**Supplementary Material**

**S1 Table: Reasons for exclusion of full text records**

|  |  |  |
| --- | --- | --- |
| **Record** | **Year** | **Reason for exclusion** |
| Aliot et al [1] | 2010 | Not qualitative methods |
| Alkhalil et al [2] | 2011 | Not qualitative methods |
| Alkhalil et al [3] | 2014 | Conference abstract; no full paper available |
| Alonso-Coello et al [4] | 2015 | Not qualitative methods |
| Alonso-Coello et al [5] | 2008 | Not qualitative methods |
| Anderson et al [6] | 2005 | Not qualitative methods |
| Andrade et al [7] | 2016 | Not qualitative methods |
| Andrade et al [8] | 2015 | Not qualitative methods |
| Anguita-Sanchez et al [9] | 2016 | Not qualitative methods |
| Arepally et al [10] | 2010 | Conference abstract; no full paper available |
| Asteggiano [11] | 2015 | Conference abstract; no full paper available |
| Bajorek et al [12] | 2006 | Not about prescription |
| Bajorek et al [13] | 2007 | Not about prescription |
| Banner et al [14] | 2014 | Conference abstract; no full paper available |
| Bell et al [15] | 2015 | Not qualitative methods |
| Borgundvaag and Ovens [16] | 2004 | Not qualitative methods |
| Brehaut et al [17] | 2007 | Not qualitative methods |
| Bungard et al [18] | 2003 | Not qualitative methods |
| Bush and Tayback [19] | 1998 | Not qualitative methods |
| Changying and Yihong [20] | 2014 | Conference abstract; no full paper available |
| Chataway et al [21] | 2016 | Not qualitative methods |
| Christian et al [22] | 2011 | Conference abstract; full paper included in review |
| Cimminiello et al [23] | 2018 | Not qualitative methods |
| Cloutier et al [24] | 2016 | Not qualitative methods |
| Crawford et al [25] | 1997 | Not qualitative methods |
| David et al [26] | 2013 | Not qualitative methods |
| Deplanque et al [27] | 2004 | Not qualitative methods |
| Devereaux et al [28] | 2001 | Not qualitative methods |
| Dharmarajan et al [29] | 2006 | Not qualitative methods |
| Dinh et al [30] | 2007 | Not qualitative methods |
| Douketis et al [31] | 2000 | Not qualitative methods |
| Eikelboom and Merli [32] | 2016 | Not qualitative methods |
| El Wakeel et al [33] | 2016 | Conference abstract; no full paper available |
| Farzin [34] | 2012 | Not qualitative methods |
| Ferguson et al [35] | 2016 | Not qualitative methods |
| Ferguson et al [36] | 2017 | Conference abstract; no full paper available |
| Flaker et al [37] | 2016 | Not qualitative methods |
| Frankel et al [38] | 2015 | Not qualitative methods |
| Fuchs et al [39] | 2015 | Not qualitative methods |
| Fujino et al [40] | 2014 | Conference abstract; no full paper available |
| Garavalia et al [41] | 2011 | Conference abstract; no full paper available |
| Gattellari et al [42] | 2008 | Not qualitative methods |
| Gattellari et al [43] | 2008 | Not qualitative methods |
| Gattellari et al [44] | 2015 | Conference abstract; no full paper available |
| Generalova et al [45] | 2019 | Not qualitative methods |
| Glauser et al [46] | 2016 | Not qualitative methods |
| Gross et al [47] | 2003 | Not qualitative methods |
| Heidbuchel et al [48] | 2018 | Not qualitative methods |
| Huang et al [49] | 2013 | Not qualitative methods |
| Holt et al [50] | 2018 | Not about prescription |
| Ingelgard et al [51] | 2006 | Not qualitative methods |
| Jia et al [52] | 2012 | Conference abstract; no full paper available |
| Kea et al [53] | 2017 | Conference abstract; no full paper available |
| Kirby et al [54] | 2018 | Not qualitative methods |
| Kirby et al [55] | 2016 | Conference abstract; no full paper available |
| Kristoffersen et al [56] | 2011 | Conference abstract; no full paper available |
| Kutner et al [57] | 1991 | Not qualitative methods |
| Leung et al [58] | 2016 | Conference abstract; no full paper available |
| Levitan et al [59] | 2013 | Conference abstract; no full paper available |
| Linchak et al [60] | 2014 | Not qualitative methods |
| Liu et al [61] | 2016 | Not qualitative methods |
| Maeda et al [62] | 2004 | Not qualitative methods |
| McCrory et al [63] | 1995 | Not qualitative methods |
| Mead et al [64] | 1996 | Not qualitative methods |
| Monette et al [65] | 1997 | Not qualitative methods |
| Moulson et al [66] | 2017 | Not qualitative methods |
| Muller-Oerlinghausen et al [67] | 2003 | Not qualitative methods |
| Nicholls et al [68] | 2014 | Not qualitative methods |
| Oehrlein et al [69] | 2017 | Conference abstract; no full paper available |
| Okamura et al [70] | 2015 | Not qualitative methods |
| Okamura et al [71] | 2012 | Conference abstract; no full paper available |
| Okumura et al [72] | 2012 | Conference abstract; no full paper available |
| Oqab et al [73] | 2014 | Not qualitative methods |
| Oqab et al [74] | 2015 | Not qualitative methods |
| Patzer et al [75] | 2016 | Not qualitative methods |
| Peterson et al [76] | 2002 | Not qualitative methods |
| Pokorney et al [77] | 2016 | Conference abstract; no full paper available |
| Pradhan and Levine [78] | 2002 | Not qualitative methods |
| Protasov [79] | 2013 | Not qualitative methods |
| Putnam et al [80] | 2004 | Not qualitative methods |
| Rada et al [81] | 2016 | Not qualitative methods |
| Raptis et al [82] | 2017 | Not qualitative methods |
| Salinas et al [83] | 2012 | Conference abstract only; no full paper available |
| Shen et al [84] | 2008 | Not qualitative methods |
| Sudlow et al [85] | 1998 | Not qualitative methods |
| Taylor et al [86] | 2015 | Not qualitative methods |
| Vasishta et al [87] | 2001 | Not qualitative methods |
| York et al [88] | 2003 | Not qualitative methods |

**S2 Table: Study quality**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Are the results valid? | Is a qualitative methodology appropriate? | Was the research design appropriate to address the aims of the research? | Was the recruitment strategy appropriate to the aims of the research? | Was the data collected in a way that addressed the research issue? | Has the relationship between researcher and participants been adequately considered? | Have ethical issues been taken into consideration? | Was the data analysis sufficiently rigorous? | Is there a clear statement of findings? |
| Freeman et al. 2001 [89] | Yes | Yes | Yes | Can’t tell | Yes | Can’t tell | Yes | Can’t tell | Yes |
| Lipman et al.  2004 [90] | Yes | Yes | Yes | Yes | Yes | Yes | Can’t tell | Yes | Yes |
| Anderson et al. 2007 [91] | Yes | Yes | Yes | Can’t tell | Yes | No | Can’t tell | Can’t tell | Yes |
| Murray et al.  2011 [92] | Yes | Yes | Yes | Can’t tell | Yes | No | Can’t tell | Can’t tell | Can’t tell |
| Decker et al. 2012 [93] | Yes | Yes | Yes | Yes | Yes | No | Yes | Can’t tell | Yes |
| Bajorek et al.  2015 [94] | Yes | Yes | Yes | Yes | Yes | Can’t tell | Can’t tell | No | Yes |
| Borg Xuereb et al. 2016 [95] | Yes | Yes | Yes | Yes | Yes | No | Can’t tell | Can’t tell | Yes |
| Kirley et al. 2016 [96] | Yes | Yes | Yes | Can’t tell | Yes | Can’t tell | Can’t tell | Can’t tell | Yes |
| Wang et al. 2016 [97] | Yes | Yes | Yes | Yes | Yes | No | Can’t tell | Can’t tell | Yes |
| Karcher et al. 2016 [98] | Yes | Yes | Yes | Yes | Yes | No | Can’t tell | No | Can’t tell |
| Ferguson et al [99] | Yes | Yes | Yes | Can’t tell | Can’t tell | No | Can’t tell | Can’t tell | Can’t tell |
| Aarnio et al. 2019 [100] | Yes | Yes | Yes | Can’t tell | Can’t tell | No | No | Can’t tell | Yes |
| Kea et al. 2019 [101] | Yes | Yes | Yes | Yes | Yes | Can’t tell | Yes | Yes | Yes |

**S3 Table: Study characteristics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Study characteristics | Aim | Participants | Qualitative approach/ methods | Data analysis methods | Findings |
| Freeman et al. 2001, [89]  South West England, UK | To explore the reasons why GPs don’t always implement best practice. | Primary care  19 GPs  3-25 years’ experience as a partner. 14 members of the Royal College of General Practitioners, 7 GP trainers. | Three groups of GPs from separate geographical areas took part in multiple focus groups. Two of the groups met six times and one met once. GPs discussed the case notes of a patient encounter during which they did not follow evidence based medicine (EBM) and the feelings this generated. | Grounded theory approach to coding. | (Not all related to AF)Six themes influenced the implementation process: previous personal and professional experiences; the patient-doctor relationship; perceived tension between primary and secondary care; their feelings about their patients and the evidence; logistical problems. GPs were aware their choice of words influenced patients’ decisions. |
| Lipman et al.  2004, [90]  Northern England, UK | To explore how GP’s with an active interest in research or evidence based medicine make decisions about anticoagulation in AF patients. | Primary care  12 GPs (9/12 male, 5/12 full time, ages 33-55 years).  (1 poorly recorded interview discarded.)  Two were EBM workshop tutors; six others had formal EBM or critical appraisal training. Seven had academic appointments; 11 were research active. | Semi-structured interviews. Interview method took a constructionist approach, exploring the world that existed between GPs attempting to use research evidence in their practice and the investigator (a GP). Transcription in full then checked by the investigator. | Framework analysis. Reflexive discussions with researchers throughout the analysis. Coding after all interviews transcribed.  Used Potter & Wetherell’s criteria for validity: reflexive analysis through challenges to interpretation and presenting substantial extracts to the reader. | GP’s perception of the ‘evidence’ behind anticoagulant treatment was influenced by their individual experience, attitudes and knowledge of the literature. GPs supportive of EBM were committed to shared decision making, regardless of the treatment chosen by the patient. Hospital doctors were seen as being disease centred, difficult to challenge and poor at communicating. |
| Anderson et al. 2007 [91]  Leeds, UK | To improve understanding of physicians behaviour and attitudes in respect to decision making in AF and the use of anti-thrombotics. | Secondary and tertiary care  14 senior consultants or specialist registrars in Cardiology (5) or general medicine or geriatric medicine (9).  All were practicing clinicians regularly making OAC prescribing decision in AF, and worked at a large UK teaching hospital that undertakes both secondary and tertiary care. | Physicians considered vignettes and gave their opinion in treatment.  Semi structured interviews were conducted. | Analysis of interview transcripts used grounded theory.  Triangulation by use of open and closed questions and by reading emergent themes alongside AF and risk literature. | Marked variation in treatment recommendation. Greater likelihood of warfarin prescription to patients with previous intracerebral haemorrhage than to those with history of falls. Decision making in AF often involved uncertainty and concerns about knowledge of risk and benefit. |
| Murray et al.  2011, [92]  Rural, suburban and urban sites across Canada | 1. To determine attitudes & gaps in knowledge, skill and competence of community physicians in screening, diagnosis, treatment, management and referral.  2. To provide evidence for development of educational interventions. | Primary and secondary care  Clinicians:  28 HCPs interviewed:  family physicians/GPs; internal medicine specialists; cardiologists; emergency physicians and neurologists, all providing care to a minimum number of AF patients per month.  Patients: diagnosed for at least one year and had seen a physician ≥ twice in the last year. | Mixed method.  Quantitative survey recording clinicians knowledge, perceived barriers to optimal care, views on different AF prevention types, role in AF care and response to 3 case studies.  Qualitative open-ended semi-structures telephone interviews probing screening, diagnosis, treatment, management, referral and communication. | Interviews transcribed and analysed using NVIVO 7. Initial open coding was carried out based on the previously identified research questions and conceptual framework; followed by selective coding whereby data were coded and classified based on the continuum of care and Can MEDS competencies. | Barriers to optimal AF care included an unclear definition of AF, uncertainty of its pathology, knowledge gaps in screening, diagnosis and treatment. Specific challenges included clinical decision making, individualised patient therapy, communication with patients and between professionals and application of guidelines. |
| Decker et al. 2012, [93]  A large Midwestern city, USA | To define key issues in the prescription of warfarin therapy for AF by cardiology specialists and IM physicians | Secondary and tertiary care  27 HCPs: 18 cardiology physicians; 3 cardiology nurses; 5 internal medicine physicians; 1 internal medicine nurse practitioner.  Purposive sampling for those with experience of anticoagulation in AF. | In-depth interviews conducted in person or via telephone. A semi-structured interview guide was used. | Review of transcripts to develop familiarity; manual coding. (An iterative process) | In addition to CHADS2 score, patients’ social situation and past medication-taking behaviour were considered when treating them. Other themes: patient knowledge; real-world problems; breakdown in communication; clinical reluctance. |
| Bajorek et al.  2015, [94]  New South Wales, Australia | To describe Australian GPs approach to managing AF, including stroke prevention & identify range of services used to support patient care. | Primary care  50 GPs from ‘General practice’ or ‘Medical locals’ originally recruited to an intervention trial of stroke prevention in AF.  Average age: 53.75 +-9.94 years old; average 22.88+- 10.14 years in practice; 35/50 were male | Project officers clarified the nature of the services provided by each practice and conducted a structured questionnaire with both quantitative and qualitative responses, on paper, in person. | Qualitative: thematic analysis of open ended responses to specific questions, using manual inductive coding by the project officer verified by the lead researcher. | Key determinants influencing GPs’ initiation of OACs were: stroke risk/CHADS₂ score followed by patients’ adherence/compliance. GPs focused more on medication safety and day-to-day management of therapy than on risk of bleeding. |
| Borg Xuereb et al. 2016, [95]  West Midlands, UK | To explore patients’ and physicians’ experiences of AF consultations and OAC decision-making | Primary and secondary care  Five subgroups of participants:  16 HCPs: 4 consultant cardiologist; 4 consultant general physicians; 4 general practitioners; 4 cardiology registrars and 11 AF patients.  Physicians were eligible for inclusion if they had experience of managing patients with AF and had prescribed warfarin. | Semi-structured interviews | Multi-perspective interpretive phenomenological analysis | Themes representing patients’ experiences: Positioning within the physician-patient dyad; health-life balance; drug myths and fear of stroke.  Themes representing physicians’ experiences: Mechanised metaphors and probabilities; navigating towards the ‘right’ decision; negotiating systemic factors. |
| Kirley et al. 2016  [96]  Chicago, USA | To address the many unanswered questions about physician knowledge, attitudes, and practices regarding NOAC use. | Primary, secondary and tertiary care.  7 HCPs: 3 family physicians; 1 internist; 2 cardiologists; 1 cardiologist specialising in electrophysiology. | Semi-structured open-ended interviews | Familiarisation and independent coding by 2 researchers. Thematic analysis, data then indexed into a framework matrix. | 1. The likelihood of physicians to prescribe NOACs depends upon their willingness to try new medications and their successful experience with them. 2. Physicians balance the benefits and risks of anticoagulation in AF patients, although not always accurately. 3. Patient and physician convenience and preferences are important. The out-of-pocket cost of NOACs deter prescription. |
| Wang et al. 2016, [97]  Sydney, Australia | To describe HCP perspectives on the decision-making around antithrombothic therapy for stroke prevention in AF | Primary and secondary care  26 HCPs: Seven pharmacists; seven specialist clinicians; 6 GPs and six nurses.  Nurses and pharmacists were from primary and secondary care. Only health professionals with experience in prescribing and managing antithrombotics for stroke prevention in AF were recruited. | Semi-structured face-to-face interviews with open-ended questions were conducted until theme saturation was reached in each HCP subgroup.  Transcripts were transcribed verbatim. | Manual inductive coding was conducted by 2 researchers independently, using Thematic analysis techniques. The analysis was validated by 3 further independent researchers. | 1. HCPs focused on stroke risk not bleeding risk or medication safety issues – a more comprehensive assessment is needed.  2. Different HCP types had different antithrombotic preferences (warfarin/NOAC).  3. Different HCPs had different priorities: GPs and specialists focused on the appropriate prescription of antithrombotics; pharmacists and nurses focused on daily management. |
| Karcher et al. 2016, [98]  11 states in South Eastern USA termed the ‘Stroke Belt’ | To identify current practice patterns and barriers (including racial disparities) to optimal stroke prevention in AF patients in the US ‘Stroke Belt’ | Primary and secondary care  14 HCPs interviewed: 7 physicians, 5 nurses, 2 medical assistants.  Clinicians were from 3 cardiologist and 3 primary care practices.  Practices included if they provided care to ≥20 patients for cardiologists or ≥10 for PCPs; had ≥20% minority patients & ≥10% patients of low socioeconomic status  All physicians were board certified and averaged 25 years in clinical practice. | Mixed methods: web-based survey; site visits to discern baseline practice behaviours and areas for improvement; one-on-one interviews using standardised questionnaires including props to facilitate expansion if needed | Qualitative analysis: transcripts and researcher notes from interviews extensively reviewed to identify overarching themes that were categorised into topics | Identified contributors to racial disparities in stroke prevention included implicit racial biases, lack of awareness of racial disparities in stroke risk, lack of multicultural awareness and training. General barriers included lack of lack of stroke assessment consistency in assessing stroke and bleeding risk; underuse of standardised risk assessment tools; discomfort with NOACS and patient education deficiencies. |
| Ferguson et al. [99]  2017,  Sydney, Australia | To elucidate patient and provider barriers and enablers to adherence to OACs in patients with chronic heart failure & | Tertiary care  Clinician’s notes from the treatment of 144 patients with Chronic heart failure and concomitant AF enrolled in an over-arching cohort study April-October 2013. Patients exclusions: <18years old, AF due to irreversible causes such as thyrotoxicosis | Patient interviews during bed-side clinical assessments and review of healthcare file notes. | Synthesis of patient interviews & clinician notes. Data analysed within the WHO’s multidimensional model of medication adherence (socio-economic, health system, condition, treatment & patient barriers to anticoagulation | Clinician related findings: barriers to effective anti-coagulation included patients experiencing psychiatric illness, cognitive impairment and depression; clinician reticence due to fear of falls, frailty, age, bleeding and the challenges of multi-morbidity. |
| Aarnio et al.  [100]  2019,  Central and Eastern Finland | To understand  how physicians choose an oral anticoagulant (OAC) for patients with AF and  how physicians view patients’ participation in this decision | Primary and secondary care  17 HCPs: 8 GPs; 2 neurologists; 5 cardiologists; 2 internal medicine specialists.  14 male; 3 female.  Frequency of treating AF patients ranged from <monthly to daily. | Semi-structured interviews with open-ended questions. 13 face-to-face and 4 phone interviews. Interviews conducted by 1 researcher; recorded and transcribed verbatim by a transcription service. | Thematic analysis using inductive and deductive approaches.  Deductive: previously known factors looked for in data.  Inductive: data searched for new factors. | When there were no contraindications  or other clinical factors limiting the choice between OACs, patient's opinion was the most influential factor in the prescription decision.  New influential factors: indication (the need for cardioversion), physicians’ past OAC prescribing habits, characteristics of clinical trials and patients’ entitlement to reimbursement affecting the amount of co‐payment. |
| Kea et al  [101]  2019,  Oregon, USA | To examine emergency physician thought  processes and identify themes that prevent or support oral  anticoagulation prescribing for new-onset atrial fibrillation | Secondary care  18 HCPs: Board-prepared or board-certified Emergency department attending physicians who had evaluated a new onset AF patients in the last 30 days | Semi-structured telephone interviews conducted by a resident physician skilled in conducting interviews. Interview guide revised based on participants’ answers. | A modified, constructivist  grounded theory approach to both data collection and analysis.  Comparative coding by 3 researchers, followed by thematic analysis. | Three broad themes are reported relating to OAC prescription in the emergency department: 1. OAC prescribing practice including clinician practice patterns, beliefs and barriers and patient factors including co-morbidities, bleeding risk, social concerns. 2. Lack of guideline usage. 3. The need for population specific guidelines that include patient social factors. |

**S4 Table: Frequency of codes in studies**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Code | | | | | | | | | | | | |
| Study | Clinicians' treatment or risk assessment knowledge and understanding | Clinicians' sense of uncertainty, anxiety, guilt and responsibility | Clinicians' treatment preferences and their reasons | Clinicians' treatment safety concerns | Clinicians' use of scientific evidence and its value | Clinicians' communication with patients | Clinicians' use of persuasion | Clinicians' view of who is the final decision maker | Clinicians' outlook (disease vs patient centred) | Clinicians' perception of the medical hierarchy | Communication between HCPs and continuity of care | Patients' social and clinical factors | Patients' treatment preferences and experiences |
| Freeman et al. 2001 [89] | 0 | 2 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Lipman et al. 2004 [90] | 3 | 3 | 3 | 2 | 9 | 2 | 1 | 4 | 2 | 2 | 4 | 0 | 2 |
| Anderson et al. 2007 [91] | 4 | 4 | 4 | 1 | 0 | 2 | 0 | 4 | 0 | 0 | 0 | 2 | 0 |
| Murray et al. 2011 [92] | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Decker et al. 2012 [93] | 2 | 3 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 |
| Bajorek et al. 2015 [94] | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 |
| Borg-Xuereb et al. 2016 [95] | 0 | 0 | 0 | 0 | 2 | 7 | 1 | 2 | 0 | 0 | 5 | 2 | 1 |
| Kirley et al. 2016 [96] | 1 | 0 | 9 | 3 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 7 | 3 |
| Wang et al. 2016 [97] | 9 | 7 | 7 | 12 | 3 | 1 | 2 | 1 | 4 | 5 | 1 | 9 | 5 |
| Karcher et al. 2016 [98] | 3 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| Ferguson et al. 2017 [99] | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Aarnio et al. 2019 [100] | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 4 |
| Kea et al. 2019 [101] | 11 | 0 | 5 | 1 | 4 | 0 | 0 | 1 | 1 | 5 | 5 | 15 | 1 |

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