

## **‘Quest for Quality’: an evaluation of the impact on elderly care**

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### **Abstract**

The Quest for Quality scheme was introduced with the aim of reducing hospital admission rates from care homes through interventions conducted by a multidisciplinary team (MDT). The objective of this was to study the types of interventions being made and establish their impact. The data was collected directly by the MDT prior to the research and therefore the analysis was retrospective. Exclusion criteria were set for each part of the analysis, taking into account missing data. A flow chart based on situations was developed allowing interventions to be classified into British National Formulary (BNF) categories and then assigned a priority. The categories found to have the most interventions were related to the gastrointestinal system (140) and to nutrition and blood (128), findings that were anticipated due to the medical issues arising in the elderly. One of the major problems identified was in the follow-up of interventions. Overall, 35% of intervention outcomes were unknown and only 20% were actioned. Reasons given for this were issues with patient record systems and the interventions not being received by the prescriber; a system allowing interventions to be tracked was therefore suggested. The causation between increasing reviews and decreasing hospitalisations could not be proved (Pearson correlation=-0.983, CI 95%) due to insufficient data. It was, however, shown that the MDT were making appropriate and valuable interventions, contributing to a reduction in polypharmacy and better quality of care when taking into account the specific case studies identified. With Quest for Quality now recommissioned, it will continue to make improvements to the benefit of patients.

**Keywords:** Polypharmacy; multidisciplinary team; intervention; care home; deprescribing.

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### **Introduction**

With emergency admission rates to hospital being higher for the residents of care homes than for the general population (Calderdale Clinical Commissioning Group, n.d.), it is important to recognise and improve the quality of care for these patients. Owing to the nature of patients in this setting, these residents have complicated needs and are taking many different medications. The risk of inappropriate prescribing, interactions and adverse drug events is, therefore, high in this population and strategies can be employed to improve the quality of care they receive. To solve this problem, a multidisciplinary approach is needed, putting the patient at the centre of care and incorporating a partnership approach with care homes and social care professionals (British Geriatrics Society, 2011).

In 2012, NHS Calderdale Clinical Commissioning Group implemented Quest for Quality, a scheme involving the use of telecare health systems, allowing real-time access to live clinical records, and a multidisciplinary team (MDT) to review patients and make interventions. The purpose of this pilot was to improve care quality for residents and to reduce avoidable visits to hospitals and GPs (Smith, Sherlaw-Johnson, Ariti, & Bardsley, 2015).

The study outlined in this paper aimed to evaluate the impact that the involvement of an MDT has made on the quality of care for residents of care homes in the Calderdale area. The study set out to classify the types of interventions made by the MDT and evaluate the proportion of harm minimisation in order to determine whether the inclusion of an MDT in the Quest for Quality scheme has made a significant difference in quality of care, and to assess the contribution of the Quest pharmacist in the MDT.

This was achieved through a review of the data collected from the date of implementation in May 2014 until August 2015, with the objective of determining the impact that the MDT has had on the quality of care. After classifying the interventions made by the health care professionals, the level of harm minimisation was evaluated for each individual patient and collated along with the contribution that the pharmacist has made in the MDT.

## **Literature review**

There are long-standing and well-documented issues regarding the quality of care in care homes, including the use of multiple medicines and the NHS resources shared between the 433,000 (Laing, 2015) people living in residential care. Quality Watch, an independent body analysing the quality of health and social care, has worked to fill a gap in research concerning this population (Smith, Sherlaw-Johnson, Ariti, & Bardsley, 2015). Primary analysis showed that 79.7% of emergency admissions of patients over the age of 75 originated from care homes, including for conditions such as dementia, mental health problems and epilepsy. The report concluded that admission rates were increased in patients over 75 years of age and implied that there were increased chances of emergency admission from care homes due to complicated conditions.

The Department of Health aimed to establish the cause and types of medication errors (Alldred et al., 2011), dividing them into prescribing, monitoring, dispensing and administration of medicines. The results showed that each patient was taking a mean of 7.2 medicines, with 69.5% of the patients having at least one error. Another report, using a variety of data collection methods, found that each patient was on an average of 8 medications, with an average of 1.9 errors per patient (Barber et al., 2009).

### *Previous projects*

The Applied Health and Wellbeing Partnership conducted a pilot study of care quality in care homes in the Wirral Community Trust (Hughes & Timpson, 2013). This report recognised that with an ageing population there is a need for the advancement and improvement of care when using an out-of-hours GP and an MDT. There were similarities to Quest for Quality, although telecare health was not included; this showed that a previous pilot has been successful, which justifies the benefit of the scheme.

### *Results of interventions made in care home settings*

Gurwitz et al. (2000) studied the incidence and preventability of adverse drug reactions (ADRs) in nursing homes. They identified 546 ADRs, with 51% concluded to be preventable and 308 to be significant ( $P < 0.001$ ). Although it took into account data from only one area, this study demonstrates the need for a scheme such as Quest for Quality.

### *Impact on care quality of the inclusion of pharmacy in MDTs*

Zermansky et al. (2006) evaluated the contribution of the pharmacist in a review of medications, and the outcomes of this included a reduction in fall risk. The pharmacist's interventions were compared to the control group who were reviewed by a GP, and although the methodology was limited due to time and confidentiality issues, it was concluded that a pharmacist-led intervention reduces fall risk.

### *Guidelines for prescribing safely in the elderly*

The Stopp/Start toolkit is one of the primary reference sources used in the care of the elderly to support medication reviews and appropriate prescribing, allowing medications to be stopped and more appropriate ones started (NHS Cumbria, 2013). The resource was developed by 18 experts in geriatric pharmacology, based on statistical analysis and local guidance.

The All Wales Medicines Strategy Group has provided guidance on polypharmacy and prescribing for frail adults (Jones, Bevan, & Pugh-Jones, 2014). This work aimed to document and resolve current issues in prescribing for the elderly, while taking into account that guidelines often focus on the initial treatment and not withdrawal. In addition to specific medication suggestions, such as reducing anticholinergic side effects, the report gives solutions, such as simplifying the dosage regime, discussing long-term side effects and offering appliance aids.

One issue commonly encountered in the elderly, polypharmacy, is the subject of much guidance. The Model of Care Polypharmacy Working Group for NHS Scotland (2012) aimed to provide a national approach to adverse drug reactions; suggestions include stopping Angiotensin Converting Enzyme (ACE) inhibitors and Non-Steroidal Anti-inflammatory Drugs (NSAIDs) in dehydrated patients and seeking specialist advice before starting medications such as Amiodarone and Disease-Modifying Antirheumatic Drugs (DMARDs). Reducing polypharmacy can be achieved by withdrawing medication in the patient; Scott, Gray, Martin, Pillans, and Mitchell (2012), who reported on the evidence for deprescribing in older populations, described the process of tapering, withdrawing and discontinuing medications. They found evidence supporting a structured approach to drug discontinuation, providing that the correct strategies are in place.

### *Common clinical issues and prescription errors in care home patients*

Elderly patients are commonly taking complicated multidrug regimes, which have a higher potential for interactions and ADRs. Polypharmacy is a widespread problem and a known challenge to the pharmacological management of patients. In a report on deprescribing, Gnjidic, Le Couteur, Kouladjian, and Hilmer (2012) defined polypharmacy as the use of five or more medications. A report by the Kings Fund (Duerden, Avery, & Payne, 2013) described polypharmacy as being both problematic and beneficial therapeutically. It may increase drug interactions and decrease medication adherence, but, on the positive side, it can improve the outcomes for patients and increase quality of life. One of the main outcomes was that the rationale for treatment choice should be clearly stated, and those choices that do not follow an evidence base should be recorded.

### *Intervention classification and tools for analysis*

To analyse the outcomes of interventions, a number of analytical techniques and classifications can be used. A report to the Patient Safety Research Portfolio (Alldred et al.,

2011) used a harm-minimisation scale. The scale assigned a number between 0 and 10, where a score of 0 would mean no harm and a score of 10 would mean death. Alldred et al. suggested a further way to separate and classify interventions, namely by the four main types of medication errors: prescribing, monitoring, dispensing or administration. A third method for classifying interventions was described by Barker et al. (2002), where medication errors were witnessed by observation; they were verified by a research pharmacist and the clinical significance of each was classified, which may be considered subjective to the opinion of the health professionals involved.

To analyse the impact of the Quest for Quality scheme, interventions would have to be categorised in order to allow statistical analysis to be performed.

### *The Quest for Quality scheme*

Primary statistical analysis conducted by the Calderdale Clinical Commissioning Group (CCG) (n.d.) already shows improvement in the quality of care. For example, emergency hospital admissions have been reduced by 25% annually and GP visits to Quest care homes have been reduced by 58%.

## **Methodology**

### *Materials and methods*

The analysis was conducted retrospectively after the data was collected directly by the MDT across the 31 Quest care homes over a period of 17 months. After discussion of each patient during the reviews, the outcome was noted and then followed up at a later date by the MDT. The data collected included the care home and the GP surgery, interventions made, NHS number if available, and follow-up details. Ethical approval to undertake this analysis was received from the university along with Calderdale and Huddersfield NHS Foundation Trust. After the data was received, analysis was conducted using Microsoft Excel and the IBM SPSS software package.

### *Exclusion criteria*

Some of data collected by the MDT had values missing, so certain records were excluded from the analysis for the following reasons:

1. The medication name was not listed, meaning the priority of the intervention could not be assessed.
2. No NHS number was included, so it could not be determined whether the data came from the same patient, therefore giving the possibility of skewed results.
3. There were fewer than five reviews conducted in one month.

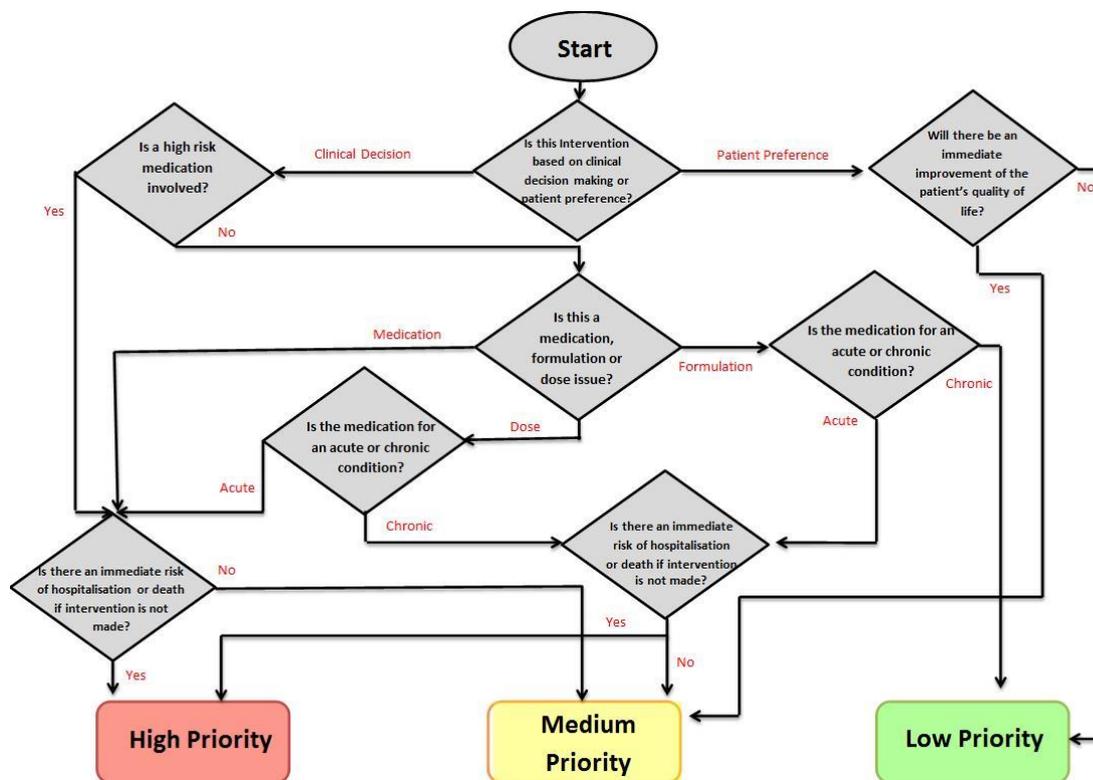
If follow-up of the intervention was not included, results could still be used to assess the short-term effectiveness of the MDT's intervention. Therefore, all the remaining data after the initial exclusion criteria was used in the analysis.

### *Categorisation of data*

Before analysis, the exclusion criteria were applied and the 803 interventions remaining put into one of the following groups, according to the mode of action and classification in the British National Formulary (BNF): Antibiotics; Cardiovascular; Central Nervous System; Ear, Nose and Oropharynx; Endocrine; Eye; Gastrointestinal; Musculoskeletal and Joint; Nutrition and Blood; Obstetrics, Gynaecology and Urinary Tract Disorders; Respiratory; and Skin. Each intervention was then classified as either high priority, medium priority or low priority. In order to accurately and consistently identify which interventions were high or low priority, a flow chart was devised (Figure 1). For example, in a high-priority case, the intervention would need to be implemented immediately and followed up with the prescriber, while in a low-priority case, there would be no time restriction on the intervention being made due to the nature of the medication. Although some medication classes have a small number of

interventions, for example the Antibiotics class, it was still essential for these to be represented due to antibiotic stewardship, a principle to limit inappropriate antibiotic use in order to ensure that antimicrobial resistance is reduced.

Figure 1: Flow chart to allow classification of intervention into different priorities



### Analysis of the most common medications

The data was ranked according to the amount of interventions made for each drug, irrespective of type or priority. For any medication that had been involved in 15 or more interventions, the data was separated. This included 12 drugs and accounted for 50% of the data.

### Correlation with emergency admission statistics

Data was collected independently by the MDT for each year over the course of the Quest for Quality pilot for hospital admissions. These figures were compared to the total medication reviews conducted each year using the Spearman's rank correlation test. These figures represent the influence that the whole team had on the hospital admission rates, not just through medication review, but also taking into account telecare health, a system that allows real-time monitoring of patient vital signs. Therefore, the percentage of emergency hospital admissions that relate to medication errors must be calculated; a figure of 6.5% (Pirmohamed, 2004) was used for this, which is the best estimate according to the literature. No data was eliminated from this part of the analysis, as it was only the outcome of the intervention that would be correlated and not the follow-up.

## Findings

Overall, the average number of reviews conducted increased over the time period. However, when looking at the average interventions made per patient visit (2.8), only 20.8% were acted on. Furthermore, out of a total of 401 interventions, 43.4% were not actioned and 35.8% had unknown outcomes, indicating an issue with uptake by prescribers and follow-up.

### Classification of interventions and implications of trends

Interventions were classified in multiple ways to allow analysis of trends in the data. By looking at 150 patients where there were 330 medication changes, it was shown that the percentage of medications added to a patient's regime (7.6%) was much lower than the amount of medications removed (71.2%) and medications switched (21.2%). These percentages fit with the Elderly Care Guidance that medication regimes should be reduced as much as possible (Jones et al., 2014) and that any inappropriate medications should be stopped.

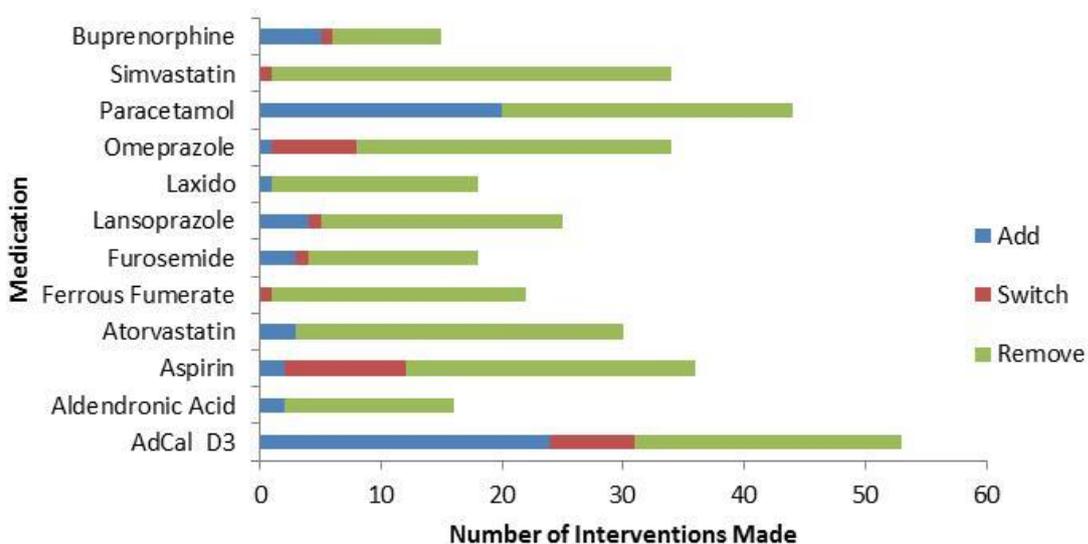
### Surgeries and care homes

To establish trends across the 21 surgeries and 20 care homes involved, the data was separated. This was an important factor, as finding an issue at one site may skew results for the whole data set. Three sites made the largest contribution; this could be due to patients having very complicated conditions, giving rise to issues with polypharmacy and multiple interventions being made on one patient. The number of interventions undertaken in each location varied, ranging from 1 to 67 for care homes, depending largely on the proximity of the site to the MDT, and from 1 to 69 for the surgeries, a factor dependent on the surgery catchment area. Overall, there was no single care home or surgery responsible for skewing the percentages, although there were a number of sites that had a 100% uptake or 100% not actioned; these locations accounted for only a small number of reviews.

### Most common medications involved in interventions

Looking at the most common medications involved in interventions (Figure 2), it is clear that many involve the same class of drug, for example, the addition of Adcal D3 (given to the elderly for the prevention of osteoporosis) or the removal of statins, including atorvastatin and simvastatin, a common class for those over the age of 65. The 12 most common drugs had equally low intervention acceptance rates, with atorvastatin having particularly low action rates and furosemide the highest percentage.

Figure 2: Number of add, switch or remove interventions for most common medications



An example of medication commonly found in the elderly population is proton pump inhibitors such as lansoprazole and omeprazole. In the data, there was a trend for switching omeprazole to lansoprazole; this could be due to research that lansoprazole has a better effect on oesophageal acidity (Janczewska, Sagar, & Sjosted, 1998), or related to cost.

Omeprazole was also being changed to ranitidine, or, on some occasions, Losec MUPS, a modified dosage formulation of omeprazole.

The statins prescribed for hyperlipidaemia, including atorvastatin and simvastatin, are another group of common medications. The majority of interventions in this category involved removal of the statin (Figure 2), except for one, where simvastatin was swapped for atorvastatin, a higher-potency drug in the same class; this is a simple intervention that means the statin can be taken at any time during the day. The Stopp/Start toolkit (NHS Cumbria, 2013), a key piece of guidance for prescribing in the elderly, states that a statin should be started in the elderly with a history of coronary, cerebral or peripheral vascular disease with a life expectancy of over five years. The majority of patients will be taking statins as long-term therapy; therefore, patients entering these care homes are likely to be already taking a statin. Due to the nature of the patients, their complications and average life expectancy, the removal of statins is likely to be due to the associated risks, such as rhabdomyolysis.

Another common medication is buprenorphine, which can be used in opiate addiction and is prescribed for chronic pain in the elderly. The majority of the formulations are transdermal patches so the dose release can be better controlled (Vadivelu & Hines, 2008). A larger proportion of the data is removal of Buprenorphine or switching to lower doses, which is beneficial to the patient due to withdrawal and dependence issues.

Alendronic acid, a bisphosphate prescribed in the elderly to reduce the 10-year risk of osteoporosis, is commonly involved in interventions. A known adverse effect is the risk of atypical stress fractures (Welsh Medicines Resource Centre, 2010) with long-term therapy (MHRA, 2011). In this study, 93% of the interventions were removals (Figure 2), which is as expected due to the potential risk being greater than the benefit.

The number of interventions was highest for Adcal D3, which contains calcium and vitamin D, contributing to bone and teeth health, which is an issue in the elderly. The majority of these interventions involved the addition of the caplets or chewable tablets. The guidance used by the MDT provides explanations for the interventions.

Apart from reasons such as medicines optimisation and safety, some interventions are due to patient refusal. This is important, as patient non-adherence is a major issue (Jones et al., 2014), and a simple intervention can improve the patient's quality of life and save money.

#### *Intervention priorities and harm minimisation*

The interventions were first classified into BNF categories and then further into the priorities according to the flow chart (Figure 1). In the Antibiotics category, the majority of interventions were high priority, but the numbers that were actioned and those not acted upon were equal. Each group represents a different sample size, for example, the two categories Obstetrics, Gynaecology and Urinary Tract Infections and Musculoskeletal and Joints both show similar distributions in the priority of interventions made, but because Musculoskeletal and Joints is a much larger sample, there were more medium- and low-priority interventions made overall. The interventions in one of the largest categories, Nutrition and Blood, were all classified as low-risk interventions due to the type of medications, whereas in Central Nervous System category, the interventions were distributed across all the priority levels, with more skewed towards low and medium.

Out of the 801 interventions, there were an equal number with low and medium priority, with high-priority interventions making up a much smaller proportion, often due to the timescales and risks involved. Examples include bisphosphonates, the benefits of which will be seen over a long time period, and topical pain-relieving gels such as diclofenac and ibuprofen, where the risk to the patient is minimal. The category with the largest proportion of high-priority interventions is Antibiotics. This is because making a change to a patient's treatment

in this class can result in a very rapid improvement in quality of life and can stop the progression of an infection that may result in hospitalisation. An example would be trimethoprim stopping hospital admission for a urinary tract infection. Equally, stopping an inappropriate course of antibiotics can both reduce the contribution to antibiotic resistance and ensure the patient is not experiencing side effects such as nausea and photosensitivity, as with, for example, doxycycline (Bryant, Fisher, & Kluge, 1987). Another category comprising only low-priority interventions is Nutrition and Blood, which had interventions made to Adcal D3 chewable tablets and Calogen Extra Shots due to patient preference. These interventions are all low priority, as there is no immediate clinical reason that these need to be stopped or changed for the patient. There are a number of possible reasons for the lower number of high-priority interventions, such as the patient not being in an acute care environment, where conditions may be more serious. Furthermore, due to the nature of high-risk medication, prescribers tend to be more careful when constructing dosing regimes, so fewer interventions will be necessary at a later date. These findings would reduce the demand on the surgeries and care homes, as only high-priority interventions would need to be considered immediately, while low-risk interventions can be implemented at a time to suit the prescriber.

#### *Individual case studies of note*

##### Removal of risperidone

In one intervention the patient was taking 1g of risperidone at night. The MDT requested that this be removed for safety reasons. Risperidone is an antipsychotic used to treat schizophrenia and bipolar disorder. This intervention was classified as high priority due to the safety aspect, and was neither actioned nor followed up. The drug can also be used to treat psychosis symptoms associated with dementia; a warning has been added that prescribing it to elderly patients can carry a risk of death (FDA, 2006).

##### Polypharmacy reduction in multiple patients

In many cases, there were multiple interventions made for the same patient. One patient reviewed during December 2014 had multiple medications stopped, simplifying the medication regime considerably (Table 1). A complicated medication regime can be difficult to manage in a care home situation; therefore, there are benefits to making sure polypharmacy is at a minimum.

Table 1: Medication changes as a result of interventions on a patient during December 2014

<b>Medications Stopped</b>	<b>Medications Started</b>
<b>Prednisolone 5mg OD</b>	Paracetamol 500mg 10 pack
<b>Adcal D3 Chewable 56 Pack</b>	Doxazocin 4mg tablets
<b>Omeprazole 20mg OD</b>	Glyceryl Trinitrate 400mcg s/l Spray
<b>Nefopam 30mg TDS 90 pack</b>	Movicol 30 pack
<b>Doxazocin 4mg m/r Tablets</b>	
<b>Diltiazem 120mg M/R Capsules</b>	
<b>Isosorbide Mononitrate 60mg m/r OD</b>	
<b>Lactulose Solution 500ml</b>	

##### Addition of Anoro Ellipta

A resident had Anoro Ellipta added to their regime for reasons of medicine optimisation. Anoro Ellipta is a combination therapy long acting  $\beta_2$ -adrenergic agonist (LABA) and long-acting muscarinic antagonist (LAMA) used in chronic obstructive pulmonary Disease (COPD). Although it is not currently stated as being the primary treatment, the National Institute for Health and Care Excellence evidence (NICE, 2014) states that this treatment is beneficial for a patient where a corticosteroid is

unsuccessful. It may be that without the intervention from the MDT, this patient would not have been prescribed this new drug that could improve the management of the COPD.

#### Intervention due to safety of dalteparin

Dalteparin was removed from one patient during a review in June 2015; the patient was receiving 10,000 units subcutaneously daily. Dalteparin is low molecular weight heparin used as prophylaxis of deep vein thrombosis, pulmonary embolism or venous thromboembolism, among other indications. As this is a high-risk drug, there are many reasons why this would have been removed, including that the patient had an increased risk of bleeding, or renal impairment. This was an essential intervention to ensure patient safety.

#### *Correlation of MDT reviews and hospital admission rates*

The correlation between the hospitalisation rates from Quest care homes and the number of reviews conducted was quantified. There is a clear trend that as the number of reviews is increasing, the number of hospital admissions is decreasing. This was calculated as admissions due to medication-related issues with a figure of 6.5% (MHRA, 2014). In the sample, a strong negative correlation (Pearson Correlation=-0.983) can be seen. However, due to the sample size, statistical significance could not be determined (CI=95%, 0.119). Therefore, in the future it would be beneficial to continue recording hospital admissions, giving the possibility of a significant statistical relationship. Overall, there was a 50% reduction in admissions over the 17 months in admissions. This is high when compared with a reported figure of 16% (Gillespie et al., 2009), but the small amount of evidence and the assumption used to estimate the numbers may contribute to this. Although it is not possible to draw the conclusion that the MDT has reduced the number of hospitalisations, it is clear that conducting regular reviews on patients to make sure they are receiving the correct medication has been of benefit.

#### *Interventions not implemented: systems issues or prescriber preference?*

Over the whole data set, only 20% of interventions were known to be implemented, 43% were not, and the rest were unknown.

The Quest pharmacist gave various reasons to explain the lack of follow-up on the interventions, the main one being that the GPs use different record systems and therefore access to follow-up data was limited for the MDT. This occurred in approximately 50–60% of the reviews. Another reason is that the interventions were not being received by the correct person. This, again, is a major issue for the scheme because if a high-priority intervention was missed, a patient could be at risk. For example, in the Cardiovascular category, only three high-priority interventions were actioned. These included the use of digoxin, a cardiac glycoside with a narrow therapeutic window and high-risk of ADRs, and rivaroxaban, an oral anticoagulant with no approved antidote should the patient overdose. If these interventions were not implemented, there could be serious consequences for the patients. With regard to the interventions involving addition, switching and removal, almost half of the interventions in each category were known not to be actioned. This indicated two possible issues, one being that the prescriber and the MDT are following different guidance, which could explain the low uptake in statin intervention. The second issue relates to the number of interventions made: it is not feasible to action all in the time available at GP surgeries. It was stated by the Quest pharmacist after the MDT meeting that the pharmacist will write to the GPs around the time of intervention, but due to the nature of discussing this with the GP in writing, a better system of follow-up, with systems access, may be required. In other studies, this rate of uptake has been found to be 45% (Roberts et al., 2008), and this is something that needs further investigation.

### *Research implications*

The Quest for Quality scheme has already been continued for the future.

### Patient benefit

The residents of the care homes involved have benefited not only from the interventions made by the MDT but also from the use of telecare health. Due to the nature of the patients residing in these homes, they often have complicated medical history and multidrug regimes. Therefore, any input from a health professional in an environment where time is normally restricted allows for an increase in the quality of care.

### Positive contribution of the Quest pharmacist

During the MDT meetings, both the pharmacist and the consultant made suggestions of interventions for the patient and this was then discussed by the matron, care home staff and the patient if they were present. Due to the structure of these meetings, it is impossible to state that the interventions are a direct result of the pharmacist being involved and therefore, a literature figure was used to estimate the percentage of hospital admissions that were due to medication issues. As the number of interventions increases, the number of medication-related hospital admissions decreases. It could therefore be inferred that the pharmacist has potentially had a positive impact on the MDT and the quality of the interventions, though future specific research would be needed for proof of this. Although the contribution of the Quest pharmacist cannot be proven, it is obvious from the types of interventions made that the particular expertise in medications and optimisation of medication regimes will prove valuable to the MDT.

### *Originality and value*

This paper has allowed the interventions made by the MDT to be classified and analysed, proving the value of their introduction in the Quest for Quality scheme. The analysis has allowed issues to be raised with the scheme and suggestions for the future have been made as a result.

As Quest for Quality was a new scheme, this paper has discussed results not previously published. For the MDT directly, it can provide suggestions to address some of the issues in data collection and follow-up. Furthermore, this paper will be beneficial to similar projects in the future, and goes some way to proving the justification for pharmacy involvement in an MDT.

### *Research limitations*

The data analysis demonstrates the apparent benefits of the MDT. This is evidenced in the individual case study interventions that have been described and in the number of interventions made. However, it is difficult to prove any significant statistical relationships unless this data continues to be collected. Due to the lack of inclusion of the elderly population in clinical trials and medical research, it is difficult to state the long-term benefits of the interventions made. However, such benefits could be demonstrated by looking at other health data collected from patients by the telecare health system, which would give a long-term view of the effectiveness of the intervention. Although the quantity of data collected for this study was large and from a wide distribution of patients across Quest care homes, most of the records were incomplete, so had to be excluded from parts of the analysis. As the information had been collected in previous years, it was beyond the control of the research and depended on how much information the MDT was able to collect. Therefore, the methods of collection are something to consider in the future. The scheme was also conducted in an area involving selected Quest care homes, and hence, the data could not be generalised to show that an MDT would be beneficial in all situations. Although the limitations have been listed, the extent to which they affect the results is small; even if a true statistical significance cannot yet be proven due to lack of data, there is still a positive impact on care.

### Future suggestions

There are a number of ways that the uptake of interventions could be improved in the future. A method that avoids the problems of systems that were not accessible to all parties would need to be used. If the study was conducted prospectively instead of retrospectively, a number of methodology improvements could be made. The flow chart would still be used to classify interventions, but it would need to be adapted to include factors such as comorbidities and clinical aspects relevant at the time of intervention. Also concerning data collection, a small number of care homes should be included, and each intervention could then be traced back to the original patient. An option to solve the issues of follow-up could be to develop a system to which all GPs and other health care professionals would transfer details, meaning that patients would be trackable. This would not only be expensive but also take a lot of time and would be resource intensive. If the flow chart system was followed and each intervention was classified, it would mean that interventions would be easier to follow up, as only the high-priority interventions would need to be checked. They would be checked as soon as possible, either by a phone call to the prescriber or by an internal programme of intervention sheets, where the care home could let the MDT know that an intervention had been implemented or rejected, or that it needed further discussion with the prescriber.

One important theme that has been repeated is that medication reviews in care homes are much more effective when they involve both a team of health care professionals and staff who know the patients' medical history. Therefore, in the future this should be continued. The Quest for Quality scheme was an undoubted success, and has therefore been recommissioned for the future with the hope of gaining a permanent position for a pharmacist.

### **Conclusion**

Not only did the Quest for Quality scheme involve a large number of reviews taking place, but appropriate and significant interventions resulted, with the input of health care professionals and the patients themselves, allowing the best decision to be made.

The characterisation of the interventions showed the most significant areas in which interventions were being made, and these correlated with the areas of common medical problems in the elderly.

The types of interventions made showed that the MDT were successful in reducing polypharmacy in the elderly by removing more medications than were added, and also by switching medicines, thereby reducing the complication of patients' medical regimes, a common reason for non-adherence and ADRs.

After developing a way to classify the priorities of interventions, it was shown that the majority were low and medium priority. This leads to the possibility of a system of notification in the future, based on priority; for cases where it is essential that the intervention is implemented quickly, a method of communication would exist between the parties involved.

No significant statistical relationship was proven between the reduction in hospital admission rates and the reviews conducted, as a result of factors beyond the control of the study. Nevertheless, it was clear that the scheme is likely to have contributed to this reduction in number, and it was suggested that this recording of numbers could be continued in the future and differentiated to show the long-term impact of both the MDT and, more specifically, pharmacy.

The expertise of the pharmacist involved had some degree of impact on the interventions made, along with the clinician. The interventions not only followed the appropriate guidance on treatment option, but also used evidence-based medicine principles to provide the most appropriate treatment option to the patient.

The major limitations in the research were out of the author's control due to the nature of the retrospective analysis. Suggestions made for the future included focusing on a smaller group of patients and being able to follow up on these interventions, documenting the impact using other monitoring data. The development of a specific system allowing the follow-up of each intervention would be beneficial in the future, making sure that the high-quality and appropriate interventions that the MDT are making are not wasted. More discussion is needed between the MDT and prescribers to establish whether there are any reasons why common specific interventions are not being actioned, and how this can be solved in the future.

## References

- Allred, D.P., Barber, N., Buckle, P., Carpenter, J., Dean-Franklin, B., Dickinson, R., Garfield, S., Jesson, B., Lim, R., Raynor, D.K., Savage, I., Standage, C., Wadsworth, P., Wadsworth, P., Woloshynowych, M., Zermansky, A.G., (2011). *Care Home Use of Medicines Study (CHUMS) - Medication Errors in Nursing and Residential Care Homes, the Prevalence, consequences, causes and solutions*. Patient Safety Research Portfolio, Department of Health.
- Barber, N. D., Allred, D. P., Raynor, D. K., Dickinson, R., Garfield, S., Jesson, B. Zermansky, A. G. (2009). Care homes' use of medicines study: prevalence, causes and potential harm of medication errors in care homes for older people. *Quality and Safety in Health Care*, 18(5), 341-346. <http://dx.doi.org/10.1136/qshc.2009.034231>
- British Geriatrics Society. (2011). *Quest for Quality - An Inquiry into the Quality of Healthcare Support for Older People in Care Homes: A Call for Leadership, Partnership and Improvement*. London: British Geriatrics Society.
- Bryant, S. G., Fisher, S., & Kluge, R. M. (1987). Increased frequency of doxycycline side effects. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*, 7(4), 125-129. <http://dx.doi.org/10.1002/j.1875-9114.1987.tb04037.x>
- Calderdale Clinical Commissioning Group. (n.d.). *Quest for Quality in Care Homes - Using Telehealthcare to Enable Integrated, Anticipatory and Sustainable Health and Care Service*. Tunstall Healthcare (UK) Ltd. Retrieved from [http://www.tunstall.co.uk/Uploads/Documents/150826\\_Quest%20for%20quality%20in%20care%20homes%20pilot.pdf](http://www.tunstall.co.uk/Uploads/Documents/150826_Quest%20for%20quality%20in%20care%20homes%20pilot.pdf)
- Duerden, M., Avery, T., & Payne, R. (2013). *Polypharmacy and medicines optimisation: Making it safe and sound*. London: The Kings Fund.
- Food and Drug Administration (FDA). (2006). Alert for Healthcare Professionals: Risperidone (marketed as Risperdal). Retrieved from <http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm152291.htm>
- Gillespie, U., Alassaad, A., Henrohn, D., Garmo, H., Hammarlund-Udenaes, M., Toss, H., Kettis-Lindblad, A., Melhus, H., Mörlin, C. (2009). A comprehensive pharmacist intervention to reduce morbidity in patients 80 years or older. *Archives of Internal Medicine*, 169(9). <http://dx.doi.org/10.1001/archinternmed.2009.71>
- Gnjidic, D., Le Couteur, D. G., Kouladjian, L., & Hilmer, S. N. (2012). Deprescribing trials: methods to reduce polypharmacy and the impact on prescribing and clinical outcomes. *Clinics in Geriatric Medicine*, 28(2), 237-253. <http://dx.doi.org/10.1016/j.cger.2012.01.006>
- Gurwitz, J. H., Field, T. S., Avorn, J., McCormick, D., Jain, S., Eckler, M., Bates, D. W. (2000). Incidence and preventability of adverse drug events in nursing homes. *American Journal of Medicine*, 109(2), 87-94. [http://dx.doi.org/10.1016/s0002-9343\(00\)00451-4](http://dx.doi.org/10.1016/s0002-9343(00)00451-4)
- Hughes, L., & Timpson, H. (2013). *An Evaluation of the Wirral Community Trust Care Home Pilot*. Liverpool: Centre for Public Health, Liverpool John Moores University.
- Janczewska, I., Sagar, M., & Sjosted, S. (1998). Comparison of the effect of lansoprazole and omeprazole on intragastric acidity and gastroesophageal reflux in patients with gastroesophageal reflux disease. *Scandinavian Journal of Gastroenterology*, 33(12), 1239-1243. <http://dx.doi.org/10.1080/00365529850172304>
- Jones, E., Bevan, A., & Pugh-Jones, J. (2014). *Polypharmacy: Guidance for Prescribing in Frail Adults*. Llandough: All Wales Medicines Strategy Group.

- Laing, W. (2015). *Care of older people: UK market report*. London: LaingBuisson.
- MHRA. (2011). Atypical femoral fractures reported rarely with bisphosphonate therapy, mainly in patients receiving long-term treatment for osteoporosis. Retrieved from <https://www.gov.uk/drug-safety-update/bisphosphonates-atypical-femoral-fractures>
- MHRA. (2014). *Patient Safety Alert: Stage Three Directive, Improving medication error incident reporting and learning*. Retrieved from <https://www.england.nhs.uk/wp-content/uploads/2014/03/psa-med-error.pdf>
- NHS Cumbria. (2013). *Stopp Start Toolkit - Supporting Medication Review*. Retrieved from <http://www.cumbria.nhs.uk/ProfessionalZone/MedicinesManagement/Guidelines/StopstartToolkit2011.pdf>
- NICE. (2014). Chronic obstructive pulmonary disease: umeclidinium/vilanterol combination inhaler (Anoro Ellipta). Retrieved from <https://www.nice.org.uk/advice/esnm49/chapter/key-points-from-the-evidence>
- Pirmohamed, M. (2004). Adverse drug reactions as cause of admission to hospital: prospective analysis of 18 820 patients. *British Medical Journal*, 329(7456), 15-19. <http://dx.doi.org/10.1136/bmj.329.7456.15>
- Roberts, M. S., Stokes, J. A., King, M. A., Lynne, T. A., Purdie, D. M., Glasziou, P. P., Wilson, D.A., McCarthy, S.T., Brooks, G.E., De Looze, F.J., Del Mar, C. B. (2008). Outcomes of a randomized controlled trial of a clinical pharmacy intervention in 52 nursing homes. *British Journal of Clinical Pharmacology*, 51(3), 257-265. <http://dx.doi.org/10.1046/j.1365-2125.2001.00347.x>
- Scott, I. A., Gray, L. C., Martin, J. H., Pillans, P. I., & Mitchell, C. A. (2012). Deciding when to stop: towards evidence-based deprescribing of drugs in older populations. *Evidence-Based Medicine*, 18(4), 121-124. <http://dx.doi.org/10.1136/eb-2012-100930>
- Smith, P., Sherlaw-Johnson, C., Ariti, C., & Bardsley, M. (2015). *Focus on: Hospital Admissions from Care Homes*. London: The Health Foundation, Nuffield Trust. Retrieved from [www.qualitywatch.org.uk/care-homes](http://www.qualitywatch.org.uk/care-homes)
- The Model of Care Polypharmacy Group, Quality and Efficiency Support Team, & Scottish Government Health and Social Care Directorates. (2012). *Polypharmacy Guidance*. NHS Scotland. Retrieved from <http://www.central.knowledge.scot.nhs.uk/upload/Polypharmacy%20full%20guidance%20v2.pdf>
- Vadivelu, N., & Hines, R. (2008). Management of chronic pain in the elderly: focus on transdermal buprenorphine. *Clinical Interventions in Ageing*, 3(3), 421-430. <https://doi.org/10.2147/CIA.S1880>
- Welsh Medicines Resource Centre. (2010). Stopping medicines – bisphosphonates in postmenopausal osteoporosis. Retrieved from [www.wemerec.org/Documents/enotes/Stoppingbisphosphonatese-notes.pdf](http://www.wemerec.org/Documents/enotes/Stoppingbisphosphonatese-notes.pdf)
- Zermansky, A. G., Alldred, D. P., Petty, D. R., Raynor, D. K., Freemantle, N., Eastaugh, J., & Bowie, P. (2006). Clinical medication review by a pharmacist of elderly people living in care homes-randomised controlled trial. *Age and Ageing*, 35(6), 586-591. <http://dx.doi.org/10.1093/ageing/af1075>