



Polypharmacy in the Elderly: Analysis of QRESEARCH Data

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1 EXECUTIVE SUMMARY

The prescribing of multiple entities to the same person – co-prescribing or polypharmacy – may often be necessary. However it carries implicit and explicit risks for the patient.

This report used the QRESEARCH pilot database to examine the extent of such polypharmacy, time trends and inter-practice variation in patients aged 60 years or more.

The key findings are:

- Polypharmacy is very common: during 2002 over half the population aged 60 or more received five or more different chemical entities.
- The rate of such polypharmacy is increasing every year.
- Inter-practice variations are shown but, compared to many inter-practice differences in health indicators, the inter-quartile range for polypharmacy is relatively narrow.

2 SPECIFICATION

This specification is part of the program of work examining prescribing rates in elderly people commissioned by the Department of Health. There are four topics and this is the second report in this area of work. This report concerns polypharmacy in people aged over 60 years. The relevant specification was:

“We would like to know how many ‘different’ drugs are being used by older people at any one time. This could well be difficult to analyse, so as an approximation to this, we would like to have a table giving the distribution of the number of chemical entities prescribed to each patient, by 5 year age bands, in a) 2002 (see Table 2a) and b) October to December 2002 (see Table 2b).

We foresee two possible issues here, on which we would welcome your comments and assessment of the magnitude of any problems. The first is that of over the counter drugs. To what extent do GPs record which over the counter drugs, if any, a patient is using? How should we approach the questions around a patient moving from buying drugs over the counter to being prescribed them, or visa versa?

The second potential problem is that some drugs contain more than one active chemical entity. Should they be counted separately from drugs containing one of the chemical entities? Should they be counted more than once? ”

The question about over the counter drugs will need to be addressed in later reports since they have not yet been fully specified.

3 OBJECTIVES

This report has three objectives

Objective 1 To describe the number of chemical entities prescribed in a single year (2002), and in the last quarter of the year (1.10.2002 to 31.12.2002)

Objective 2 To measure the variation between practices in the number of chemical entities prescribed in a single year, and in the last quarter of the year.

Objective 3 To determine trends over time in the number of chemical entities prescribed in each year 1998 to 2003, and in the last quarter of each year.

4 METHOD

We conducted these analyses using the pilot version of the QRESEARCH database which contains data on 43 practices. The data were downloaded on 23 October 2003.

Inclusion criteria

We included patients in the analysis if they were registered for the entire year. For 2003, we included patients who were registered for the whole of the nine months from January to September 2003.

We only included practices in the trend analysis if EMIS had been installed for the whole of the year in question.

Definition of chemical entities

We grouped individual preparations according to the combination of their chemical entities (ie grouping equivalent to the chemical entities listed in the PACT). For example, preparations containing paracetamol only form one chemical entity (with one constituent) group, while those containing paracetamol and codeine form another chemical entity (containing two constituents) group.

We included items listed in chapters 1 to 15 of the BNF. We excluded items which exclusively appeared in BNF pseudo chapters 19 to 23 as these include dressings and appliances. Items which appeared in chapters one to 15 and also 19 to 23 (such as lancets and glucose test kits) were included in these counts as distinct chemical entities.

Counts of chemical entities prescribed to patients

We counted the number of distinct chemical entities prescribed to each patient in each calendar year. In addition, we counted patients with a Read code for over-the-counter aspirin in or before that year as being prescribed aspirin. That is, we assumed that the person continued to use over-the-counter aspirin in every year from the date of the Read code, and we counted this aspirin as a chemical entity in each year.

We determined counts for the last quarter of the year in a similar manner. As an example, if a patient had 3 prescription items for paracetamol, 2 prescription items for simvastatin and 6 prescription items for aspirin, then this analysis would consider them to have had 3 chemical entities in the quarter.

The methodology used in this analysis avoids double counting of the same prescription [eg paracetamol and co-codamol] and is probably preferable. However, QRESEARCH is sufficiently flexible to conduct analyses where such items are double counted should this be deemed useful for comparison purposes.

Inter-practice variation

We based the inter-practice variation tables on the average number of chemical entities prescribed in each practice. We have presented median and interquartile ranges for the rates as the data are unlikely to be normally distributed.

5 COMPARATIVE DATA

Articles on polypharmacy in older people were identified through searching PubMed from 1998 to the present, using the keywords 'polypharmacy', 'co-prescribing', 'older people', and 'elderly'. A manual search of the reference lists from identified articles was conducted to identify additional articles. In addition to this the Department of Health website was searched using the same keywords, and a general search using google was also conducted. The findings from these searches are included in the discussion.

6 RESULTS

Table 1 shows the number of chemical entities prescribed to patients by age group. Of the 52,866 patients aged 60 and over who were registered with the 43 practices during 2002, 6,500 (12.3%) did not receive any prescription items.

Among those aged 60 and over, just under one third (32%) received between one and four different chemical entities during the year, one third (32.8%) received between 5 and 9 chemical entities and just under a quarter (22.9%) received 10 or more distinct items. In

other words, more than half the elderly population were prescribed five or more different items during 2002.

As expected, polypharmacy increased with ageband with 13.7% of patients aged 60-64 years having ten or more items compared with 34.6% of patients aged 85-89 years old.

A more detailed breakdown of the number of chemical entities prescribed during 2002 can be found in the accompanying Excel workbook (Table 1b and Table 2A(i)).

The record for the maximum number prescribed was 51 distinct entities (patient in the 70-74 year age band). Otherwise, there were a handful of patients in each age band who scored 41 or 42 chemical entities.

Table 1: Number of chemical entities prescribed during 2002. Figures are counts of patients unless otherwise specified

No. chemical entities	60-64	Col %	65-69	Col %	70-74	Col %	75-79	Col %	80-84	Col %	85-89	Col %	90+	Col %	60+	Col %
0	2,455	19.6	1,483	13.3	1,040	10.5	707	8.5	454	7.2	240	7.6	211	13.1	6,500	12.3
1 to 4	5,142	41.1	4,004	36.0	3,085	31.1	2,229	26.9	1,465	23.2	676	21.4	333	20.7	16,934	32.0
5 to 9	3,213	25.7	3,550	31.9	3,445	34.7	3,017	36.4	2,374	37.6	1,148	36.4	594	36.9	17,341	32.8
10 plus	1,712	13.7	2,099	18.8	2,350	23.7	2,339	28.2	2,027	32.1	1,092	34.6	472	29.3	12,091	22.9
total	12,522	100	11,136	100	9,920	100	8,292	100	6,320	100	3,156	100	1,610	100	52,866	100

The following Table 2 shows the inter-practice variation in the median number of entities prescribed per person per year. In 1998, the median rate was 5.35 (IQR 5.15) rising to 6.46 (IQR 5.84 to 7.01) in 2002

Table 2 Inter-practice variation in the number of chemical entities prescribed in QRESEARCH pilot practices, people aged 60 and over, by year

Year	Number of entities	Number of patients	Average number of entities prescribed per person		
			Median	Inter-quartile range	
1998	162,675	30,593	5.35	5.15	5.98
1999	209,654	39,347	5.40	5.01	5.82
2000	265,253	46,664	5.81	5.36	6.26
2001	288,309	47,565	6.10	5.71	6.93
2002	331,900	52,956	6.46	5.84	7.01
2003 (part year)	313,154	53,246	6.08	5.42	6.40

The Excel workbook contains two further tables with similar data but restricted to the last quarter of the year. Excel Table 2B(i) shows the number of chemical entities prescribed to patients in the last quarter of 2002. Excel Table 2B(ii) shows inter-practice variation in the number of chemical entities prescribed to patients in the last quarter of each of the years 1998-2003. The median number of entities per person per practice in 1998 was 3.29 (IQR 3.08 to 3.74). The equivalent figure for 2002 was 4.03 (IQR 3.69 to 4.68). As expected the figures for the last quarter were lower than the figures for the whole year.

7 DISCUSSION

What is polypharmacy?

This report looked at the number of chemical entities prescribed to patients within a specified time period. According to the literature, polypharmacy is defined as the concomitant use of multiple drugs. Although no specific number of medications has been established to define polypharmacy, many use a cutpoint of three to five drugs per patient¹. Polypharmacy often occurs with older people who have concurrent disease processes, each needing a specific treatment regime².

Why is the number of drugs prescribed to elderly patients important?

Polypharmacy is problematic for older patients because it may increase the risk of adverse effects and drug interactions. One study conducted in the Netherlands examined

the incidence and prevalence of adverse effects in general practice patients using two or more drugs simultaneously, and found the incidence rate to be 5.5 per 100 elderly patients (>64 years), and the prevalence rate to be 6.1 per 100³. The risk of adverse drug reactions is strongly associated with increasing number of drugs taken¹. Polypharmacy also increases the risk of geriatric syndromes (cognitive impairment and delirium, falls and hip fractures, urinary incontinence), and diminished functional status¹⁴

Older patients with multiple diseases have altered ability to metabolize and excrete drugs, sensory and cognitive deficits and often complex medication regimens present a challenge to clinicians prescribing and to nurses administering medications. Apart from adverse reactions, polypharmacy can also be associated with the following

- drug-drug interactions
- decreased medication compliance can prevent therapeutic goals from being reached
- increase risk of self medication errors
- poor quality of life, and
- unnecessary drug expense

Several studies have examined the rate of polypharmacy in the elderly. In one study, concurrent use of five or more drugs was found in 11% (10-12%) of people in the 65-74 age group, and in 15% (14-16%) in the 75 and over age-group⁵. Findings from the Health survey for England 1998, reveal higher rates of polypharmacy in people over 75 years: approximately 36% are taking four or more drugs⁶. Older, more educated women are most likely to engage in polypharmaceutical consumption⁷, whilst people over 65 years in social classes IV and V (partly skilled occupations and unskilled occupations, respectively) have an increasing chance of taking five or more drugs concurrently⁵. Elderly people living in institutions and hospitalised patients have been found to be much more likely to be taking several drugs simultaneously^{5,8}.

The most consistent risk factor for adverse drug reactions is the number of drugs being taken and the risk rises exponentially as the number of drugs increases. Studies of hospital admissions have shown that polypharmacy and adverse drug reactions are found in 10-12% of patients admitted to medical services.

Other problems with multiple medication are that one drug may block the effect of another. For example, NSAIDs impair prostaglandin synthesis in the kidney with resultant salt and water retention, which can raise blood pressure in a patient whose hypertension has previously been controlled with anti-hypertensive drugs.

A drug may increase blood levels of another drug, producing toxic effects. An example is the addition of erythromycin to a patient taking digoxin - the digoxin level will increase, potentially leading to digitalis toxicity. Many drugs can either increase or decrease the anti-coagulant effect of warfarin.

Drugs can also interact with disease. For example corticosteroids can worsen diabetes, accelerate bone loss and osteoporosis, hasten the development of cataracts. Beta blockers precipitate bronchospasm in patients with asthma or COPD.

What is the extent of polypharmacy in older people in QRESEARCH?

One in eight of the elderly did not receive any chemical entity; one in three received between one and three; one in three received between five and nine; and a quarter received 10 or more entities. So more than half the elderly were prescribed five or more entities in 2002 which is higher than other published data. However, not all these drugs were necessarily prescribed at the same time although we suspect most of the drugs are prescribed as repeats as the pattern from the whole year (2002) and last quarter analysis is similar.

The co-prescribing of entities increases with age with more than one in three of patients aged 85-89 receiving ten or more entities. Clearly the scope for interaction increases as the risk of iatrogenic disease due to frailty and age increases.

What is the inter-practice variation?

As the median number of entities has increased, so the inter-quartile range between practice rates has increased. However, given the acknowledged wide variations between practices due to population, practice and cultural differences, these variations seems relatively narrow. In 2002, the median number of entities prescribed was 6.46 per patient, with an inter-quartile range of 5.84 to 7.01.

What is the trend with time?

The number of entities prescribed is increasing ever year (the drop in 2003 in Table 2 is probably due to it being for 9 months of the year), so the extent of polypharmacy and its attendant risks is increasing with time. There has been an average 4.3% increase in the mean number of entities prescribed in each year in the five years from 1998.

From our literature review, we identified one study which reported on time trends. This showed that the rate of polypharmacy has increase over time: evidence from Finland shows that polypharmacy increased from 19% to 25% (P= 0.06) between the years 1990-1991 and 1998-1999 in persons aged 64 years or older ⁹.

8 FUTURE WORK

The Department of Health might wish to consider whether it wishes to look at the prevalence of drug combinations known to cause clinical risks or problems, and the time trends in their use.

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