

A clinical audit of oral anticoagulant therapy in aged care residents with atrial fibrillation

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Abstract

Background

Atrial fibrillation (AF) is a risk factor for stroke in older people. Oral anticoagulants can reduce stroke risk but they are commonly under prescribed in the elderly, often due to concerns regarding the risk of bleeding. Prescribing in aged care residents may also be further complicated by associated geriatric conditions such as dementia and risk of falls. Systematic assessment of stroke and bleed risk can help identify people with AF expected to benefit from anticoagulant therapy and optimise prescribing.

Objective

The aim of this study was to assess the prescribing of anticoagulants in elderly aged care residents in accordance with Australian guideline recommendations.

Setting

Nineteen aged care facilities across southeast Queensland.

Method

A clinical audit of anticoagulant therapy in aged care residents was conducted.

Main Outcome measure

Information was collected from the records of residents with non-valvular AF to assess the risk of stroke and bleeding and compare this prescribing to current evidence-based guidelines for anticoagulation in AF.

Results

A total of 1754 residents were screened with 359 (20.4%) identified to have a diagnosis of non-valvular AF. There were 356 (99.2%) residents with non-valvular AF and a sufficiently high risk of

stroke to warrant the use of an anticoagulant. Of these, 172 (48.3%) were prescribed an oral anticoagulant and 40 (11.2%) residents had a documented decision not to prescribe oral anticoagulants in their records. The majority of residents prescribed anticoagulation were receiving non-vitamin K antagonists (76.8%). The prescribed dose was consistent with recommendations for 44.8% of residents prescribed oral anticoagulant therapy.

Conclusion

Many residents with non-valvular AF and significant risk of stroke were not receiving oral anticoagulation despite a lack of documented reason for non-prescribing. Non-vitamin K antagonists were widely prescribed but dosing of these agents could still be improved. There remains a need to improve anticoagulant prescribing for aged care residents and optimise stroke prevention in this population.

Keywords: Oral anticoagulants, atrial fibrillation, aged care, pharmacy practice, clinical audit

Impact of findings on practice

- This study highlights the importance of assessing the risk of stroke and bleeding in residents of aged care facilities with atrial fibrillation and clearly documenting decisions regarding use of oral anticoagulants.
- Many residents of aged care facilities with atrial fibrillation were not prescribed an oral anticoagulant and under dosing some non-vitamin K antagonist oral anticoagulants was relatively common

Introduction

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia with an estimated prevalence in Western countries ranging from 0.5 to 2%[1, 2]. Prevalence of AF increases with age affecting 5–15% of people over the age of 80[3]. AF increases the risk of stroke and this risk is further increased with advancing age. Oral anticoagulant drug therapy reduces the risk of stroke in patients with AF and the absolute benefit of oral anticoagulant therapy is often greater in older patients due to their higher baseline risk of stroke. However, prescribing in older patients is complicated by the risks associated with anticoagulation, especially bleeding. Previous studies have found that oral anticoagulant therapy is commonly underused in elderly populations[4].

Rozzini et al found oral anticoagulant prescribing in eligible nursing home residents to range from 8% to 47%[5]. Bahri et al reported that although one in ten nursing home residents had AF and were candidates for oral anticoagulants, they were frequently prescribed antiplatelets as a substitute[6]. In the Australian context, Nishtala et al found a relatively low usage of oral anticoagulants (28.1%) and suggested the use of guideline recommended stroke risk tools could address the reluctance to prescribe anticoagulation in older eligible patients with AF and assist in optimising therapy[7]. In a community setting, Virdee and Stewart demonstrated that a pharmacist-led intervention could increase uptake of oral anticoagulants in alignment with stroke prophylaxis guidelines[8].

Australian guidelines for the diagnosis and management of AF were released in 2018[9]. These guidelines recommend oral anticoagulant therapy in patients with non-valvular AF with a CHA₂DS₂-VA (genderless CHA₂DS₂VASc) score of two or more, unless there are contraindications to anticoagulation. Australian guidelines adopted the CHA₂DS₂-VA to provide consistent recommendations for anticoagulation across genders and avoid the situation of different threshold scores for males and females which occurs when utilising CHA₂DS₂-VASc[9]. Oral anticoagulant options for non-valvular AF include warfarin and non-vitamin K antagonist oral anticoagulant (NOAC) treatments such as dabigatran, rivaroxaban and apixaban. Warfarin is contraindicated in patients with severe hepatic disease and non-vitamin K antagonist treatments are contraindicated in patients

with severe renal impairment. The choice of anticoagulant therapy is dependent on individual factors including patient age, weight, renal/liver function, concurrent drug therapy, and patient preference[10]. Dosing of warfarin is adjusted according to the International Normalised Ratio (INR) and dosing of NOACs are adjusted according to renal function. The Australian AF guidelines state that the net benefit of stroke prevention outweighs the risk of major bleeding for most patients without a contraindication but recommend assessing bleeding risk using HASBLED and reducing modifiable risk factors where possible (e.g. treat hypertension, initial fall prevention strategies).

Aim of the Study

The aim of this study was to compare prescribing of oral anticoagulant therapy in residents of aged care facilities with non-valvular AF against current guidelines based on resident-specific risk factors for stroke and bleeding.

Ethics Approval

Ethics approval was obtained from the University of Queensland (2018001290), Griffith University (2018/721), and Anglicare Southern Queensland (EC00341:2018:41).

Method

Thirty-two aged care facilities located in Southeast Queensland, Australia were invited to take part in a clinical audit of oral anticoagulant prescribing. All facilities were receiving dispensing and medication review services from a single pharmacy provider were invited to take part in the audit. The audit was conducted between September 2018 and January 2019.

Residents with a diagnosis of non-valvular AF were identified from resident medical records (e.g. documented diagnoses, general practitioner notes and/or latest hospital or specialist summary). Information extracted from the medical records of residents with a diagnosis of non-valvular AF included: current list of diagnoses, complete medication list including any oral anticoagulant or antiplatelet agent, smoking and alcohol status, plus documentation of frailty and falls risk via the Falls Risk Assessment Tool (FRAT) score[11]. Parameters to enable calculation of appropriateness of

NOAC dosing and renal function were recorded including weight, height, serum creatinine and eGFR. Resident records including doctor's and specialist's notes plus hospital discharges were scanned for any entries related to decisions regarding anticoagulant use for a period of two years and any documentation regarding decisions not to prescribe anticoagulants were recorded. A two-year period was considered a sufficiently long period to check for a documented decision not to prescribe an anticoagulant that could be considered current. Data relating to factors that may influence anticoagulant prescribing were collected, including: history of bleeding, history of falls, diagnosis of dementia, a cancer diagnosis, anaemia, palliative care and renal dialysis.

Stroke risk score (CHA₂DS₂-VA) and bleed risk score (HAS-BLED) were calculated. The use of oral anticoagulants was assessed against current Australian AF guidelines[9]. Oral anticoagulant dosing for residents receiving a NOAC was compared to dosing recommendations in the Australian Medicines Handbook[12]. Time in therapeutic range (TTR) was calculated for residents taking warfarin using the Rosendaal method[13]. In accordance with Australian AF guidelines, patients were categorised as poor warfarin control if TTR was less than 60%[9].

Patients characteristics were reported as mean \pm standard deviation for continuous data and number and percentage for categorical data. Descriptive statistics were utilised to describe prevalence of anticoagulant prescribing overall. Patients were categorised according to guideline recommending anticoagulant therapy, i.e. CHA₂DS₂-VA score \geq 2, and oral anticoagulant prescribed or not prescribed and patient characteristics between these groups were compared. Statistical comparison between groups was performed for data represented as mean \pm standard deviation with GraphPad InStat Version 3 using non-parametric methods of the Mann-Whitney test. Data represented as number (percentages) were compared with the MedCalc comparison of proportions using chi-squared testing. Significance was defined as $p < 0.05$.

Results

Nineteen facilities participated in the audit. Participating facilities included facilities from two large national aged care providers as well as several independent facilities. The facilities were distributed over a large geographic area in southeast Queensland, with the majority of facilities located in urban areas. The facilities were located in a range of sociodemographic areas. The occupancy of the facilities ranged from 60–178 with a median of 102. A total of 1754 residents were screened across the 19 facilities with 359 (20.4%) identified with non-valvular AF. The mean age of residents was 86.0 ± 8.1 years and there was a higher percentage of female ($n=222$, 61.8%) residents (Table 1). Of the 359 residents with non-valvular AF, 3 (0.8%) residents had a CHA₂DS₂-VA score of 1 and the remaining 356 (99.2%) residents had a CHA₂DS₂-VA score ≥ 2 .

Of the 356 residents with a CHA₂DS₂-VA score ≥ 2 , only 172 (48.3%) were prescribed an oral anticoagulant (Figure 1). A documented reason for not prescribing oral anticoagulant therapy was present for 40 (11.2%) of these residents. Documented reasons for not prescribing anticoagulation included bleed risk ($n=13$, 32.5%), falls risk ($n=11$, 27.5%), patient/prescriber decision ($n=11$, 27.5%), precautionary co-morbidities such as dementia and malignancy ($n=4$, 10.0%), and past reaction to anticoagulant ($n=1$, 2.5%). Ninety-three (26.1%) of residents with a CHA₂DS₂-VA score ≥ 2 were not prescribed an anticoagulant had a condition or risk factor that may have influenced anticoagulant prescribing (history of bleeding, history of falls, diagnosis of dementia, cancer diagnosis, anaemia, palliative care and renal dialysis), and 51 (14.3%) were not prescribed an anticoagulant and had neither a documented decision nor a condition or risk factor that may have influenced prescribing. Compared to residents with AF who received anticoagulation, those who did not were significantly less likely to have heart failure, and significantly more likely to have dementia and a history of falls (Table 2).

The 173 residents receiving oral anticoagulants were prescribed apixaban ($n=67$, 38.7%), dabigatran ($n=10$, 5.8%), rivaroxaban ($n=56$, 32.4%) and warfarin ($n=40$, 23.1%). The doses of these anticoagulants prescribed were consistent with dosing recommendations for 77 (44.8%) of these

residents, while 8 (4.7%) received doses higher than recommended and 25 (14.5%) received doses lower than recommended, and missing pathology meant 22 (12.8%) were unable to have appropriate doses confirmed. Figure 2 presents the prescribed dosing against prescribing information for each of the NOACs. Forty (23.2%) residents were receiving warfarin and 32 (80%) of these had a calculated TTR above 60% and 8 (20%) were below a TTR of 60%.

Discussion

This clinical audit revealed that non-valvular AF was common in this population of residents of aged care facilities in southeast Queensland. A significant proportion of these residents (144/356, 40.5%) had a CHA₂DS₂-VA score ≥ 2 , were not receiving an anticoagulant and did not have a documented decision against use. Of those residents taking an oral anticoagulant, use of a NOAC was common. NOAC dosing outside labelling recommendations was frequent. This study suggests that underuse of oral anticoagulants in residents of aged care facilities with non-valvular AF is common and emphasises the importance of regularly assessing stroke risk, documenting decisions regarding anticoagulant use and reviewing NOAC dosing.

The prevalence of non-valvular AF in this study was 20.4%, which is higher than some reports. Previously both Bahri et al and Rojas-Fernandez et al reported a prevalence of 11% and 10% respectively in residential care settings[6,14]. However, the prevalence of AF varies with age and can rise to 10-17% of those aged 80 years or older with females representing the majority of patients in this age group due to their longer survival[15]. Further to this, it has been suggested the burden of AF is particularly increasing in the Asia-Pacific region not only due to increasing age but also the increased incidence of other risk factors such as hypertension, diabetes, and obesity[16]. Therefore, the high prevalence of non-valvular AF in our study could be due to the mean age of our population being 86 years plus the high incidence of co-morbidities such as hypertension and diabetes.

The percentage of eligible residents prescribed oral anticoagulants in this study was 48.3%. Comparable to this, both Bahri et al and Rozzini et al found almost 50% of eligible cases were prescribed anticoagulation[5, 6]. Rojas-Fernandez et al reported a higher percentage of patients (69%) with indications for oral anticoagulant receiving this therapy, but this was for all anticoagulant indications not just AF[14]. A study in octogenarians reported 70% of patients with a high risk of stroke (as measured by CHADS₂ score of 3 compared to 1) were receiving oral anticoagulant therapy [17]. A systematic review reported oral anticoagulant treatment levels below 70% based on studies classifying patients at an elevated risk of stroke using CHADS₂[18]. There are a number of possible explanations for differences in anticoagulation rates in these studies. First, in accordance with the Australia AF guidelines, this study utilised CHA₂DS₂-VA (genderless CHA₂DS₂VASc) to assess stroke risk, whereas most of the cited studies used CHADS₂. Using CHA₂DS₂-VA to assess risk rather than CHADS₂ can reclassify patients as warranting anticoagulant therapy and expand anticoagulation use in patients that may benefit from anticoagulation [19–21]. Another explanation is the presence of co-existing precautions to oral anticoagulant therapy. Common precautions to anticoagulant therapies include prior bleed, frequent falls, frailty, and high bleed risk[22]. Bleeds and falls risk accounted for over half of the documented reasons for not prescribing oral anticoagulants in this study. In addition, the proportion of residents with falls risk and dementia was significantly higher in residents eligible for anticoagulation but not prescribed anticoagulant therapy. A review of oral anticoagulants for older patients found perceived harm greater than benefit was a common reason why physicians withheld anticoagulants due to factors such as advanced age, short-life expectancy, fear of bleeding and geriatric syndromes[23].

However, there is conflicting advice regarding prescribing anticoagulants in specific patient populations at risk of anticoagulant-related harm including dementia and falls. For example, Moroney et al found dementia an independent determinant of non-treatment with warfarin but Orkaby et al demonstrated discontinuation of warfarin after a dementia diagnosis to be associated with increased stroke and mortality[24, 25]. In regards to falls, patients on oral anticoagulant at high

risk of falls have been found to have no significant increase in major bleeds by Donze et al, whereas in contrast Gage et al found these patients at significantly increased risk of intracranial haemorrhage[26, 27]. Interestingly, it has been suggested that persons taking warfarin would need to fall about 295 times in one year for anticoagulation to not be optimal therapy[28]. Further to this, the American Academy of Neurology state that data is insufficient to determine if anticoagulation is safe and effective in elderly patients with frequent falls or advanced dementia[29]. In contrast, CHEST guidelines identify the need for individual risk assessment in patients with falls risk but suggest exploring strategies to reduce mechanical falls risk such as removing trip hazards and improving walking with aids and appropriate footwear[30]. Similarly for patients with dementia, these guidelines state anticoagulant therapy should only be withheld in the absence of an available caregiver to guarantee medication adherence[30]. Residents in aged care facilities are administered medications by caregivers so the risk of anticoagulation misadventure by the resident is removed. Further investigation of possible reasons for not prescribing anticoagulation in residents with dementia and falls risk is warranted as some of these residents may benefit from anticoagulation.

The majority of residents who were prescribed anticoagulation were receiving NOACs (76.8%) with apixaban and rivaroxaban most commonly prescribed. Similar to this, Loo et al found the majority of anticoagulant prescriptions in primary care to be NOACs with rivaroxaban prescribed most frequently followed by apixaban then dabigatran[31]. NOAC prescribing has been reported to be increasing in many countries including the United Kingdom, Europe and the United States[32–34]. Specific to Australian prescribing, Alemneh et al reported decreased prescribing of warfarin and increased prescribing of NOACs[35]. In this study, approximately 23% of residents were receiving warfarin with a high percentage (80%) classified as achieving good control as defined by a TTR > 60%. In our study, dosing of NOACs was inconsistent with dosing recommendations in about a quarter of residents. Similar to this, a Qatar study found inappropriate dosing in about a third of NOAC prescriptions with dabigatran dosing errors more common than rivaroxaban[36]. Dabigatran was the least used NOAC in our study with apixaban most widely prescribed and the NOAC most

associated with dosing outside recommendations. A review of NOAC prescribing found inappropriate dosage in a third of cases with apixaban most frequently dosed inappropriately[37]. An Australian study reported prescribing in a coronary care unit and found 60% of patients prescribed NOACs with prescribing errors in 16.7% of these, specifically 10% related to dose reduction with apixaban despite no indication for this[38]. Reduction of apixaban dose without fulfilling the criteria for dose reduction was commonly observed in our study. A dose reduction for apixaban is recommended when a resident meets two of the following: aged 80 years or more; weight 60kg or less; and serum creatinine 133 micromol/L or more. Some of the participants who received an inappropriately low dose of apixaban met only one of the criteria for reducing dose so it is possible that the dosing recommendations for apixaban were misinterpreted..

The limitations of the study need to be recognised when interpreting the results. The study relied on resident medical records available at the facility. Some of the residents with non-valvular AF that were not receiving an oral anticoagulant had a condition or risk factor that may have influenced prescribing (93/144, 64.6%). A decision regarding anticoagulant use may have been made for some residents but the documentation was not found. It is also possible that a correct decision was made not to prescribe anticoagulants for some of these residents but it was not documented. It is important to recognise that prescribing decisions in older patients with AF is complex. While the benefits of anticoagulant use outweighs the harms in most patients without an absolute contraindication to therapy there remains a lack of consensus regarding relative contraindications for oral anticoagulant therapy[22]. This emphasises the importance of regularly assessing stroke and bleeding risk and the need to document decisions regarding anticoagulant use. Rojas-Fernandez et al found documentation relating to oral anticoagulant needs improvement and can assist understanding regarding oral anticoagulant use in long-term care facilities[14].

Conclusion

Over half of the aged care residents with non-valvular AF eligible for anticoagulation were not prescribed an anticoagulant and the majority of residents did not have a documented decision against use. Anticoagulant dosing in aged care residents could also be improved. The study suggests that better adherence to current clinical guidelines could further reduce stroke risk, and highlights the importance of documenting decisions not to prescribe anticoagulants.

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Conflict of Interests

The authors have no conflicts of interest to declare.

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Table 1 – Patient demographics (n=359)

Characteristic	Number (Percentage)
Gender	
Female	222 (61.8)
Male	137 (38.2)
Age (years)	
Mean \pm standard deviation	86.0 \pm 8.1
< 65	4 (1.1)
65 – 74	27 (7.5)
75 – 84	95 (26.5)
85 – 94	187 (52.1)
\geq 95	46 (12.8)
Co-morbidities	
Hypertension	243 (67.7)
Heart Failure	105 (29.2)
Diabetes Mellitus	94 (26.2)
Vascular disease	111 (30.9)
Renal disease	18 (5.0)
Liver dysfunction	15 (4.2)
History of stroke	142 (39.6)
History of bleeds	27 (7.5)
Concurrent rate/rhythm medication	
Amiodarone	19 (5.3)
Beta-blockers	176 (49.0)
Calcium channel blockers	40 (11.1)
Digoxin	93 (25.9)
Concurrent anti-platelet medication	
Aspirin	79 (22.0)
Aspirin/clopidogrel	5 (1.4)
Aspirin/dipyridamole	4 (1.1)

Clopidogrel	11 (3.1)
Social History	
Smoker	12 (3.3)
Alcohol use	34 (9.5)
HASBLED score	
Mean \pm standard deviation	1.6 \pm 0.7
Median (interquartile range)	2 (1-2)
1	178 (49.6)
2	147 (40.9)
3	27 (7.5)
4	7 (2.0)
CHADsVA score	
Mean \pm standard deviation	4.3 \pm 1.4
Median (interquartile range)	4 (3-5)
1	3 (0.8)
2	32 (8.9)
3	70 (19.5)
4	93 (25.9)
5	91 (25.4)
6	52 (14.5)
7	13 (3.6)
8	5 (1.4)

Table 2 – Comparison of residents prescribed and not prescribed anticoagulant therapy when recommended by guidelines according to gender, age and co-morbidities. Data shown is number (percentage) for each category with mean (standard deviation) shown for age, HASBLED score and CHADsVA score. Chi-squared test was used for statistical comparison between percentages and non-parametric two-tailed Mann-Whitney test between means with a p-value < 0.05 considered significant.

	Guideline recommended therapy and anticoagulant prescribed (n=172)	Guideline recommended therapy and anticoagulant NOT prescribed (n=184)	Statistical comparison between groups (p-value)
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Gender			
Female	105 (61.0)	115 (62.5)	0.77
Male	67 (39.0)	69 (37.5)	0.79
Age			
Mean	86.2 (7.4)	87.4 (8.5)	0.029
< 75 years	14 (8.1)	15 (8.2)	0.97
> 75 years	158 (91.9)	169 (91.8)	0.97
Co-morbidities			
Hypertension	112 (65.1)	114 (62.0)	0.54
Heart Failure	63 (36.6)	42 (22.8)	0.004
Diabetes Mellitus	50 (29.1)	44 (23.9)	0.27
Vascular disease	54 (31.4)	57 (31.0)	0.94
Renal disease	9 (5.2)	14 (7.6)	0.36
Liver dysfunction	8 (4.7)	7 (3.8)	0.67
History of stroke	76 (44.2)	66 (35.9)	0.11
History of bleeds	10 (5.8)	13 (7.1)	0.62
History of Falls	18 (10.5)	33 (17.9)	0.047
Dementia	24 (14.0)	51 (27.7)	0.002
HASBLED score	1.7 (0.7)	1.6 (0.7)	0.08
CHADsVA score	4.6 (1.4)	4.1 (1.3)	0.001

Anticoagulant prescribing in residents with atrial fibrillation and risk of stroke

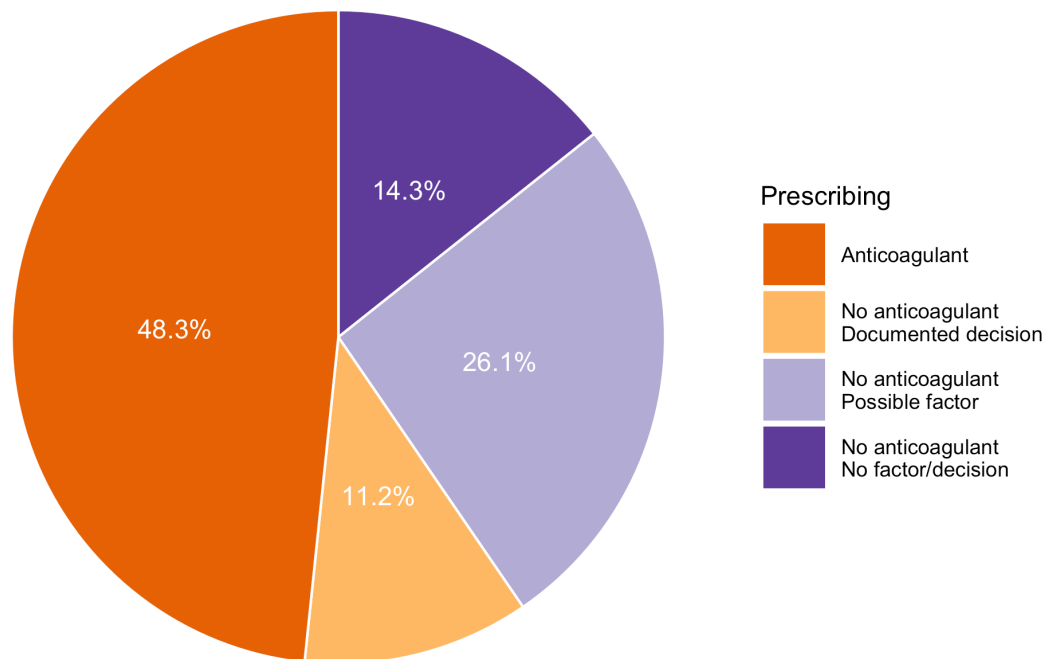


Figure 1: Anticoagulant prescribing in residents with $\text{CHA}_2\text{DS}_2\text{-VA} \geq 2$. Residents not taking an anticoagulant include “No anticoagulant: Documented decision”: residents with a documented decision not to prescribe an anticoagulant; “No anticoagulant: Possible factor”: residents with a condition or risk factor that may have influenced prescribing of an anticoagulant (but no decision was documented), and “No anticoagulant: No factor/decision”: residents who have neither a condition or risk factor that may have influenced prescribing of an anticoagulant nor a documented decision not to prescribe.

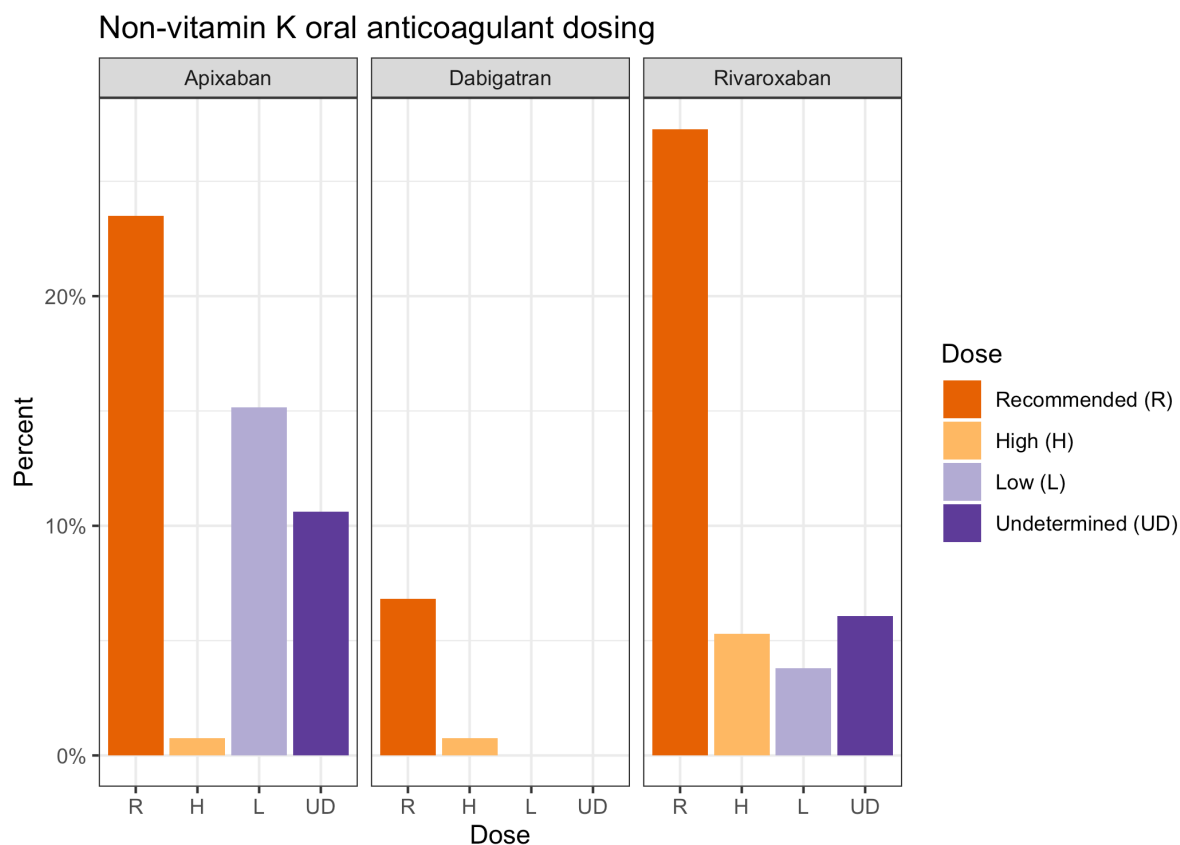


Figure 2: Prescribed NOAC doses are compared to doses recommended in the Australian Medicines Handbook in terms of percent of total NOAC use. “Recommended (R)”: resident prescribed a dose that was consistent with prescribing information; “High (H)”: resident prescribed a dose that was higher than recommended in the prescribing information; “Low (L)”: resident prescribed a dose that was lower than recommended in the prescribing information; “Undetermined (UD)”: It was not possible to compare resident dose against prescribing information because renal function was not available.