Attitudes of physicians regarding anticoagulation for atrial fibrillation: a systematic review

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Abstract

Background: the efficacy of warfarin for prevention of stroke in patients with atrial fibrillation (AF) is well established, but many people with AF who would benefit from warfarin are not receiving it. This systematic review aims to determine physicians’ attitudes to the prescription of warfarin for AF, and identify reasons for its underuse.

Methods: an electronic search of MEDLINE (1950–present), EMBASE (1980–present), CINAHL (1994–present), PsycINFO (1987–present) and Web of Knowledge (1970–present) was performed in November 2010 to identify all studies which addressed, via survey, physicians’ attitudes regarding anticoagulation for patients with AF.

Results: a total of 1,375 citations were identified. Of these citations, 44 full text studies were obtained for scrutinisation; 14 of these studies were rejected leaving 30 studies which were included in the review. All included studies were cross-sectional surveys and addressed physicians’ opinions of anticoagulation in AF as a primary or secondary aim. Increasing age, increased bleeding risk, previous bleeds, falls risk, co-morbidities and ability to comply with treatment influenced whether physicians would prescribe anticoagulation for AF.

Conclusion: physicians are reticent to recommend warfarin for elderly patients in AF, despite evidence of increased benefit in these patients compared with younger patients. Risk of falls and previous bleeding were also shown to be disproportionate barriers to warfarin prescription. Further studies are required to determine how best to overcome these perceived barriers to appropriate anticoagulation.

Keywords: atrial fibrillation, anticoagulation, physician attitude, systematic review, ageing, elderly

Introduction

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia [1]. The prevalence of AF in those >65 years of age is 4.7%, rising to around 9% in those aged 80–89 years [2, 3]. Owing to the growing population of elderly individuals, the prevalence of AF is expected to increase 2.5-fold during the first half of this century [4].

A diagnosis of AF is associated with serious health implications, including a 5-fold increase in stroke risk [1]. When stroke occurs in association with AF, the outcome is less favourable, with longer hospital stays compared with stroke patients without AF [14].

Several randomised controlled trials show that warfarin reduces stroke risk significantly when compared with aspirin or placebo [7–11]. A recent systematic review of this evidence suggests that this amount to 25 ischaemic strokes saved yearly per 1,000 participants given warfarin [12].

However, anticoagulation is associated with a small but significant increase in the risk of major bleeding [12]. Thus, when prescribing warfarin for AF, physicians must weigh up the potential benefits (stroke prevention) against potential risks (increased risk of bleeding) in consultation with the patient. To aid clinical decision-making, several tools have been developed including the CHADS2 (Congestive heart failure, history of Hypertension, Age...
Methods

Search strategy
Our search strategies are available as supplementary data in Age and Ageing online (Appendix 1). The aim of these searches was to identify and collate all studies where clinicians’ views about anticoagulation have been sought, and their practice assessed via hypothetical case scenarios. In doing so, we wished to identify the factors which physicians have reported as important when making decisions about anticoagulation for AF.

Study selection
One author (D.P.) assessed all titles and abstracts and obtained full text articles of potentially relevant studies. One author (D.P.) applied the following inclusion criteria to retrieved full texts; any uncertainties about fulfilment of inclusion criteria were discussed with a second reviewer (G. M.) and a consensus reached:

- Study type: observational studies using surveys to examine physicians’ attitudes and hypothetical practice regarding anticoagulation for patients in AF.
- Study group: practicing physicians of any medical specialty or grade.
- Date of publication: Only studies published after 1989 were included as this was the year of publication of the first large randomised controlled trial of anticoagulation for stroke prevention in people with chronic AF [7].
- Sampling method: no restrictions based on sampling method.
- Sample size: no restrictions based on sample size.
- Method of data collection: any form of physician survey, including (but not restricted to) questionnaire, clinical vignette and interview, which explores physicians’ attitudes regarding anticoagulation therapy for patients in AF.

The following types of study were excluded:
- Qualitative studies
- Unpublished studies
- Studies not available in the English language

Data extraction and analysis
Data from eligible studies were independently extracted by two reviewers (D.P. and J.P.) into a paper data extraction form. Methodological quality of included studies was assessed based on criteria listed in the ‘Strengthening the Reporting of Observational Studies (STROBE)’ statement and the Cochrane Reviewer’s Handbook [48, 49]. All extracted data were tabulated, and a narrative synthesis was performed. The data were not suitable for meta-analysis, as different clinical scenarios had been provided in different papers.

Results

Study characteristics
The authors identified 30 studies [18–47] which fulfilled the inclusion criteria (Figure 1).

Fourteen studies [50–63] were excluded after assessment of the full text versions for the reasons shown in Figure 1. The included studies comprised 8,768 responding physicians in total (Table 1). The number of physicians included in each study ranged from 14 [41] to 711 [32], with a mean number of 292 physicians. Response rate (number of physicians included/number of physicians approached) ranged from 18 [45] to 90% [36].

The primary aim of 25 studies [18–23, 25–30, 32–38, 40–45] was to assess attitudes, practice and/or knowledge regarding anticoagulation therapy for patients in AF among different physician groups. The five other studies did include this aim; however, it was not the primary aim.

In 19 of the studies, physicians were given a range of clinical vignettes and asked what their course of action would be in the care of each hypothetical patient [18–23, 25, 27, 31–33, 35, 37–38, 40–42, 44–45]. In the remaining 11 studies, and as additional information in some of the aforementioned 19 studies, attitudes were assessed via different methods.

The results from all 30 studies are presented in Table S1 (see Supplementary data available in Age and Ageing online).

Patient age
Twenty-two studies discussed the importance of patient age [18–26, 28–29, 32, 34–38, 42–45, 47]. Several studies used a matched pair of clinical vignettes in which the only
The difference between vignettes was the age of the patient (Table 2) [18, 20–23, 32, 35, 47]. The results of these comparisons show that physicians were less likely to anticoagulate patients over 70 compared with patients under 70 in all but one of the matched pairs, when both groups are asymptomatic and have no contraindications to warfarin therapy [18, 20–22, 35]. When patients in both age groups have an additional risk factors for stroke, the results are similar [23, 32, 47].

In some studies, physicians were asked direct questions regarding their opinion of anticoagulating elderly patients, rather than linking this to a hypothetical situation. When this was the case, advanced age was still considered an important barrier in relation to prescribing warfarin therapy [18, 20–23, 35]. When patients in both age groups have an additional risk factors for stroke, the results are similar [23, 32, 47].

In some studies, physicians were asked direct questions regarding their opinion of anticoagulating elderly patients, rather than linking this to a hypothetical situation. When this was the case, advanced age was still considered an important barrier in relation to prescribing warfarin therapy, and was consistently associated with lower rates of anticoagulation (see Table S1, Supplementary data available in Age and Ageing online) [19, 20, 24–26, 28, 29, 34, 36, 37].

In two studies [29, 43] physicians were asked if they thought that the benefits of anticoagulation therapy outweighed the risks in elderly patients. One study [29] found that only 56% of physicians agreed with this statement (when elderly considered >75 years). The second study [43] reported agreement from 63% of physicians (when elderly considered >65 years).

**Bleeding risk**

Thirteen studies discussed the importance of bleeding risk as a factor in the prescription of anticoagulation for AF [20, 23–25, 32–37, 39, 41, 42]. Having a history of bleeding or significant risk of bleeding was seen as an important barrier to anticoagulation by 12 of these 13 studies [20, 23, 25, 32–37, 39, 41, 42]. In the remaining study, bleeding risk was considered important in determining whether to start warfarin by only 8% of physicians [24].

Three studies [23, 35, 42] sent out a matched pair of clinical vignettes between which the only variable was the bleeding risk, or the bleeding history, of the patient involved. Direct comparison of these vignettes showed rates of warfarin use of 41% [26], 58% [35] and 31% [42] when the patient had a history of bleeding, compared with rates of warfarin use of 81% [26], 91% [35] and 63% [42], respectively, when the same patient had no history of bleeding.
<table>
<thead>
<tr>
<th>First author and date</th>
<th>Country where based</th>
<th>Study design</th>
<th>No. of physicians sent questionnaire</th>
<th>Response rate, n (%)</th>
<th>Specialty of responding physicians</th>
<th>Grade of responding physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chang et al. (1990)</td>
<td>USA</td>
<td>Cross-sectional survey: mailed questionnaire based on five clinical vignettes</td>
<td>274</td>
<td>134 (49)</td>
<td>40% GPs, 40% internists, 20% cardiologists</td>
<td>No data</td>
</tr>
<tr>
<td>Kutner et al. (1991)</td>
<td>USA</td>
<td>Cross-sectional survey: mailed questionnaire based on four clinical vignettes</td>
<td>480</td>
<td>251 (52)</td>
<td>43% internists, 2% cardiologists, 8% neurologists, 1% other specialists</td>
<td>100% attending physicians</td>
</tr>
<tr>
<td>McCrory et al. (1995)</td>
<td>USA</td>
<td>Cross-sectional survey: mailed questionnaire based on four clinical vignettes</td>
<td>1,189</td>
<td>450 (38)</td>
<td>42% primary care physicians, 31% neurologists, 27% cardiologists</td>
<td>No data</td>
</tr>
<tr>
<td>King et al. (1995)</td>
<td>UK</td>
<td>Cross-sectional survey: mailed questionnaire based on four clinical vignettes</td>
<td>600</td>
<td>294 (49)</td>
<td>48% cardiologists, 8% geriatricians</td>
<td>100% consultants</td>
</tr>
<tr>
<td>Lip et al. (1996)</td>
<td>UK</td>
<td>Cross-sectional survey: mailed questionnaire based on six clinical cases</td>
<td>500</td>
<td>214 (44)</td>
<td>41% cardiologists, 5% other specialists</td>
<td>100% consultants</td>
</tr>
<tr>
<td>Beyth et al. 1996</td>
<td>USA</td>
<td>Cross-sectional survey: mailed questionnaire based on eight clinical vignettes</td>
<td>80</td>
<td>58 (73)</td>
<td>52% internists, 21% cardiologists, 19% other specialists, 9% family physicians</td>
<td>72% ≥ 10 years in practice</td>
</tr>
<tr>
<td>Mead et al. (1996)</td>
<td>UK</td>
<td>Cross-sectional survey: mailed questionnaire assessing practice regarding patients with minor strokes, AF and hypertension</td>
<td>640</td>
<td>294 (46)</td>
<td>100% GPs</td>
<td>No data</td>
</tr>
<tr>
<td>Monette et al. (1997)</td>
<td>Canada + USA</td>
<td>Cross-sectional survey: mailed questionnaire based on two clinical vignettes</td>
<td>269</td>
<td>182 (68)</td>
<td>36% family physicians, 32% internists, 31% geriatricians, 1% other specialists</td>
<td>42% graduated after 1980</td>
</tr>
<tr>
<td>Bush et al. (1998)</td>
<td>USA</td>
<td>Cross-sectional survey: mailed questionnaire (no further data)</td>
<td>358</td>
<td>150 (42)</td>
<td>Family physicians, GPs, Internists, Cardiologists (no figures given)</td>
<td>No data</td>
</tr>
<tr>
<td>Kellen et al. (1998)</td>
<td>Canada</td>
<td>Cross-sectional survey: mailed questionnaire based on two clinical vignettes</td>
<td>223</td>
<td>159 (71)</td>
<td>62% GPs, 20% internists, 11% cardiologists, 7% other specialists</td>
<td>Mean years in practice = 19</td>
</tr>
<tr>
<td>Suillow et al. (1998)</td>
<td>UK</td>
<td>Cross-sectional survey: mailed questionnaire based on a list of patient</td>
<td>1,031</td>
<td>622 (60)</td>
<td>74% GPs, 26% other specialists</td>
<td>Specialists: 100% consultants GPs: no data</td>
</tr>
<tr>
<td>Vasishta et al. (2001)</td>
<td>UK</td>
<td>Cross-sectional study: mailed questionnaire exploring physicians’ attitudes to patient age and co-morbidity when considering anticoagulation</td>
<td>108</td>
<td>68 (63)</td>
<td>37% geriatricians, 63% other specialists</td>
<td>100% consultants</td>
</tr>
<tr>
<td>Frykman et al. (2001)</td>
<td>Sweden</td>
<td>Cross-sectional survey: mailed questionnaire which assessed theoretical compliance with AF guidelines</td>
<td>728</td>
<td>493 (68)</td>
<td>52% cardiologists, 37% internists, 12% other specialists</td>
<td>No data</td>
</tr>
<tr>
<td>Williams et al. (2001)</td>
<td>UK</td>
<td>Cross-sectional survey: questionnaire based on five case scenarios to assess A&amp;E physicians’ treatment of AF Distribution method not stated</td>
<td>287</td>
<td>124 (45)</td>
<td>100% A&amp;E physicians</td>
<td>100% consultants</td>
</tr>
<tr>
<td>Peterson et al. (2002)</td>
<td>Australia</td>
<td>Cross-sectional survey: mailed questionnaire based on six clinical cases</td>
<td>2,500</td>
<td>711 (33)</td>
<td>74% GPs, 7% cardiologists, 19% other specialists</td>
<td>Median years in practice = 21</td>
</tr>
<tr>
<td>Pradhan et al. (2002)</td>
<td>Canada</td>
<td>Cross-sectional survey: mailed questionnaire based on four clinical scenarios</td>
<td>1,000</td>
<td>324 (32)</td>
<td>100% primary care physicians</td>
<td>Mean years in practice = 19 (SD ± 11)</td>
</tr>
<tr>
<td>Study Authors</td>
<td>Country</td>
<td>Survey Type and Details</td>
<td>Respondents</td>
<td>GPs (%)</td>
<td>General Practitioners (%)</td>
<td>Cardiologists (%)</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>------------------</td>
</tr>
<tr>
<td>Bungard et al. (2003)</td>
<td>Canada</td>
<td>Cross-sectional survey: mailed questionnaire based on rating the relative importance of potential barriers to anticoagulation</td>
<td>520</td>
<td>349 (67)</td>
<td>42% family physicians, 31% internists, 16% cardiologists, 11% neurologists</td>
<td>No data</td>
</tr>
<tr>
<td>Gross et al. (2003)</td>
<td>USA</td>
<td>Cross-sectional survey: mailed questionnaire based on 14 clinical vignettes</td>
<td>426</td>
<td>142 (33)</td>
<td>100% internists</td>
<td>No data</td>
</tr>
<tr>
<td>Deplanque et al. (2004)</td>
<td>Austria, France, Belgium, Italy, Portugal</td>
<td>Prospective observational study including a cross-sectional survey: telephone questionnaire</td>
<td>478</td>
<td>432 (90)</td>
<td>61% GPs, 39% cardiologists</td>
<td>No data</td>
</tr>
<tr>
<td>Maeda et al. (2004)</td>
<td>Japan</td>
<td>Cross-sectional survey: hand-delivered questionnaire based on eight clinical vignettes</td>
<td>209</td>
<td>126 (67)</td>
<td>58% internists, 12% cardiologists, 30% other specialists</td>
<td>No data</td>
</tr>
<tr>
<td>Anderson DR et al. (2005)</td>
<td>Canada</td>
<td>Cross-sectional survey: mailed questionnaire based on one case scenario</td>
<td>986</td>
<td>391 (57)</td>
<td>83% primary care, 18% specialists (cardiologists and internists)</td>
<td>Mean years in practice = 15.3</td>
</tr>
<tr>
<td>Ingelgård et al. (2006)</td>
<td>USA</td>
<td>Literature review and cross-sectional survey: literature review designed to identify potential barriers to anticoagulation, which were then assessed via questionnaire. Distribution method not stated</td>
<td>35</td>
<td>30 (86)</td>
<td>50% family physicians, 33% cardiologists, 13% internists, 3% other specialist</td>
<td>No data</td>
</tr>
<tr>
<td>Dharmarajan et al. (2006)</td>
<td>USA</td>
<td>Cross-sectional survey: questionnaire based on one clinical vignette. Distribution method not stated</td>
<td>No data</td>
<td>107 (no data)</td>
<td>81% internists, 19% other specialists</td>
<td>46% residents, 19% fellows, 35% attending physicians</td>
</tr>
<tr>
<td>Anderson et al. (2007)</td>
<td>UK</td>
<td>Cross-sectional survey: hand-delivered questionnaire based on five clinical vignettes</td>
<td>20</td>
<td>14 (70)</td>
<td>36% cardiology, 6% specialists (geriatrics and general medicine)</td>
<td>43% consultants, 57% specialist registrars</td>
</tr>
<tr>
<td>Gattellari et al. (2008)</td>
<td>Australia</td>
<td>Representative, national survey: questionnaire based on eight clinical vignettes. Distribution method not stated</td>
<td>926</td>
<td>596 (64)</td>
<td>100% family physicians</td>
<td>49% ≥ 20 years in practice</td>
</tr>
<tr>
<td>Gattellari et al. (2008)</td>
<td>Australia</td>
<td>Representative, national survey: mailed questionnaire which explored issues relevant to the diagnosis and management of AF</td>
<td>926</td>
<td>596 (64)</td>
<td>100% GPs</td>
<td>76% emergency physicians, 24% cardiologists</td>
</tr>
<tr>
<td>Shen et al. (2008)</td>
<td>Australia</td>
<td>Cross-sectional survey: mailed questionnaire based on five case scenarios</td>
<td>532</td>
<td>182 (34)</td>
<td>100% GPs</td>
<td>'specialists'</td>
</tr>
<tr>
<td>Arends et al. (2010)</td>
<td>Australia and New Zealand</td>
<td>Cross-sectional survey: mailed questionnaire based on seven clinical vignettes</td>
<td>1,800</td>
<td>319 (18)</td>
<td>76% emergency physicians, 24% cardiologists</td>
<td>No data</td>
</tr>
<tr>
<td>Arepally et al. (2010)</td>
<td>USA</td>
<td>Cross-sectional survey: mailed individual surveys depending on specialty</td>
<td>959</td>
<td>647 (67)</td>
<td>41% cardiologists, 59% other specialists</td>
<td>No data</td>
</tr>
<tr>
<td>Vassilikos et al. (2010)</td>
<td>Greece</td>
<td>Cross-sectional survey: mailed/hand-delivered questionnaire concerning practice patterns regarding the management of AF</td>
<td>500</td>
<td>309 (62)</td>
<td>63% cardiologists, 37% internists or GPs</td>
<td>No data</td>
</tr>
</tbody>
</table>

GP, general practitioner; AF, atrial fibrillation; A&E, accident and emergency.
Table 2. Comparison of matched pair vignettes in which patient age was the only variable

<table>
<thead>
<tr>
<th>Study author and date</th>
<th>Percentage of physicians recommending warfarin for patient in AF with no contraindications to warfarin (age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patient &lt;70 years</td>
</tr>
<tr>
<td>Chang et al. (1990)</td>
<td>47% (59)</td>
</tr>
<tr>
<td>McCrory et al. (1995)</td>
<td>90% (65)</td>
</tr>
<tr>
<td>King et al. (1995)</td>
<td>45% (&lt;40)</td>
</tr>
<tr>
<td>Lip et al. (1996)</td>
<td>86% (40)</td>
</tr>
<tr>
<td>Beyth et al. (1996)</td>
<td>81% (65)</td>
</tr>
<tr>
<td>Peterson et al. (2002)</td>
<td>98% (65)</td>
</tr>
<tr>
<td>Gross et al. (2003)</td>
<td>78% (62)</td>
</tr>
<tr>
<td>Vassilikos et al. (2010)</td>
<td>64% (25–50)</td>
</tr>
</tbody>
</table>

Risk of falls

Ten studies reported physicians’ views in relation to the risk of falls [25, 29, 34–36, 39–42, 44]. Falls risk was perceived to be an important barrier in nine of these studies [25, 29, 34, 35, 39–42, 44]. In the remaining study [36], falls risk was considered a significant barrier to warfarin prescription by only 10% of general practitioners and 8% of cardiologists. The meaning of ‘risk of falls’ was variable between papers, with the majority not providing a specific definition.

Co-morbidities

Seventeen studies [18, 19, 21, 22, 25, 29, 32, 35, 36, 39–46] reported physicians’ views in relation to co-morbidities. Chronic alcoholism was included in the scenarios in two studies [18, 39] and was an important barrier in both studies. Data regarding cognitive impairment were provided by six studies [25, 29, 35, 36, 40, 44]. Five studies asked physicians if cognitive impairment was an important barrier to anticoagulation. The results of this, in terms of percentage of physicians who agreed, ranged from 3% [36] to 98% [29], showing wide variation in opinion between physicians.

Patient’s ability to comply with treatment

Seven studies [20, 26, 34–36, 44, 47] reported physicians’ views relating to patients’ ability to comply with treatment, and this was considered an important barrier by all seven of these studies.

Most cited reasons not to anticoagulate

In addition to providing the outcomes discussed above, 19 studies [18–20, 25, 26, 28, 29, 32–37, 39–42, 44, 46] also produced a ranking order of outcomes most commonly cited by physicians as barriers to the administration of anticoagulation. Bleeding risk was the most cited reason not to anticoagulate in 11 studies, falls risk in 4 studies, age of patient in 2 studies and patient compliance in 2 studies (a table of this information is available as supplementary data in Age and Ageing online).

Methodological quality

The use of the methodological quality checklist showed that the quality of reporting was generally good. Ten studies [23, 25, 27, 30, 34, 36, 37, 39, 41, 46] had a response rate over 65%. Eight studies [36, 37, 39, 42–45, 47] actively described efforts to reduce potential sources of bias. However, six studies [19, 21, 25, 28, 29, 32] did not discuss limitations of the studies and eleven authors [18, 20, 21, 24, 25, 28, 32, 38, 39, 45, 47] did not adequately discuss the possibility that the physicians who participated in the study were not representative of the population. This information is presented in tabular format as Supplementary data in Age and Ageing online.

Discussion

Key findings

Age, risk of bleeding, risk of falls, co-morbidities (cognitive impairment and alcoholism) and patients’ ability to comply with treatment were all important barriers to effective anticoagulation.

The most striking result of the review is the extent to which physicians are reticent to administer warfarin to elderly patients, even if these patients are otherwise healthy. Physicians become even more reluctant when a patient is aged greater than 80 years. This pattern is observed throughout all specialties and grades of medical practice included in the review (Table 1 and see Table S1, Supplementary data available in Age and Ageing online).

How does reported practice relate to evidence?

NICE guidelines suggest that warfarin therapy has a greater benefit in patients over 75 as they are at a higher risk of stroke than those under 75 [6]. They also suggest that patients aged 65–75 may benefit from warfarin, especially if there are co-existing risk factors for stroke. Finally, patients under 65 are at a relatively low risk of stroke, even in the presence of additional risk factors and thus are better treated with an anti-platelet agent [6].

A recent analysis by van Walraven et al. suggests that the absolute therapeutic benefit of anticoagulation for patients at risk of stroke rises significantly with age. In accordance with this, they strongly recommend that advanced age should not be considered a contraindication to anticoagulation [74].

Recent guidelines issued by the European Society of Cardiology (ESC) have echoed this, giving even more weight to advanced age as a risk factor for stroke, and thus as an incentive for prescription of anticoagulation [73].

This review suggests that these guidelines are not being adhered to in clinical practice. Of the eight studies [18, 20–
which directly compared matched pairs of patients with age as the only variable, six studies [18, 20–23, 32] showed that physicians were less inclined to administer warfarin therapy in a patient over 70 years of age, when compared with a matched patient under 70 years of age.

Why does this discrepancy between evidence and reported practice exist?

Physicians may argue that it is unusual to see a patient over 70 years old with no health problems other than AF, and who is directly comparable with a younger patient with AF. Advanced age often goes hand-in-hand with other risk factors for bleeding such as polypharmacy, cognitive impairment and risk of falls.

However, this review highlights that even when an elderly patient is in good health, and when that patient does qualify for anticoagulation, it is often still assumed by physicians that contraindications to warfarin therapy are present. These assumption may be a crucial reason as to why 40% of patients with AF who are eligible for anticoagulation therapy are not receiving this potentially lifesaving treatment [6].

Additional findings

Bleeding risk was also considered an important barrier to anticoagulation and was the most commonly cited reason not to anticoagulate. Several of the included studies reported that a history of gastrointestinal (GI) bleeding would significantly deter physicians from anticoagulating a patient [25, 32, 35]. Recent evidence suggests, however, that due to advances in detection and eradication of Helicobacter pylori, patients who have had an ulcer-related GI bleed in the past and have subsequently received treatment for this are at no greater risk of a re-bleed than a person without this history [64]. Care must be taken however in patients taking non-steroidal anti-inflammatory drugs as these medications confer an ongoing GI bleeding risk [65].

With regards to intracranial bleeding risk, physicians often consider a patient’s risk of falling before anticoagulating. Falls risk was an important barrier to anticoagulation in the studies we included, with one study reporting that 98% of physicians would not consider warfarin if a patient had a high risk of falling [40]. Despite this, evidence suggests that a predisposition to falls should not be considered an automatic contraindication to anticoagulation therapy [66, 67]. In a recent study, ManSonHing et al. used a Markov decision analytic model to ascertain the ideal therapy for elderly patients with AF who are at risk of falling. They found that, for a patient with an average risk of stroke from AF (5% per year), it would require the patient to fall roughly 300 times per year for the risks of anticoagulant therapy to outweigh its benefits, in terms of intracranial bleeding [66]. The mean number of falls sustained annually by elderly individuals who fall is, however, only 1.81 [72].

The same study also highlights that the risk of incurring other significant injuries from falls, such as fractures, is far higher than the risk of intracranial bleeding [66].

Our review suggests therefore, that both a risk of falls and a risk of bleeding are disproportionate barriers to anticoagulation.

The meaning of the term ‘risk of falls’ was not congruent between all studies. Some gave little detail as to the level of risk, or whether the hypothetical patient in question had fallen in the past and how often. In practice this difference would be considered extremely important when assessing a patient’s suitability for anticoagulation, and should be taken into account. Similarly, the exact meaning of the term ‘bleeding risk’ was not provided by all studies. Indeed, many methods of calculating bleeding risk, such as the HAS-BLED (Hypertension, Abnormal renal/liver function, Stroke, Bleeding history or predisposition, Labile international normalised ratio, Elderly (>65 years), Drugs/alcohol concomitantly) score, include elderly age as a factor [75].

Evidence is less clear about the risk and benefits of anticoagulation in patients with cognitive impairment, alcoholism and a patient’s ability to comply with treatment. These patients are usually excluded from clinical trials assessing the risks and benefits of anticoagulation in AF and, consequently, sound clinical judgement is required in these cases [68]. In addition to this, the exact meaning of ‘cognitive impairment’ was not stated by some studies, making it difficult to draw firm conclusions.

Other research in the field

To the best of our knowledge, this is the only systematic review of perceived barriers to anticoagulation which aims to identify the importance of the particular barriers to its prescription, rather than quantify the extent of its under-utilisation. As mentioned in the introduction, some work has been done in an attempt to identify to what extent warfarin is under-utilised, and a systematic review of this evidence has been carried out [69].

Relevance of the review

In 2009 the NHS published a document named Guidance on Risk Assessment and Stroke Prevention in Atrial Fibrillation (GRASP-AF) [17]. This risk stratification tool aids GPs with clinical decision-making regarding anticoagulant therapy for AF. The tool aims to identify those patients with AF who, according to their calculated CHADS2 score, qualify for warfarin therapy and yet are not receiving it. However, the tool does not assess these patients’ contraindications to warfarin.

Strengths of the review

The search strategy was extensive and the authors believe it to be very unlikely that any relevant published studies were
missed. In addition to this, the inclusion criteria were deliberately broad in order to include all relevant publications from a wide variety of medical specialties and levels of training. The studies in the review also span the entirety of the two decades from when warfarin as stroke prevention was introduced until the present day.

Limitations of the review
Only studies that were available in the English language were selected. All unpublished data were excluded from the review, leading to the possibility of publication bias. It is hoped that this bias will be minimal however, as the studies under review focus on opinions rather than positive or negative results, which should mean that publication bias is unlikely.

Only studies published after 1989 were included in the review as this was the year of publication of the first large randomised controlled trial comparing oral anticoagulation with placebo in the prevention of stroke in patients with chronic AF [7]. Despite this, some of the earliest studies included in the review may still have been conducted at a time when anticoagulation was not as extensively understood as it is now, which means that attitudes expressed in these studies may not reflect our current understanding.

Limitations of included studies
The results of this review are based upon physicians’ self-reported practice and thus may not reflect actual practice with regard to warfarin therapy. Furthermore, the low response rate in some of the studies limits generalisability.

Methodological quality
The quality assessment included in the review suggests that, in general, the studies were carried out well. Therefore, we do not feel that variations in the quality of the evidence influence the results of this review.

Implications for future research
Further work needs to be done to increase rates of anticoagulation, and future guidelines should specifically address the barriers described in this review. The need for more clearly defined guidelines is a view that is shared by the latest Cochrane review of oral anticoagulation for stroke prevention [70].

The GRASP-AF initiative, is undoubtedly a step in the right direction, however its use should be extended for use in all specialties in which patients with AF are cared for. The efficacy of the GRASP-AF tool is, as yet, unknown, as it has been a relatively recent introduction, and audit will be important to assess this.

Conclusion
Physicians report that age is a significant barrier to anticoagulation, despite good evidence of its effectiveness in older people. The risk of falls and bleeding risk were also found to be disproportionate barriers to anticoagulation when compared with guidelines [6, 64, 66, 67].

The discrepancies highlighted in this systematic review are likely to be a significant part of why up to 40% of patients in the UK who would benefit from anticoagulation therapy are not receiving it [17].

Key points
- This review has found that advanced age is an important barrier to the prescription of warfarin, despite guidelines attempting to promote the opposite.
- A patient’s bleeding risk and falls risk are also disproportionate barriers to warfarin therapy.
- Further studies are required to determine how best to overcome the barriers highlighted here.

Conflicts of interest
None declared.

Supplementary data
Supplementary data mentioned in the text is available to subscribers in Age and Ageing online.

References
Owing to the large number of references, only 30 are listed below and are represented by bold type throughout the text. The full list can be found as Age and Ageing online.


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