Variation in benzodiazepine and antipsychotic use in people aged 65 years and over in New Zealand

Gary Jackson, Catherine Gerard, Nikolai Minko, Nirasha Parsotam

Abstract

Aims To examine the variation in the dispensing of antipsychotic and benzodiazepine medicines in the elderly (aged 65+) across New Zealand.

Methods Data drawn from the New Zealand Pharmaceutical Collection for the New Zealand Atlas of Healthcare Variation was used to establish a regression model to examine dispensing rates by age, gender, district health board (DHB) of domicile and aged residential care usage rates over a 4 year period 2008/09 to 2011/12.

Results On average 24 per 1000 people aged 65+ in New Zealand were dispensed an antipsychotic in any given quarter. Benzodiazepine dispensing rates were even higher, at 109 per 1000 aged 65+. Both rates climbed steeply with age, were higher in females, and had a 1.6 to 1.8 fold variation across DHBs. Rates did not vary significantly with rest home and private hospital residential care usage, but antipsychotic rates appeared related to the use of psychogeriatric and dementia beds.

Conclusion Given the evident harms associated with the use of antipsychotic and benzodiazepine medicines in the elderly, and the relatively poor efficacy of antipsychotics in dementia care, prescribing of these medicines should be reassessed. DHBs should examine the causes of the high rates in their area and design interventions to reduce the rates.

The New Zealand Atlas of Healthcare Variation describes variation by geographic area in the provision and use of specific health services and health outcomes (http://www.hqsc.govt.nz/atlas). It is designed to prompt debate and raise questions on why differences exist and to stimulate improvement through this debate.

One of the domains investigated is polypharmacy in older people, defined for the Atlas as dispensing of 5 or more medicines concurrently in those aged 65 years and over. In addition, the Atlas examined the use of specific medications in the elderly, including antipsychotics and benzodiazepines.

Polypharmacy is associated with negative health outcomes including adverse drug reactions, poor adherence and geriatric syndromes, for example, urinary incontinence, cognitive impairment and impaired balance leading to falls.¹

In older people certain classes of medicines carry a substantially higher risk of adverse effects, including antipsychotics, benzodiazepines and zopiclone. New initiation of a benzodiazepine in persons aged 65 and over is associated with an approximately 50% increase in the risk of dementia.²

Antipsychotic and benzodiazepine use is also associated with an increased risk of death.³⁴ Both are strongly recommended for avoidance in the American Geriatrics Society updated Beers Criteria and STOPP/START criteria.⁵⁶
The Atlas showed variation in the dispensing of antipsychotic and benzodiazepine medicines across New Zealand. We examined this variation in more detail by district health board (DHB) of domicile, age, and gender over a four year period by quarter.

We also investigated factors that might be associated with this variation, including the supply of prescribing clinicians (general practitioners, psychiatrists, geriatricians), use of primary care (general practice visits) and residential care bed use by category.

**Methods**

Data were drawn from the New Zealand Pharmaceutical Collection, which contains claim and payment information from community pharmacists for all prescription dispensing of patients living in the community and residential care.

All the medicines examined (Table 1) are prescription-only in New Zealand, so we would expect near 100% capture in the pharmaceutical collection. These are referred to as “antipsychotics” or APs and “benzodiazepines” or BZs in the text and tables. Four years data from 2008/09 to 2011/12 were examined.

For each quarter, at least one dispensing of a noted medicine was considered to be a positive finding (i.e. multiple dispensings in a quarter were only counted as one). The available quarters in each year were then averaged. We interpreted rates derived from this, e.g. 20/1000, as meaning that during that year, 20 out of every 1000 people would have had at least one dispensing in any given 3-month period.

**Table 1. Funded medicines on the New Zealand Pharmaceutical Schedule between 2008/09 to 2011/12 examined**

| Antipsychotics (AP) | amisulpride, aripiprazole, clozapine, chlorpromazine hydrochloride, haloperidol, levomepromazine, olanzapine, olanzapine pamoate monohydrate, pericyazine, quetiapine, quetiapine fumarate, risperidone, trifluoperazine hydrochloride, ziprasidone, zuclopenthixol decanoate, zuclopenthixol dihydrochloride and zuclopenthixol hydrochloride. |
| Benzodiazepines and zopiclone (BZ) | alprazolam, diazepam, lorazepam, lormetazepam, midazolam, nitrazepam, oxazepam, temazepam, triazolam and zopiclone |

New Zealand residents’ age specific population data were taken from the population projection developed by Statistics New Zealand for the Ministry of Health (MOH) in 2012. General practitioner (GP) visits were taken from the MOH’s national Primary Health Organisation (PHO) Enrolment Collection.

Aged residential care (ARC) usage rates were calculated from the DHB Shared Services ARC Demand Planner (http://www.dhbsharedservices.health.nz/Site/Health-of-Older-People-/ARC-Demand-Planner-.aspx). This covered all DHB or MOH subsidised residential care beds in New Zealand, by age, gender and DHB.

We used data for the 2008/09 to 2011/12 years to match the pharmaceutical data in hand. The bed types were grouped for analysis into rest home and hospital bed days as one group, and psychogeriatric and dementia care bed days as the other. Self-paying rest home residents were not included.

We obtained full-time equivalent general practitioner, psychiatrist, and geriatrician numbers from the Medical Council of New Zealand for the calendar year 2012. They were assigned to DHB based on worksite information.

We sought to compare the rate of dispensing with the rate of use of general practice. General practitioner consultation rates by age, gender and DHB were obtained from the MOH PHO enrolment data.

The enrolment data records whether a person has had a visit in the last quarter, leading to the slightly odd metric of “the number of GP visits per year, but counting a maximum of one per quarter”. This allowed comparison across the DHBs, the ability to analyse same age-gender-DHB grouping, and was proportional to the total number of consultations made.
We assumed that benzodiazepines or antipsychotics would be prescribed based on a patient’s clinical conditions, and these conditions would be expected to have similar prevalence throughout New Zealand. Thus the number of patients with such conditions should follow the population and only a small variation is expected between DHBs.

All collected data were linked together by DHB, age and gender by financial year. Means and standard deviations were determined for each variable. We performed canonical correlation and linear regression analysis between the number of people dispensed medicines of interest (benzodiazepines, antipsychotics and both) with each DHB’s population by age and gender, by financial year. Workforce figures, general practice consultation rates and hospital and residential care bed days and psychogeriatric and dementia bed days were separately tested, then combined.

Non-significant variables were removed from the regression in step-wise fashion until the most parsimonious model was obtained. Crude rates, standardised ratios (SRs) with 95% confidence intervals, and linear regression between predictor and dependent variables of interest were performed in Statistical Analysis System (SAS) v9.3 software.

## Results

On average, 24/1000 people aged 65+ in New Zealand in 2008/09 to 2011/12 were dispensed an antipsychotic in any quarter (detailed results shown in Table 2). The rate of dispensing increased significantly with age, from 15/1000 in the 65–74 year olds to 56/1000 in those aged 85+.

### Table 2. Dispensing rates and standardised ratios per 1000 population, 2011/12

<table>
<thead>
<tr>
<th>Variables</th>
<th>Rate/1000 population</th>
<th>Standardised ratios (SRs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>APs</td>
<td>BZs</td>
</tr>
<tr>
<td>All</td>
<td>23.8</td>
<td>108.5</td>
</tr>
<tr>
<td>Female</td>
<td>27.8</td>
<td>137.8</td>
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<tr>
<td>Male</td>
<td>19.0</td>
<td>73.9</td>
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<tr>
<td>65-74y</td>
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<td>82.1</td>
</tr>
<tr>
<td>75-84y</td>
<td>26.8</td>
<td>125.8</td>
</tr>
<tr>
<td>85y+</td>
<td>55.6</td>
<td>183.7</td>
</tr>
<tr>
<td>Northland</td>
<td>18.9</td>
<td>109.1</td>
</tr>
<tr>
<td>Waitemata</td>
<td>17.7</td>
<td>112.2</td>
</tr>
<tr>
<td>Auckland</td>
<td>28.8</td>
<td>130.6</td>
</tr>
<tr>
<td>Counties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manukau</td>
<td>18.7</td>
<td>96.4</td>
</tr>
<tr>
<td>Waikato</td>
<td>19.8</td>
<td>103.6</td>
</tr>
<tr>
<td>Lakes</td>
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<td>107.6</td>
</tr>
<tr>
<td>Bay of Plenty</td>
<td>20.5</td>
<td>122.1</td>
</tr>
<tr>
<td>Tairawhiti</td>
<td>21.2</td>
<td>79.6</td>
</tr>
<tr>
<td>Taranaki</td>
<td>20.3</td>
<td>98.4</td>
</tr>
<tr>
<td>Hawke’s Bay</td>
<td>25.1</td>
<td>116.3</td>
</tr>
<tr>
<td>MidCentral</td>
<td>25.4</td>
<td>119.1</td>
</tr>
<tr>
<td>Whanganui</td>
<td>23.3</td>
<td>129.4</td>
</tr>
<tr>
<td>Capital &amp; Coast</td>
<td>24.7</td>
<td>98.2</td>
</tr>
<tr>
<td>Hutt</td>
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<td>111.2</td>
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<tr>
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<td>22.6</td>
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<tr>
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<td>96.0</td>
</tr>
<tr>
<td>Marlborough</td>
<td></td>
<td></td>
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<tr>
<td>West Coast</td>
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<tr>
<td>Canterbury</td>
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<tr>
<td>Sth Canterbury</td>
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<td>92.7</td>
</tr>
<tr>
<td>Southern</td>
<td>27.8</td>
<td>92.1</td>
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</table>

Note: All rates are for the 65+ population apart from the age-specific rates. Standardised ratios (SRs) are standardised for each other variable listed. AP=antipsychotic, BZ=benzodiazepine and zopiclone. Shaded values in DHB section have a SR over 1 and 95% confidence intervals clearly not overlapping 1.
Benzodiazepine dispensing rates were even higher, at 109/1000 aged 65+, increasing from 82/1000 for 65–74 year olds to 184/1000 in those aged 85+. Nearly 1 in 5 New Zealanders aged 85+ had a benzodiazepine dispensed in any given quarter of 2011/12.

The combination of any one individual getting dispensed both antipsychotics and benzodiazepines in the same quarter was present in 8.8/1000 65 year olds and over. This also rose with age to reach 21/1000 85 year olds and over, just over 2%.

Those aged 85 and over were nearly four times more likely to be dispensed antipsychotics than those aged 65–74 (standardised ratio (SR) 2.1, 95% CI 2.04–2.17).

Males aged 65 and over had a lower rate of antipsychotic dispensing than females, 19/1000 aged 65 and over compared with 28/1000 (SR 0.89 compared with 1.08).

The benzodiazepines rate difference was even higher at 74/1000 for males 65 and over compared with 138/1000 for females (SR 0.72 compared with 1.21). Males were also less likely than females to have dispensed both medicines in the same quarter – SR 0.84 compared with 1.12.

Female rates showed more variation across the DHBs. No particular trend was noted over the relatively short timeframes examined, though rates were slightly higher in more recent years.

Antipsychotic dispensing rates by DHB varied from 17.7/1000 in those aged 65 and over at Waitemata DHB to 31.5 at Canterbury DHB, a 1.8-fold difference (Figure 1).

Canterbury showed a significantly higher rate of dispensing (SR 1.25, 1.20–1.30), along with Auckland, Nelson Marlborough and Southern. Waitemata had a significantly lower rate of antipsychotic dispensing (SR 0.74, 0.69–0.78), as to a lesser extent did Taranaki, Northland, Counties Manukau, Waikato, and Bay of Plenty.

Benzodiazepine dispensing rates by DHB ranged from 79.3/1000 for those aged 65+ in West Coast DHB to 130.6 at Auckland DHB (Figure 2), a 1.6-fold difference. Auckland, Whanganui and Bay of Plenty DHBs had significantly higher rates of dispensing, while a number of DHBs including Tairawhiti, West Coast, Southern and South Canterbury had lower rates.

The pattern for people dispensed both benzodiazepines and antipsychotics was similar to that for antipsychotics alone, with Auckland, Nelson Marlborough and Canterbury DHBs reaching significance with high co-dispensing rates (Figure 3).
Figure 1. Antipsychotic dispensing for aged 65+, years 2008–12, standardised rates by DHB

Note: No more than 1 dispensing counted per person per quarter. Standardised for age and sex – a ratio of 1 means the DHB has the same dispensing rate as the New Zealand average.

Figure 2. Benzodiazepine dispensing for aged 65+, years 2008–12, standardised rates by DHB

Note: As per Figure 1.
Dispensing rates increased across the four year study period. Antipsychotics went from 22.4 to 23.8 per 1000 aged 65 and over from 2008/09 to 2011/12 (linear trend by quarter $r^2=0.71$). Benzodiazepines went from 106 to 109 per 1000 aged 65 and over in the same time period ($r^2=0.72$), while those dispensed both in the same quarter increased from 8.0 to 8.8 per 1000 aged 65 and over ($r^2=0.91$).

When compared with occupied bed days in the aged residential care sector, there was no effect in removing rest home and hospital facilities from either antipsychotic or benzodiazepine dispensing. However the occupied psychogeriatric and dementia bed days (PGDM) did show a clear relationship with antipsychotic dispensing, giving a better fit particularly for Canterbury and the South Island DHBs than a straight population count. The Northern Region’s DHBs had relatively less PGDM beds per person aged 65 year and over, and showed a lesser fit on this measure.

The workforce supply figures per DHB (general practitioner, psychiatrist, and geriatricians) did not add anything to the analysis and were not used in the final regression work. Likewise, GP consultation numbers largely varied with population counts, so did not add any explanatory power.
Discussion

This study—Rates of antipsychotic and benzodiazepine dispensing rise with age, with females having a higher rate than males. There are variations in the dispensing of antipsychotics and benzodiazepines between DHBs, up to 1.8-fold, even after controlling for age and residential care bed numbers.

Disease rates do not vary by this magnitude by area, so health system factors are the likely driver for this variation. Rates of dispensing do not appear to be related to the general practitioner, psychiatrist, and geriatrician full-time-equivalent (FTE) numbers in a DHB, or the number of GP consultations occurring in that DHB.

Dispensing rates did not vary based on the occupied bed days in residential care hospital and rest homes, but did vary for antipsychotics when psychogeriatric and dementia bed days were taken into account.

The high rate of antipsychotic dispensing in Canterbury appeared associated with the higher rate of psychogeriatric and dementia bed use in that DHB. We could find no reason as to why there are relatively more such beds in Canterbury.

Previous work in New Zealand—Previous work in New Zealand has shown high rates of use of these medicines in the elderly. A study in Hawke’s Bay in 2005 showed stable rates of prescribing over a 15 year period, but still high rates of both benzodiazepine and antipsychotic prescribing. Rates of psychotropic prescribing varied greatly between facilities offering more or less the same level of care, with rates particularly high in dementia units – 60% compared with other residential care facilities (17%). The prescriber and environment factors appeared to be the main influences upon prescribing patterns suggested the editorial that accompanied that paper, leading to educative and care-resource interventions perhaps being able to be selectively applied to reduce medicine usage for outliers.

Off-label use of antipsychotics has been noted to be very high in Canterbury, with a third of psychiatrists in the region prescribing off-label for the management of behavioural and psychological symptoms of dementia.

The authors’ conclusions are clear: “Considering that even low dose [atypical antipsychotics] can have significant side-effects, are of unknown efficacy, and appear to have a potential for abuse, we recommend a more considered and measured approach to their use.”

Recent analysis of Pharmac data for 2009/10 showed rates of antipsychotic prescribing in the 65 and over population for Canterbury and Bay of Plenty DHBs of 5.3% and 3.5% respectively. These rates show as higher than the current study (Canterbury 3.2% and Bay of Plenty 2.1%) as they relate to any script in the course of the year, rather than per quarter.

Croucher et al also noted the rate of antipsychotic medication use amongst older people increasing with age, and the higher rate for older women than men.
We add to this work to show these relatively high rates of prescribing continue today throughout New Zealand, are not falling, and may be associated with aged residential care use.

**Limitations**—Our study has limitations. It was not possible to assess the appropriateness or otherwise of prescribing as the pharmaceutical data collection used does not contain data on the patients’ condition. It also does not indicate whether people took the medicine, only that it was dispensed. While it does not capture over-the-counter medicines, this does not feature in the medicine categories being examined.

All New Zealand residents, the population under study, are eligible for subsidy for pharmaceutical use so their claims will be submitted by the pharmacy and be included in the collection. If the cost of the pharmaceutical is less than the patient copayment ($3 at the time of the study), then a claim did not need to be submitted. This is unlikely for the medicines involved.

Public hospital-dispensed medicines are not included, nor any medicines not on the Pharmaceutical Schedule. Both will be very small volumes compared with the main medicines analysed.

The main limitation of this study is that it can only report an association at a population level between the different variables. Further work is recommended to link the individual patients through the national health data collections to more definitively establish the apparent link between psychogeriatric and dementia bed use and antipsychotic use, to check on the dose and quantities dispensed and the period of time over which each individual is dispensed medicines.

Local analysis including information of the patient’s condition, the purpose for starting the medication and the reviews for continuation would be particularly valuable. The study had limited power to detect whether the supply of clinicians in the New Zealand context might influence the amount of medicine dispensed.

Given that rest home residence did not seem to be related to prescribing rates, the lack of inclusion of self-paying rest home residents is unlikely to have affected our results. They were not included as data is not collected on this group of people centrally as they receive no subsidy from DHBs.

**Context**—The rate of antipsychotic dispensing in New Zealand noted in this study, 2.4% of those aged 65 and over per quarter, is likely to be below the rate estimated in the UK of 5.3% per year, even allowing for the difference between the quarterly and annual measures. This UK overall proportion is similar to that reported for Maniòba, Canada (4.3% in men and 6.0% in women).

The rates of antipsychotic medication use amongst older people increasing with age, and the higher rates for older women than men are consistent with Australian and Canadian figures. Higher rates of antipsychotic use amongst older women may reflect their over-representation in residential care, where rates of prescribing are higher.

Overall population aged 65 and over rates of benzodiazepine dispensing were noted to be as high as 22.5% in Ontario, Canada, in 1998, and noted rates of 16% in the UK,
20% in France and 23% in Quebec, all likely to be higher than the quarterly rate noted here of 10.8%.

Variation by region in medication rates in the elderly shown here mirrors previous findings of variation in excess of what can be explained by variations in the characteristics of the population being considered. The Royal Australian and New Zealand College of Psychiatrists (RANZCP) and PHARMAC have developed recommendations for prescribing of antipsychotics for the treatment of elderly people in residential care with psychological and behavioural symptoms of mental disorders. The Ministry of Health backed this up with their publication in 2011 Medicines Care Guides for Residential Aged Care.

The New Zealand Ministry of Health guidelines for Mental Health and Addiction Services for Older People and Dementia Services are also clear on the need to manage prescribing of these agents “A preference for psychological before pharmacological approaches, and effective monitoring of practice to reduce risk of harmful outcomes, are recommended.” (p25)

Guidelines emphasise the non-pharmacological management of troublesome behaviours, especially given the increased mortality rate and risk of stroke seen in people with dementia given antipsychotics. A range of non-pharmacological methods are available.

Antipsychotics and benzodiazepines are recommended for avoidance in the American Geriatrics Society updated Beers Criteria and for stopping in the STOPP/START criteria. Over-prescription of antipsychotic drugs in aged residential care facilities has been noted in New Zealand, mirroring findings in the United Kingdom.

The Department of Health in England notes a reduction in antipsychotic prescribing more recently, explaining it as a consequence of the new standards for dementia care set out in their National Dementia Strategy, published in 2009. It is backed up by very clear and strong warnings by the Medicines and Healthcare Regulatory Authority (MHRA) in the UK regarding the “risk from serious and life-threatening side effects”, and noting the medicines are useful only for short-term (up to 6 weeks) treatment of persistent aggression in Alzheimer’s dementia, and are of limited effectiveness.

For practitioners in the field, overprescribing of these drugs particularly in residential care facilities has been a concern for a number of years, and considerable educational effort has gone into promoting more rational prescribing habits. It is therefore disappointing that no improvement in rates was discernible across the 4-year study period, with the trend more towards an increase in dispensing.

Conclusion

Given the poor efficacy of antipsychotics in dementia care, and the evident harms associated, prescribing of these medicines should be reassessed.

Clinicians involved in the care of the elderly should document whenever these medicines are used as to the purpose for the treatment, and the length of time the medicine is to be trialled for – starting them seems easier than stopping them.
DHBs should examine the causes of the high rates of prescribing in their area and design interventions to reduce the high rates. Work has been underway in Canterbury along these lines.34

Most older people taking antipsychotics can be successfully weaned off after a short course of low dose treatment without re-emergence of behavioural issues, although some people experience a reoccurrence of their dementia-related symptoms.35-37

Likewise the potential harms from benzodiazepines are well documented and habituation makes their long term use pointless.2-3 Despite this evidence rates of use remain very high.

A strength of the New Zealand Atlas of Healthcare Variation is that the DHBs with lower rates can provide an initial target for other DHBs to aim for, realising that one is not expecting a target of zero. The Atlas provides a mechanism towards tracking progress in reducing the use of these medicines.

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