in the pharmacy and made some attempt to screen patients, but found it difficult to approach patients and carers if his working days did not coincide with patients/carers coming in to the pharmacy. The research team provided support to both of these pharmacists during this initial stage and added a number of extensions to the timeline, however both pharmacists eventually felt unable to continue and withdrew from the study. Despite having a limited amount of time left to complete the project, we were able to recruit another pharmacy to the study. The pharmacist did identify two PwD who may have been eligible to participate, however these patients did not present to the pharmacy during the time the study had left to run.

We conducted interviews with the three pharmacists and these provided useful feedback on the intervention and suggestions of how we could improve the study in the future. Two of the pharmacists

had viewed the video and written material, and their feedback on these was positive. They felt that the video was a good way to show them how they should approach a medication review with a PwD, and they talked about the confidence it had provided them. Neither pharmacist had experienced any difficulty in accessing the intervention material via the online system. Much of the interview discussion focused on the difficulties that the pharmacists had encountered during the screening and recruitment process. The importance of knowing the patient population well was considered to facilitate the screening process, and while the process for the initial identification of patients (using the pharmacy computer records) was straightforward, difficulties arose when pharmacists had to approach patients and carers about the study. Pharmacists felt that the entire process was over-complicated and quite long, so it was difficult to maintain patients' and carers' interest. If patients and carers did not come into the pharmacy together, then an opportunity was lost for an approach. The pharmacists were positive about the information (both written and verbal) that was provided to them by the research team throughout the study.

All of the pharmacists were disappointed that they had not been able to complete the study as they could see the benefits of conducting medication review with PwD. They suggested that in the future the study may work better if there was an established partnership between the pharmacist and a local GP, to make the screening and recruitment process easier.

Conclusion

Our Phase 1 study highlighted that PwD living in their own homes were receiving a high number of medications and they were also at risk of potentially inappropriate prescribing. These findings would indicate that review of these patients is required to fully assess the necessity for, and appropriateness of, the medications used. By identifying those groups of patients who are at higher risk of potentially inappropriate prescribing (such as female patients and those on four or more regular medications), this could help GPs and pharmacists observe these patients more closely. However, we do have to be careful in interpreting these results as they only reflect a Northern Irish population, and we would recommend that researchers need to replicate such a study in larger groups of dementia patients to see if the findings are similar.

The findings from Phase 2 highlighted a number of barriers and facilitators from the perspectives of healthcare professionals that were able to be targeted as part of an intervention to improve medicines management for PwD. Whilst the findings from the patient and carer interviews did not reveal many

barriers to medicines management, these interviews emphasised the role that carers of PwD had to play in the medicines management process, and we knew that carer involvement would be a crucial part of the future intervention. While adherence was not deemed to be an issue in this particular patient sample, future interventions may have to be refined according to the severity of dementia, as the findings only represent the views of the PwD and carers who participated in the study.

We undertook a methodological process in order to develop an intervention to improve medicines management for PwD, based upon the current evidence (i.e. using information from published literature, the study of prescribing quality in Phase 1 and the interviews with key stakeholders in Phase 2). However, we experienced a number of difficulties when we tried to test this intervention in a small number of community pharmacies, particularly when we tried to screen and recruit PwD. Therefore, we are unable to say if this intervention works in clinical practice and would like to do further work on this in the future.

Practice and Policy Implications/Recommendations

Due to the exploratory nature of the research conducted during this project, there are limited implications for practice at the current time. However, the work conducted in Phase 1 highlighted the need for appropriate and sensible prescribing for PwD. Conducting regular and thorough reviews of patients' medication will ensure that medicines-related issues are addressed for these patients. In addition, the qualitative work undertaken in Phase 2 highlighted the importance of carer involvement in any future interventions developed for PwD.

The issue of prescribing appropriately for PwD should be explored further in future work, for example similar work could be conducted using larger and more detailed databases, and there needs to be further investigation into why certain classes of drugs continue to be prescribed inappropriately for PwD, particularly anticholinergic drugs.

Clearly, given the difficulties that were experienced during the third and final phase of work, we recommend that further work will need to be done to refine the intervention before further feasibility testing can happen. In particular, the way in which we screen and recruit PwD and carers should be reviewed with the aim of making this as straightforward as possible, both for participating healthcare professionals as well as potential patient participants. We suggest that a collaborative partnership between GPs and community pharmacists may be required in order to streamline the process, and

consideration should also be given to the changes that are happening within primary care currently, with the possibility of involving other primary healthcare professionals (such as GP Practice Pharmacists) in the future.

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A comprehensive list of acknowledgements is available in the full academic report.

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