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**Prescribed medicines for elderly frail people with diabetes resident in
Nursing Homes – issues of polypharmacy and medication costs**

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ABSTRACT

Aims To describe the numbers and costs of medications prescribed to people living with diabetes resident in nursing homes in one Primary Care Trust (PCT) in the UK

Methods A retrospective case notes review of 75 people with known diabetes who were resident in the 11 Nursing homes in Coventry Teaching PCT

Results 63 residents (84%) were being prescribed 4 or more medications. 44 residents (59%) were prescribed antiplatelet drugs for CVD prevention including aspirin, clopidogrel and dipyridamole and 31 residents (41%) were on statin therapy.

18 (24%) residents had a monthly medication cost that was above £101 per month. On detailed review these were largely residents who were being prescribed special order liquid preparations, usually for secondary CVD prevention.

Conclusion . Polypharmacy, defined as taking 4 or more drugs per day per resident is highly prevalent within this population of care home residents with diabetes.

A high proportion of residents are prescribed drugs for cardiovascular disease prevention which may be entirely inappropriate in this population with limited life expectancy..

Regular medication review of care home residents with diabetes should be undertaken as it has the potential to reduce costs, minimise adverse drug reactions, and increase health gain.

Introduction

Polypharmacy does not have a formally accepted definition but it is usually considered as concurrent prescribing of at least four or five drugs (1). In one German study, over a quarter of older patients in primary care were found to be on five or more medications. (2)

Polypharmacy can also be considered as inappropriate medication use, is a significant problem in older patients who have more chronic co-morbid conditions and are more likely to experience adverse drug side effects, than younger populations (3) The problem of polypharmacy and inappropriate medication is correlated with age, co-morbidity, disability, and the number of medications (4). It increases the likelihood of nursing home placement, impaired mobility, morbidity, hospitalization and death (4).

Therapies are often prescribed for older people based on evidence from studies of younger people who usually have few co-morbidities and who have life expectancies of several decades. Applying the results and/or the clinical guidelines developed from these studies, to elderly people may be inappropriate because of higher risk to benefit ratios with increasing age, complexity of illness, and number of medications prescribed (3,5)

Medicines cost the NHS in excess of £10 billion annually with the total cost and number of prescriptions is steadily rising. In this current time of national financial austerity it is important to ensure that prescribing is effective in maximising health gains, ensuring high levels of cost-effectiveness and minimising risks to patients. (1)

A study has been published which suggests that elderly people with diabetes living in Care homes in France are being over-medicated (6). A study from Sweden has suggested that diabetes medications can be safely reduced or withdrawn in some nursing home patients (7). There has been little information published in this area from the UK, apart from some case history reports of over medication producing hypoglycaemia (8,9)

An initial paper describing the significant levels of disability and nursing need in people with diabetes living in Nursing homes in Coventry has already been published (10). This report describes the medications prescribed and the costs of the medications in these residents.

Methods

Permission to perform this study was obtained from Coventry PCT and the Warwickshire Biomedical Research Ethics Committee

The data was collected from a retrospective case notes review of the 75 people with known diabetes who were resident in the 11 Nursing homes in the Coventry Teaching PCT in early 2010.

The researcher (RG) visited each of the 11 homes during February to April 2010. Data on the total number of residents in each home and the total with known diabetes were obtained at the visit from the manager or senior nurse on duty.

The notes of everyone with known diabetes were then reviewed. Information on co-morbidities, disabilities and current regular medications was extracted. Data were recorded and analysed on an Excel spreadsheet. (8) The cost of the medications were calculated by MG and the Coventry Medicines Management Team using costings from the BNF of March 2010 for tablets and actual costs from pharmacies for special order liquid medications. The last recorded HBA1c result for each resident was obtained from the local hospital laboratory database

Results

Numbers of Medications

The 75 Nursing home residents in the study had an age range of 55 -102 years (mean age 80.6years) . They were being prescribed a mean of 6.7 (range 0 -17) individual regular medications either orally or parenterally . All “as required” medications, and all local treatments (e.g creams, eye drops etc) have been excluded from this analysis. One resident, aged 102 years, had refused to take any medications for the past 3 years and so was recorded as taking none. The number of residents taking different numbers of medications are listed in table 1

Table 1

| Number of medications per day | 0-3 | 4-7 | 8-11 | 12 + |
|-------------------------------|-----|-----|------|------|
| Number of Residents | 12 | 34 | 26 | 3 |

Significant numbers of residents were being prescribed primary and secondary CVD prevention therapies and these are listed in Table 2

TABLE 2

Primary & Secondary CVD prevention therapies

| <u>MEDICATION</u> | <u>NUMBER OF RESIDENTS (n=75)</u> |
|---------------------------|------------------------------------|
| <u>Aspirin</u> | <u>34</u> |
| <u>Dipyridamole</u> | <u>4</u> |
| <u>clopidogrel</u> | <u>6</u> |
| <u>Anti-hypertensives</u> | <u>42</u> |
| <u>Statins</u> | <u>31</u> |

An HBA1c measurement recorded in the previous 12 months was available for 69 residents (92%) from the local hospital laboratory database.

The glucose lowering medications being prescribed for the residents are listed in table 3 along with the mean HBA1c level and range

TABLE 3 – Glucose Lowering Therapies & HBA1c Results

| Glucose lowering therapy | Number of residents (n=75) | Mean HBA1c and range in % and IFCC units | Number of residents with HBA1c measurement within previous year n=69 |
|--------------------------|----------------------------|------------------------------------------|----------------------------------------------------------------------|
| Diet alone | 20 | 6 (5.4-6.7) 42 (35-50) | 16 |
| Metformin monotherapy | 19 | 7 (4.9-8.8) 53 (30-73) | 18 |
| Gliclazide monotherapy | 11 | 6.8 (5.4-12.3) 51 (35-111) | 10 |
| Two or more oral agents | 6 | 5.8 (4.6-6.9) 40 (27-52) | 6 |
| Insulin alone | 16 | 7.1 (6.1-10.5) 54 (43 -91) | 16 |
| Insulin plus oral agent | 3 | 8.8 (7.7-10.2) 73 (61-88) | 3 |

Total Medication costs

The mean monthly prescription cost for the 75 residents (one of whom was on no medications) based on BNF from March 2010 was £90-88p (range 0- £799)

Table 4 lists the numbers of residents by prescription costs per month per resident

Table 4

| Medication costs per month | 0to £20 | £21 to £100 | £101to £300 | £301 and more |
|----------------------------|---------|-------------|-------------|---------------|
| Number of residents n=75 | 24 | 33 | 10 | 8 |

The costs of nutrition therapies for the 14 residents on PEG feeding have not been included. The average price of these has been calculated to be around £200/month per resident based on nutrison 2 Litres per day.

There were 18 (out of the 75) residents whose monthly medication cost was above £101 per month. On detailed review these were largely residents who were being prescribed special order liquid preparations, usually for secondary CVD prevention. The costs of such liquid formulations are often around 30 to 50 times that of standard oral tablets. For example the cost of bisoprolol 5mg tablet one daily is £5-90 per month whereas the costing of bisoprolol liquid at the same

dose is £315 per month. Simvastatin 40mg tablet once daily is costed at £1-52 per month whereas simvastatin liquid is £152 per month for the same dose. The total monthly cost of the 8 people with prescriptions over £301 per month is £3162 per month which is 47% of the total monthly cost of the 75 residents in this study. The total monthly cost of the 18 people with prescriptions over £101 per month is £3877 which is 72.5% of the total monthly cost of the 75 residents in the study

Costs of Glucose Lowering Medications

Most residents on oral glucose lowering therapies were on either metformin or gliclazide monotherapy which are generic drugs costed at around £1-50 per month. Several of the residents on insulin were being prescribed under 20 units/day so these were costed at below £20 per month. The two residents who had glucose lowering therapy costs of over £101 per month were being prescribed special order gliclazide liquid which was costed at £100 per month as compared with £1-24 per month for Gliclazide 80mg tablets twice a day

Discussion

If polypharmacy is defined as being the concurrent prescribing of four or more drugs 63 residents (84%) in this study meet the criteria of polypharmacy. 44 residents (59%) were being prescribed antiplatelet drugs for CVD prevention including aspirin, clopidogrel and dipyridamole and 31 residents (41%) were on statin therapy. Given the levels of disability and nursing need described in this group of residents in our earlier paper (10) it could be concluded that CVD prevention therapy is inappropriate and is unlikely to have any benefit in prolonging or enhancing remaining life. By increasing the risk of adverse drug effects it might well be causing a reduction in quality of any remaining life. More than one third of the residents were being prescribed 8 or more medications per month. This group might be considered to be most at risk from the dangers of polypharmacy and could be the group who should be targeted and prioritised to see if any medications could be usefully stopped.

Glucose lowering medications do not seem to be a cost driver in this group of residents as the majority are being prescribed cheap generic oral agents. The only exceptions were 2 residents who were being prescribed gliclazide in a liquid formulation costed at £100 per month per resident.

HBA1c results in these residents indicate that many have levels well below 7%. Through medication review and discussion between the prescriber, nursing home staff, and the resident (wherever this is possible) reductions in prescribed glucose lowering therapies may be beneficial, to reduce the risk of hypoglycaemia, in a population of residents likely to have multiple risk factors for hypoglycaemia (9).

There may be some possibility of improving the quality of life of the 19 residents (25%) prescribed insulin by reducing the number of injections given per day, through altering the insulin prescription. Two people were being prescribed basal insulin plus short acting insulin and 11 were being prescribed twice daily mixed

insulin. It might be possible at a medicines review to consider changing these to a once daily long acting basal insulin.

It therefore seems that the main driver of medication costs in this study is the prescription of very expensive liquid preparations in residents, presumably who have been deemed to have swallowing difficulties or who were being PEG fed. On review it is possible that these expensive medications might be able to be stopped after discussion between the prescriber, the nursing home staff and the resident (if this is possible) when they are felt to be no longer of clinical benefit. If continuing these prescriptions is thought to be best the substitution of tablet medication, which could then be crushed, would give considerable financial saving. In our opinion it is not unreasonable to suggest that with appropriate medication review and discussion, medication changes resulting in at least a 50% reduction in the prescription costs for this group of residents would be possible. This would result in yearly savings of around £40,000 based on this study population. The 11 Nursing homes in Coventry are likely to be typical and representative of other nursing homes in England. If similar savings were able to be replicated across England the cost savings would be in the region £10 to 12 million pounds, a not insignificant sum in these times of financial restriction. Although we did not study the prevalence of adverse drug reactions in these residents, medication review leading to the prescription of fewer and more appropriate medications might also result in benefits relating to quality of life and well-being in this vulnerable group of residents.

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COMPETING INTERESTS

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Professor Alan Sinclair, Mark Galloway and Dr Peter Barker have no competing interests to declare in relation to this study

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