Contemporary approaches to managing atrial fibrillation: A survey of Australian general practitioners

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ABSTRACT

Background

Recent attention to the management of atrial fibrillation (AF) and stroke prevention has emphasised the need to support the use of existing pharmacotherapy through available services and resources, in preference to using the new, more expensive, novel oral anticoagulants. In this regard, general practitioners (GPs) are at the core of care.

Aims

To survey Australian GPs regarding their approach to managing AF, particularly in relation to stroke prevention therapy, and to identify the range of services to support patient care.

Methods

A structured questionnaire, comprising quantitative and qualitative responses, was administered to participating GPs within four geographical regions of NSW (metropolitan, regional, rural areas).

Results

Fifty GPs (mean age 53.74±9.94 years) participated. Most (98 per cent) GPs regarded themselves as primarily responsible for the management of AF, only referring patients to specialists when needed. However, only 10 per cent of GPs specialised in "heart/vascular health". Most (76 per cent) GPs offered point-of-care international normalised ratio (INR) testing, with 90 per cent also offering patient support via practice nurses and home visits. Overall, key determinants influencing GPs' initiation of antithrombotic therapy were: "stroke risk"/"CHADS$_2$ score", followed by "patients' adherence/compliance". GPs focused more on medication safety considerations and the day-to-day management of therapy than on the risk of bleeding.

Conclusion

Australian GPs are actively engaged in managing AF, and appear to be well resourced. Importantly, there is a greater focus on the benefits of therapy during decision-making, rather than on the risks. However, medication safety considerations affecting routine management of therapy remain key concerns, with patients' adherence to therapy a major determinant in decision-making.

Key Words

Atrial fibrillation, stroke prevention, general practitioners, pharmacotherapy, antiarrhythmic, antithrombotic

What this study adds:

1. What is known about this subject?

AF management is becoming increasingly complex, particularly around therapeutic decision-making, yet there is limited information about how well supported Australian GPs are in terms of resources.

2. What new information is offered in this study?

GPs have access to various services and resources to support their management of AF patients. Key determinants in GPs' decision-making relate to perceived benefits of

therapy, and day-to-day management issues, more so than the risks.

3. What are the implications for research, policy, or practice?

Targeted interventions are needed to better support GPs in managing patients with cognitive or functional impairments, and those patients who are non-adherent to therapy.

Background

Atrial fibrillation (AF) is a major contributor to the burden of stroke in Australia, on the background of an ageing population, and the increasing prevalence of heart disease.[1] Recent Australian data highlight that strokes attributed to AF are often more severe in presentation, with a higher mortality rate, than other types of stroke,[2] consistent with international findings.[3] For this reason, the management of AF has become a clinical priority, with attention focused on the use of antithrombotic and antiarrhythmic therapies. Previous studies have shown that use of these therapies has been suboptimal,[4–7] particularly in the at-risk elderly population, with clinicians citing a range of barriers to optimal management, including: difficulty in applying guidelines to clinical practice; concerns about the risk versus benefit of therapy in elderly patients; and lack of adequate support to effectively manage patients using complex anticoagulant or antiarrhythmic therapies.[8,9]

In Australia, as far back as 1997, the National Health and Medical Research Council guidelines[10] have stated: *"General Practitioners … are the key to better stroke prevention. What is needed is proactive opportunistic screening and risk management, and prompt action for two groups of patients: those with stroke/TIA symptoms and those with atrial fibrillation"*.[11] This has set the scene, over the past decade, for the implementation of targeted interventions to assist general practitioners (GPs) in managing patients with AF, including the use of risk assessment tools, practical guidelines, point-of-care testing for warfarin therapeutic monitoring, and patient education resources.

More recently, the advent of new treatment options, i.e., the novel oral anticoagulants (NOACs), has re-focused attention on the management of AF.[12] Given the significant costs of the NOACs and their potential impact on health-system expenditure, a government report's[13] recommendations emphasise the need to optimise management of AF through existing pharmacotherapy (e.g., warfarin), existing services, and resources (e.g., point-of-care testing). In considering the report's recommendations, it is important to first understand the contemporary

approach to the management of persons with AF in general practice. Therefore, the aim of this study was to canvas Australian GPs regarding their approach to managing AF, particularly in relation to stroke prevention therapy, and to identify the range of services they used to support their care of patients.

Method

Study design

A structured questionnaire was administered to participating GPs over a three-month period in 2012. The questionnaire was purpose-designed to determine GPs' approaches to the management of patients with AF; access and use of services to support patient care; and factors influencing their management of AF. Approval was granted from the relevant institutional Human Research Ethics Committees (Protocol 12453; HREC 2011-348A).

Sample frame

The participating GPs were from four Divisions of General Practice (DGP) or Medical Locals[14] (more recently known as Primary Health Care Networks) in the state of New South Wales (NSW), Australia, who were originally recruited to participate in an intervention trial addressing stroke prevention in AF.[15] The geographical divisions (i.e., City Metropolitan (CM), Coastal Region (CR), Regional Urban (RU), Regional Rural (RR)) were purposively selected to accommodate a cross-section of GPs caring for patients from diverse backgrounds (i.e., socio-economic, health status, access to health services) within both rural and urban settings in Australia.

Recruitment methods

GPs were invited to participate in the original intervention trial through advertisements for expressions of interest, which were distributed by the relevant DGP. GPs were then recruited into the trial, subject to meeting eligibility criteria,[15] and invited to complete the questionnaire. All participating GPs were informed that the trial was exploring AF management and the use of therapy for stroke prevention. Eligible GPs were those who: were practicing in one general practice surgery and not across multiple sites or surgeries; practiced in the specified divisions of GP; and provided informed written consent to participate in the study.

Sample size calculation

The sample size was estimated based on previous data as well as the requirements of the intervention trial to which the GPs were originally recruited.[15] For this specific descriptive sub-study, the main trial sample provided

sufficient participants to meet the stated objectives; i.e., using a point estimate of 25 per cent (i.e., estimated proportion of GPs using specific services to support their management of AF patients) with 95 per cent confidence and 10 per cent degree of precision, a target of 50 GPs recruited over a three-month period was required (in line with the main trial).

Data collection and analysis

The purpose-designed questionnaire was distributed in paper format to the GPs by the study's project officers (in person), who also verified specific inputs (e.g., clarification regarding the nature of services available in the practice).

Computerised analysis of quantitative data was performed using IBM SPSS Statistics 20 (IBM Corp; Armonk: NY). The Chi-square test, Mann-Whitney U test, and Kruskal-Wallis test were used to examine differences in independent proportions (parametric and non-parametric distributions, respectively). ANOVA was used to test for mean differences in continuous variables. A significance level of five per cent ($p < 0.05$) was set for all analyses. Open-ended responses to specific questions were thematically analysed, using manual inductive coding by the project officer and verified by the lead researcher.

Results

Characteristics of the GPs

On average, the 50 participating GPs were 53.74±9.94 years old with 22.88±10.14 years of experience in practice; 35 (70.0 per cent) were male (Table 1). GPs in the City Metropolitan region were older in age than those in other regions ($p = 0.01$). There were no significant differences across the four practice regions in terms of the GPs' gender distribution ($p = 0.63$) or years of experience in practice ($p = 0.21$). The characteristics of the GPs were typical of the wider Australian GP setting in terms of age and years of experience, and comparable to that reported in the Better the Evaluation and Care of Health (BEACH) program (a continuous cross-sectional national study).[16] However, there was a higher proportion of male GPs in the present study (versus 57 per cent in the BEACH program).

Characteristics of the practice setting

Overall, the most common type of setting that these GPs practiced in was a "medium-sized medical centre" (i.e., 4–5 GPs; 30.0 per cent of all GPs) (Table 1).

General practice areas of specialisation
While all of the GPs were obviously focused on general/family practice, one-fifth (22 per cent) additionally

specialised in Women's Health, followed by Aged Care (14 per cent). Only 10 per cent reported specialising in Heart/Vascular Health (under which the management of AF would fall).

GPs practicing in the Coastal Region and Regional Rural areas reported additional specialties of practice, compared with those in the Regional Urban and City Metropolitan areas; only one GP in the City Metropolitan area reported a specialisation (Aged Care). Among the group of "Other" reported specialty areas (n=5 GPs) were: "anaesthetics" (n=1 GP, Rural Region), "mental health" (n=1 GP, Regional Urban), *"skin cancer"* (one GP each in the Regional Rural and Coastal Region), and "travel and diving diseases" (n=1 GP, Coastal Region).

Diagnostic services provided in general practice
In regard to the diagnostic and monitoring services provided by these GPs, the most commonly reported were: urine testing (e.g., screening tests, test strips), followed by respiratory tests (e.g., peak flow meters) and cardiovascular (e.g., ECG–electrocardiograms, halter monitors) tests. One GP offered "24-hour blood pressure monitoring" (Coastal Region). Approximately three-quarters of GPs provided on-site pathology collection services. Point-of-care testing (e.g., anticoagulation tests) was offered by most (76 per cent) GPs (Table 1). In terms of "other" diagnostic services offered by these GPs, one GP offered "laser" (Regional Urban), and one GP offered "dopplers" (Coastal Region).

Patient support services provided in general practice
In regard to patient support services, 90 per cent of GPs provided home visits as well as access to an on-site practice nurse. Most GPs (70 per cent) also provided access to medication management reviews. Other services reported by GPs included an *"off-site after-hours clinic"* (one GP) and "pharmacy next door" (one GP).

Overall, there were no major differences across the practice regions in terms of practice type, specialisation, diagnostic services, and patients support services ($p > 0.05$).

Management of patients with atrial fibrillation
Overall, most GPs estimated that one-quarter of their patient base (in their current practice setting) was elderly (i.e., ≥65 years of age); 32 per cent of GPs estimated the proportion to be 10–25 per cent, while 34 per cent estimated it as 25–50 per cent. A higher proportion of GPs practicing in the Coastal Region reported that 50–75 per cent of their patient base was elderly (Table 1). The GPs also estimated that, overall, one-quarter of their elderly patient

base (i.e., patients ≥65 years of age) had a diagnosis of AF (persistent, permanent, chronic AF); 42 per cent of GPs estimated the proportion to be 10–25 per cent, and 38 per cent estimated this proportion to be 25–50 per cent.

Responsibility for the management of AF
Most GPs (n=49, 98 per cent) reported that they maintained primary responsibility for the management of their patient's AF therapy; only one GP from the total sample reported that a cardiologist was primarily responsible for their patients' AF management, while one GP specifically stated that they maintained responsibility for the patients management in "liaison with the cardiologist" (Table 2).

Specialist management of AF
In relation to specialist management of AF, half of the GPs (n=27, 54 per cent) reported that they referred their patients to specialist management of antiarrhythmic therapy only "when needed", while 32 per cent referred to specialist management "for initial assessment only"; only one GP referred to specialist management "for initial and regular follow-up (complete management)" of their antiarrhythmic therapy (Table 2). For antithrombotic therapy, a higher proportion of GPs reported that they referred patients to specialist management only "when needed" (n=36, 68 per cent); 20 per cent of GPs indicated referring patients "for initial assessment only". Only one GP referred to specialist management "for initial and regular follow-up (complete management)" of their antithrombotic therapy.

On-site services for the management of AF
For more than half of the GPs (n=29 GPs, 59.2 per cent) the monitoring and management of their warfarinised patients comprised testing in a local pathology clinic combined with subsequent GP follow-up and review of results. More than 67.3 per cent of GPs (n=33) provided on-site monitoring and review services (at the general practice) for warfarinised patients. GPs also used on-site practice nurses (n=45 GPs, 90 per cent) and home visits (n=45 GPs, 90 per cent) as part of the support offered to anticoagulated patients.

Determinants of the use of antithrombotic therapy
The GPs were asked to nominate their key determinants (up to a maximum of five) in decision-making for the initiation of antithrombotic therapy in an individual patient, ranking the factors in order of importance (i.e., first, second, third, etc., determinants).

As a first determinant, most commonly stated were the "CHADS$_2$ score", specifically (n=15 GPs, 29.4 per cent),

followed by a generic statement about "stroke risk" (n= 9 GPs, 17.6 per cent), then a "confirmed diagnosis of AF" (n=7 GPs, 13.7 per cent) (Table 3).

As a second determinant, most commonly stated were "stroke risk" (n=7 GPs, 13 per cent), "cognitive status/mental status of patient" (n=6 GPs, 11.1 per cent), "patient's comorbidities" (n=5 GPs, 9.3 per cent), and "safety of therapy" (n=5 GPs, 9.3 per cent) (Table 3).

As a third determinant, most commonly stated were "cognitive status/mental status of patient" (n=11 GPs, 21.2 per cent), followed by "patient's adherence/compliance" (n=9 GPs, 17.3 per cent), and "confirmed diagnosis of AF" (n= 5 GPs, 9.6 per cent) (Table 3).

Overall, across all the factors stated by the GPs in any ranking, the most frequently stated determinants were "stroke risk" (n=19, 9.4 per cent) and "CHADS$_2$ score" (n=17, 8.4 per cent), followed by "patient's adherence/compliance" (n=17, 8.4 per cent), "confirmed AF diagnosis" (n=15, 7.4 per cent), and "patient age" (n=15, 7.4 per cent). "Stroke risk" and "CHADS$_2$ score" were cited as determinants by 38 per cent (19/50) and 34 per cent (17/50) of GPs, respectively. There were no significant differences in the citation and ranking of determinants across the four practice regions.

Qualitative analysis subsequently categorised the cited determinants into three main themes, aligning with the categorisation of decision-making factors, as reported in previous studies:[17]

- Perceived benefit of therapy
- Risks associated with therapy
- Medication safety considerations

The perceived benefit of therapy was ranked as a first priority in the decision to initiate antithrombotic therapy, with the patient's "stroke risk" (as assessed by the CHADS$_2$ score) cited as the main factor. Additionally, GPs cited the need to "confirm the diagnosis of AF" (potentially indicating consideration as to whether the AF is "permanent" or "chronic") and the overall "treatment" strategy (potentially referring to any advice received from specialists) prior to initiating therapy. Furthermore, GPs mentioned "other cardiovascular problems" and "comorbidities" as influences on decision-making, in recognition of the contribution of these to the overall stroke risk and/or additional indications for antithrombotic therapy. Interestingly, "life quality" was also mentioned here, reflecting consideration of any

benefits relative to the risks and management issues for the target elderly population.

Surprisingly, factors associated with the perceived risks of therapy did not rank very highly as key determinants of therapy; the risk of bleeding was not explicitly stated by any of the GPs, although "safety" was generically mentioned. In broad terms, GPs highlighted the need to consider "contraindications" to therapy and the patient's "suitability for anticoagulation", although no specific assessment of the risk of bleeding was mentioned.

Most of the determinants cited by GPs fell within the medication safety theme, describing patient and system factors affecting the day-to-day use and management of therapy. Patient-related factors commonly cited were "age", "adherence/compliance", "cognitive/mental state", "falls risk", and "medication/drug interactions". In regard to system-related factors, "monitoring and support" was the key issue cited. Overall, the GPs were more likely to focus on the medication safety issues that underpinned the success of therapy, than an explicit assessment of the risk of bleeding.

Discussion

Overall, the findings from this study are encouraging, and show an evolution in the approach to managing patients with AF, specifically in managing antithrombotic therapy, in the Australian general practice setting. This temporal improvement in the approach to the management of AF patients suggests that GPs are confident and well-resourced in assuming the primary responsibility for management of these patients, whereas historically GPs referred patients for specialist management usually by cardiologists or neurologists.[8,18] This may reflect their increased ability to apply treatment guidelines, following the implementation of key interventions over the past decade to address previously reported barriers to the prescription of anticoagulant therapy, i.e., the inability to apply evidence-based guidelines to practice, use of risk assessment tools to assist with decision-making (e.g., CHADS$_2$ criteria),[19] and concerns about the use of anticoagulants in "elderly" patients. [8,18]

Previous studies have reported an age bias in the prescribing of antithrombotic therapy, with anticoagulants (specifically warfarin) reportedly underused in older persons.[5,20–22] However, in the present study, GPs seldom cited "old age" *per se* as a specific determinant in decision-making. Instead, GPs focused on a diverse range of factors that impact on the routine day-to-day management of

therapy, the so-called medication safety considerations. Although many of these factors are age-related, e.g., cognitive impairment, functional impairment, and the risk of falls,[23] they can be present in all patients and can be independently assessed and potentially addressed through appropriate patient support services. The de-emphasis on "old age" highlights a more sensitive understanding by GPs of the factors that underpin safe and effective management of therapy. Surprisingly, "frailty" was not mentioned by the GPs as a consideration in decision-making, despite the increasing awareness of this geriatric syndrome;[24] previous studies have reported the impact of frailty on the use of antithrombotic therapy.[25,26]

Following from this it was surprising, however, to note the relative lack of specific consideration regarding the risk of bleeding associated with antithrombotic therapy. None of the GPs explicitly stated that the risk of bleeding was a key determinant in decision-making, and none mentioned bleeding risk assessment tools[27,28] that may assist with this (unlike the reference to the CHADS$_2$ criteria[19] when assessing the risk of stroke). This contrasts with previous studies, which have shown that GPs have historically focused on the perceived risks of therapy, over and above the benefits of therapy.[8] To an extent this demonstrates an evolution in the approach to decision-making in primary care, with more emphasis placed on identifying and addressing those factors that increase the risk of bleeding so that anticoagulation can be appropriately prescribed to prevent stroke.[29] Indeed, recent practice guidelines emphasise that bleeding risk assessment tools should be used to identify factors that may increase the risk of bleeding so that they can be appropriately managed or "modified".[30] In this regard, it may be argued that bleeding risk is less a determinant in decision-making *per se*, and more a consideration in the management of therapy. Another explanation may be that the advent of the NOACs has directed attention to the practical aspects of treatment use, rather than the relative risks of bleeding, which are associated with all anticoagulant therapy.[31]

In part, the transition of responsibility of care for AF patients to general practice is the result of increased access to services to support both GPs and patients in the management of therapy. In particular, the implementation of on-site services, such as practice nurses[32,33] and point-of-care testing (for monitoring coagulation parameters),[34] has allowed GPs to more closely monitor their patients and streamline care. The fact that GPs have access to relevant services is positive, but more importantly, this study has shown no apparent differences in access between practice

settings across a range of geographical areas ranging from metropolitan to regional and rural settings, in contrast to concerns raised in previous studies.[35,36]

Furthermore, there are other medication management services available now to support GPs and their patients. For example, medication management review services [such as Home Medicines Review (HMR) provided by accredited pharmacists],[37] provide a platform for the comprehensive review of an individual's pharmacotherapy and the generation of key recommendations to further optimise therapy.[13] The latter service is important, given that it provides an avenue to assess and monitor a patient's adherence to therapy,[38] which is an issue commonly cited by the GPs as determining the initiation of therapy.[39,40] The medication management review process also provides a framework for the follow-up and support of patients on anticoagulant therapy, particularly those transitioning from hospital back to primary care. An Australian study has previously demonstrated the benefits of a medication review service complemented by point-of-care testing (for coagulation parameters) in improving the quality of anticoagulation (i.e., time in therapeutic range), improving clinical outcomes, and improving patients' adherence (in terms of persistence) with anticoagulant therapy.[41]

In drawing conclusions from the findings of this study, it is important to acknowledge several limitations. First, the findings are based on self-report from a self-selected sample of GPs (who were willing to participate in the study) and it is possible that the responses received may not accurately reflect GPs' actual management of patients; however, the sample is broadly representative of Australian general practice, comparable to that reported in the BEACH program.[16] Second, the range of services accessible by GPs may not be actually used in practice for patient care. Third, the findings are based on the management of AF patients, where warfarin has been the mainstay of therapy; with the expanding access to the NOACs, the management approaches to AF patients may be further evolving. All in all, however, this study provides valuable insight into the contemporary management of AF in Australian general practice. In particular, it shows that it has moved away from emphasis on the "error of commission" to a focus on the "error of omission", such that the benefits of therapy are now considered ahead of the risks. More attention needs to be paid, however, to supporting patients' adherence to therapy.

Conclusion

Australian GPs are actively engaged in managing AF, and are well resourced in terms of services and resources. Importantly, there is a greater focus on the benefits of therapy during decision-making, rather than the risks. However, medication safety considerations affecting routine management of therapy remain key concerns, with patients' cognitive or functional impairments, as well as adherence to therapy, serving as major determinants in decision-making.

References

1. Australian Institute of Health and Welfare. Australia's Health 2010. Australia's Health Series; no. 12: Cat. no. AUS 122. Canberra: AIHW. 2010.

2. Gattellari M, Goumas C, Aitken R, et al. Outcomes for patients with ischaemic stroke and atrial fibrillation: the PRISM study (A Program of Research Informing Stroke Management). Cerebrovasc Dis. 2011;32(4):370-82. doi: 10.1159/000330637.

3. Dulli D, Stanko H, Levine R. Atrial fibrillation is associated with severe acute ischemic stroke. Neuroepidemiology. 2003;22(2):118–23. PMID: 12629277.

4. Bajorek BV, Ren S. Utilisation of antithrombotic therapy for stroke prevention in atrial fibrillation in a Sydney hospital: then and now. Int J Clin Pharm. 2012 Feb;34(1):88-97. doi: 10.1007/s11096-011-9594-y.

5. Bajorek BV, Krass I, Ogle SJ, et al. The impact of age on antithrombotic use in elderly patients with non-valvular atrial fibrillation. Australasian Journal on Ageing. 2002;21(1):36–41. DOI: 10.1111/j.1741-6612.2002.tb00413.x.

6. Bajorek BV, Ogle SJ, Krass I, et al. A survey of long-term antiarrhythmic therapy in elderly patients with atrial fibrillation. Australian Journal of Hospital Pharmacy. 2001;31(1):93–7. Available from: http://hdl.handle.net/10453/15512.

7. Gibbs H, Kakkar A. Australian treatment patterns in atrial fibrillation: results from the global anticoagulation in the field (GARFIELD) registry. Heart, Lung and Circulation. 2015;24, Supplement 3:S375. DOI: http://dx.doi.org/10.1016/j.hlc.2015.06.613.

8. Bajorek BV, Ogle SJ, Duguid MJ, et al. Management of warfarin in atrial fibrillation: views of health professionals, older patients and their carers. Med J Aust. 2007 Feb 19;186(4):175-80.

9. Gattellari M, Worthington J, Zwar N, et al. Barriers to the use of anticoagulation for nonvalvular atrial fibrillation: a representative survey of Australian family physicians. Stroke; a journal of cerebral circulation.

2008;39(1):227–30. DOI: 10.1161/strokeaha.107.495036.

10. National Health and Medical Research Council. Prevention of Stroke: the role of anticoagulants, antiplatelet agents and carotid endarterectomy. Canberra: NHMRC, 1997.

11. National Health and Medical Research Council. Prevention of stroke: a guide for general practitioners. Canberra: Australian Government Publishing Service; 1997.

12. National Stroke Foundation. National Stroke Foundation response to Review of Anticoagulation Therapies in Atrial Fibrillation. [accessed 2015 May 1]. Available from: http://www.pbs.gov.au/reviews/atrial-fibrillation-files/62-national-stroke-foundation.pdf;jsessionid=jsdcm8w02kwg69zg019sn9lq/.

13. Australian Government Department of Health and Ageing. Review of Anticoagulation Therapies in Atrial Fibrillation. 2012.

14. Primary Health Care Research and Information Service (PHCRIS). Divisions and SBO Profiles. [accessed 2015 May 1]. Available from: http://www.phcris.org.au/divisions/profiles/index.php.

15. Bajorek B, Magin P, Hilmer S, et al. A cluster-randomized controlled trial of a computerized antithrombotic risk assessment tool to optimize stroke prevention in general practice: a study protocol. BMC Health Serv Res. 2014 Feb 7;14:55. doi: 10.1186/1472-6963-14-55.

16. Britt H, Miller G, Henderson J, et al. General practice activity in Australia 2013-14. General Practice series no. 36. Sydney: Sydney University Press, 2014. [accessed 2015 Sept 14]. Available from: http://purl.library.usyd.edu.au/sup/9781743324219.

17. Bajorek BV, Krass I, Ogle SJ, et al. Optimizing the use of antithrombotic therapy for atrial fibrillation in older people: A pharmacist-led multidisciplinary intervention. J Am Geriatr Soc. 2005 Nov;53(11):1912-20.

18. Gattellari M, Worthington J, Zwar N, et al. The management of non-valvular atrial fibrillation (NVAF) in Australian general practice: bridging the evidence-practice gap. A national, representative postal survey. BMC Fam Pract. 2008;9:62. DOI: 10.1186/1471-2296-9-62.

19. Gage BF, Waterman AD, Shannon W, et al. Validation of clinical classification schemes for predicting stroke: results from the National Registry of Atrial Fibrillation. JAMA 2001;285(22):2864–70. doi:10.1001/jama.285.22.2864.

20. Bajorek BV, Ogle SJ, Duguid MJ, et al. Management of warfarin in atrial fibrillation: views of health professionals, older patients and their carers. Med J Aust. 2007 Feb 19;186(4):175-80.

21. Bungard T, Ghali W, Teo K, et al. Why do patients with atrial fibrillation not receive warfarin? Arch Intern Med. 2000;160(1):41–6. doi:10.1001/archinte.160.1.41.

22. Hylek E, D'Antonio J, Evans-Molina C, et al. Translating the results of randomized trials into clinical practice: the challenge of warfarin candidacy among hospitalized elderly patients with atrial fibrillation. Stroke. 2006 Apr;37(4):1075–80. DOI: 10.1161/01.STR.0000209239.71702.ce.

23. Sellers M, Newby L. Atrial fibrillation, anticoagulation, fall risk, and outcomes in elderly patients. Am Heart J. 2011;161(2):241–6. DOI: 10.1016/j.ahj.2010.11.002.

24. Sleeper R. Geriatric primer – common geriatric syndromes and special problems. Consult Pharm. 2009;24(6):447-62. doi.10.4140/TCP.n.2009.051.

25. De Lepeleire J, Iliffe S, Mann E, et al. Frailty: an emerging concept for general practice. Br J Gen Pract. 2009 May;59(562):e177-82. doi: 10.3399/bjgp09X420653.

26. Perera V, Bajorek BV, Matthews S, et al. The impact of frailty on the utilisation of antithrombotic therapy in older patients with atrial fibrillation. Age Ageing. 2009 Mar;38(2):156-62. doi: 10.1093/ageing/afn293. Epub 2009 Jan 16.

27. Lip GY, Frison L, Halperin JL, et al. Comparative validation of a novel risk score for predicting bleeding risk in anticoagulated patients with atrial fibrillation: the HAS-BLED (Hypertension, Abnormal Renal/Liver Function, Stroke, Bleeding History or Predisposition, Labile INR, Elderly, Drugs/Alcohol Concomitantly) score. J Am Coll Cardiol. 2011 Jan 11;57(2):173-80. doi: 10.1016/j.jacc.2010.09.024. Epub 2010 Nov 24.

28. Gage BF, Yan Y, Milligan PE, et al. Clinical classification schemes for predicting hemorrhage: results from the National Registry of Atrial Fibrillation (NRAF). Am Heart J. 2006;151(3):713–9. DOI: 10.1016/j.ahj.2005.04.017.

29. Peterson G, Boom K, Jackson S, et al. Doctors' beliefs on the use of antithrombotic therapy in atrial fibrillation: identifying barriers to stroke prevention. Intern Med J. 2002;32(1-2):15-23. DOI: 10.1046/j.1445-5994.2002.00156.x.

30. National Prescribing Service (NPS). MedicineWise News – Good anticoagulant practice. [2013 February 04]. [accessed 2015 November 11]. Available from: http://www.nps.org.au/publications/health-professional/medicinewise-news/2013/good-anticoagulant-practice.

31. Bajorek B. A review of the safety of anticoagulants in older people using the medicines management pathway: weighing the benefits against the risks. Ther Adv Drug Saf. 2011 Apr;2(2):45-58. doi: 10.1177/2042098611400495.

32. Fitzmaurice D, Hobbs F, Murray E. Primary care anticoagulant clinic management using computerized decision support and near patient International Normalized Ratio (INR) testing: routine data from a practice nurse-led clinic. Fam Pract. 1998;15(2):144–6. PMID:9613482.

33. Lowthian J, Joyce C, Diug B, et al. Patient safety in primary care: are general practice nurses the answer to improving warfarin safety? An Australian perspective. Worldviews Evid Based Nurs. 2011 Mar;8(1):25-9. doi: 10.1111/j.1741-6787.2010.00211.x. Epub 2010 Dec 23.

34. Wurster M, Doran T. Anticoagulation management: a new approach. Dis Manag. 2006 Aug;9(4):201-9.

35. Jackson S, Peterson G, Bereznicki L, et al. Improving the outcomes of anticoagulation in rural Australia: an evaluation of pharmacist-assisted monitoring of warfarin therapy. J Clin Pharm Ther. 2005;30(4):345–53. DOI: 10.1111/j.1365-2710.2005.00656.x.

36. Shephard M, Mazzachi B, Watkinson L, et al. Evaluation of a training program for device operators in the Australian Government's Point of Care Testing in General Practice Trial: issues and implications for rural and remote practices. Rural Remote Health. 2009 Jul-Sep;9(3):1189. Epub 2009 Aug 10.

37. Pharmacy Guild of Australia. Fifth Community Pharmacy Agreement (5CPA) – Medication Management Initiatives: Home Medicines Review. [accessed 2015 June 29]. http://www5cpacomau/programs/medication-management-initiatives/home-medicines-review.

38. Blenkinsopp A, Bond C, Raynor D. Medication reviews. Br J Clin Pharmacol. 2012;74(4):573–80. DOI: 10.1111/j.1365-2125.2012.04331.x.

39. Kneeland P, Fang M. Current issues in patient adherence and persistence: focus on anticoagulants for the treatment and prevention of thromboembolism. Patient Prefer Adherence. 2010;4:51–60. DOI: 10.2147/PPA.S6101.

40. Nicholls S, Brehaut J, Arim R, et al. Impact of stated barriers on proposed warfarin prescription for atrial fibrillation: a survey of Canadian physicians. Thromb J. 2014;12:13. DOI: 10.1186/1477-9560-12-13.

41. Stafford L, Peterson GM, Bereznicki LR, et al. Clinical outcomes of a collaborative, home-based post-discharge warfarin management service. Ann Pharmacother. 2011 Mar;45(3):325-34. doi: 10.1345/aph.1P617. Epub 2011 Mar 8.

PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

ETHICS COMMITTEE APPROVAL

This study was approved by the relevant Human Research Ethics Committees (University of Sydney, University of Newcastle, University of Technology Sydney), and the participating Divisions of General Practice.

Table 1: General characteristics of GPs and their practice sites

Characteristic [number of GPs (% in subgroup)]	Regional Urban n=12 (24.0%)	Regional Rural n=11 (22.0%)	Coastal Region n=18 (36.0%)	City Metropolitan n=9 (18.0%)	Total n=50 (100.0%)
GPs age (years), mean ± SD	51.00±8.53[a]	53.73±7.93	51.5±9.07	61.89±12.45	53.74±9.94
Years of experience in practice	20.00±9.46	23.73±10.63	21.33±9.90	28.78±9.94	22.88±10.14
Gender					
Male	10(83.3)	8(72.7)	11(61.1)	6(66.7)	35(70.0)
Female	2(16.7)	3(27.3)	7(38.9)	3(33.3)	15(30.0)
Type of practice					
Sole practice	2(16.7)	4(36.4)	2(11.1)	5(55.6)	13(26.0)
Partnership	1(8.3)	0(0.0)	0(0.0)	1(11.1)	2(4.0)
Small medical centre (≤3 GPs)	2(16.7)	2(18.2)	4(22.2)	0(0.0)	8(16.0)
Medium medical centre (4–5 GPs)	4(33.3)	4(36.4)	6(33.3)	1(11.1)	15(30.0)
Large medical centre (≥6 GPs)	3(25.0)	1(9.1)	6(33.3)	1(11.1)	11(22.0)
Other practice type	0(0.0)	0(0.0)	0(0.0)	1(11.1)	1(2.0)
Type of specialisation					
General/Family practice	12(100.0)	11(100.0)	18(100.0)	9(100.0)	50(100.0)
Aged care/Geriatric medicine	0(0.0)	3(27.3)	3(16.7)	1(11.1)	7(14.0)
Paediatric medicine	0(0.0)	4(36.4)	3(16.7)	0(0.0)	7(14.0)
Women's Health	2(4.0)	4(36.4)	5(27.8)	0(0.0)	11(22.0)
Heart/Vascular	0(0.0)	3(27.3)	2(11.1)	0(0.0)	5(10.0)
Respiratory/Asthma	0(0.0)	3(27.3)	3(16.7)	0(0.0)	6(12.0)
Diabetes/Endocrine	1(2.0)	2(18.2)	2(11.1)	0(0.0)	5(10.0)
Other	1(2.0)	2(18.2)	2(11.1)	0(0.0)	5(10.0)
Diagnostic and monitoring services*					
Pathology collection	9(75.0)	7(63.6)	13(72.2)	7(77.8)	36(72.0)
Scans and imaging	0(0.0)	1(9.1)	3(16.7)	0(0.0)	4(8.0)
Point-of-care testing	9(75.0)	9(81.8)	16(88.9)	4(44.4)	38(76.0)
Urine testing	11(91.7)	11(100.0)	18(100.0)	7(77.8)	47(94.0)
Respiratory tests	10(83.3)	10(90.9)	16(88.9)	4(44.4)	40(80.0)
Cardiovascular tests	10(83.3)	9(81.8)	17(94.4)	7(77.8)	43(86.0)
Other	1(8.3)	0(0.0)	2(11.1)	2(22.2)	5(10.0)
Patient support services					
Home visits	11(91.7)	11(100.0)	14(77.8)	9(100.0)	45(90.0)
After-hours visits	5(41.7)	10(90.9)	13(72.2)	6(66.7)	34(68.0)
Point-of-care testing	11(91.7)	9(81.8)	15(83.3)	4(44.4)	39(78.0)
On-site nurse	11(91.7)	10(90.9)	16(88.9)	8(88.9)	45(90.0)
On-site allied health services	6(50.0)	7(63.6)	9(50.0)	2(22.2)	24(48.0)
Medication management reviews	10(83.3)	9(81.8)	12(66.7)	4(44.4)	35(70.0)
Disease state management	5(41.7)	5(45.5)	12(66.7)	4(44.4)	26(52.0)
Other	0(0.0)	0(0.0)	2(11.1)	0(0.0)	2(4.0)
Estimated proportion of patient-base that is elderly (≥65years)					
5–10% of patient base	0(0.0)	0(0.0)	2(11.1)	0(0.0)	2(4.0)
10–25% of patient base	5(41.7)	5(45.5)	5(27.8)	1(11.1)	16(32.0)
25–50% of patient base	5(41.7)	2(18.2)	3(16.7)	7(77.8)	17(34.0)
50–75% of patient base	2(16.7)	4(36.4)	6(33.3)	1(11.1)	13(26.0)
>75% of patient base	0(0.0)	0(0.0)	2(11.1)	0(0.0)	2(4.0)
Estimated proportion of patient-base that has AF					
5–10% of patient base	0(0.0)	0(0.0)	1(5.6)	0(0.0)	1(2.0)
10–25% of patient base	4(33.3)	6(54.5)	6(33.3)	5(55.6)	21(42.0)
25–50% of patient base	6(50.0)	4(36.4)	7(38.9)	2(22.2)	19(38.0)
50–75% of patient base	2(16.7)	0(0.0)	4(22.2)	1(11.1)	7(14.0)
>75% of patient base	0(0.0)	1(9.1)	0(0.0)	1(11.1)	2(4.0)
SD = standard deviation					

Table 2: Management of patients with AF

Management approach [number of GPs (% within sub-group)]	Regional Urban n=12 (24.0%)	Regional Rural n=11 (22.0%)	Coastal Region n=18 (36.0%)	City Metropolitan n=9 (18.0%)	Total n=50 (100.0)
Individual assuming primary responsibility for management of patient with AF:					
Myself (as patient's GP)	11(91.7)	11(100.0)	18(100.0)	9(100.0)	49(98.0)
Cardiologist	1(8.3)	0(0.0)	1(5.6)	0(0.0)	2(4.0)
Other	0(0.0)	0(0.0)	1(5.6)	0(0.0)	1(2.0)
Context for referral to specialist management of <u>anti-arrhythmic therapy</u>:					
Only as needed	6(50.0)	8(72.7)	8(44.4)	5(55.6)	27(54.0)
For initial assessment only	5(41.7)	4(36.4)	7(38.9)	0(0.0)	16(32.0)
For initial + regular follow-up (complete)	0(0.0)	0(0.0)	0(0.0)	1(11.1)	1(2.0)
For initial + periodic follow-up only	1(8.3)	0(0.0)	3(16.7)	3(33.3)	7(14.0)
Context for referral to specialist management of <u>anti-thrombotic therapy</u>:					
Only as needed	7(58.3)	9(81.8)	14(77.8)	4(44.4)	34(68.0)
For initial assessment only	4(33.3)	2(18.2)	2(11.1)	2(22.2)	10(20.0)
For initial + regular follow-up (complete)	0(0.0)	0(0.0)	1(5.6)	1(11.1)	2(4.0)
For initial + periodic follow-up only	1(8.3)	0(0.0)	1(5.6)	2(22.2)	4(8.0)
Approach to monitoring & managing anticoagulant therapy:					
Local pathology clinic with GP follow-up	9(75.0)	7(63.6)	6(33.3)	7(87.5)	29(59.2)
GP-based on-site monitoring and review	8(66.7)	7(63.6)	15(83.3)	3(37.5)	33(67.3)

* Some GPs used both local pathology clinics and on-site monitoring.

Table 3: Determinants for decision making for the initiation of antithrombotic therapy by GPs

Determinants for decision-making [number of GPs (% within subgroup)]	FIRST determinant n=51 GPs (25.1%)	SECOND determinant n=55 GPs (27.1%)	THIRD determinant n=52 GPs (25.6%)	Fourth determinant n=30 GPs (14.8%)	FIFTH determinant n=15 GPs (7.4%)	Total determinant N=203 (100.0)
Theme: Perceived benefit of therapy						
CHADS$_2$ score	15(29.4)	-	1(1.9)	1(3.3)	-	17(8.4%)
Stroke risk	9(17.6)	7(12.7)	2(3.8)	1(3.3)	-	19(9.4)
Confirmed diagnosis of AF	7(13.7)	3(5.5)	5(9.6)		-	15(7.4)
Advice of specialist	-	-	1(1.9)	-	-	1(0.5)
Treatment strategy	5(9.8)	1(1.8)	-	-	-	6(3.0)
Diabetes mellitus	-	-	1(1.9)	1(3.3)	-	2(1.0)
Other cardiovascular issue	1(2.0)	2(3.6)	1(1.9)	4(13.3)	1(6.7)	9(4.4)
Theme: Perceived risks associated with therapy						
Contraindication	3(5.9)	2(3.6)	2(3.8)	-	-	7(3.4)
Suitability for therapy*	-	4(7.3)	-	-	1(6.7)	5(2.5)
Safety (adverse effects)	1(2.0)	6(10.9)	2(3.8)	2(6.7)	2(13.3)	13(6.4)
Theme: Medication safety considerations impacting on the day-to-day management of therapy						
Adherence/compliance	2(3.9)	5(9.1)	10(19.2)	-	-	17(8.4)
Comorbidities	1(2.0)	5(9.1)	3(5.8)	2(6.7)	1(6.7)	12(5.9)
Allergies	-	-	1(1.9)	-	3(20.0)	4(2.0)
Benefit of therapy	-	2(3.6)	-	-	1(6.7)	3(1.5)
Renal/liver/GI change	-	-	-	-	1(6.7)	1(0.5)
Cognitive/mental status	-	4(7.3)	10(19.2)	1(3.3)	-	15(7.4)
Fall risk/mobility	1(2.0)	4(7.3)	4(7.7)	2(6.7)	-	11(5.4)
Cost	-	-	-	2(6.7)	-	2(1.0)
History (medical)	-	3(5.5)	2(3.8)	4(13.3)	-	9(4.4)
Patient age	6(11.8)	2(3.6)	3(5.8)	2(6.7)	2(13.3)	15(7.4)
Life quality	-	1(1.8)	-	-	1(6.7)	2(1.0)
Drug interactions	-	1(1.8)	2(3.8)	3(10.0)	-	6(3.0)
Monitoring and support	-	-	1(1.9)	4(13.3)	2(13.3)	7(3.4)
Patient preference	-	3(5.5)	-	1(3.3)	-	4(2.0)
Social factors	-	-	1(1.9)	-	-	1(0.5)
≤5 GPs provided more than one entry to indicate more than one "equal" determinant.					
**Therapy refers to anticoagulation. GPs were able to cite up to a maximum of five determinants of therapy, ranking them in order of priority as considerations in decision-making.*					