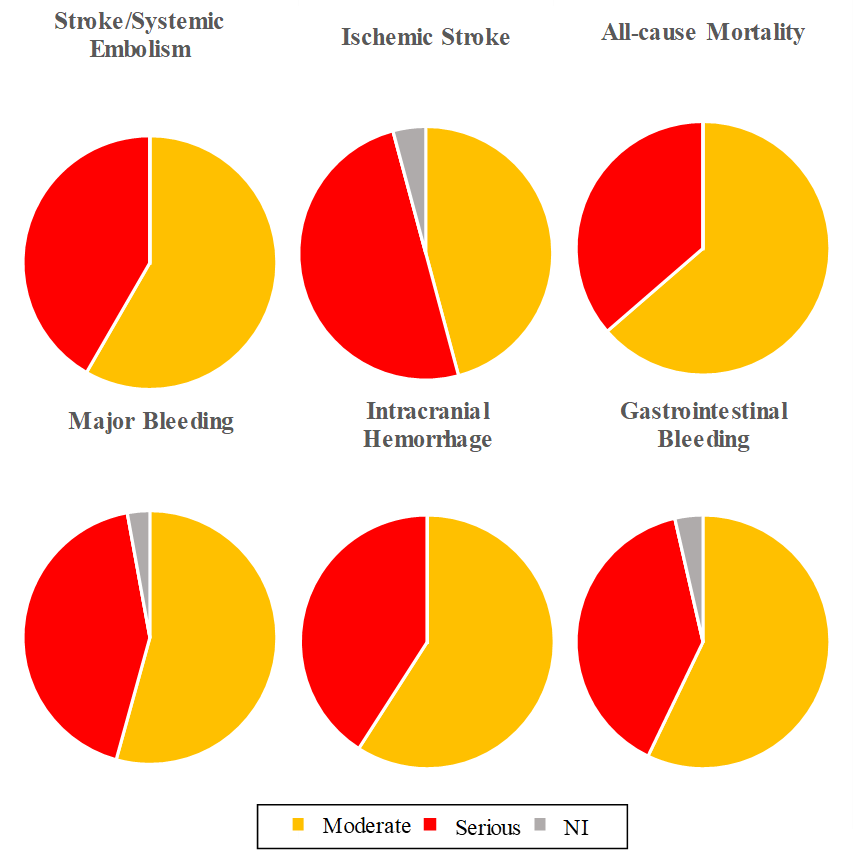
# Additional File 1. Supplemental Figures and Tables

## Supplemental Figures

Supplemental Figure 1. Risk of Bias Assessment Results by Outcome for Studies Included in Base-case Analysis Using Risk of Bias in Non-randomized Studies of Interventions



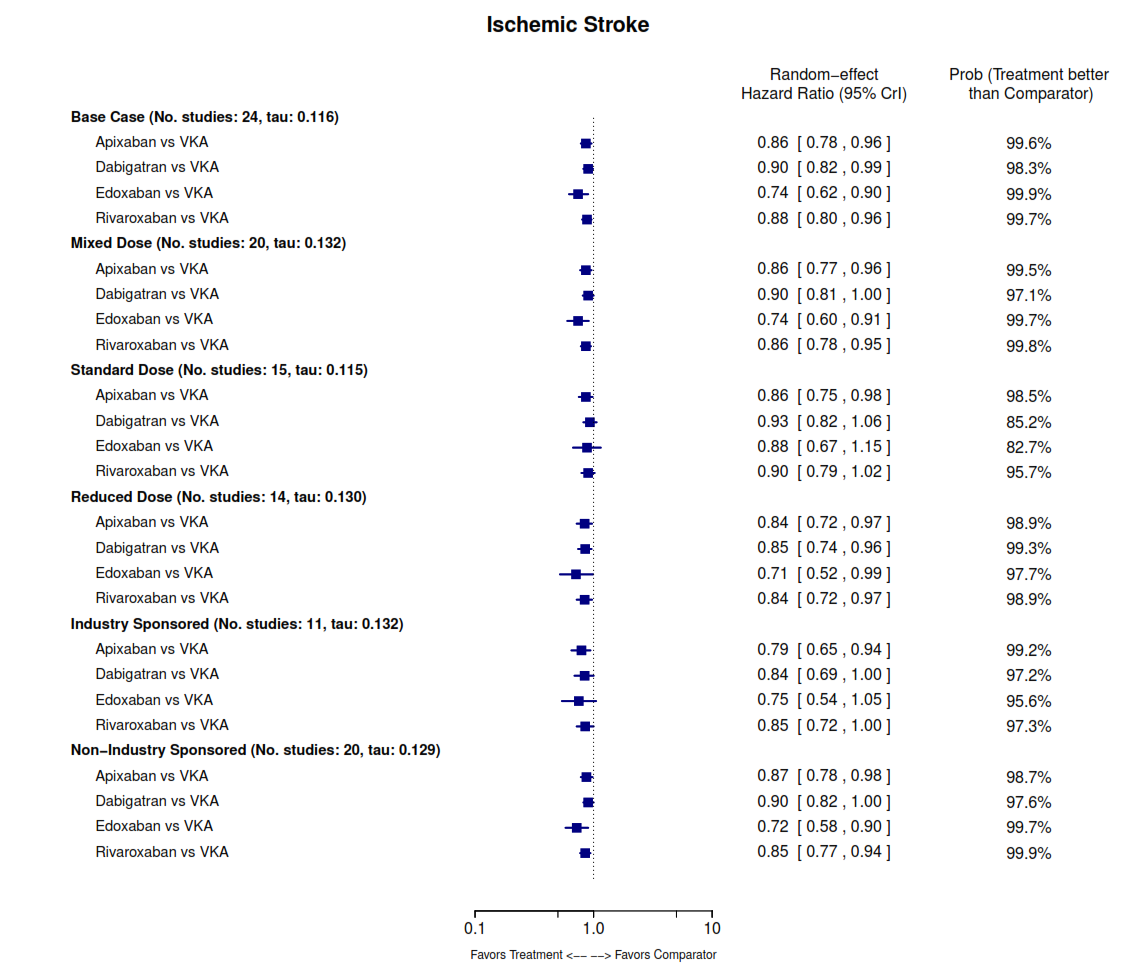
Abbreviation: NI = no information

Supplemental Figure 2. Risk of Bias Assessment Results by Domain for Studies Included in Base-case Analysis Using Risk of Bias in Non-randomized Studies of Interventions



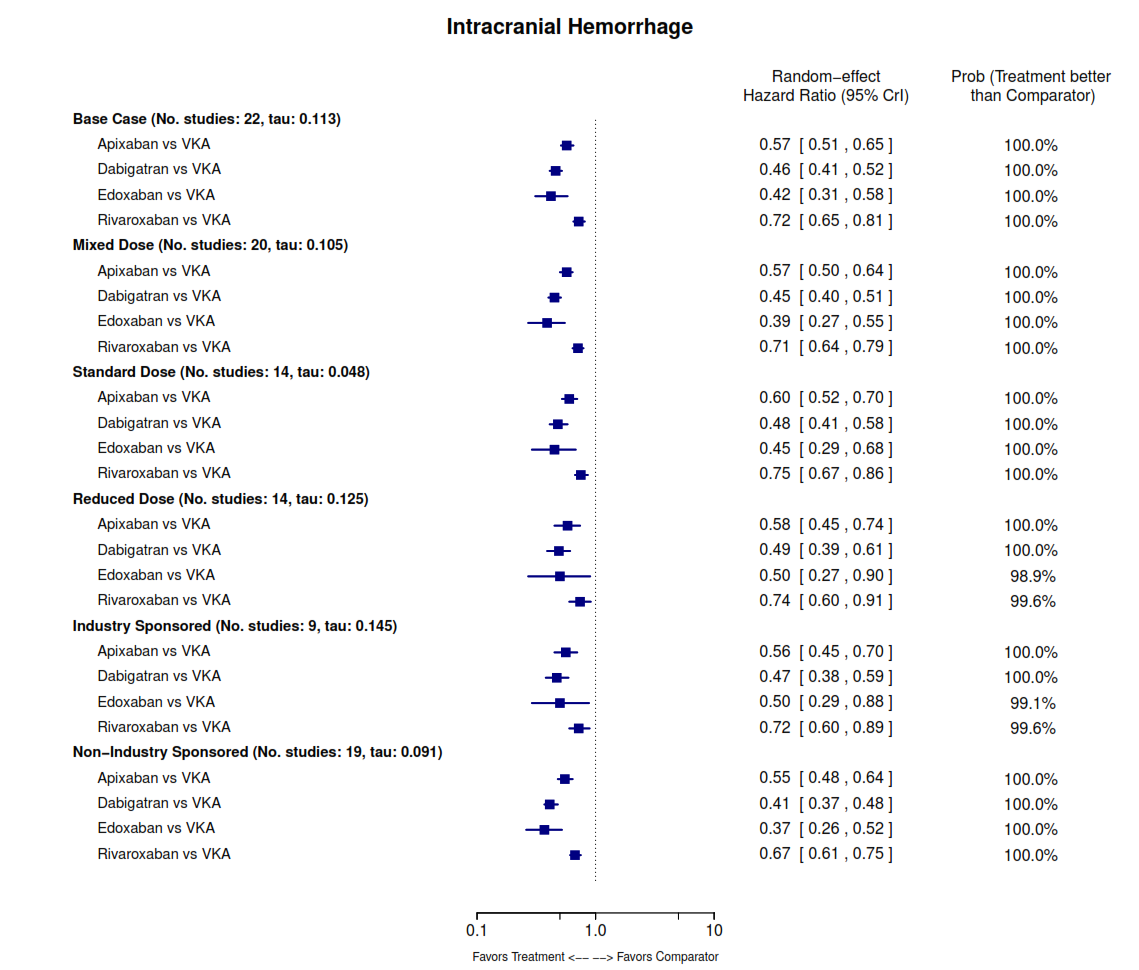
Abbreviation: NI = no information

Supplemental Figure 3. Network Meta-analysis Results for Ischemic Stroke



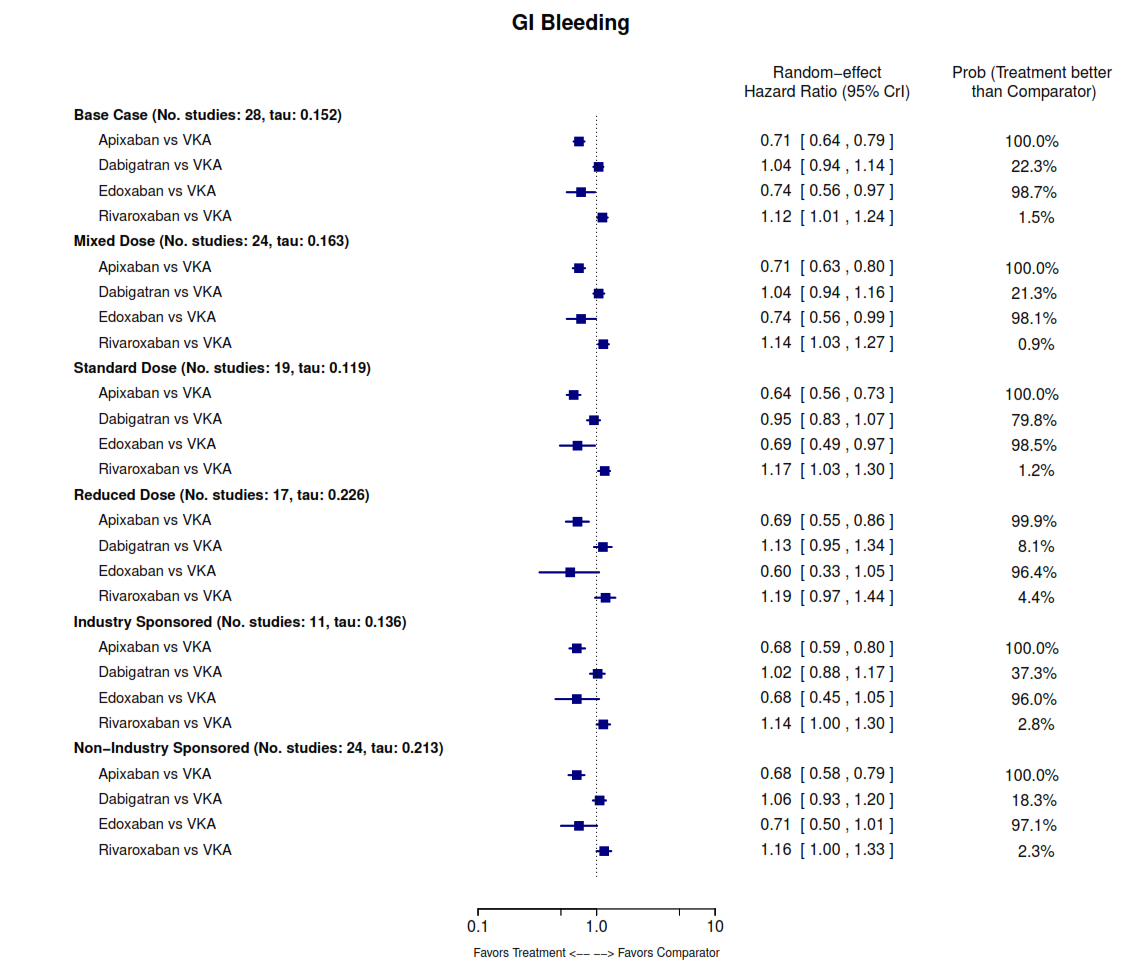
Abbreviations: CrI = credible interval; VKA = vitamin K antagonist

Supplemental Figure 4. Network Meta-analysis Results for Intracranial Hemorrhage



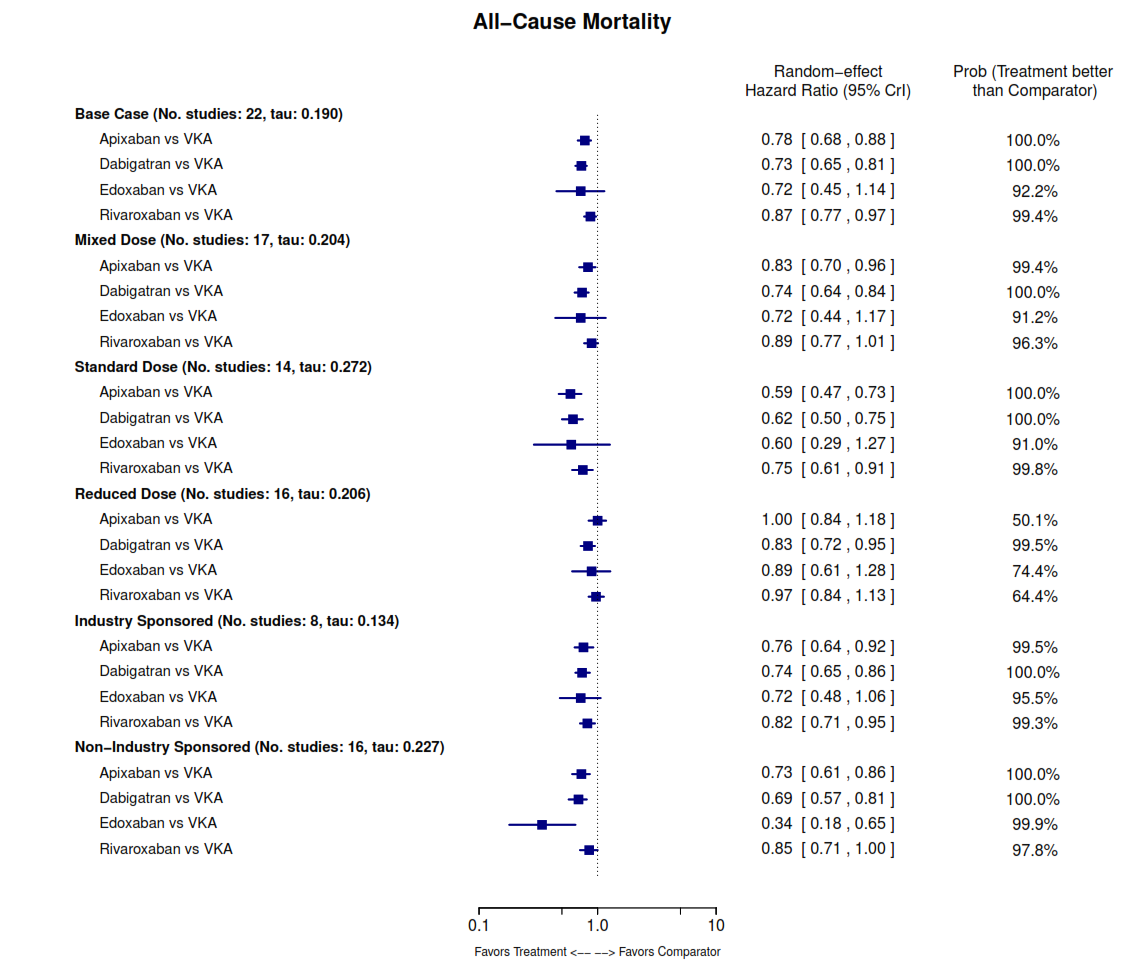
Abbreviations: CrI = credible interval; VKA = vitamin K antagonist

Supplemental Figure 5. Network Meta-analysis Results for Gastrointestinal Bleeding



Abbreviations: CrI = credible interval; VKA = vitamin K antagonist

Supplemental Figure 6. Network Meta-analysis Results for All-cause Mortality



Abbreviations: CrI = credible interval; VKA = vitamin K antagonist

## Supplemental Tables

Supplemental Table . Search Strategy

| **#** | **Search Terms** | **# Hits** |
| --- | --- | --- |
| ***Embase (Via Ovid)*** | |  |
| 1 | exp heart atrium fibrillation/ or exp heart atrium flutter/ or (atrial fibrillation or atrial flutter or nonvalvular or nvaf or non-valvular).ti,ab,kw. | 143,984 |
| 2 | exp dabigatran/ or exp apixaban/ or exp rivaroxaban/ or exp edoxaban/ or exp warfarin/ or (warfarin or dabigatran or apixaban or edoxaban or rivaroxaban or savaysa or pradaxa or xarelto or eliquis or bms562247 or bms-562247-01 or bay 59-7939 or bibr 1048 or factor xa inhibitor$ or fxa inhibitor$ or direct thrombin inhibitor$ or DTIs or novel anticoagulant$ or new anticoagulant$ or newer anticoagulant$ or new oral anticoagulant$ or NOACs or direct oral anticoagulant$ or DOACs).ti,ab. | 113,281 |
| 3 | Exp case control study/ or exp longitudinal study/ or exp retrospective study/ or exp prospective study/ or exp cohort analysis/ or exp cross-sectional study/ or exp observational study/ or exp follow-up/ or exp register/ or (case control or cohort$ or longitudinal or retrospective or prospective or cross-sectional or comparative or prevalence study or registry or electronic medical record or electronic health record or followup or follow-up or observational or control group$1 or propensity score$ or propensity scoring or Cox regression or claims or database or real-world or real world).ti,ab. or (epidemiologic$ adj3 study).ti,ab. or (electronic adj2 record) or ((case$1) adj3 (control or controlled or comparison$)).ti,ab. | 5,984,489 |
| 4 | (editorial or letter or note or review).pt. or case report/ or practice guideline/ | 7,387,592 |
| 5 | (1 and 2 and 3) not 4 | 9326 |
| 6 | 5 not ((exp animal/ or nonhuman/) not exp human/) | 9302 |
| 7 | limit 6 to (english language and yr="2013-Current") | 7119 |
| ***MEDLINE and MEDLINE In-Process (via Ovid) and*** | |  |
| 1 | exp atrial fibrillation/ or exp atrial flutter/ or (atrial fibrillation or atrial flutter or nonvalvular or nvaf or non-valvular).ti,ab,kw. | 82,723 |
| 2 | exp dabigatran/ or exp rivaroxaban/ or exp warfarin/ or (warfarin or dabigatran or apixaban or edoxaban or rivaroxaban or savaysa or pradaxa or xarelto or eliquis or bms562247 or bms-562247-01 or bay 59-7939 or bibr 1048 or factor xa inhibitor$ or fxa inhibitor$ or direct thrombin inhibitor$ or DTIs or novel anticoagulant$ or new anticoagulant$ or newer anticoagulant$ or new oral anticoagulant$ or NOACs or direct oral anticoagulant$ or DOACs).ti,ab. | 39,866 |
| 3 | Exp Case-Control Studies/ or exp Longitudinal Studies/ or exp Retrospective Studies/ or exp Prospective Studies/ or exp Cohort Studies/ or exp Cross-Sectional Studies/ or exp Follow-Up Studies/ or exp Registries/ or (observational study).pt. or (case control or cohort$ or longitudinal or retrospective or prospective or cross-sectional or comparative or prevalence study or registry or electronic medical record or electronic health record or followup or follow-up or observational or control group$1 or propensity score$ or propensity scoring or Cox regression or claims or database or real-world or real world).ti,ab. or (epidemiologic$ adj3 study).ti,ab. or (electronic adj2 record) or ((case$1) adj3 (control or controlled or comparison$)).ti,ab. | 4,454,602 |
| 4 | (editorial or letter or lecture note or review or case reports or practice guideline).pt. | 5,908,214 |
| 5 | (1 and 2 and 3) not 4 | 3559 |
| 6 | 5 not (exp animals/ not exp humans/) | 3555 |
| 7 | limit 6 to (english language and yr="2013-Current") | 2488 |

Abbreviations: ab = abstract; bms = Bristol Myers Squibb; DOAC = direct oral anticoagulant; DTI = direct thrombin inhibitor; exp = explode ; kw = keyword; NOAC = non-oral anticoagulant; NVAF = non-valvular atrial fibrillation; ti = title; yr = year

Supplemental Table . Population, Interventions and Comparisons, Outcomes, Study Design, and Time Period Selection Criteria

| **PICOS-T** | **Inclusion Criteria** |
| --- | --- |
| Population | * Adults with NVAF, as indicated by a diagnosis of AF without valvular AF\* * Studies of mixed populations enrolling ≥90% of NVAF patients * Studies of patients with NVAF and a comorbidity (CAD/PAD, HF, renal disease, diabetes, etc.) |
| Intervention/ Comparators | * NOACs: apixaban, dabigatran, edoxaban, and rivaroxaban * Head-to-head comparison to other NOACs or VKAs (e.g., warfarin) |
| Outcomes | Studies will be included if they reported on any of the following outcomes of interest:   * All-cause (ischemic or hemorrhagic) stroke/SE, ischemic stroke, major bleeding and individual components of major bleeding (gastrointestinal bleeding and intracranial hemorrhage), and all-cause mortality   Studies that examine alternative/various definitions of outcomes are considered and the differences will be captured accordingly.  Subgroups of interest:   * Standard/mixed/not reported dosage versus mixed dose only versus standard dose only versus reduced dose only * Industry-sponsored versus non-industry sponsored study |
| Study Design | * Observational studies (e.g., prospective and retrospective cohort studies, cross-sectional studies, case-control studies, and pragmatic trials) * Only studies that applied methods for reducing bias and confounding (propensity score matching, propensity score weighting, and/or multivariate analyses). |
| Date Limit | Publications published after January 1, 2013 |
| Language | English language (available in full text) |

\* Within real-world evidence studies, the patient population definition depends on the availability and specificity of International Classification of Diseases (ICD) codes. There is not an ICD code for ‘NVAF’, rather an ICD code for ‘AF’ and codes related to valvular AF (both general AF and NVAF search terms are included in our current search strategies).

Abbreviations: AF = atrial fibrillation; CAD = coronary artery disease; HF = heart failure; NOAC = non-vitamin K antagonist oral anticoagulant; NVAF = non-valvular atrial fibrillation; PAD = peripheral artery disease; PICOS-T = population, interventions and comparisons, outcomes, study design, and time period; SE = systemic embolism; VKA = vitamin K antagonist

Supplemental Table . Process for Selecting Data among Kin Publications

|  |  |
| --- | --- |
| 1 | Use studies based on overall populations (where possible) |
| 2 | Mixed dose was selected over standard dose (for the base-case analysis).   * When there was a mixed-dose study with 3 treatments and a standard-dose study with 4 treatments, the mixed-dosage data was selected as long as there were not also meaningful reasons to think the standard-dose results were more representative. This was based on the criteria below, such as considerable gaps in number of patients or data recency. * Low-dose comparisons, even if it was the only information available for a given analysis, were not used, given the extreme unlikelihood that low-dose comparisons are representative of mixed or standard-dose comparisons. |
| 3 | Most recent dataset |
| 4 | Follow-up period closest to 1.5 years   * Where studies report data for multiple follow-up times, the data for the follow-up time closest to the target follow-up period (selected as 1.5 years, given what was seen many papers) was selected.   In situations of equidistant proximity of two follow-up times to the target, the data with the largest sample size was chosen. |
| 5 | Studies with more rather than fewer total comparators were selected. If different studies had different comparators, both were used. |
| 6 | Studies with more rather than fewer total outcomes reported were selected. |
| 7 | Studies utilizing estimates generated from a propensity score-based adjustment were selected over studies with non-propensity-score, regression-based adjustments. |
| 8 | When multiple comparisons were presented in a study (NOAC vs. VKA and NOAC vs. NOAC), the VKA comparisons were prioritized to preserve neutrality among the NOACs. This still preserved indirect evidence on the NOAC vs. NOAC comparison. |
| 9 | Largest study population |
| 10 | Some studies using data from the Taiwan database reported rivaroxaban 10 mg and 15 mg. The data for the 15 mg dose was used to align with standard dosing in all other countries. |

Abbreviations: NOAC = non-vitamin K antagonist oral anticoagulant; VKA = vitamin K antagonist

Supplemental Table . Key Characteristics from Studies Included in the Network Meta-analysis

| **Author & Year** | **Citation** | **Industry Sponsor** | **Brief Patient Description** | **Treatments Included** | **Design** | **Data Source** | **Data Source Name** | **Country** | **Include in NMA [Base-case & Subgroup Analysis]** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Yu 2018 | Yu HT, et al. Impact of renal function on outcomes with edoxaban in real-world patients with atrial fibrillation. Stroke. 2018;49:2421-2429. | None | Adult patients (≥18 years) with NVAF treated with edoxaban | Edoxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | Korea | Non-industry |
| Abraham 2017 | Abraham NS, et al. Gastrointestinal Safety of Direct Oral Anticoagulants: A Large Population-Based Study. Gastroenterology. 2016 Dec 30. | None | Patients with NVAF with incident exposure to dabigatran, rivaroxaban, or apixaban | Apixaban, dabigatran, rivaroxaban | Retrospective cohort | Pharmacy/Claims | Optum Labs Data Warehouse | US | Standard |
| Abraham 2015 | Abraham NS ,et al. Comparative risk of gastrointestinal bleeding with dabigatran, rivaroxaban, and warfarin: population based cohort study. BMJ. 2015;350:h1857. | None | Patients with NVAF who were new users of dabigatran, rivaroxaban, and warfarin | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Optum Labs Data Warehouse | US | Standard |
| Adeboyeje 2017 | Adeboyeje G, et al. Major Bleeding Risk During Anticoagulation with Warfarin, Dabigatran, Apixaban, or Rivaroxaban in Patients with Nonvalvular Atrial Fibrillation. Journal of Managed Care & Specialty Pharmacy. 2017; 23(9); 968-978c | Anthem | Patients with NVAF who were new users of warfarin, dabigatran, apixaban, or rivaroxaban | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | HealthCore Integrated Research Environment (HIRE) | US | Base-case, mixed, industry |
| Alberts 2020 | Alberts M, et al. Risks of Stroke and Mortality in Atrial Fibrillation Patients Treated With Rivaroxaban and Warfarin. Stroke. 2019. STROKEAHA119025554 | Janssen Scientific Affairs, LLC | Patients with NVAF with treatment with either rivaroxaban or warfarin as a first anti-coagulant treatment within 30 days following the initial diagnosis of NVAF | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Optum Clinformatics Extended Data Mart—Date of Death Database | US | Base-case, mixed, industry |
| Amin 2019 | Amin A, et al. Effectiveness and safety of oral anticoagulants in older adults with non-valvular atrial fibrillation and heart failure. PLoS ONE. 2019. 14:e0213614 | Pfizer and BMS | Elderly patients (≥65 years) with NVAF and heart failure treated with dabigatran, apixaban, rivaroxaban or warfarin | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | No |
| Amin 2019 | Amin A, et al. Comparative clinical outcomes between direct oral anticoagulants and warfarin among elderly patients with non-valvular atrial fibrillation in the CMS medicare population. Journal of Thrombosis & Thrombolysis. 2019. 48:240-249 | Pfizer and BMS | Elderly patients (≥65 years) with NVAF treated with dabigatran, apixaban, edoxaban, rivaroxaban or warfarin | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | Standard |
| Amin 2018 | Amin A, et al. A Real-World Observational Study of Hospitalization and Health Care Costs Among Nonvalvular Atrial Fibrillation Patients Prescribed Oral Anticoagulants in the U.S. Medicare Population. J Manag Care Spec Pharm. 2018;24(9):911-20. | Pfizer and BMS | Elderly (≥65 years) patients with NVAF initiating apixaban, dabigatran, rivaroxaban, or warfarin | Apixaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | No |
| Amin 2017 | Amin A, et al. Risk of stroke/systemic embolism, major bleeding and associated costs in non-valvular atrial fibrillation patients who initiated apixaban, dabigatran or rivaroxaban compared with warfarin in the United States Medicare population. Curr Med Res Opin. 2017. 33(9): 1595-1604. | Pfizer and BMS | Elderly NVAF patients (age ≥65 years) with ≥1 pharmacy claim for warfarin, apixaban, rivaroxaban, or dabigatran. | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | No |
| Amin 2018 | Amin A, et al. Real-world comparison of all-cause hospitalizations, hospitalizations due to stroke and major bleeding, and costs for non-valvular atrial fibrillation patients prescribed oral anticoagulants in a US health plan. J Med Econ. 2018;21(3): 244-253. | Pfizer and BMS | Patients with NVAF (≥18 years) who had ≥1 prescription claim for apixaban, dabigatran, rivaroxaban, or warfarin | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Optum Clinformatics Data Mart | US | No |
| Andersson 2018 | Andersson NW, et al. Comparative effectiveness and safety of apixaban, dabigatran, and rivaroxaban in patients with non-valvular atrial fibrillation. Int J Cardiol. 2018;268:113-9. | None | Adult (≥45 years) patients with NVAF initiating apixaban, dabigatran, or rivaroxaban | Apixaban, dabigatran, rivaroxaban | Retrospective cohort | Registry | Danish National Patient Register | Denmark | Base-case, standard, non-industry |
| Becattini 2018 | Becattini C, et al. Variation of renal function over time is associated with major bleeding in patients treated with direct oral anticoagulants for atrial fibrillation. J Thromb Haemost. 2018;16(5):833-41. | None | Patients with NVAF who were newly prescribed with DOACs | Apixaban, dabigatran, rivaroxaban | Prospective cohort | Hospital | Internal and Cardiovascular Medicine – Stroke Unit of the University of Perugia, Italy | Italy | Base-case, mixed, non-industry |
| Bengston 2017 | Bengtson LGS, et al. Comparative effectiveness of dabigatran and rivaroxaban versus warfarin for the treatment of non-valvular atrial fibrillation. J Cardiol. 2017;69(6):868-76. | None | Patients with NVAF initiating dabigatran, rivaroxaban, or warfarin or switching from warfarin to dabigatran or rivaroxaban | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Blin 2020 | Blin P, et al. Comparative Real-Life Effectiveness and Safety of Dabigatran or Rivaroxaban vs. Vitamin K Antagonists: A High-Dimensional Propensity Score Matched New Users Cohort Study in the French National Healthcare Data System SNDS. Am J Cardiovasc Drugs. 2020;20(1):81-103 | Boehringer Ingelheim | Adults with a diagnosis of definite NVAF based on outpatient chronic disease registration or inpatient diagnosis of AF | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Système National des Données de Santé (SNDS) | France | Base-case, mixed, industry |
| Blin 2019 | Blin P, et al. Effectiveness and safety of 110 or 150 mg dabigatran vs. vitamin K antagonists in nonvalvular atrial fibrillation. Br J Clin Pharmacol. 2019;85:432–441 | Boehringer Ingelheim | Adult patients with NVAF and a first dispensing of oral anticoagulants (dabigatran or VKA) | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | Système National des Données de Santé (SNDS) | France | Base-case, standard, reduced, industry |
| Blin 2018 | Blin P, et al. Comparative Effectiveness and Safety of Standard or Reduced Dose Dabigatran vs. Rivaroxaban in Nonvalvular Atrial Fibrillation. Clin Pharmacol Ther. 2018 | Boehringer Ingelheim | Patients with NVAF newly initiating rivaroxaban or dabigatran | Dabigatran, rivaroxaban | Retrospective cohort | Pharmacy/Claims | Système National des Données de Santé (SNDS) | France | Base-case, standard, reduced, industry |
| Blin 2019 | Blin P, et al. Effectiveness and Safety of Rivaroxaban 15 or 20 mg Versus Vitamin K Antagonists in Nonvalvular Atrial Fibrillation. Stroke. 2019;50(9):2469-2476. | Bayer Pharma AG | Adults with a dispensing of any OAC, with a diagnosis of definite NVAF | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Système National des Données de Santé (SNDS) | France | Standard, reduced |
| Bonnemeier 2019 | Bonnemeier H, et al. Comparative effectiveness of rivaroxaban versus a vitamin K antagonist in patients with renal impairment treated for non-valvular atrial fibrillation in Germany - A retrospective cohort study. International Journal of Cardiology. Heart & Vasculature. 2019;23:100367 | Bayer Pharma AG | Patients with NVAF and renal impairment newly initiated with rivaroxaban or phenprocoumon | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Health Risk Institute's research database | Germany | No |
| Briasoulis 2018 | Briasoulis A, et al. Safety and Efficacy of Novel Oral Anticoagulants Versus Warfarin in Medicare Beneficiaries With Atrial Fibrillation and Valvular Heart Disease. J Am Heart Assoc. 2018;7(8). | None | Newly diagnosed patients with NVAF (>65 years) who initiated dabigatran, rivaroxaban, or warfarin | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | Non-industry |
| Cha 2017 | Cha MJ, et al. Effectiveness and Safety of Non-Vitamin K Antagonist Oral Anticoagulants in Asian Patients With Atrial Fibrillation. Stroke. 2017;48(11):3040-3048 | None | Patients with NVAF and CHA2DS2-VASc score ≥2 who used anticoagulants | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | Korea | Base-case, mixed, non-industry |
| Chan 2016 | Chan PH, et al. Stroke prevention using dabigatran in elderly Chinese patients with atrial fibrillation. Heart Rhythm. 2016. 13:366-373 | None | Elderly patients (≥80 years) with NVAF | Dabigatran, VKA | Retrospective cohort | Hospital | Queen Mary Hospital-based registry (Hong Kong) | Hong Kong | Reduced |
| Chan 2016 | Chan YH, et al. Thromboembolic, bleeding, and mortality risks of rivaroxaban and dabigatran in Asians with nonvalvular atrial fibrillation. Journal of the American College of Cardiology. 2016;68(13):1389-401. | None | Patients newly diagnosed with NVAF (≥30 years) | Rivaroxaban, dabigatran | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | No |
| Chan 2019 | Chan YH, et al. Effectiveness and Safety of Four Direct Oral Anticoagulants in Asian Patients With Nonvalvular Atrial Fibrillation. Chest. 2019;156:529-543 | None | Patients with NVAF who had first prescription of DOAC including edoxaban, apixaban, rivaroxaban, dabigatran, or warfarin | Apixaban, dabigatran, edoxaban, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | Base-case, mixed, standard, reduced, non-industry |
| Chan 2018 | Chan YH, et al. Efficacy and Safety of Apixaban, Dabigatran, Rivaroxaban, and Warfarin in Asians With Nonvalvular Atrial Fibrillation. J Am Heart Assoc. 2018 Apr 5;7(8). pii: e008150. | None | Patients with NVAF initiating apixaban, rivaroxaban, dabigatran, or warfarin. | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | Base-case, mixed, standard, reduced, non-industry |
| Chan 2016 | Chan YH, et al. Cardiovascular, Bleeding, and Mortality Risks of Dabigatran in Asians With Nonvalvular Atrial Fibrillation. Stroke. 2016;47:441-9 | None | Patients newly diagnosed with NVAF (≥30 years) | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | No |
| Chi 2018 | Chi NF, et al. Health Care Costs and Utilization of Dabigatran Compared With Warfarin for Secondary Stroke Prevention in Patients With Nonvalvular Atrial Fibrillation: A Retrospective Population Study. Med Care. 2018;56(5):410-415. | None | Adult patients with NVAF and history of ischemic stroke initiating treatment with dabigatran or warfarin | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | No |
| Cho 2019 | Cho MS, et al. Outcomes After Use of Standard- and Low-Dose Non–Vitamin K Oral Anticoagulants in Asian Patients With Atrial Fibrillation. Stroke. 2019;50:110-118. | None | Anticoagulation-naive patients with NVAF and high thromboembolic risk (CHA2DS2-VASc score ≥2) | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | Korea | Reduced |
| Chrischilles 2018 | Chrischilles EA, et al. Prospective surveillance pilot of rivaroxaban safety within the US Food and Drug Administration Sentinel System. Pharmacoepidemiol Drug Saf, 2018;27(3):263-271. | None | NVAF patients (≥21 years) who were new users of rivaroxaban or warfarin | Rivaroxaban, VKA | Prospective cohort | Pharmacy/Claims | Aetna, Humana, Optum, and HealthCore | US | Mixed, non-industry |
| Coleman 2016 | Coleman CI, et al. Real-world evidence of stroke prevention in patients with nonvalvular atrial fibrillation in the United States: the REVISIT-US study. Current Medical Research and Opinion. 2016;32(12):2047-53. | Bayer Pharma AG | Adult patients with NVAF newly initiated on rivaroxaban, apixaban or warfarin | Apixaban, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | Mixed |
| Coleman 2016 | Coleman C, et al. REal-LIfe Evidence of stroke prevention in patients with atrial Fibrillation — The RELIEF study. International Journal of Cardiology. 2016;882–884 | Bayer Pharma AG | Adult patients (≥18 years) with NVAF treated with rivaroxaban or VKA | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Primary Care Physician panel of IMS Disease Analyzer, an EMR Database | Germany | Base-case, mixed, industry |
| Coleman 2019 | Coleman CI, et al. Effectiveness and safety of rivaroxaban vs. warfarin in patients with non-valvular atrial fibrillation and coronary or peripheral artery disease, European Heart Journal - Cardiovascular Pharmacotherapy. 2019 | Bayer Pharma AG | NVAF patients with CAD and/or PAD treated in routine practice | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Coleman 2018 | Coleman CI, et al. Effectiveness and safety of rivaroxaban vs warfarin in people with non-valvular atrial fibrillation and diabetes: an administrative claims database analysis. Diabet Med. 2018;35(8):1105-1110 | Bayer Pharma AG | Patients with NVAF and comorbid diabetes who were anticoagulation naïve | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Coleman 2019 | Coleman CI, et al. Rivaroxaban's Impact on Renal Decline in Patients With Nonvalvular Atrial Fibrillation: A US MarketScan Claims Database Analysis. Clinical and applied thrombosis/hemostasis. 2019. | Bayer Pharma AG | Treatment naïve patients with NVAF | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Coleman 2019 | Coleman C, et al. Rivaroxaban Versus Warfarin in Patients With Nonvalvular Atrial Fibrillation and Severe Kidney Disease or Undergoing Hemodialysis. The American Journal Of Medicine. 2019;132(9):1078-1083. | Bayer Pharma AG | Patients with nonvalvular atrial fibrillation and stage 4 or 5 chronic kidney disease or undergoing hemodialysis | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Coleman 2018 | Coleman CI, et al. Comparative Effectiveness and Safety of Apixaban and Vitamin K Antagonist Therapy in Patients With Nonvalvular Atrial Fibrillation Treated in Routine German Practice. Heart Lung Circ. 2018 Mar;27(3):390-393. | Bayer Pharma AG | Adult patients with NVAF newly initiated on apixaban or a VKA | Apixaban, VKA | Retrospective cohort | Registry | Primary Care Physician panel of IMS Disease Analyzer, an EMR Database | Germany | Base-case, industry |
| Coleman 2017 | Coleman CI, et al. Effectiveness and Safety of Apixaban, Dabigatran, and Rivaroxaban Versus Warfarin in Patients With Nonvalvular Atrial Fibrillation and Previous Stroke or Transient Ischemic Attack. Stroke. 2017;48(8):2142-9. | Bayer Pharma AG | Adult patients with NVAF, newly initiated on apixaban, dabigatran, rivaroxaban, warfarin, with a history of stroke or TIA | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Coleman 2018 | Coleman CI, et al. Effectiveness and Safety of Rivaroxaban Versus Warfarin in Nonvalvular Atrial fibrillation Patients with a Non-Sex-Related CHA2DS2-VASc Score of 1. Eur Heart J Cardiovasc Pharmacother. 2018. | Bayer Pharma AG | Adult patients with NVAF and non-sex-related CHA2DS2-VASc score of 1 and initiating rivaroxaban or warfarin | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Coleman 2018 | Coleman CI, et al. Effectiveness and safety of rivaroxaban vs. warfarin in patients 80+ years of age with non-valvular atrial fibrillation. Eur Heart J Qual Care Clin Outcomes. 2018; 4(4):328-329 | Bayer Pharma AG | Elderly (≥80 years) oral anticoagulant-naïve patients with NVAF | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Deitelzweig 2019 | Deitelzweig S, et al. Comparisons between Oral Anticoagulants among Older Nonvalvular Atrial Fibrillation Patients. Journal of the American Geriatrics Society. 2019;67(8):1662–1671. | Pfizer and BMS | Elderly (aged ≥80 y) NVAF patients newly initiating apixaban, dabigatran, rivaroxaban, or warfarin | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | ARISTOPHANES | US | No |
| Deitelzweig 2017 | Deitelzweig S, et al. Comparison of effectiveness and safety of treatment with apixaban vs. other oral anticoagulants among elderly nonvalvular atrial fibrillation patients. Current Medical Research and Opinion, 2017;33(10):1745-1754 | Pfizer and BMS | Elderly (≥65 years) patients with NVAF initiating oral anticoagulants | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Humana | US | No |
| Fauchier 2019 | Fauchier L, et al. Reduced dose of rivaroxaban and dabigatran vs. vitamin K antagonists in very elderly patients with atrial fibrillation in a nationwide cohort study. EP Europace. 2019; 22(2). | Bayer Pharma AG | Elderly (aged ≥85 y) NVAF patients | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Système National des Données de Santé | France | Reduced |
| Forslund 2017 | Forslund T, et al. Stroke and bleeding with non-vitamin K antagonist oral anticoagulant or warfarin treatment in patients with non-valvular atrial fibrillation: a population-based cohort study. EP Europace. | None | Patients with NVAF initiating treatment with NOAC or warfarin | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Registry | Stockholm administrative health data register | Sweden | Base-case, mixed, non-industry |
| Gilligan 2019 | Gilligan AM, et al. Comparison of stroke- and bleed-related healthcare resource utilization and costs among patients with newly diagnosed non-valvular atrial fibrillation and newly treated with dabigatran, rivaroxaban, or warfarin. Expert Rev Pharmacoecon Outcomes Res. 2019;19(2):203-212. | Boehringer Ingelheim | Adult patients (≥18 years) with newly diagnosed with NVAF and treated with dabigatran, rivaroxaban, or warfarin | Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Go 2017 | Go AS, et al. Outcomes of Dabigatran and Warfarin for Atrial Fibrillation in Contemporary Practice: A Retrospective Cohort Study. Ann Intern Med. 2017;167(12):845-854. | None | Adult patients with NVAF initiating warfarin or dabigatran | Dabigatran, VKA | Retrospective cohort | Registry | FDA Sentinel network | US | Base-case, standard, non-industry |
| Gorst-Rasmussen 2016 | Gorst‐Rasmussen A, et al. Rivaroxaban versus warfarin and dabigatran in atrial fibrillation: comparative effectiveness and safety in Danish routine care. Pharmacoepidemiology and drug safety. 2016. | None | NVAF patients who were new-users of rivaroxaban, dabigatran, or warfarin | Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | No |
| Graham 2019 | Graham DJ, et al. Comparative Stroke, Bleeding, and Mortality Risks in Older Medicare Patients Treated with Oral Anticoagulants for Nonvalvular Atrial Fibrillation. Am J Med. 2019. | None | Elderly patients (≥65 years) with NVAF newly treated with an oral anticoagulant | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | Standard, non-industry |
| Graham 2016 | Graham DJ, et al. Stroke, Bleeding, and Mortality Risks in Elderly Medicare Beneficiaries Treated With Dabigatran or Rivaroxaban for Nonvalvular Atrial Fibrillation. JAMA Intern Med. 2016;176(11):1662-71. | None | Elderly (≥65 years) patients with NVAF initiating dabigatran or rivaroxaban | Dabigatran, rivaroxaban | Retrospective cohort | Pharmacy/Claims | CMS | US | Reduced |
| Graham 2015 | Graham DJ, et al. Cardiovascular, bleeding, and mortality risks in elderly Medicare patients treated with dabigatran or warfarin for nonvalvular atrial fibrillation. Circulation.2015;131(2):157-64. | None | Elderly patients (≥65 years) with NVAF treated with dabigatran or warfarin | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | Reduced, non-industry |
| Gupta 2019 | Gupta K, et al. Effectiveness and safety of direct oral anticoagulants compared to warfarin in treatment naïve non-valvular atrial fibrillation patients in the US Department of defense population. BMC cardiovascular disorders. 2019;19(1):142. | Pfizer and BMS | Treatment naïve patients with NVAF | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | DoD Database | US | Base-case, mixed, standard, reduced, industry |
| Gupta 2018 | Gupta K, et al. Real-World Comparative Effectiveness, Safety, and Health Care Costs of Oral Anticoagulants in Nonvalvular Atrial Fibrillation Patients in the U.S. Department of Defense Population. Journal of Managed Care & Specialty Pharmacy. 2018;24(11) | Pfizer and BMS | Adult patients with NVAF initiating warfarin or DOACs (apixaban, rivaroxaban, and dabigatran) | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | DoD Database | US | No |
| Halvorsen 2017 | Halvorsen S, et al. A nationwide registry study to compare bleeding rates in patients with atrial fibrillation being prescribed oral anticoagulants. European Heart Journal-Cardiovascular Pharmacotherapy. 2016:pvw031. | Pfizer Inc | Patients with NVAF and a first prescription of oral anticoagulants | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Registry | Norwegian Patient Registry and Norwegian Prescription Database | Norway | No |
| Harel 2016 | Harel Z, et al. Novel Oral Anticoagulants and the Risk of Major Hemorrhage in Elderly Patients With Chronic Kidney Disease: A Nested Case-Control Study. Can J Cardiol. 2016;32(8):986.e17-986.e9.86E22. | None | Elderly patients (≥ 66 years) with chronic kidney disease who received anticoagulants | Dabigatran, rivaroxaban, VKA | Nested case-control | Pharmacy/Claims | Administrative databases from Ontario: Ontario Public Drug Benefit Program Database, Canadian Institute for Health Information Discharge Abstract Database, CIHI National Ambulatory Care Reporting System, Ontario Health Insurance Plan database, Registered Persons Database and Ontario Diabetes Database | Canada | Base-case, mixed, non-industry |
| Ho 2015 | Ho CW, et al. Ischemic Stroke and Intracranial Hemorrhage With Aspirin, Dabigatran, and Warfarin Impact of Quality of Anticoagulation Control. Stroke.2015;46:23-30. | None | Elderly patients (≥65 years) with NVAF who were prescribed dabigatran or warfarin for stroke prevention | Dabigatran, VKA | Retrospective cohort | Hospital | Queen Mary Hospital-based registry | Hong Kong | No |
| Hohnloser 2018 | Hohnloser SH, et al. Effectiveness and Safety of Non-Vitamin K Oral Anticoagulants in Comparison to Phenprocoumon: Data from 61,000 Patients with Atrial Fibrillation. Thromb Haemost. 2018 Mar;118(3):526-538. | Pfizer and BMS | Patient with NVAF who were treatment naïve and receiving NOAC or phenprocoumon | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Germany's Applied Health Research Database (formerly Health Risk Institute) | Germany | Base-case, mixed, reduced, industry |
| Hohnloser 2017 | Hohnloser SH, et al. Comparative risk of major bleeding with new oral anticoagulants (NOACs) and phenprocoumon in patients with atrial fibrillation: a post-marketing surveillance study. Clin Res Cardiol. 2017;106(8):618-628. | Pfizer and BMS | Patients with NVAF (≥18 years old) who were new users of apixaban, dabigatran, rivaroxaban, and phenprocoumon | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Germany's Applied Health Research Database (formerly Health Risk Institute) | Germany | No |
| Hsu 2018 | Hsu CC, et al. Is There a Preferred Stroke Prevention Strategy for Diabetic Patients with Non-Valvular Atrial Fibrillation? Comparing Warfarin, Dabigatran and Rivaroxaban. Thromb Haemost. 2018;118(1):72-81. | None | Adult (≥20 years) patients with NVAF and T2DM initiating warfarin, dabigatran, or rivaroxaban | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Registry | Diabetes P4P database | Taiwan | Base-case, mixed, reduced, non-industry |
| Huang 2018 | Huang HY, et al. Effectiveness and Safety of Different Rivaroxaban Dosage Regimens in Patients with Non-Valvular Atrial Fibrillation: A Nationwide, Population-Based Cohort Study. Sci Rep. 2018;8(1):3451. | None | Patients with NVAF (≥20 years old) who were receiving warfarin or rivaroxaban therapy | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | No |
| Huybrechts 2019 | Huybrechts KF, et al. Safety and Effectiveness of Dabigatran and Other Direct Oral Anticoagulants Compared With Warfarin in Patients With Atrial Fibrillation. Clin Pharmacol Ther. 2019 Dec 23. [Epub ahead of print]. | Boehringer Ingelheim | NVAF patients at risk of stroke (CHA2DS2-VASc score ≥ 1) | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | MarketScan and Clinformatics, Optum | US | No |
| Jansson 2020 | Jansson M, et al. Direct comparisons of effectiveness and safety of treatment with Apixaban, Dabigatran and Rivaroxaban in atrial fibrillation.Thromb Res. 2020 Jan;185:135-141 | None | Patients with NVAF | Apixaban, dabigatran, rivaroxaban | Retrospective cohort | Registry | The Swedish anticoagulation quality registry (Auricula) | Sweden | Reduced |
| Jeong 2019 | Jeong HK, et al. Real World Comparison of Rivaroxaban and Warfarin in Korean Patients with Atrial Fibrillation: Propensity Matching Cohort Analysis. Chonnam Med J. 2019 Jan;55(1):54-61. | None | Patients with NVAF taking warfarin or rivaroxaban | Rivaroxaban, VKA | Retrospective cohort | Hospital | Chonnam National University Hospital | Korea | Base-case, mixed, non-industry |
| Jung 2019 | Jung H, et al. Effectiveness and Safety of Non-Vitamin K Antagonist Oral Anticoagulants in Patients With Atrial Fibrillation With Hypertrophic Cardiomyopathy: A Nationwide Cohort Study. Chest. 2019 Feb;155(2):354-363. | None | Patients with NVAF and comorbid hypertrophic cardiomyopathy | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | Korea | No |
| Kalil 2016 | Kalil RS, et al. Association between Renal Function and Bleeding Risk for Dabigatran after Switching from Warfarin. Am J Nephrol. 2016;44(1):11-8. | None | Elderly (≥65 years) patients with NVAF who switched from warfarin to dabigatran or remained on warfarin treatment | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | VA National Patient Care claims, VA DSS National Pharmacy and Laboratory extracts, Medicare | US | No |
| Kido 2019 | Kido K, et al. Comparing the Efficacy and Safety of Direct Oral Anticoagulants With Warfarin in the Morbidly Obese Population With Atrial Fibrillation. Ann Pharmacother. 2019 Feb;53(2):165-170. | None | Morbidly obese patients (>18 years) with NVAF or atrial flutter treated with DOACs or warfarin | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Hospital | None | US | No |
| Kjerpeseth 2019 | Kjerpeseth LJ, et al. Comparative effectiveness of warfarin, dabigatran, rivaroxaban and apixaban in non-valvular atrial fibrillation: A nationwide pharmacoepidemiological study. PLoS One. 2019 Aug 26;14(8):e0221500. | None | Patients with NVAF in routine care | Apixaban, rivaroxaban, VKA | Retrospective cohort | Registry | Norwegian Prescription Database, the Norwegian Patient Registry, the Norwegian Cause of Death Registry, and the National Registry. | Norway | Non-industry |
| Kohsaka 2018 | Kohsaka S, et al. Safety and effectiveness of apixaban in comparison to warfarin in patients with nonvalvular atrial fibrillation: a propensity-matched analysis from Japanese administrative claims data. Curr Med Res Opin. 2018;34(9):1627-34. | Pfizer and BMS | Adult patients with NVAF newly initiated on warfarin or apixaban | Apixaban, VKA | Retrospective cohort | Pharmacy/Claims | Medical Data Vision Co. | Japan | Base-case, mixed, industry |
| Kohsaka 2017 | Kohsaka S, et al. Bleeding risk ofapixaban, dabigatran, and low-dose rivaroxaban compared with warfarin in Japanese patients with non-valvular atrial fibrillation: a propensity matched analysis of administrative claims data. Curr Med Res Opin. 2017 Nov;33(11):1955-1963. | Pfizer and BMS | Treatment naïve patients with NVAF newly initiated on oral anticoagulants | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Medical Data Vision Co. | Japan | Base-case, mixed, industry |
| Korenstra 2015 | Korenstra J, et al. Effectiveness and safety of dabigatran versus acenocoumarol in ‘real-world’ patients with atrial fibrillation. Europace. 2016;18(9):1319-1327. | Boehringer Ingelheim | Patients with AF | Dabigatran, VKA | Retrospective cohort | Hospital | Martini Hospital Groningen | Netherlands | Base-case, mixed, industry |
| Koretsune 2018 | Koretsune Y, et al. Comparative effectiveness and safety of warfarin and dabigatran in patients with non-valvular atrial fibrillation in Japan: A claims database analysis. Journal of Cardiology. 2018, 172; No. of pages 6. | Boehringer Ingelheim | Adult patients (≥18 years) with NVAF treated with dabigatran or warfarin | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | Medical Data Vision Co. | Japan | Base-case, mixed, industry |
| Lai 2018 | Lai CL, et al. Dabigatran, Rivaroxaban, and Warfarin in the Oldest Adults with Atrial Fibrillation in Taiwan. J Am Geriatr Soc. 2018;66(8): 1567-1574. | None | Elderly patients (≥85 years) with NVAF and flutter treated with dabigatran, rivaroxaban, or warfarin | Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | No |
| Laliberte 2014 | Laliberte F, et al. Real-world comparative effectiveness and safety of rivaroxaban and warfarin in nonvalvular atrial fibrillation patients. Curr Med Res Opin. 2014;30(7):1317-25 | Janssen Scientific Affairs, LLC | Patients with NVAF newly initiated on rivaroxaban or warfarin | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Symphony Health Solutions’ Patient Transactional Datasets | US | Base-case, industry |
| Lamberts 2017 | Lamberts M, et al. Major Bleeding Complications and Persistence With Oral Anticoagulation in Non‐Valvular Atrial Fibrillation: Contemporary Findings in Real‐Life Danish Patients. Journal of the American Heart Association. 2017 Feb 1;6(2):e004517. | Pfizer and BMS | Patients with NVAF newly initiated on apixaban, rivaroxaban, dabigatran, or warfarin | Apixaban, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | Base-case, mixed, industry |
| Larsen 2014 | Larsen T, et al. Bleeding Events Among New Starters and Switchers to Dabigatran Compared with Warfarin in Atrial Fibrillation. The American Journal Of Medicine. 2014;127(7), 650-656.e5. | None | Patients with AF initiating dabigatran therapy | Dabigatran, VKA | Retrospective cohort | Registry | Danish National Patient Register, Danish National prescription registry, Danish Civil registration system | Denmark | No |
| Larsen 2014 | Larsen TB, et al. Dabigatran and warfarin for secondary prevention of stroke in atrial fibrillation patients: A nationwide cohort study. Am J Med. 2014.127(12),1172-1178. | None | Patients with NVAF with a history of stroke/TIA making a first-time purchase of dabigatran | Dabigatran, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | No |
| Larsen 2013 | Larsen TB, et al. Efficacy and safety of dabigatran etexilate and warfarin in “real-world” patients with atrial fibrillation: a prospective nationwide cohort study. Journal of the American College of Cardiology. 2013.61(22), 2264-2273. | None | Previously untreated patients with NVAF initiating warfarin or dabigatran | Dabigatran, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | No |
| Larsen 2016 | Larsen TB, et al. Comparative effectiveness and safety of non-vitamin K antagonist oral anticoagulants and warfarin in patients with atrial fibrillation: propensity weighted nationwide cohort study. bmj. 2016 Jun 16;353:i3189. | None | Patients with NVAF who were naïve to oral anticoagulants | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | Base-case, standard, non-industry |
| Lau 2017 | Lau WCY, et al. Bleeding-related hospital admissions and 30-day readmissions in patients with non-valvular atrial fibrillation treated with dabigatran versus warfarin. J Thromb Haemost. 2017;15(10):1923-33. | None | Adult patients (≥18 years) with NVAF initiating dabigatran or warfarin | Dabigatran, VKA | Retrospective cohort | Registry | Clinical Data Analysis and Reporting System of the Hong Kong Hospital Authority | Hong Kong | Base-case, mixed, reduced, non-industry |
| Lauffenburger 2015 | Lauffenburger JC, et al. Effectiveness and safety of dabigatran and warfarin in real-world US patients with non-valvular atrial fibrillation: a retrospective cohort study. J Am Heart Assoc. 2015;4(4) | None | Adult (≥18 years) patients with NVAF | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Lee 2018 | Lee CJ, et al. Risk of Myocardial Infarction in Anticoagulated Patients With Atrial Fibrillation. J Am Coll Cardiol. 2018;72(1):17-26. | None | Oral anticoagulant-naïve adults with NVAF who were initiating apixaban, dabigatran, rivaroxaban, or VKA | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | No |
| Lee 2019 | Lee HF, et al. Effectiveness and Safety of Non-Vitamin K Antagonist Oral Anticoagulant and Warfarin in Cirrhotic Patients With Nonvalvular Atrial Fibrillation. J Am Heart Assoc. 2019;8(5):e011112. | None | Taiwanese patients with liver cirrhosis and NVAF who were prescribed apixaban, dabigatran rivaroxaban or warfarin | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | No |
| Lee 2018 | Lee HF, et al. The effectiveness and safety of low-dose rivaroxaban in Asians with non-valvular atrial fibrillation. Int J Cardiol. 2018;261:78-83. | None | Patients with NVAF taking rivaroxaban or warfarin | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | No |
| Lee 2017 | Lee KH, et al. Optimal dose of dabigatran for the prevention of thromboembolism with minimal bleeding risk in Korean patients with atrial fibrillation. Europace. 2017 Dec 1;19(suppl\_4):iv1-iv9. | None | Patients with NVAF taking warfarin or Dabigatran | Dabigatran, VKA | Retrospective cohort | Hospital | Chonnam National University Hospital | Korea | Base-case, standard, reduced, non-industry |
| Lee 2019 | Chan YH, et al. Effectiveness and Safety of Four Direct Oral Anticoagulants in Asian Patients With Nonvalvular Atrial Fibrillation. Chest. 2019. 156:529-543 | None | Patients with NVAF and supranormal renal function (CrCl >80 mL/min) | Apixaban, Dabigatran, Edoxaban, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | Korea | No |
| Lee 2018 | Lee SR, et al. Edoxaban in Asian Patients With Atrial Fibrillation: Effectiveness and Safety. J Am Coll Cardiol. 2018;72(8):838-53. | Daiichi Sankyo Co, Ltd (Tokyo, Japan) | Patients with NVAF who were new users of edoxaban or warfarin | Edoxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | Korea | Base-case, mixed, standard, reduced, industry |
| Lee 2019 | Lee SR, et al. Comparison of Once-Daily Administration of Edoxaban and Rivaroxaban in Asian Patients with Atrial Fibrillation. Scientific Reports. 2019. 9:6690 | Daiichi Sankyo Co, Ltd (Tokyo, Japan) | Asian patients with NVAF | Edoxaban, rivaroxaban | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | Korea | Base-case, mixed, reduced, industry |
| Lee 2019 | Lee SR, et al. Optimal Rivaroxaban Dose in Asian Patients With Atrial Fibrillation and Normal or Mildly Impaired Renal Function. Stroke. 2019. 50:1140-1148 | None | Patients with NVAF and normal to mildly impaired renal function (CrCl >50 mL/min) | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | Korea | No |
| Lee 2019 | Lee SR, et al. Effectiveness and Safety of Contemporary Oral Anticoagulants Among Asians With Nonvalvular Atrial Fibrillation. Stroke. 2019. 50:2245-2249 | None | OAC naïve patients without previous stroke, ICH, or GI bleeding | Apixaban, dabigatran, edoxaban, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean Health Insurance Review Health Bigdata Hub | Korea | Base-case, mixed, standard, non-industry |
| Li 2016 | Li WH, et al. Efficacy and safety of dabigatran, rivaroxaban, and warfarin for stroke prevention in Chinese patients with atrial fibrillation: the Hong Kong Atrial Fibrillation Project. Clinical Cardiology. 2016 Nov 1. | None | Patients with NVAF treated with NOACs or warfarin | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Hospital | Queen Mary Hospital-based registry (Hong Kong) | Hong Kong | Base-case, mixed, non-industry |
| Li 2018 | Li X, et al. Apixaban 5 and 2.5 mg twice-daily versus warfarin for stroke prevention in nonvalvular atrial fibrillation patients: Comparative effectiveness and safety evaluated using a propensity-score-matched approach.PLoS One. 2018 Jan 26;13(1):e0191722 | Pfizer and BMS | Adult (≥18 years) patients with NVAF who initiated apixaban or warfarin | Apixaban, VKA | Retrospective cohort | Pharmacy/Claims | ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | US | Standard, reduced |
| Li 2017 | Li XS, et al. Effectiveness and safety of apixaban versus warfarin in non-valvular atrial fibrillation patients in "real-world" clinical practice. A propensity-matched analysis of 76,940 patients. Thromb Haemost. 2017;117(6):1072-82. | Pfizer and BMS | Adult (≥65 years) patients with NVAF initiating apixaban or warfarin | Apixaban, VKA | Retrospective cohort | Pharmacy/Claims | ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | US | No |
| Lin 2019 | Lin HD, et al. Re-evaluating Safety and Effectiveness of Dabigatran Versus Warfarin in a Nationwide Data Environment: A Prevalent New-User Design Study. Drugs Real World Outcomes. 2019;6(3):93‐104. | None | NVAF patients in Taiwan from 2012 through 2015, with at least one warfarin or dabigatran prescription on or after the date of incident AF diagnosis | Dabigatran, VKA | Retrospective cohort | Registry | Taiwan National Health Insurance Research Database | Taiwan | No |
| Lin 2017 | Lin J, et al. Major bleeding risk and healthcare economic outcomes of non-valvular atrial fibrillation patients newly-initiated with oral anticoagulant therapy in the real-world setting | Pfizer and BMS | Patients with NVAF (≥18 years) who initiated an OAC | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | IMS Real-world Adjudicated Claims database (formerly IMS Pharmetrics Plus) | US | No |
| Lip 2016 | Lip GY, et al. Major bleeding risk among non-valvular atrial fibrillation patients initiated on apixaban, dabigatran, rivaroxaban or warfarin: a "real-world" observational study in the United States. Int J Clin Pract. 2016;70(9):752-63. | Pfizer and BMS | Adult (≥18 years) patients with NVAF initiating warfarin, apixaban, dabigatran, or rivaroxaban | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Lip 2016 | Lip GY, et al. Real-world comparison of major bleeding risk among non-valvular atrial fibrillation patients initiated on apixaban, dabigatran, rivaroxaban, or warfarin. A propensity score matched analysis. Thromb Haemost. 2016;116(5): 975-986. | Pfizer and BMS | Patients with NVAF (≥18 years) who newly initiated OACs (warfarin, dabigatran, rivaroxaban, and apixaban) | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Lip 2018 | Lip GYH, et al. Effectiveness and safety of oral anticoagulants among nonvalvular atrial fibrillation patients: The ARISTOPHANES study. Stroke. 2018 Nov 8. [Epub ahead of print] | Pfizer and BMS | Patients with NVAF initiating apixaban, dabigatran, rivaroxaban, or warfarin | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | US | Base-case, mixed, standard, reduced, industry |
| Lip 2017 | Lip GYH, et al. Effectiveness and Safety of Standard-Dose Nonvitamin K Antagonist Oral Anticoagulants and Warfarin Among Patients With Atrial Fibrillation With a Single Stroke Risk Factor: A Nationwide Cohort Study. JAMA Cardiol. 2017 Aug 1;2(8):872-881. | None | Treatment naïve patients with NVAF and one low-risk, non-sex-related stroke risk factor treated with standard dose NOAC agents | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | No |
| Lopes 2018 | Lopes RD, et al. Effectiveness and Safety of Anticoagulants in Adults with Non-valvular Atrial Fibrillation and Concomitant Coronary/Peripheral Artery Disease. Am J Med. 2018 Sep;131(9):1075-1085.e4. doi: 10.1016/j.amjmed.2018.05.007. | Pfizer and BMS | NVAF patients (≥65 years) diagnosed with coronary/peripheral artery disease and newly initiating apixaban, rivaroxaban, dabigatran, or warfarin | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | No |
| Martinez 2019 | Martinez B, et al. Influence of Polypharmacy on the Effectiveness and Safety of Rivaroxaban versus Warfarin in Patients with Nonvalvular Atrial Fibrillation. Pharmacotherapy 2019;39(2):196–203 | Bayer Pharma AG | Oral anticoagulant-naïve patients with NVAF receiving rivaroxaban or warfarin | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Martinez 2018 | Martinez BK, et al. Effectiveness and safety of rivaroxaban vs. warfarin in patients with non-valvular atrial fibrillation and heart failure. ESC Heart Fail. 2018 Oct 9. doi: 10.1002/ehf2.12365. | Bayer Pharma AG | Adult patients with NVAF and heart failure who were initiating rivaroxaban or warfarin | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Martinez 2018 | Martinez BK, et al. Effectiveness and Safety of Apixaban, Dabigatran, and Rivaroxaban Versus Warfarin in Frail Patients With Nonvalvular Atrial Fibrillation. Journal of the American Heart Association. 2018;7(8), e008643 | Bayer Pharma AG | Frail NVAF patients | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Maura 2015 | Maura G, et al. Comparison of the short-term risk of bleeding and arterial thromboembolic events in nonvalvular atrial fibrillation patients newly treated with dabigatran or rivaroxaban versus vitamin K antagonists: a French nationwide propensity-matched cohort study. Circulation. 2015 Sep 29;132(13):1252-60 | None | Patients with NVAF who initiated dabigatran, rivaroxaban, or VKA | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Système National des Données de Santé | France | Base-case, mixed, standard, reduced, non-industry |
| Meng 2019 | Meng SW, et al. Direct Comparison of Low-Dose Dabigatran and Rivaroxaban for Effectiveness and Safety in Patients with Non-Valvular Atrial Fibrillation. Acta Cardiologica Sinica. 2019;35(1), 42-54. | None | Patients with NVAF newly initiating treatment with low dose dabigatran or low dose rivaroxaban | Dabigatran, Rivaroxaban | Retrospective cohort | Pharmacy/Claims | Taiwan National Health Insurance Research Database | Taiwan | No |
| Miao 2019 | Miao B, et al. Safety and effectiveness of oral factor Xa inhibitors versus warfarin in nonvalvular atrial fibrillation patients at high-risk for falls. Journal of Thrombosis & Thrombolysis. 2019. 48:366-372 | Bayer Pharma AG | Patients with NVAF who are oral anticoagulant naïve and have high risks for falls | Apixaban, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Miao 2020 | Miao B, et al. Rivaroxaban versus apixaban in non-valvular atrial fibrillation patients with end-stage renal disease or receiving dialysis. Eur J Haematol. 2020 Apr;104(4):328-335 | Bayer Pharma AG | NVAF patients with comorbid ESRD or receiving dialysis | Apixaban, Rivaroxaban | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Deitelzweig 2016 | Deitelzweig S, et al. An early evaluation of bleeding-related hospital readmissions among hospitalized patients with nonvalvular atrial fibrillation treated with direct oral anticoagulants. Curr Med Res Opin. 2016. 32:573-82 | Pfizer and BMS | Adults (≥18 years) with NVAF initiating apixaban, dabigatran or warfarin | Apixaban, Dabigatran, Rivaroxaban | Retrospective cohort | Registry | Premier Hospital database and the Cerner Health Facts hospital database | US | No |
| Mueller 2018 | Mueller T, et al. Comparative safety and effectiveness of direct oral anticoagulants in patients with atrial fibrillation in clinical practice in Scotland. Br J Clin Pharmacol. 2019 Feb;85(2):422-431. | None | Patients with NVAF newly initiating DOAC | Apixaban, dabigatran, rivaroxaban | Retrospective cohort | Pharmacy/Claims | Prescribing Information System, Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Scotland | Base-case, mixed, non-industry |
| Naganuma 2017 | Naganuma M, et al. Effectiveness and safety of dabigatran versus warfarin in “real-world” Japanese patients with atrial fibrillation: A single-center observational study. J Arrhythm. 2017; 33(2): 107–110 | None | Patients with NVAF | Dabigatran, VKA | Retrospective cohort | Hospital | Tokyo Women's Medical University Hospital | Japan | Base-case, mixed, non-industry |
| Nielsen 2017 | Nielsen PB, et al. Effectiveness and safety of reduced dose non-vitamin K antagonist oral anticoagulants and warfarin in patients with atrial fibrillation: propensity weighted nationwide cohort study. bmj. 2017 Feb 10;356:j510. | None | Patients with NVAF filling a first prescription for an oral anticoagulant | Dabigatran, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | Reduced |
| Nishtala 2016 | Nishtala PS, et al. 'Real-world' haemorrhagic rates for warfarin and dabigatran using population-level data in New Zealand. Int J Cardiol. 2016. 203:746-52 | None | Elderly patients (≥65 years) with NVAF who were prescribed dabigatran or warfarin | Apixaban, dabigatran, rivaroxaban, VKA | Prospective cohort | Registry | National Minimum Dataset- the national collection of all public and private hospital discharge information (Ministry of Health New Zealand; 2014) | New Zealand | Base-case, mixed, reduced, non-industry |
| Norby 2017 | Norby FL, et al. Comparative effectiveness of rivaroxaban versus warfarin or dabigatran for the treatment of patients with non-valvular atrial fibrillation. BMC Cardiovasc Disord. 2017;17(1):238. | None | Patients with NVAF initiating dabigatran, rivaroxaban, or warfarin or switching from warfarin to rivaroxaban | Dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | Non-industry |
| Noseworthy 2016 | Noseworthy PA, et al. Direct Comparison of Dabigatran, Rivaroxaban, and Apixaban for Effectiveness and Safety in Nonvalvular Atrial Fibrillation. Chest. 2016;150(6):1302-12. | None | Adult patients with NVAF using Dabigatran, Rivaroxaban, and Apixaban | Apixaban, Dabigatran, Rivaroxaban | Retrospective cohort | Pharmacy/Claims | Optum Labs Data Warehouse | US | No |
| Ohshima 2020 | Ohshima A, et al. Oral anticoagulants usage in Japanese patients aged 18-74 years with non-valvular atrial fibrillation: a retrospective analysis based on insurance claims data. Family Practice. 2019. 36:685-692 | None | Japanese patients with NVAF taking DOACs or warfarin | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | Japanese Medical Data Centre | Japan | Base-case, mixed, non-industry |
| Shantha 2017 | Shantha GPS, et al. Sex-Specific Comparative Effectiveness of Oral Anticoagulants in Elderly Patients With Newly Diagnosed Atrial Fibrillation. Circ Cardiovasc Qual Outcomes. 2017;10(4). | None | Newly diagnosed patients with NVAF, initiating dabigatran, rivaroxaban, or warfarin | Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | No |
| Shantha 2017 | Shantha GPS, et al. Sex-Specific Associations of Oral Anticoagulant Use and Cardiovascular Outcomes in Patients With Atrial Fibrillation. Journal of the American Heart Association. 2017. 6:18. | None | Adult patients with NVAF | Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | CMS | US | No |
| Park 2019 | Park J, et al. Effectiveness and Safety of Direct Oral Anticoagulant for Secondary Prevention in Asians with Atrial Fibrillation. Journal of clinical medicine. 2019;8(12):2228 | None | OAC-naïve patients with non-valvular AF and a history of stroke | Apixaban, Dabigatran, Edoxaban, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Korean National Health Insurance Service Database | South Korea | No |
| Peterson 2019 | Peterson ED, et al. Comparative effectiveness, safety, and costs of rivaroxaban and warfarin among morbidly obese patients with atrial fibrillation. Am Heart J. 2019;212:113-119. | Janssen Scientific Affairs, LLC | Morbidly obese patients with NVAF | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | MarketScan and Medicare Supplemental databases | US | No |
| Pratt 2019 | Pratt NL, et al. Comparative effectiveness and safety of low-strength and high-strength direct oral anticoagulants compared with warfarin: a sequential cohort study. BMJ Open. 2019 5;9(5):e026486. | None | Australian veteran population | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Australian Government Department of Veterans’ Affairs administrative claims database | Australia | Base-case, standard, reduced, non-industry |
| Ramagopalan 2018 | Ramagopalan SV, et al. Patient characteristics and bleeding events in nonvalvular atrial fibrillation patients treated with apixaban or vitamin K antagonists: real-world evidence from Italian administrative databases. J Comp Eff Res. 2018;7(11): 1063-1071. | Pfizer and BMS | Patients with NVAF (≥18 years) who received a first prescription of apixaban or VKA | Apixaban, VKA | Retrospective cohort | Registry | Administrative database of Italian local health units | Italy | Base-case, standard, industry |
| Ramagopalan 2019 | Ramagopalan SV, et al. Patient characteristics and stroke and bleeding events in nonvalvular atrial fibrillation patients treated with apixaban and vitamin K antagonists: a Spanish real-world study. J Comp Eff Res. 2019;8(14):1201‐1212. | Pfizer and BMS | Patients with NVAF newly initiated on apixaban or VKA | Apixaban, VKA | Retrospective cohort | Registry | BIG-PAC® database (2017 Real Life Data) | Spain | Base-case, mixed, industry |
| Russo-Alvarez 2018 | Russo-Alvarez G, et al. Thromboembolic and Major Bleeding Events With Rivaroxaban Versus Warfarin Use in a Real-World Setting. Ann Pharmacother. 2018;52(1):19-25. | None | Adult patients with NVAF initiated on warfarin or rivaroxaban | Rivaroxaban, VKA | Retrospective cohort | Hospital | Cleveland Clinic Health Systems | US | Base-case, mixed, non-industry |
| Rutherford 2019 | Rutherford OW, et al. Comparison of dabigatran, rivaroxaban, and apixaban for effectiveness and safety in atrial fibrillation: a nationwide cohort study. Eur Heart J Cardiovasc Pharmacother. 2020;6(2):75–85. | Pfizer and BMS | NVAF Patients ≥ 18 yrs old, and ≥ 1 anti-coagulant dispensation in the study period but NOAC naïve before study start. | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Registry | Norwegian Patient Registry | Norway | Base-case, mixed, standard, reduced, industry |
| Schneeweiss 2019 | Schneeweiss S, et al. Sequential Monitoring of the Comparative Effectiveness and Safety of Dabigatran in Routine Care. Circulation: Cardiovascular Quality And Outcomes. 2019;12(2). | Boehringer Ingelheim | Nonvalvular AF patients in routine care | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | MarketScan and Clinformatics, Optum | US | No |
| Seeger 2017 | Seeger JD, et al. Propensity Score Weighting Compared to Matching in a Study of Dabigatran and Warfarin. Drug Saf. 2017;40(2):169-181 | Boehringer Ingelheim | Patients were ≥ 18 years of age, prior diagnosis with AF treated with dabigatran or warfarin, but no use in previous year | Dabigatran, VKA | Retrospective cohort | Registry | MarketScan and Clinformatics, Optum | US | No |
| Seeger 2015 | Seeger JD, et al. Safety and effectiveness of dabigatran and warfarin in routine care of patients with atrial fibrillation. Thromb Haemost. 2015. 114:1277-89 | Boehringer Ingelheim | Patients with NVAF who were prescribed dabigatran or warfarin for stroke prevention | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | MarketScan and Clinformatics, Optum | US | No |
| Shah 2018 | Shah S, et al. Comparative effectiveness of direct oral anticoagulants and warfarin in patients with cancer and atrial fibrillation. Blood Adv. 2018 Feb 13;2(3):200-209. | None | Adult patients (≥18 years) with NVAF who were prescribed warfarin, rivaroxaban, dabigatran, or apixaban | Apixaban, Dabigatran, Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Yap 2015 | Yap LB, et al. A Comparison of Dabigatran With Warfarin for Stroke Prevention in Atrial Fibrillation in an Asian Population. Clinical and Applied Thrombosis/Hemostasis. 2015:1-6 | None | Patients with NVAF who were prescribed dabigatran and warfarin | Dabigatran, VKA | Retrospective cohort | Registry | Registry at the Malaysia’s National Heart Institute | Malaysia | Base-case, mixed, non-industry |
| Siontis 2018 | Siontis KC, et al. Outcomes Associated With Apixaban Use in Patients With End-Stage Kidney Disease and Atrial Fibrillation in the United States. Circulation. 2018 Oct 9;138(15):1519-1529. | None | Newly diagnosed patients with NVAF and end-stage kidney disease who were receiving dialysis and initiating treatment with an oral anticoagulant | Apixaban, VKA | Retrospective cohort | Pharmacy/Claims | United States Renal Data System | US | Base-case, mixed, non-industry |
| Sjalander 2018 | Själander S, et al. Dabigatran, rivaroxaban and apixaban vs. high TTR warfarin in atrial fibrillation. Thromb Res. 2018 May 17;167:113-118 | None | Patients with NVAF starting a new treatment period with warfarin, dabigatran, rivaroxaban, or apixaban | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Registry | The Swedish anticoagulation quality registry (Auricula) | Sweden | Base-case, mixed, non-industry |
| Song 2017 | Song X, et al. Comparison of all-cause, stroke, and bleed-specific healthcare resource utilization among patients with non-valvular atrial fibrillation (NVAF) and newly treated with dabigatran or warfarin. Expert Rev Pharmacoecon Outcomes Res. 2018: 1-10. | Boehringer Ingelheim | Patients with NVAF (≥18 years old) who were newly treated with dabigatran or warfarin | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | Base-case, mixed, industry |
| Staerk 2017 | Staerk L, et al. Ischaemic and haemorrhagic stroke associated with non-Vitamin K antagonist oral anticoagulants and warfarin use in patients with atrial fibrillation: A nationwide cohort study. European Heart Journal. 2017. 38(12):907-915 | None | Patients with NVAF who were anticoagulant-naïve | Apixaban, dabigatran, rivaroxaban | Retrospective cohort | Registry | Danish National Patient Register | Denmark | Base-case, mixed, non-industry |
| Staerk 2018 | Staerk L, et al. Standard and reduced doses of dabigatran, rivaroxaban and apixaban for stroke prevention in atrial fibrillation: a nationwide cohort study. Journal of internal medicine. 2018 Jan 1;283(1):45-55. | None | Patients with NVAF who were oral anticoagulant-naïve and initiated NOAC treatment | Apixaban, dabigatran, rivaroxaban | Retrospective cohort | Registry | Danish National Patient Register | Denmark | Reduced |
| Staerk 2015 | Staerk L, et al. Risk of gastrointestinal adverse effects of dabigatran compared with warfarin among patients with atrial fibrillation: a nationwide cohort study. Europace. 2015;17:1215–1222. | None | OAC-naïve patients with NVAF initiating or switching to dabigatran | Dabigatran, VKA | Retrospective cohort | Registry | Danish National Patient Register | Denmark | Base-case, standard, non-industry |
| Tepper 2018 | Tepper PG, et al. Real-world comparison of bleeding risks among non-valvular atrial fibrillation patients prescribed apixaban, dabigatran, or rivaroxaban. PLoS One. 2018 Nov 1;13(11):e0205989 | Pfizer and BMS | Adult patients with NVAF who were new initiators of NOACs or switched from warfarin to NOACs | Apixaban, Dabigatran, Rivaroxaban | Retrospective cohort | Pharmacy/Claims | Truven MarketScan | US | No |
| Ujeyl 2018 | Ujeyl M, et al. Comparative risks of bleeding, ischemic stroke and mortality with direct oral anticoagulants versus phenprocoumon in patients with atrial fibrillation. Eur J Clin Pharmacol. 2018. | None | Adult (≥18 years) patients with NVAF initiating rivaroxaban, dabigatran, apixaban, or phenprocoumon | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Germany | Base-case, mixed, non-industry |
| Vaughan 2014 | Vaughan Sarrazin MS, et al. Bleeding rates in Veterans Affairs patients with atrial fibrillation who switch from warfarin to dabigatran. Am J Med. 2014. Volume 127, Issue 12, December 2014, Pages 1179–1185 | None | Patients with NVAF who switched from warfarin to dabigatran | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | VA National administrative encounter and Pharmacy Data | US | No |
| Villines 2018 | Villines TC, et al. Comparative safety and effectiveness of dabigatran versus rivaroxaban and apixaban in patients with non-valvular atrial fibrillation: a retrospective study from a large healthcare system. Eur Heart J Cardiovasc Pharmacother. 2018 Nov 30. | Boehringer Ingelheim | Adult patients with NVAF newly initiating treatment with dabigatran, rivaroxaban, or apixaban | Apixaban, dabigatran, rivaroxaban | Retrospective cohort | Pharmacy/Claims | DoD Database | US | Base-case, standard, industry |
| Villines 2015 | Villines TC, et al. A comparison of the safety and effectiveness of dabigatran and warfarin in non-valvular atrial fibrillation patients in a large healthcare system. Thromb Haemost. 2015. 114:1290-8 | Boehringer Ingelheim | Patients with NVAF who were oral anticoagulant treatment naïve and receiving their first prescription for either dabigatran or warfarin | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | DoD Database | US | Base-case, mixed, standard, industry |
| Vinogradova 2018 | Vinogradova Y, et al. Risks and benefits of direct oral anticoagulants versus warfarin in a real world setting: cohort study in primary care. BMJ 2018;362:k2505 | None | Adults (21–99 years) patients with AF without anticoagulant prescriptions for 12 months before study entry | Apixaban, dabigatran, rivaroxaban, VKA | Prospective cohort | Registry | QResearch and Clinical Practice Research Datalink databases. | UK | Base-case, mixed, standard, reduced, non-industry |
| Wanat 2019 | Wanat MA, et al. Warfarin vs. apixaban in nonvalvular atrial fibrillation, and analysis by concomitant antiarrhythmic medication use: A national retrospective study. Research and practice in thrombosis and haemostasis. 2019;3(4):674–683 | Pfizer and BMS | Patients with NVAF on warfarin or apixaban | Apixaban, VKA | Retrospective cohort | Pharmacy/Claims | GE Centricity EMR database | US | Base-case, mixed, industry |
| Wang 2018 | Wang SV, et al. Generalized boosted modeling to identify subgroups where effect of dabigatran versus warfarin may differ: An observational cohort study of patients with atrial fibrillation. Pharmacoepidemiol Drug Saf. 2018;27:383–390 | None | Adults (≥18 years) with NVAF initiating dabigatran or warfarin | Dabigatran, VKA | Retrospective cohort | Pharmacy/Claims | MarketScan and Clinformatics, Optum | US | No |
| Wee 2017 | Wee XT, et al. Incidence of thromboembolic and bleeding events in patients with newly diagnosed nonvalvular atrial fibrillation: An Asian multicenter retrospective cohort study in Singapore. Clin Cardiol. 2017 Dec;40(12):1218-1226. | None | Newly diagnosed patients with NVAF (≥21 years) treated with DOACs or warfarin | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Hospital | Khoo Teck Puat Hospital, Tan Tock Seng Hospital, National University Hospital, National Heart Centre Singapore | Singapore | Base-case, mixed, non-industry |
| Weir 2017 | Weir MR, et al. Impact of renal function on ischemic stroke and major bleeding rates in nonvalvular atrial fibrillation patients treated with warfarin or rivaroxaban: a retrospective cohort study using real-world evidence. Curr Med Res Opin. 2017 Oct;33(10):1891-1900. | Janssen Scientific Affairs, LLC | Adult patients with NVAF who were treated with rivaroxaban or warfarin | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Optum-Humedica | US | No |
| Weir 2018 | Weir MR, et al. Evaluation of clinical outcomes among nonvalvular atrial fibrillation patients treated with rivaroxaban or warfarin, stratified by renal function. Clin Nephrol. 2018;89(5): 314-329. | Janssen Scientific Affairs, LLC | Adult patients with NVAF who were treated with warfarin or rivaroxaban | Rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | IMS Real-world Adjudicated Claims database (formerly IMS Pharmetrics Plus) | US | No |
| Yao 2016 | Yao X, et al. Effectiveness and Safety of Dabigatran, Rivaroxaban, and Apixaban Versus Warfarin in Nonvalvular Atrial Fibrillation. Journal of the American Heart Association. 2016 Jun 1;5(6):e003725. | None | Patients with NVAF who were users of apixaban, dabigatran, rivaroxaban, or warfarin | Apixaban, dabigatran, rivaroxaban, VKA | Retrospective cohort | Pharmacy/Claims | Optum Labs Data Warehouse | US | Non-industry |

Abbreviations: AF = atrial fibrillation; BMS = Bristol Myers Squibb; CAD = coronary artery disease; CMS = Centers for Medicare and Medicaid Services; CrCl = creatinine clearance; DOAC = direct oral anticoagulant drug; DoD = Department of Defense; DSS = Department of Social Services; EMR = electronic medical record; ESRD = end-stage renal disease; GE = General Electric; GI = gastrointestinal; ICH = intracranial hemorrhage; NMA = network meta-analysis; NVAF = non-valvular atrial fibrillation; OAC = oral anticoagulant; P4P = pay for performance; PAD = peripheral artery disease; T2DM = type 2 diabetes mellitus; TIA = transient ischemic attack; UK = United Kingdom; US = United States; VA = Veteran’s Affairs; VKA = vitamin K antagonist

Supplemental Table 5. Outcomes from Studies Included in the Network Meta-analysis

| **Data Source** | **Author and Year** | **Outcome** | **Treatment Name** | **Treatment Dose** | **Treatment N** | **Comparator** | **Comparator N** | **HR** | **Lower 95% CI** | **Upper 95% CI** | **SE** | **P-value** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | Major bleeding | Dabigatran | 75, 110 or 150 mg | 8,539 | Warfarin | 23431 | 0.67 | 0.6 | 0.76 | NR | NR |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | Major bleeding | Apixaban | 2.5 or 5 mg | 3,689 | Warfarin | 23431 | 0.52 | 0.41 | 0.67 | NR | NR |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | Major bleeding | Rivaroxaban | >10 mg | 8,398 | Warfarin | 23431 | 1 | 0.89 | 1.12 | NR | NR |
| Internal and Cardiovascular Medicine – Stroke Unit of the University of Perugia, Italy | Becattini 2018 | Major bleeding | Rivaroxaban | 75, 110 or 150 mg | 304 | Dabigatran | 126 | 0.96 | 0.48 | 1.93 | NR | 1 |
| Internal and Cardiovascular Medicine – Stroke Unit of the University of Perugia, Italy | Becattini 2018 | Major bleeding | Apixaban | 75, 110 or 150 mg | 15 | Dabigatran | 126 | 0.45 | 0.18 | 1.15 | NR | 0.096 |
| Système National des Données de Santé (SNDS) | Blin 2020 | Major bleeding | Dabigatran | Mixed: 110 mg (63.8%) | 20489 | VKA | 20489 | 0.55 | 0.46 | 0.66 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2020 | Major bleeding | Rivaroxaban | Mixed: 15 mg (40%) | 23053 | VKA | 23053 | 0.68 | 0.58 | 0.79 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | Major bleeding | Dabigatran | 150 mg | 6565 (person-years) | VKA | 27,242 (person-years) | 0.3 | 0.21 | 0.43 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | Major bleeding | Dabigatran | 110 mg | 8,980 (person-years) | VKA | 27,242 (person-years) | 0.61 | 0.51 | 0.73 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | Major bleeding | Rivaroxaban | 20 mg | 31171 | VKA | 31171 | 0.67 | 0.59 | 0.77 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | Major bleeding | Rivaroxaban | 15 mg | 23314 | VKA | 23314 | 0.84 | 0.74 | 0.96 | NR | NR |
| CMS | Briasoulis 2018 | Major bleeding | Rivaroxaban | 20 mg | 13407 | Warfarin | 13407 | 1.1 | 0.8 | 1.5 | NR | 0.5 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Edoxaban | 30/15, or 60 mg | 4577 | Warfarin | 19761 | 0.42 | 0.28 | 0.64 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Apixaban | 2.5 or 5 mg | 9952 | Warfarin | 19761 | 0.34 | 0.23 | 0.5 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Rivaroxaban | 15/10, or 20 mg | 33022 | Warfarin | 19761 | 0.55 | 0.41 | 0.75 | NR | 0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Dabigatran | 110 or 150 mg | 22371 | Warfarin | 19761 | 0.56 | 0.41 | 0.77 | NR | 0.0003 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Edoxaban | 60 mg | 1653 | Warfarin | 19761 | 0.37 | 0.19 | 0.74 | NR | 0.0048 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Apixaban | 5 mg | 3593 | Warfarin | 19761 | 0.28 | 0.16 | 0.51 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Rivaroxaban | 20 mg | 1914 | Warfarin | 19761 | 0.71 | 0.27 | 1.86 | NR | 0.483 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Dabigatran | 150 mg | 2550 | Warfarin | 19761 | 0.51 | 0.23 | 1.16 | NR | 0.1104 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Edoxaban | 30/15 mg | 2924 | Warfarin | 19761 | 0.44 | 0.27 | 0.72 | NR | 0.0011 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Apixaban | 2.5 mg | 6359 | Warfarin | 19761 | 0.38 | 0.24 | 0.59 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Rivaroxaban | 15/10 mg | 31108 | Warfarin | 19761 | 0.54 | 0.4 | 0.74 | NR | 0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Major bleeding | Dabigatran | 110 mg | 19821 | Warfarin | 19761 | 0.57 | 0.41 | 0.78 | NR | 0.0005 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | Major bleeding | Dabigatran | 110 mg | 12593 | Warfarin | 10409 | 0.85 | 0.71 | 1 | NR | 0.0503 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | Major bleeding | Rivaroxaban | 10 or 15 mg | 21000 | Warfarin | 10409 | 0.99 | 0.85 | 1.15 | NR | 0.8865 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | Major bleeding | Apixaban | 2.5 mg | 12502 | Warfarin | 10409 | 0.7 | 0.58 | 0.85 | NR | 0.0003 |
| Stockholm administrative health data register | Forslund 2017 | Major bleeding | Dabigatran | 75, 110 or 150 mg | 3322 | Warfarin | 12919 | 0.96 | 0.77 | 1.2 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | Major bleeding | Rivaroxaban | 10, 15, or 20 mg | 2370 | Warfarin | 12919 | 1.05 | 0.83 | 1.34 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | Major bleeding | Apixaban | 2.5 or 5 mg | 3587 | Warfarin | 12919 | 1.05 | 0.82 | 1.34 | NR | NR |
| CMS | Graham 2015 | Major bleeding | Dabigatran | 75 or 150 mg | 67207 | Warfarin | 67207 | 0.97 | 0.88 | 1.07 | NR | 0.5 |
| DOD Database | Gupta 2019 | Major bleeding | Dabigatran | 75 mg | 566 | Warfarin | 566 | 1.3 | 0.7 | 2.41 | NR | vs. Standard dose: 0.369 |
| DOD Database | Gupta 2019 | Major bleeding | Rivaroxaban | 15 mg | 2561 | Warfarin | 2561 | 0.84 | 0.63 | 1.12 | NR | vs. Standard dose: 0.054 |
| DOD Database | Gupta 2019 | Major bleeding | Apixaban | 2.5 mg | 1893 | Warfarin | 1893 | 0.66 | 0.46 | 0.95 | NR | vs. Standard dose: 0.803 |
| DOD Database | Gupta 2019 | Major bleeding | Dabigatran | 75 or 150 mg | 3691 | Warfarin | 3691 | 1.05 | 0.79 | 1.4 | NR | 0.73 |
| DOD Database | Gupta 2019 | Major bleeding | Rivaroxaban | 15 or 20 mg | 8226 | Warfarin | 8226 | 1.07 | 0.91 | 1.27 | NR | 0.423 |
| DOD Database | Gupta 2019 | Major bleeding | Apixaban | 2.5 or 5 mg | 7607 | Warfarin | 7607 | 0.65 | 0.53 | 0.8 | NR | <0.001 |
| DOD Database | Gupta 2019 | Major bleeding | Dabigatran | 150 mg | 3125 | Warfarin | 3125 | 0.94 | 0.68 | 1.31 | NR | Ref (comparing dosages) |
| DOD Database | Gupta 2019 | Major bleeding | Rivaroxaban | 20 mg | 5665 | Warfarin | 5665 | 1.19 | 0.97 | 1.47 | NR | Ref (comparing dosages) |
| DOD Database | Gupta 2019 | Major bleeding | Apixaban | 5 mg | 5714 | Warfarin | 5714 | 0.62 | 0.48 | 0.81 | NR | Ref (comparing dosages) |
| Administrative databases from Ontario: Ontario Public Drug Benefit Program Database, Canadian Institute for Health Information (CIHI) Discharge Abstract Database, CIHI National Ambulatory Care Reporting System, Ontario Health Insurance Plan (OHIP) database, Registered Persons Database and Ontario Diabetes Database | Harel 2016 | Major bleeding | Dabigatran | ≤ 220 mg and >220 mg | 200 | Warfarin | 6064 | 0.9† | 0.64 | 1.25 | NR | NR |
| Administrative databases from Ontario: Ontario Public Drug Benefit Program Database, Canadian Institute for Health Information (CIHI) Discharge Abstract Database, CIHI National Ambulatory Care Reporting System, Ontario Health Insurance Plan (OHIP) database, Registered Persons Database and Ontario Diabetes Database | Harel 2016 | Major bleeding | Rivaroxaban | ≤ 15 mg and > 15 mg | 33 | Warfarin | 6064 | 0.97† | 0.44 | 2.11 | NR | NR |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Apixaban | 2.5 or 5 mg | 10117 | Phenprocoumon | 23823 | 0.58 | 0.49 | 0.69 | NR | <0.001 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Dabigatran | 110 or 150 mg | 5122 | Phenprocoumon | 23823 | 0.64 | 0.5 | 0.8 | NR | <0.001 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Rivaroxaban | 15 or 20 mg | 22143 | Phenprocoumon | 23823 | 0.99 | 0.88 | 1.1 | NR | <0.001 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Apixaban | 5 mg | 6376 | Phenprocoumon | 23823 | 0.48 | 0.37 | 0.61 | NR | NR |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Dabigatran | 150 mg | 2526 | Phenprocoumon | 23823 | 0.47 | 0.3 | 0.74 | NR | NR |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Rivaroxaban | 20 mg | 15923 | Phenprocoumon | 23823 | 0.96 | 0.84 | 1.1 | NR | NR |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Apixaban | 2.5 mg | 3741 | Phenprocoumon | 23823 | 0.68 | 0.55 | 0.84 | NR | 0.037 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Dabigatran | 110 mg | 2596 | Phenprocoumon | 23823 | 0.72 | 0.55 | 0.94 | NR | 0.111 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Major bleeding | Rivaroxaban | 15 mg | 6220 | Phenprocoumon | 23823 | 1.03 | 0.88 | 1.19 | NR | 0.495 |
| Diabetes P4P database | Hsu 2018 | Major bleeding | Dabigatran | 110 or 150 mg | 305 | Warfarin | 305 | 0.665 | 0.431 | 1.024 | NR | 0.0641 |
| Diabetes P4P database | Hsu 2018 | Major bleeding | Rivaroxaban | 10 or 15 mg | 300 | Warfarin | 301 | 1.202 | 0.766 | 1.884 | NR | 0.4239 |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Major bleeding | Apixaban | Standard dose (unspecified) | NR | Dabigatran | NR | 1.07 | 0.77 | 1.47 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Major bleeding | Apixaban | Reduced dose (unspecified) | NR | Dabigatran | NR | 0.62 | 0.44 | 0.88 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Major bleeding | Apixaban | Standard dose (unspecified) | NR | Rivaroxaban | NR | 0.69 | 0.54 | 0.88 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Major bleeding | Apixaban | Reduced dose (unspecified) | NR | Rivaroxaban | NR | 0.45 | 0.33 | 0.61 | NR | NR |
| Chonnam National University Hospital (Korea) | Jeong 2019 | Major bleeding | Rivaroxaban | 15 or 20 mg | 804 | Warfarin | 804 | 0.41 | 0.22 | 0.76 | NR | 0.004 |
| Japan Medical Data Vision Co. | Kohsaka 2017 | Major bleeding | Apixaban | 2.5 or 5 mg | 5977 | Warfarin | 5977 | 0.586 | 0.421 | 0.815 | NR | 0.002 |
| Japan Medical Data Vision Co. | Kohsaka 2017 | Major bleeding | Dabigatran | 110 or 150 mg | 5090 | Warfarin | 6726 | 0.617 | 0.425 | 0.895 | NR | 0.011 |
| Japan Medical Data Vision Co. | Kohsaka 2017 | Major bleeding | Rivaroxaban | 10 or 15 mg | 6726 | Warfarin | 5090 | 0.693 | 0.514 | 0.933 | NR | 0.016 |
| Martini Hospital Groningen, the Netherlands | Korenstra 2015 | Major bleeding | Dabigatran | NR | 333 | Acenocoumarol | 383 | 0.39\* | 0.18 | 0.86 | NR | 0.019 |
| Symphony Health Solutions’ Patient Transactional Datasets | Laliberte 2014 | Major bleeding | Rivaroxaban | Dosing pattern, mg per day, mean (SD): Rivaroxaban : 19.1 (2.1) | 3654 | Warfarin | 14616 | 1.08 | 0.71 | 1.64 | NR | 0.7209 |
| Danish National Patient Register | Lamberts 2017 | Major bleeding | Rivaroxaban | 10, 15, or 20 mg | 6715 | Apixaban | 7963 | 1.49 | 1.27 | 1.77 | NR | NR |
| Danish National Patient Register | Lamberts 2017 | Major bleeding | Dabigatran | 110 or 150 mg | 15413 | Apixaban | 7963 | 1.17 | 1 | 1.38 | NR | NR |
| Danish National Patient Register | Lamberts 2017 | Major bleeding | Warfarin | NR | 24230 | Apixaban | 7963 | 1.23 | 1.05 | 1.43 | NR | NR |
| Danish National Patient Register | Larsen 2016 | Major bleeding | Apixaban | 5 mg | 6349 | Warfarin | 35436 | 0.61 | 0.49 | 0.75 | NR | NR |
| Danish National Patient Register | Larsen 2016 | Major bleeding | Dabigatran | 150 mg | 12701 | Warfarin | 35436 | 0.58 | 0.47 | 0.71 | NR | NR |
| Danish National Patient Register | Larsen 2016 | Major bleeding | Rivaroxaban | 20 mg | 7192 | Warfarin | 35436 | 1.06 | 0.91 | 1.23 | NR | NR |
| Clinical Data Analysis and Reporting System (CDARS) of the Hong Kong Hospital Authority | Lau 2017 | Major bleeding | Dabigatran | 75, 110 or 150 mg | 2580 | Warfarin | 2580 | 0.92\* | 0.66 | 1.28 | NR | NR |
| Clinical Data Analysis and Reporting System (CDARS) of the Hong Kong Hospital Authority | Lau 2017 | Major bleeding | Dabigatran | 110 mg | 1991 | Warfarin | 1991 | 1.04\* | 0.71 | 1.54 | NR | NR |
| Chonnam National University Hospital (Korea) | Lee 2017 | Major bleeding | Dabigatran | 150 mg | 183 | Warfarin | 549 | 0.54 | 0.18 | 1.59 | NR | 0.264 |
| Chonnam National University Hospital (Korea) | Lee 2017 | Major bleeding | Dabigatran | 110 mg | 366 | Warfarin | 549 | 0.19 | 0.07 | 0.55 | NR | 0.002 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | Major bleeding | Edoxaban | 30 or 60 mg | 4061 | Warfarin | 12183 | 0.532 | 0.352 | 0.773 | NR | 0.001 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | Major bleeding | Edoxaban | 30 mg | 2371 | Warfarin | 7113 | 0.693 | 0.43 | 1.062 | NR | 0.274 |
| Korean National Health Insurance Service (NHIS) | Lee 2019 | Major bleeding | Edoxaban | 15/10, or 20 mg | 12369 | Rivaroxaban | 4123 | 0.775 | 0.515 | 1.124 | NR | 0.197 |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Major bleeding | Dabigatran | 150 mg | 5996 | Rivaroxaban 20 mg | 14852 | 0.811 | 0.616 | 1.053 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Major bleeding | Apixaban | 5 mg | 10187 | Rivaroxaban 20 mg | 14852 | 0.754 | 0.601 | 0.94 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Major bleeding | Edoxaban | 60 mg | 6390 | Rivaroxaban 20 mg | 14852 | 0.708 | 0.513 | 0.96 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Major bleeding | Rivaroxaban | Mixed | 35965 | Warfarin | 25420 | 0.778 | 0.695 | 0.872 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Major bleeding | Dabigatran | Mixed | 17745 | Warfarin | 25420 | 0.624 | 0.537 | 0.724 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Major bleeding | Apixaban | Mixed | 22177 | Warfarin | 25420 | 0.6 | 0.52 | 0.691 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Major bleeding | Edoxaban | Mixed | 15496 | Warfarin | 25420 | 0.556 | 0.462 | 0.665 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Apixaban | 5 mg | 76107 | Warfarin | 100977 | 0.58 | 0.55 | 0.62 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Dabigatran | 150 mg | 30997 | Warfarin | 36990 | 0.67 | 0.6 | 0.74 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Rivaroxaban | 20 mg | 88157 | Warfarin | 125068 | 1.07 | 1.02 | 1.13 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Apixaban | 2.5 or 5 mg | 100977 | Warfarin | 100977 | 0.6 | 0.56 | 0.63 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Dabigatran | 75 or 150 mg | 36990 | Warfarin | 36990 | 0.71 | 0.65 | 0.78 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Rivaroxaban | 10, 15, or 20 mg | 125068 | Warfarin | 125068 | 1.06 | 1.02 | 1.1 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Apixaban | 2.5 mg | 24870 | Warfarin | 100977 | 0.56 | 0.51 | 0.61 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Dabigatran | 75 mg | 5993 | Warfarin | 36990 | 0.83 | 0.7 | 0.99 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Major bleeding | Rivaroxaban | 10 or 15 mg | 36911 | Warfarin | 125068 | 1.04 | 0.98 | 1.11 | NR | NR |
| Système National des Données de Santé (SNDS) | Maura 2015 | Major bleeding | Dabigatran | 75 or 110 mg | 5895 | VKA | 11571 | 0.84 | 0.59 | 1.2 | NR | NR |
| Système National des Données de Santé (SNDS) | Maura 2015 | Major bleeding | Dabigatran | 75, 110 or 150 mg | 8443 | VKA | 16014 | 0.88 | 0.64 | 1.21 | NR | NR |
| Système National des Données de Santé (SNDS) | Maura 2015 | Major bleeding | Rivaroxaban | 10, 15, or 20 mg | 4651 | VKA | 9301 | 0.98 | 0.64 | 1.51 | NR | NR |
| Système National des Données de Santé (SNDS) | Maura 2015 | Major bleeding | Dabigatran | 150 mg | 2548 | VKA | 5096 | 0.85 | 0.43 | 1.68 | NR | NR |
| Système National des Données de Santé (SNDS) | Maura 2015 | Major bleeding | Rivaroxaban | 20 mg | 2861 | VKA | 5722 | 0.81 | 0.44 | 1.49 | NR | NR |
| Système National des Données de Santé (SNDS) | Maura 2015 | Major bleeding | Rivaroxaban | 10 or 15 mg | 1790 | VKA | 3580 | 0.97 | 0.53 | 1.76 | NR | NR |
| Prescribing Information System (PIS), Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Mueller 2018 | Major bleeding | Apixaban | NR | 6200 | Rivaroxaban | 7265 | 0.66 | 0.52 | 0.83 | NR | <0.001 |
| Prescribing Information System (PIS), Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Mueller 2018 | Major bleeding | Dabigatran | NR | 1112 | Rivaroxaban | 7265 | 0.74 | 0.54 | 1.02 | NR | 0.067 |
| Tokyo Women's Medical University Hospital | Naganuma 2017 | Major bleeding | Dabigatran | 75, 110, or 150 mg | 181 | Warfarin | 181 | 0.15 | 0.01 (do not use) | 0.9 | NR | 0.037 |
| Danish National Patient Register | Nielsen 2017 | Major bleeding | Apixaban | 2.5 mg | 4400 | Warfarin | 38893 | 1.04 | 0.76 | 1.43 | NR | NR |
| Danish National Patient Register | Nielsen 2017 | Major bleeding | Dabigatran | 110 mg | 4762 | Warfarin | 38893 | 0.87 | 0.75 | 1.01 | NR | NR |
| Danish National Patient Register | Nielsen 2017 | Major bleeding | Rivaroxaban | 15 mg | 3476 | Warfarin | 38893 | 1.17 | 0.94 | 1.45 | NR | NR |
| National Minimum Dataset (NMDS)- the national collection of all public and private hospital discharge information (Ministry of Health New Zealand; 2014) | Nishtala 2016 | Major bleeding | Dabigatran | 110 or 150 mg | 4385 | Warfarin | 4385 | 0.45 | 0.37 | 0.55 | NR | NR |
| National Minimum Dataset (NMDS)- the national collection of all public and private hospital discharge information (Ministry of Health New Zealand; 2014) | Nishtala 2016 | Major bleeding | Dabigatran | 150 mg | 2153 | Warfarin | NR | 0.278 | 0.191 | 0.406 | NR | NR |
| National Minimum Dataset (NMDS)- the national collection of all public and private hospital discharge information (Ministry of Health New Zealand; 2014) | Nishtala 2016 | Major bleeding | Dabigatran | 110 mg | 3395 | Warfarin | NR | 0.397 | 0.31 | 0.52 | NR | NR |
| Japanese Medical Data Center (JMDC Inc.) | Ohshima 2020 | Major bleeding | Dabigatran | NR | 465 | Warfarin | 1071 | 0.91 | 0.6 | 1.39 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | Major bleeding | Apixaban | 5 mg | 325 | Warfarin | 325 | 0.53 | 0.26 | 1.06 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | Major bleeding | Rivaroxaban | 20 mg | 548 | Warfarin | 548 | 0.91 | 0.56 | 1.47 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | Major bleeding | Apixaban | 2.5 mg | 521 | Warfarin | 521 | 0.79 | 0.49 | 1.26 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | Major bleeding | Rivaroxaban | 15 mg | 763 | Warfarin | 763 | 1.17 | 0.8 | 1.7 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | Major bleeding | Dabigatran | 110 mg | 357 | Warfarin | 357 | 0.77 | 0.42 | 1.42 | NR | NR |
| Administrative database of Italian local health units | Ramagopalan 2018 | Major bleeding | Apixaban | 5 mg | 1521 | VKA | 8393 | 0.44 | 0.2 | 0.97 | NR | 0.044 |
| BIG-PAC® database (2017 Real Life Data) | Ramagopalan 2019 | Major Bleeding | Apixaban | 5 or 10 mg | 2160 | Acenocoumarol | 2160 | 0.64 | 0.52 | 0.79 | NR | <0.001 |
| Cleveland Clinic Health Systems | Russo-Alvarez 2018 | Major bleeding | Rivaroxaban | 15 or 20 mg | 472 | Warfarin | 472 | 0.87 | 0.32 | 2.37 | NR | 0.78 |
| Norwegian Patient Registry | Rutherford 2019 | Major bleeding | Dabigatran | 20 or 15 mg | 10413 | Apixaban | 10413 | 1.03 | 0.85 | 1.24 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Major bleeding | Dabigatran | 150 mg | 6498 | Apixaban | 8514 | 0.98 | 0.85 | 1.14 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Major bleeding | Dabigatran | 110 mg | 3754 | Apixaban | 1899 | 0.95 | 0.75 | 1.23 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Major bleeding | Dabigatran | 150 or 110 mg | 10052 | Rivaroxaban | 10052 | 0.75 | 0.64 | 0.88 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Major bleeding | Dabigatran | 150 mg | 6498 | Rivaroxaban | 8115 | 1.06 | 0.8 | 1.4 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Major bleeding | Dabigatran | 110 mg | 3754 | Rivaroxaban | 2137 | 0.99 | 0.76 | 1.28 | NR | NR |
| Registry at the Malaysia’s Registry at the Malaysia’s National Heart InstitutetioRegistry at the Malaysia’s National Heart Institutel Heart Institute | Yap 2015 | Major bleeding | Dabigatran | 110 or 150 mg | 500 | Warfarin | 500 | 1.57‡ | 0.33 | 6.77 | NR | 0.59 |
| United States Renal Data System | Siontis 2018 | Major bleeding | Apixaban | 2.5 or 5 mg | 2351 | Warfarin | 7053 | 0.72 | 0.59 | 0.87 | NR | <0.001 |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Major bleeding | Apixaban | 2.5 or 5 mg | 12311 | Warfarin | 12311 | 0.63 | 0.52 | 0.75 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Major bleeding | Dabigatran | 110 or 150 mg | 6574 | Warfarin | 6574 | 0.74 | 0.62 | 0.87 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Major bleeding | Rivaroxaban | 15 or 20 mg | 8323 | Warfarin | 8323 | 1.06 | 0.92 | 1.23 | NR | NR |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | Major bleeding | Rivaroxaban | 15 or 20 mg | 59449 | Phenprocoumon | 59449 | 1.04 | 0.97 | 1.11 | NR | 0.2545 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | Major bleeding | Dabigatran | 110 or 150 mg | 23654 | Phenprocoumon | 59449 | 0.87 | 0.77 | 0.98 | NR | 0.0225 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | Major bleeding | Apixaban | 2.5 or 5 mg | 4894 | Phenprocoumon | 59449 | 0.65 | 0.5 | 0.86 | NR | 0.0023 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Dabigatran | <300 or 300+mg | 5537 [calculated] | Warfarin | NR | 0.87 | 0.72 | 1.04 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Rivaroxaban | <20 or 20+ mg | 4347 [calculated] | Warfarin | NR | 1.12 | 0.99 | 1.26 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Apixaban | <10 or 10+ mg | 10601 [calculated] | Warfarin | NR | 0.66 | 0.54 | 0.79 | NR | <0.01 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Dabigatran | >300 mg/d | NR | Warfarin | NR | 0.79 | 0.56 | 1.1 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Rivaroxaban | >20 mg/d | NR | Warfarin | NR | 1.06 | 0.92 | 1.21 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Apixaban | >10 mg/d | NR | Warfarin | NR | 0.62 | 0.49 | 0.79 | NR | <0.01 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Dabigatran | <300 mg/d | NR | Warfarin | NR | 0.93 | 0.74 | 1.17 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Rivaroxaban | <20 mg/d | NR | Warfarin | NR | 1.25 | 1.01 | 1.55 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Major bleeding | Apixaban | <10 mg/d | NR | Warfarin | NR | 0.68 | 0.52 | 0.9 | NR | <0.01 |
| GE Centricity EMR database | Wanat 2019 | Major bleeding | Apixaban | NR | 10189 | Warfarin | 10189 | 0.65† | 0.58 | 0.73 | NR | <0.00 |
| Khoo Teck Puat Hospital, Tan Tock Seng Hospital, National University Hospital, National Heart Centre Singapore | Wee 2017 | Major bleeding | Rivaroxaban | 10, 15, or 20 mg | 121 | Warfarin | 224 | 1.17 | 0.375 | 3.62 | NR | NR |
| Optum Labs Data Warehouse | Abraham 2015 | Ischemic stroke | Dabigatran | 150 mg | 7749 | Warfarin | 7749 | 1.03 | 0.63 | 1.68 | NR | NR |
| Optum Labs Data Warehouse | Abraham 2015 | Ischemic stroke | Rivaroxaban | NR | 5166 | Warfarin | 5166 | 0.95 | 0.51 | 1.79 | NR | NR |
| CMS | Amin 2019 | Ischemic stroke | Apixaban | 5 mg | 37525 | Warfarin | 37525 | 0.79 | 0.66 | 0.94 | NR | 0.007 |
| CMS | Amin 2019 | Ischemic stroke | Dabigatran | 150 mg | 18131 | Warfarin | 18131 | 1.05 | 0.84 | 1.31 | NR | 0.685 |
| CMS | Amin 2019 | Ischemic stroke | Rivaroxaban | 20 mg | 55359 | Warfarin | 55359 | 0.84 | 0.73 | 0.95 | NR | 0.007 |
| Système National des Données de Santé (SNDS) | Blin 2019 | Ischemic stroke | Dabigatran | 150 mg | 8389 | VKA | 8389 | 0.75 | 0.52 | 1.09 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | Ischemic stroke | Dabigatran | 110 mg | 14442 | VKA | 14442 | 0.7 | 0.55 | 0.9 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2018 | Ischemic stroke | Dabigatran | 150 mg | 8290 | Rivaroxaban | 8290 | 0.9 | 0.61 | 1.33 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2018 | Ischemic stroke | Dabigatran | 110 mg | 7639 | Rivaroxaban | 7639 | 0.79 | 0.58 | 1.07 | NR | NR |
| Queen Mary Hospital-based registry (Hong Kong) | Chan 2016 | Ischemic stroke | Dabigatran | 110 mg | 129 | Warfarin | 442 | 0.22 | 0.23 (do not use) | 0.67 (do not use) | 0.5 | NR |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Edoxaban | 30/15, or 60 mg | 4577 | Warfarin | 19761 | 0.71 | 0.5 | 1 | NR | 0.049 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 9952 | Warfarin | 19761 | 0.71 | 0.52 | 0.95 | NR | 0.023 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Rivaroxaban | 15/10, or 20 mg | 33022 | Warfarin | 19761 | 0.76 | 0.57 | 1.01 | NR | 0.0557 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Dabigatran | 110 or 150 mg | 22371 | Warfarin | 19761 | 0.82 | 0.62 | 1.08 | NR | 0.162 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Edoxaban | 60 mg | 1653 | Warfarin | 19761 | 0.74 | 0.45 | 1.23 | NR | 0.2426 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Apixaban | 5 mg | 3593 | Warfarin | 19761 | 0.53 | 0.34 | 0.84 | NR | 0.0071 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Rivaroxaban | 20 mg | 1914 | Warfarin | 19761 | 0.56 | 0.19 | 1.69 | NR | 0.3045 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Dabigatran | 150 mg | 2550 | Warfarin | 19761 | 0.79 | 0.4 | 1.56 | NR | 0.495 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Edoxaban | 30/15 mg | 2924 | Warfarin | 19761 | 0.68 | 0.45 | 1.02 | NR | 0.0645 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Apixaban | 2.5 mg | 6359 | Warfarin | 19761 | 0.83 | 0.59 | 1.16 | NR | 0.2731 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Rivaroxaban | 15/10 mg | 31108 | Warfarin | 19761 | 0.77 | 0.57 | 1.03 | NR | 0.0732 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | Ischemic stroke | Dabigatran | 110 mg | 19821 | Warfarin | 19761 | 0.82 | 0.61 | 1.1 | NR | 0.1845 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | Ischemic stroke | Dabigatran | 110 mg | 12593 | Warfarin | 10409 | 0.87 | 0.75 | 1.01 | NR | 0.0735 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | Ischemic stroke | Rivaroxaban | 10 or 15 mg | 21000 | Warfarin | 10409 | 0.75 | 0.65 | 0.87 | NR | 0.0001 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | Ischemic stroke | Apixaban | 2.5 mg | 12502 | Warfarin | 10409 | 0.82 | 0.69 | 0.97 | NR | 0.0179 |
| Aetna, Humana, Optum, and HealthCore | Chrischilles 2018 | Ischemic stroke | Rivaroxaban | NR | 36512 | Warfarin | 80180 | 0.61 | 0.47 | 0.79 | NR | NR |
| Germany Primary Care Physician panel of IMS Disease Analyzer, an EMR Database | Coleman 2016 | Ischemic stroke | Rivaroxaban | >15 mg | 1039 | VKA | NR | 0.44\* | NR | NR | 0.453 | 0.0245 |
| Germany Primary Care Physician panel of IMS Disease Analyzer, an EMR Database | Coleman 2018 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 835 | VKA | 835 | 1.51 | 0.54 | 4.24 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | Ischemic stroke | Dabigatran | 75, 110 or 150 mg | 3322 | Warfarin | 12919 | 0.84 | 0.6 | 1.18 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | Ischemic stroke | Rivaroxaban | 10, 15, or 20 mg | 2370 | Warfarin | 12919 | 0.7 | 0.46 | 1.06 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 3587 | Warfarin | 12919 | 0.83 | 0.57 | 1.22 | NR | NR |
| FDA Sentinel network | Go 2017 | Ischemic stroke | Dabigatran | 150 mg | 25289 | Warfarin | 25289 | 0.92 | 0.65 | 1.28 | NR | NR |
| CMS | Graham 2019 | Ischemic stroke | Rivaroxaban | 20 mg | 106369 | Warfarin | 183003 | 0.72 | 0.63 | 0.83 | NR | NR |
| CMS | Graham 2019 | Ischemic stroke | Apixaban | 5 mg | 106369 | Warfarin | 72921 | 0.71 | 0.6 | 0.83 | NR | NR |
| CMS | Graham 2016 | Ischemic stroke | Rivaroxaban | 15 mg | 24435 | Dabigatran | 12730 | 0.88 | 0.65 | 1.2 | NR | NR |
| CMS | Graham 2015 | Ischemic stroke | Dabigatran | 75 or 150 mg | 67207 | Warfarin | 67207 | 0.8 | 0.67 | 0.96 | NR | 0.02 |
| CMS | Graham 2015 | Ischemic stroke | Dabigatran | 75 mg | 10522 | Warfarin | 10522 | 0.88 | 0.6 | 1.27 | NR | NR |
| DOD Database | Gupta 2019 | Ischemic stroke | Dabigatran | 75 or 150 mg | 3691 | Warfarin | 3691 | 0.79 | 0.46 | 1.36 | NR | 0.39 |
| DOD Database | Gupta 2019 | Ischemic stroke | Rivaroxaban | 15 or 20 mg | 8226 | Warfarin | 8226 | 1.12 | 0.82 | 1.55 | NR | 0.476 |
| DOD Database | Gupta 2019 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 7607 | Warfarin | 7607 | 0.68 | 0.45 | 1.02 | NR | 0.064 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 10117 | Phenprocoumon | 23823 | 0.82 | 0.68 | 0.99 | NR | 0.036 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Dabigatran | 110 or 150 mg | 5122 | Phenprocoumon | 23823 | 0.85 | 0.67 | 1.08 | NR | 0.188 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Rivaroxaban | 15 or 20 mg | 22143 | Phenprocoumon | 23823 | 0.91 | 0.78 | 1.05 | NR | 0.208 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Apixaban | 5 mg | 6376 | Phenprocoumon | 23823 | 0.83 | 0.66 | 1.06 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Dabigatran | 150 mg | 2526 | Phenprocoumon | 23823 | 0.52 | 0.32 | 0.83 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Rivaroxaban | 20 mg | 15923 | Phenprocoumon | 23823 | 0.93 | 0.79 | 1.11 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Apixaban | 2.5 mg | 3741 | Phenprocoumon | 23823 | 0.8 | 0.62 | 1.04 | NR | 0.837 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Dabigatran | 110 mg | 2596 | Phenprocoumon | 23823 | 1.05 | 0.8 | 1.38 | NR | 0.012 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | Ischemic stroke | Rivaroxaban | 15 mg | 6220 | Phenprocoumon | 23823 | 0.87 | 0.7 | 1.07 | NR | 0.631 |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Ischemic stroke | Apixaban | Reduced dose (unspecified) | NR | Dabigatran | NR | 0.75 | 0.48 | 1.17 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Ischemic stroke | Apixaban | Standard dose (unspecified) | NR | Dabigatran | NR | 0.96 | 0.53 | 1.76 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Ischemic stroke | Apixaban | Reduced dose (unspecified) | NR | Rivaroxaban | NR | 0.88 | 0.53 | 1.46 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Ischemic stroke | Apixaban | Standard dose (unspecified) | NR | Rivaroxaban | NR | 0.87 | 0.56 | 1.34 | NR | NR |
| Chonnam National University Hospital (Korea) | Jeong 2019 | Ischemic stroke | Rivaroxaban | 15 or 20 mg | 804 | Warfarin | 804 | 1.13 | 0.5 | 2.56 | NR | 0.778 |
| Norwegian Prescription Database, the Norwegian Patient Registry, the Norwegian Cause of Death Registry and the National Registry. | Kjerpeseth 2019 | Ischemic stroke | Dabigatran | Mixed; unspecified | 5984 | Warfarin | 6435 | 0.93 | 0.65 | 1.32 | NR | NR |
| Norwegian Prescription Database, the Norwegian Patient Registry, the Norwegian Cause of Death Registry and the National Registry. | Kjerpeseth 2019 | Ischemic stroke | Rivaroxaban | Mixed; unspecified | 7851 | Warfarin | 6435 | 1.22 | 0.9 | 1.66 | NR | NR |
| Norwegian Prescription Database, the Norwegian Patient Registry, the Norwegian Cause of Death Registry and the National Registry. | Kjerpeseth 2019 | Ischemic stroke | Apixaban | Mixed; unspecified | 10550 | Warfarin | 6435 | 1.05 | 0.77 | 1.42 | NR | NR |
| Symphony Health Solutions’ Patient Transactional Datasets | Laliberte 2014 | Ischemic stroke | Rivaroxaban | Dosing pattern, mg per day, mean (SD): Rivaroxaban : 19.1 (2.1) | 3654 | Warfarin | 14616 | 0.81 | 0.57 | 1.14 | NR | NR |
| Danish National Patient Register | Larsen 2016 | Ischemic stroke | Apixaban | 5 mg | 6349 | Warfarin | 35436 | 1.11 | 0.94 | 1.3 | NR | NR |
| Danish National Patient Register | Larsen 2016 | Ischemic stroke | Dabigatran | 150 mg | 12701 | Warfarin | 35436 | 1.24 | 0.94 | 1.64 | NR | NR |
| Danish National Patient Register | Larsen 2016 | Ischemic stroke | Rivaroxaban | 20 mg | 7192 | Warfarin | 35436 | 0.86 | 0.72 | 1.04 | NR | NR |
| Chonnam National University Hospital (Korea) | Lee 2017 | Ischemic stroke | Dabigatran | 150 mg | 183 | Warfarin | 549 | 1 | 0.32 | 3.14 | NR | 0.996 |
| Chonnam National University Hospital (Korea) | Lee 2017 | Ischemic stroke | Dabigatran | 110 mg | 366 | Warfarin | 549 | 0.58 | 0.2 | 1.67 | NR | 0.312 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | Ischemic stroke | Edoxaban | 30 or 60 mg | 4061 | Warfarin | 12183 | 0.693 | 0.487 | 0.959 | NR | 0.033 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | Ischemic stroke | Edoxaban | 30 mg | 2371 | Warfarin | 7113 | 0.733 | 0.481 | 1.076 | NR | 0.129 |
| Korean National Health Insurance Service (NHIS) | Lee 2019 | Ischemic stroke | Edoxaban | 15/10, or 20 mg | 12369 | Rivaroxaban | 4123 | 0.951 | 0.658 | 1.338 | NR | 0.782 |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Ischemic stroke | Dabigatran | 150 mg | 5996 | Rivaroxaban 20 mg | 14852 | 0.899 | 0.706 | 1.134 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Ischemic stroke | Apixaban | 5 mg | 10187 | Rivaroxaban 20 mg | 14852 | 0.829 | 0.678 | 1.01 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Ischemic stroke | Edoxaban | 60 mg | 6390 | Rivaroxaban 20 mg | 14852 | 0.861 | 0.658 | 1.112 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Ischemic stroke | Rivaroxaban | Mixed | 35965 | Warfarin | 25420 | 0.792 | 0.771 (do not use) | 0.881 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Ischemic stroke | Dabigatran | Mixed | 17745 | Warfarin | 25420 | 0.81 | 0.711 | 0.922 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Ischemic stroke | Apixaban | Mixed | 22177 | Warfarin | 25420 | 0.685 | 0.602 | 0.779 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | Ischemic stroke | Edoxaban | Mixed | 15496 | Warfarin | 25420 | 0.629 | 0.532 | 0.74 | NR | NR |
| Queen Mary Hospital-based registry (Hong Kong) | Li 2016 | Ischemic stroke | Dabigatran | 75, 110 or 150 mg | 467 | Warfarin | NR | 0.39 | 0.18 | 0.83 | NR | 0.015 |
| Queen Mary Hospital-based registry (Hong Kong) | Li 2016 | Ischemic stroke | Rivaroxaban | 15 or 20 mg | 669 | Warfarin | NR | 0.61 | 0.31 | 1.2 | NR | 0.152 |
| ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | Li 2018 | Ischemic stroke | Apixaban | 2.5 mg | 6600 | Warfarin | 6600 | 0.61 | 0.46 | 0.8 | NR | <0.001 |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 100977 | Warfarin | 100977 | 0.71 | 0.65 | 0.81 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Ischemic stroke | Dabigatran | 75 or 150 mg | 36990 | Warfarin | 36990 | 0.99 | 0.84 | 1.17 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Ischemic stroke | Rivaroxaban | 10, 15, or 20 mg | 125068 | Warfarin | 125068 | 0.85 | 0.77 | 0.92 | NR | NR |
| Prescribing Information System (PIS), Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Mueller 2018 | Ischemic stroke | Apixaban | NR | 6200 | Rivaroxaban | 7265 | 1.06 | 0.68 | 1.64 | NR | 0.808 |
| Prescribing Information System (PIS), Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Mueller 2018 | Ischemic stroke | Dabigatran | NR | 1112 | Rivaroxaban | 7265 | 1.18 | 0.7 | 2.01 | NR | 0.535 |
| Danish National Patient Register | Nielsen 2017 | Ischemic stroke | Apixaban | 2.5 mg | 4400 | Warfarin | 38893 | 1.19 | 0.95 | 1.49 | NR | NR |
| Danish National Patient Register | Nielsen 2017 | Ischemic stroke | Dabigatran | 110 mg | 4762 | Warfarin | 38893 | 0.92 | 0.79 | 1.06 | NR | NR |
| Danish National Patient Register | Nielsen 2017 | Ischemic stroke | Rivaroxaban | 15 mg | 3476 | Warfarin | 38893 | 0.93 | 0.71 | 1.21 | NR | NR |
| Truven MarketScan | Norby 2017 | Ischemic stroke | Rivaroxaban | 10, 15, or 20 mg | 11845 | Dabigatran | 16957 | 0.77 | 0.58 | 1.03 | NR | 0.08 |
| Truven MarketScan | Norby 2017 | Ischemic stroke | Rivaroxaban | 10, 15, or 20 mg | 32495 | Warfarin | 45496 | 0.75 | 0.62 | 0.91 | NR | 0.003 |
| Japanese Medical Data Center (JMDC Inc.) | Ohshima 2020 | Ischemic stroke | Dabigatran | NR | 465 | Warfarin | 1071 | 0.74 | 0.34 | 1.64 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Ischemic stroke | Dabigatran | 20 or 15 mg | 10413 | Apixaban | 10413 | 0.88 | 0.75 | 1.03 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Ischemic stroke | Dabigatran | 150 or 110 mg | 10052 | Rivaroxaban | 10052 | 1.02 | 0.88 | 1.2 | NR | NR |
| Registry at the Malaysia’s National Heart Institute | Yap 2015 | Ischemic stroke | Dabigatran | 110 or 150 mg | 500 | Warfarin | 500 | 0.13‡ | 0 (do not use) | 50.25 (do not use) | 1.969 | 0.3 |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 12311 | Warfarin | 12311 | 1.12 | 0.8 | 1.57 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Ischemic stroke | Dabigatran | 110 or 150 mg | 6574 | Warfarin | 6574 | 1.1 | 0.85 | 1.44 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Ischemic stroke | Rivaroxaban | 15 or 20 mg | 8323 | Warfarin | 8323 | 0.96 | 0.74 | 1.25 | NR | NR |
| Danish National Patient Register | Staerk 2017 | Ischemic stroke | Dabigatran | 75, 110 or 150 mg | 12613 | VKA | 18094 | 0.89 | 0.72 | 1.09 | NR | NR |
| Danish National Patient Register | Staerk 2017 | Ischemic stroke | Rivaroxaban | 10, 15, or 20 mg | 5693 | VKA | 18094 | 0.89 | 0.67 | 1.19 | NR | NR |
| Danish National Patient Register | Staerk 2017 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 6899 | VKA | 18094 | 0.98 | 0.74 | 1.3 | NR | NR |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | Ischemic stroke | Rivaroxaban | 15 or 20 mg | 59449 | Phenprocoumon | 59449 | 1.05 | 0.94 | 1.17 | NR | 0.3793 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | Ischemic stroke | Dabigatran | 110 or 150 mg | 23654 | Phenprocoumon | 59449 | 1.14 | 0.97 | 1.35 | NR | 0.1146 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 4894 | Phenprocoumon | 59449 | 1.84 | 1.2 | 2.84 | NR | 0.0053 |
| DoD Database | Villines 2018 | Ischemic stroke | Dabigatran | 150 mg | 4802 | Apixaban | 4802 | 1.05 | 0.54 | 2.06 | NR | 0.878 |
| DoD Database | Villines 2018 | Ischemic stroke | Dabigatran | 150 mg | 12763 | Rivaroxaban | 12763 | 0.92 | 0.67 | 1.28 | NR | 0.631 |
| DoD Database | Villines 2015 | Ischemic stroke | Dabigatran | 150 mg | 11484 | Warfarin | 11484 | 0.89 | 0.63 | 1.26 | NR | 0.5 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Apixaban | <10 or 10+ mg | 10601 [calculated] | Warfarin | NR | 1.13 | 0.89 | 1.44 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Dabigatran | <300 or 300+mg | 5537 [calculated] | Warfarin | NR | 1.12 | 0.87 | 1.45 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Rivaroxaban | <20 or 20+ mg | 4347 [calculated] | Warfarin | NR | 1.03 | 0.85 | 1.24 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Dabigatran | >300 mg/d | NR | Warfarin | NR | 1.37 | 0.92 | 2.05 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Rivaroxaban | >20 mg/d | NR | Warfarin | NR | 0.97 | 0.78 | 1.2 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Apixaban | >10 mg/d | NR | Warfarin | NR | 1.07 | 0.79 | 1.46 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Dabigatran | <300 mg/d | NR | Warfarin | NR | 1.06 | 0.76 | 1.48 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Rivaroxaban | <20 mg/d | NR | Warfarin | NR | 1.27 | 0.92 | 1.75 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | Ischemic stroke | Apixaban | <10 mg/d | NR | Warfarin | NR | 1.16 | 0.81 | 1.67 | NR | NR |
| Optum Labs Data Warehouse | Yao 2016 | Composite systemic embolism/stroke | Apixaban | 2.5 or 5 mg | 7,695 | Warfarin | 7,695 | 0.59 | 0.38 | 0.93 | NR | NR |
| Optum Labs Data Warehouse | Yao 2016 | Major bleeding | Apixaban | 2.5 or 5 mg | 7,695 | Warfarin | 7,695 | 0.41 | 0.3 | 0.56 | Nr | NR |
| Optum Labs Data Warehouse | Yao 2016 | Composite systemic embolism/stroke | Dabigatran | 110 or 150 mg | 14,307 | Warfarin | 14,307 | 0.92 | 0.66 | 1.26 | NR | NR |
| Optum Labs Data Warehouse | Yao 2016 | Composite systemic embolism/stroke | Rivaroxaban | 10, 15, or 20 mg | 16,175 | Warfarin | 16,175 | 0.77 | 0.57 | 1.04 | NR | NR |
| Optum Labs Data Warehouse | Yao 2016 | Major bleeding | Rivaroxaban | 10, 15, or 20 mg | 16,175 | Warfarin | 16,175 | 0.94 | 0.79 | 1.14 | NR | NR |
| Optum Labs Data Warehouse | Yao 2016 | Ischemic stroke | Apixaban | 2.5 or 5 mg | 7,695 | Warfarin | 7,695 | 0.83 | 0.53 | 1.29 | NR | 0.4 |
| Optum Labs Data Warehouse | Yao 2016 | Ischemic stroke | Dabigatran | 110 or 150 mg | 14,307 | Warfarin | 14,307 | 1.06 | 0.79 | 1.42 | NR | 0.7 |
| Optum Labs Data Warehouse | Yao 2016 | Ischemic stroke | Rivaroxaban | 10, 15, or 20 mg | 16,175 | Warfarin | 16,175 | 1.01 | 0.75 | 1.36 | NR | 0.95 |
| Optum Labs Data Warehouse | Yao 2016 | ICH | Apixaban | 2.5 or 5 mg | 7,695 | Warfarin | 7,695 | 0.24 | 0.12 | 0.5 | NR | <0.001 |
| Optum Labs Data Warehouse | Yao 2016 | ICH | Dabigatran | 110 or 150 mg | 14,307 | Warfarin | 14,307 | 0.36 | 0.23 | 0.56 | NR | <0.001 |
| Optum Labs Data Warehouse | Yao 2016 | ICH | Rivaroxaban | 10, 15, or 20 mg | 16,175 | Warfarin | 16,175 | 0.51 | 0.35 | 0.75 | NR | <0.001 |
| Optum Labs Data Warehouse | Yao 2016 | GI bleeding | Apixaban | 2.5 or 5 mg | 7,695 | Warfarin | 7,695 | 0.51 | 0.37 | 0.7 | NR | <0.001 |
| Optum Labs Data Warehouse | Yao 2016 | GI bleeding | Dabigatran | 110 or 150 mg | 14,307 | Warfarin | 14,307 | 1.03 | 0.84 | 1.26 | NR | 0.78 |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | ICH | Dabigatran | 75, 110 or 150 mg | 8539 | Warfarin | 23431 | 0.47 | 0.35 | 0.65 | NR | NR |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | ICH | Apixaban | 2.5 or 5 mg | 3689 | Warfarin | 23431 | 0.83 | 0.52 | 1.34 | NR | NR |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | ICH | Rivaroxaban | >10 mg | 8398 | Warfarin | 23431 | 0.74 | 0.54 | 1 | NR | NR |
| CMS | Amin 2019 | ICH | Apixaban | 5 mg | 37525 | Warfarin | 37525 | 0.6 | 0.48 | 0.75 | NR | <0.001 |
| CMS | Amin 2019 | ICH | Dabigatran | 150 mg | 18131 | Warfarin | 18131 | 0.51 | 0.37 | 0.71 | NR | <0.001 |
| CMS | Amin 2019 | ICH | Rivaroxaban | 20 mg | 55359 | Warfarin | 55359 | 0.71 | 0.61 | 0.83 | NR | <0.001 |
| Queen Mary Hospital-based registry (Hong Kong) | Chan 2016 | ICH | Dabigatran | 110 mg | 129 | Warfarin | 442 | 0.68 | 0.11 | 4.54 | NR | NR |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Edoxaban | 30/15, or 60 mg | 4577 | Warfarin | 19761 | 0.41 | 0.21 | 0.8 | NR | 0.0089 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Apixaban | 2.5 or 5 mg | 9952 | Warfarin | 19761 | 0.44 | 0.26 | 0.75 | NR | 0.0027 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Rivaroxaban | 15/10, or 20 mg | 33022 | Warfarin | 19761 | 0.54 | 0.34 | 0.88 | NR | 0.0127 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Dabigatran | 110 or 150 mg | 22371 | Warfarin | 19761 | 0.48 | 0.29 | 0.8 | NR | 0.0048 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Edoxaban | 60 mg | 1653 | Warfarin | 19761 | 0.4 | 0.14 | 1.12 | NR | 0.803 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Apixaban | 5 mg | 3593 | Warfarin | 19761 | 0.41 | 0.19 | 0.9 | NR | 0.0266 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Rivaroxaban | 20 mg | 1914 | Warfarin | 19761 | 0.73 | 0.17 | 3.21 | NR | 0.6776 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Dabigatran | 150 mg | 2550 | Warfarin | 19761 | 0.25 | 0.04 | 1.51 | NR | 0.1304 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Edoxaban | 30/15 mg | 2924 | Warfarin | 19761 | 0.41 | 0.18 | 0.9 | NR | 0.0274 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Apixaban | 2.5 mg | 6359 | Warfarin | 19761 | 0.46 | 0.24 | 0.87 | NR | 0.0176 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Rivaroxaban | 15/10 mg | 31108 | Warfarin | 19761 | 0.53 | 0.33 | 0.87 | NR | 0.0122 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | ICH | Dabigatran | 110 mg | 19821 | Warfarin | 19761 | 0.51 | 0.3 | 0.86 | NR | 0.0107 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | ICH | Rivaroxaban | 20 mg | 21000 | Warfarin | 10409 | 0.92 | 0.61 | 1.4 | NR | 0.7024 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | ICH | Apixaban | 5 mg | 12502 | Warfarin | 10409 | 0.78 | 0.44 | 1.38 | NR | 0.3924 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | ICH | Dabigatran | 110 mg | 12593 | Warfarin | 10409 | 0.61 | 0.38 | 0.98 | NR | 0.0404 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | ICH | Rivaroxaban | 10 or 15 mg | 21000 | Warfarin | 10409 | 0.77 | 0.51 | 1.15 | NR | 0.2054 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | ICH | Apixaban | 2.5 mg | 12502 | Warfarin | 10409 | 1.02 | 0.67 | 1.57 | NR | 0.9118 |
| Aetna, Humana, Optum, and HealthCore | Chrischilles 2018 | ICH | Rivaroxaban | NR | 36171 | Warfarin | 79529 | 0.71 | 0.5 | 1.01 | NR | NR |
| Système National des Données de Santé (SNDS) | Fauchier 2019 | ICH | Rivaroxaban | 15 mg | 7536 | VKA | 7536 | 0.8 | 0.54 | 1.2 | NR | NR |
| Système National des Données de Santé (SNDS) | Fauchier 2019 | ICH | Dabigatran | 110 mg | 5925 | VKA | 5925 | 0.38 | 0.22 | 0.66 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | ICH | Dabigatran | 75, 110 or 150 mg | 3322 | Warfarin | 12919 | 0.52 | 0.32 | 0.87 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | ICH | Rivaroxaban | 10, 15, or 20 mg | 2370 | Warfarin | 12919 | 0.89 | 0.57 | 1.4 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | ICH | Apixaban | 2.5 or 5 mg | 3587 | Warfarin | 12919 | 0.75 | 0.45 | 1.25 | NR | NR |
| FDA Sentinel network | Go 2017 | ICH | Dabigatran | 150 mg | 25289 | Warfarin | 25289 | 0.51 | 0.33 | 0.79 | NR | NR |
| CMS | Graham 2019 | ICH | Rivaroxaban | 20 mg | 106369 | Warfarin | 183003 | 0.65 | 0.56 | 0.77 | NR | NR |
| CMS | Graham 2019 | ICH | Apixaban | 5 mg | 106369 | Warfarin | 72921 | 0.54 | 0.43 | 0.68 | NR | NR |
| CMS | Graham 2016 | ICH | Rivaroxaban | 15 mg | 24435 | Dabigatran | 12730 | 1.58 | 0.94 | 2.66 | NR | NR |
| CMS | Graham 2015 | ICH | Dabigatran | 75 or 150 mg | 67207 | Warfarin | 67207 | 0.34 | 0.26 | 0.46 | NR | <0.001 |
| CMS | Graham 2015 | ICH | Dabigatran | 75 mg | 10522 | Warfarin | 10522 | 0.46 | 0.26 | 0.81 | NR | NR |
| DOD Database | Gupta 2019 | ICH | Dabigatran | 75 or 150 mg | 3691 | Warfarin | 3691 | 0.3 | 0.13 | 0.71 | NR | 0.006 |
| DOD Database | Gupta 2019 | ICH | Rivaroxaban | 15 or 20 mg | 8226 | Warfarin | 8226 | 0.56 | 0.37 | 0.84 | NR | 0.005 |
| DOD Database | Gupta 2019 | ICH | Apixaban | 2.5 or 5 mg | 7607 | Warfarin | 7607 | 0.49 | 0.3 | 0.8 | NR | 0.004 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Apixaban | 2.5 or 5 mg | 10117 | Phenprocoumon | 23823 | 0.44 | 0.3 | 0.64 | NR | <0.001 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Dabigatran | 110 or 150 mg | 5122 | Phenprocoumon | 23823 | 0.52 | 0.33 | 0.84 | NR | 0.007 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Rivaroxaban | 15 or 20 mg | 22143 | Phenprocoumon | 23823 | 0.68 | 0.53 | 0.88 | NR | 0.003 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Apixaban | 5 mg | 6376 | Phenprocoumon | 23823 | 0.39 | 0.23 | 0.65 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Dabigatran | 150 mg | 2526 | Phenprocoumon | 23823 | 0.28 | 0.1 | 0.77 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Rivaroxaban | 20 mg | 15923 | Phenprocoumon | 23823 | 0.7 | 0.53 | 0.93 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Apixaban | 2.5 mg | 3741 | Phenprocoumon | 23823 | 0.51 | 0.31 | 0.83 | NR | 0.463 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Dabigatran | 110 mg | 2596 | Phenprocoumon | 23823 | 0.66 | 0.39 | 1.12 | NR | 0.143 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | ICH | Rivaroxaban | 15 mg | 6220 | Phenprocoumon | 23823 | 0.66 | 0.46 | 0.95 | NR | 0.801 |
| Diabetes P4P database | Hsu 2018 | ICH | Dabigatran | 110 or 150 mg | 305 | Warfarin | 305 | 1.249 | 0.406 | 3.849 | NR | 0.6981 |
| Diabetes P4P database | Hsu 2018 | ICH | Rivaroxaban | 10 or 15 mg | 300 | Warfarin | 301 | 0.837 | 0.315 | 2.221 | NR | 0.7201 |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | ICH | Apixaban | Standard dose (unspecified) | NR | Dabigatran | NR | 0.94 | 0.45 | 1.97 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | ICH | Apixaban | Reduced dose (unspecified) | NR | Dabigatran | NR | 0.72 | 0.29 | 1.78 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | ICH | Apixaban | Standard dose (unspecified) | NR | Rivaroxaban | NR | 0.77 | 0.42 | 1.42 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | ICH | Apixaban | Reduced dose (unspecified) | NR | Rivaroxaban | NR | 0.41 | 0.21 | 0.8 | NR | NR |
| Chonnam National University Hospital (Korea) | Jeong 2019 | ICH | Rivaroxaban | 15 or 20 mg | 804 | Warfarin | 804 | 0.02 | 0 | 1.45 | NR | 0.075 |
| Japan Medical Data Vision Co. | Koretsune 2018 | ICH | Dabigatran | 110 or 150 mg | 4606 | Warfarin | 4606 | 0.67 | 0.47 | 0.96 | NA | NA |
| Symphony Health Solutions’ Patient Transactional Datasets | Laliberte 2014 | ICH | Rivaroxaban | Dosing pattern, mg per day, mean (SD): Rivaroxaban : 19.1 (2.1) | 3654 | Warfarin | 14616 | 1.17 | 0.66 | 2.05 | NR | 0.059 |
| Danish National Patient Register | Larsen 2016 | ICH | Apixaban | 5 mg | 6349 | Warfarin | 35436 | 0.72 | 0.42 | 1.24 | NR | NR |
| Danish National Patient Register | Larsen 2016 | ICH | Dabigatran | 150 mg | 12701 | Warfarin | 35436 | 0.4 | 0.25 | 0.65 | NR | NR |
| Danish National Patient Register | Larsen 2016 | ICH | Rivaroxaban | 20 mg | 7192 | Warfarin | 35436 | 0.56 | 0.34 | 0.9 | NR | NR |
| Clinical Data Analysis and Reporting System (CDARS) of the Hong Kong Hospital Authority | Lau 2017 | ICH | Dabigatran | 75, 110 or 150 mg | 2580 | Warfarin | 2580 | 0.26\* | 0.12 | 0.55 | NR | <0.05 |
| Clinical Data Analysis and Reporting System (CDARS) of the Hong Kong Hospital Authority | Lau 2017 | ICH | Dabigatran | 110 mg | 1991 | Warfarin | 1991 | 0.31\* | 0.12 | 0.77 | NR | <0.05 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | ICH | Edoxaban | 30 or 60 mg | 4061 | Warfarin | 12183 | 0.407 | 0.182 | 0.785 | NR | 0.014 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | ICH | Edoxaban | 60 mg | 1815 | Warfarin | 5445 | 0.532 | 0.159 | 1.326 | NR | 0.23 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | ICH | Edoxaban | 30 mg | 2371 | Warfarin | 7113 | 0.565 | 0.217 | 1.215 | NR | 0.186 |
| Korean National Health Insurance Service (NHIS) | Lee 2019 | ICH | Edoxaban | 15/10, or 20 mg | 12369 | Rivaroxaban | 4123 | 0.844 | 0.405 | 1.582 | NR | 0.622 |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | ICH | Dabigatran | 150 mg | 5996 | Rivaroxaban 20 mg | 14852 | 0.76 | 0.455 | 1.214 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | ICH | Apixaban | 5 mg | 10187 | Rivaroxaban 20 mg | 14852 | 0.95 | 0.652 | 1.369 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | ICH | Edoxaban | 60 mg | 6390 | Rivaroxaban 20 mg | 14852 | 0.654 | 0.351 | 1.135 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | ICH | Rivaroxaban | Mixed | 35965 | Warfarin | 25420 | 0.716 | 0.585 | 0.876 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | ICH | Dabigatran | Mixed | 17745 | Warfarin | 25420 | 0.448 | 0.332 | 0.597 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | ICH | Apixaban | Mixed | 22177 | Warfarin | 25420 | 0.674 | 0.53 | 0.852 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | ICH | Edoxaban | Mixed | 15496 | Warfarin | 25420 | 0.375 | 0.254 | 0.537 | NR | NR |
| ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | Li 2018 | ICH | Apixaban | 5 mg | 31827 | Warfarin | 31827 | 0.63 | 0.48 | 0.82 | NR | <0.001 |
| ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | Li 2018 | ICH | Apixaban | 2.5 mg | 6600 | Warfarin | 6600 | 0.56 | 0.36 | 0.88 | NR | 0.011 |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | ICH | Apixaban | 2.5 or 5 mg | 100977 | Warfarin | 100977 | 0.56 | 0.48 | 0.65 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | ICH | Dabigatran | 75 or 150 mg | 36990 | Warfarin | 36990 | 0.43 | 0.33 | 0.55 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | ICH | Rivaroxaban | 10, 15, or 20 mg | 125068 | Warfarin | 125068 | 0.63 | 0.56 | 0.71 | NR | NR |
| National Minimum Dataset (NMDS)- the national collection of all public and private hospital discharge information (Ministry of Health New Zealand; 2014) | Nishtala 2016 | ICH | Dabigatran | 110 or 150 mg | 4385 | Warfarin | 4385 | 0.21 | 0.06 | 0.74 | NR | NR |
| Truven MarketScan | Norby 2017 | ICH | Rivaroxaban | 10, 15, or 20 mg | 11845 | Dabigatran | 16957 | 1.47 | 0.8 | 2.72 | NR | 0.22 |
| Truven MarketScan | Norby 2017 | ICH | Rivaroxaban | 10, 15, or 20 mg | 32495 | Warfarin | 45496 | 0.55 | 0.39 | 0.78 | NR | 0.0008 |
| Japanese Medical Data Center (JMDC Inc.) | Ohshima 2020 | ICH | Dabigatran | NR | 465 | Warfarin | 1071 | 3.56 | 0.47 | 26.75 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | ICH | Dabigatran | 20 or 15 mg | 10413 | Apixaban | 10413 | 0.9 | 0.67 | 1.22 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | ICH | Dabigatran | 150 or 110 mg | 10052 | Rivaroxaban | 10052 | 0.48 | 0.34 | 0.67 | NR | NR |
| United States Renal Data System | Siontis 2018 | ICH | Apixaban | 2.5 or 5 mg | 2351 | Warfarin | 7053 | 0.79 | 0.49 | 1.26 | NR | 0.32 |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | ICH | Apixaban | 2.5 or 5 mg | 12311 | Warfarin | 12311 | 0.56 | 0.36 | 0.85 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | ICH | Dabigatran | 110 or 150 mg | 6574 | Warfarin | 6574 | 0.46 | 0.3 | 0.7 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | ICH | Rivaroxaban | 15 or 20 mg | 8323 | Warfarin | 8323 | 0.94 | 0.67 | 1.33 | NR | NR |
| Danish National Patient Register | Staerk 2017 | ICH | Dabigatran | 75, 110 or 150 mg | 12613 | VKA | 18094 | 0.37 | 0.27 | 0.52 | NR | NR |
| Danish National Patient Register | Staerk 2017 | ICH | Rivaroxaban | 10, 15, or 20 mg | 5693 | VKA | 18094 | 0.66 | 0.45 | 0.98 | NR | NR |
| Danish National Patient Register | Staerk 2017 | ICH | Apixaban | 2.5 or 5 mg | 6899 | VKA | 18094 | 0.53 | 0.34 | 0.83 | NR | NR |
| Danish National Patient Register | Staerk 2018 | ICH | Rivaroxaban | 15 mg | 2098 | Dabigatran | 4414 | 1.85‡ | NR | NR | 0.37 | NR |
| Danish National Patient Register | Staerk 2018 | ICH | Apixaban | 2.5 mg | 3861 | Dabigatran | 4414 | 1.57‡ | NR | NR | 0.34 | NR |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | ICH | Rivaroxaban | 15 or 20 mg | 59449 | Phenprocoumon | 59449 | 0.57 | 0.47 | 0.7 | NR | 0 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | ICH | Dabigatran | 110 or 150 mg | 23654 | Phenprocoumon | 59449 | 0.4 | 0.27 | 0.58 | NR | 0 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | ICH | Apixaban | 2.5 or 5 mg | 4894 | Phenprocoumon | 59449 | 0.79 | 0.36 | 1.73 | NR | 0.5495 |
| DoD Database | Villines 2018 | ICH | Dabigatran | 150 mg | 4802 | Apixaban | 4802 | 1.11 | 0.47 | 2.63 | NR | 0.812 |
| DoD Database | Villines 2018 | ICH | Dabigatran | 150 mg | 12763 | Rivaroxaban | 12763 | 0.65 | 0.44 | 0.98 | NR | 0.041 |
| DoD Database | Villines 2015 | ICH | Dabigatran | 150 mg | 11484 | Warfarin | 11484 | 0.46 | 0.28 | 0.76 | NR | 0.0027 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | ICH | Dabigatran | <300 or 300+mg | 5537 [calculated] | Warfarin | NR | 0.45 | 0.26 | 0.77 | NR | <0.01 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | ICH | Rivaroxaban | <20 or 20+ mg | 4347 [calculated] | Warfarin | NR | 0.87 | 0.67 | 1.12 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | ICH | Apixaban | <10 or 10+ mg | 10601 [calculated] | Warfarin | NR | 0.4 | 0.25 | 0.64 | NR | <0.01 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | ICH | Rivaroxaban | >20 mg/d | NR | Warfarin | NR | 0.85 | 0.63 | 1.14 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | ICH | Apixaban | >10 mg/d | NR | Warfarin | NR | 0.41 | 0.22 | 0.76 | NR | <0.01 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | ICH | Dabigatran | <300 mg/d | NR | Warfarin | NR | 0.48 | 0.26 | 0.91 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | ICH | Rivaroxaban | <20 mg/d | NR | Warfarin | NR | 0.86 | 0.52 | 1.42 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | ICH | Apixaban | <10 mg/d | NR | Warfarin | NR | 0.44 | 0.23 | 0.82 | NR | <0.01 |
| Optum Labs Data Warehouse | Abraham 2017 | GI bleeding | Rivaroxaban | NR | 15787 | Dabigatran | 15787 | 1.2 | 1 | 1.45 | NR | NR |
| Optum Labs Data Warehouse | Abraham 2017 | GI bleeding | Apixaban | NR | 6542 | Dabigatran | 6542 | 0.39 | 0.27 | 0.58 | NR | <0.001 |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | GI bleeding | Dabigatran | 75, 110 or 150 mg | 8539 | Warfarin | 23431 | 1.17 | 1.04 | 1.32 | NR | NR |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | GI bleeding | Apixaban | 2.5 or 5 mg | 3689 | Warfarin | 23431 | 0.82 | 0.63 | 1.06 | NR | NR |
| HealthCore Integrated Research Environment (HIRE) | Adeboyeje 2017 | GI bleeding | Rivaroxaban | >10 mg | 8398 | Warfarin | 23431 | 1 | 0.87 | 1.16 | NR | NR |
| CMS | Amin 2019 | GI bleeding | Apixaban | 5 mg | 37525 | Warfarin | 37525 | 0.6 | 0.53 | 0.67 | NR | <0.001 |
| CMS | Amin 2019 | GI bleeding | Dabigatran | 150 mg | 18131 | Warfarin | 18131 | 1.06 | 0.91 | 1.23 | NR | 0.46 |
| CMS | Amin 2019 | GI bleeding | Rivaroxaban | 20 mg | 55359 | Warfarin | 55359 | 1.25 | 1.16 | 1.35 | NR | <0.001 |
| Danish National Patient Register | Andersson 2018 | GI bleeding | Apixaban | 5 mg | 3235 | Dabigatran | 3235 | 0.86 | 0.49 | 1.51 | NR | NR |
| Danish National Patient Register | Andersson 2018 | GI bleeding | Apixaban | 5 mg | 3676 | Rivaroxaban | 3676 | 0.94 | 0.6 | 1.47 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2020 | GI bleeding | Dabigatran | Mixed: 110 mg (63.8%) | 20489 | VKA | 20489 | 0.98 | 0.8 | 1.19 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2020 | GI bleeding | Rivaroxaban | Mixed: 15 mg (40%) | 23053 | VKA | 23053 | 1.08 | 0.9 | 1.3 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | GI bleeding | Dabigatran | 150 mg | 6565 (person-years) | VKA | 27,242 (person-years) | 0.58 | 0.41 | 0.81 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | GI bleeding | Dabigatran | 110 mg | 8,980 (person-years) | VKA | 27,242 (person-years) | 1.14 | 0.94 | 1.37 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | GI bleeding | Rivaroxaban | 20 mg | 31171 | VKA | 31171 | 1.11 | 0.95 | 1.31 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | GI bleeding | Rivaroxaban | 15 mg | 23314 | VKA | 23314 | 1.13 | 0.96 | 1.33 | NR | NR |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Edoxaban | 30/15, or 60 mg | 4577 | Warfarin | 19761 | 0.32 | 0.16 | 0.65 | NR | 0.0019 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Apixaban | 2.5 or 5 mg | 9952 | Warfarin | 19761 | 0.24 | 0.12 | 0.47 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Rivaroxaban | 15/10, or 20 mg | 33022 | Warfarin | 19761 | 0.65 | 0.41 | 1.02 | NR | 0.0609 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Dabigatran | 110 or 150 mg | 22371 | Warfarin | 19761 | 0.78 | 0.5 | 1.21 | NR | 0.2653 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Edoxaban | 60 mg | 1653 | Warfarin | 19761 | 0.4 | 0.14 | 1.11 | NR | 0.0775 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Apixaban | 5 mg | 3593 | Warfarin | 19761 | 0.21 | 0.07 | 0.61 | NR | 0.004 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Rivaroxaban | 20 mg | 1914 | Warfarin | 19761 | 0.89 | 0.23 | 3.44 | NR | 0.8673 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Dabigatran | 150 mg | 2550 | Warfarin | 19761 | 0.86 | 0.32 | 2.35 |  | 0.773 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Edoxaban | 30/15 mg | 2924 | Warfarin | 19761 | 0.27 | 0.11 | 0.69 | NR | 0.006 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Apixaban | 2.5 mg | 6359 | Warfarin | 19761 | 0.26 | 0.11 | 0.59 | NR | 0.0013 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Rivaroxaban | 15/10 mg | 31108 | Warfarin | 19761 | 0.63 | 0.4 | 1.01 | NR | 0.0549 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2019 | GI bleeding | Dabigatran | 110 mg | 19821 | Warfarin | 19761 | 0.77 | 0.49 | 1.21 | NR | 0.2584 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | GI bleeding | Dabigatran | 110 mg | 12593 | Warfarin | 10409 | 1.1 | 0.97 | 1.26 | NR | 0.1481 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | GI bleeding | Rivaroxaban | 10 or 15 mg | 21000 | Warfarin | 10409 | 1.09 | 0.96 | 1.24 | NR | 0.1794 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | GI bleeding | Apixaban | 2.5 mg | 12502 | Warfarin | 10409 | 0.91 | 0.78 | 1.05 | NR | 0.1908 |
| Aetna, Humana, Optum, and HealthCore | Chrischilles 2018 | GI bleeding | Rivaroxaban | NR | 36173 | Warfarin | 79520 | 1.47 | 1.29 | 1.67 | NR | NR |
| Système National des Données de Santé (SNDS) | Fauchier 2019 | GI bleeding | Dabigatran | 110 mg | 5925 | VKA | 5925 | 1.87 | 1.4 | 2.51 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | GI bleeding | Dabigatran | 75, 110 or 150 mg | 3322 | Warfarin | 12919 | 1.43 | 1.07 | 1.9 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | GI bleeding | Rivaroxaban | 10, 15, or 20 mg | 2370 | Warfarin | 12919 | 1.28 | 0.9 | 1.8 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | GI bleeding | Apixaban | 2.5 or 5 mg | 3587 | Warfarin | 12919 | 1.13 | 0.79 | 1.63 | NR | NR |
| FDA Sentinel network | Go 2017 | GI bleeding | Dabigatran | 150 mg | 25289 | Warfarin | 25289 | 1.04 | 0.83 | 1.3 | NR | NR |
| CMS | Graham 2019 | GI bleeding | Rivaroxaban | 20 mg | 106369 | Warfarin | 183003 | 1.48 | 1.36 | 1.6 | NR | NR |
| CMS | Graham 2019 | GI bleeding | Apixaban | 5 mg | 106369 | Warfarin | 72921 | 0.52 | 0.45 | 0.6 | NR | NR |
| CMS | Graham 2016 | GI bleeding | Rivaroxaban | 15 mg | 24435 | Dabigatran | 12730 | 1.62 | 1.33 | 1.98 | NR | NR |
| CMS | Graham 2015 | GI bleeding | Dabigatran | 75 or 150 mg | 67207 | Warfarin | 67207 | 1.28 | 1.14 | 1.44 | NR | <0.001 |
| CMS | Graham 2015 | GI bleeding | Dabigatran | 75 mg | 10522 | Warfarin | 10522 | 1.01 | 0.78 | 1.31 | NR | NR |
| DOD Database | Gupta 2019 | GI bleeding | Dabigatran | 75 or 150 mg | 3691 | Warfarin | 3691 | 1.26 | 0.9 | 1.78 | NR | 0.183 |
| DOD Database | Gupta 2019 | GI bleeding | Rivaroxaban | 15 or 20 mg | 8226 | Warfarin | 8226 | 1.3 | 1.06 | 1.6 | NR | 0.013 |
| DOD Database | Gupta 2019 | GI bleeding | Apixaban | 2.5 or 5 mg | 7607 | Warfarin | 7607 | 0.71 | 0.55 | 0.92 | NR | 0.009 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Apixaban | 2.5 or 5 mg | 10117 | Phenprocoumon | 23823 | 0.71 | 0.6 | 0.82 | NR | <0.001 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Dabigatran | 110 or 150 mg | 5122 | Phenprocoumon | 23823 | 0.96 | 0.79 | 1.17 | NR | 0.683 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Rivaroxaban | 15 or 20 mg | 22143 | Phenprocoumon | 23823 | 1.26 | 1.13 | 1.4 | NR | <0.001 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Apixaban | 5 mg | 6376 | Phenprocoumon | 23823 | 0.72 | 0.59 | 0.89 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Dabigatran | 150 mg | 2526 | Phenprocoumon | 23823 | 0.76 | 0.53 | 1.09 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Rivaroxaban | 20 mg | 15923 | Phenprocoumon | 23823 | 1.26 | 1.11 | 1.42 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Apixaban | 2.5 mg | 3741 | Phenprocoumon | 23823 | 0.69 | 0.56 | 0.85 | NR | 0.776 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Dabigatran | 110 mg | 2596 | Phenprocoumon | 23823 | 1.06 | 0.85 | 1.32 | NR | 0.123 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | GI bleeding | Rivaroxaban | 15 mg | 6220 | Phenprocoumon | 23823 | 1.26 | 1.1 | 1.45 | NR | 0.998 |
| Diabetes P4P database | Hsu 2018 | GI bleeding | Dabigatran | 110 or 150 mg | 305 | Warfarin | 305 | 0.518 | 0.3 | 0.895 | NR | 0.0183 |
| Diabetes P4P database | Hsu 2018 | GI bleeding | Rivaroxaban | 10 or 15 mg | 300 | Warfarin | 301 | 1.126 | 0.639 | 1.984 | NR | 0.681 |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | GI bleeding | Apixaban | Standard dose (unspecified) | NR | Dabigatran | NR | 0.86 | 0.52 | 1.43 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | GI bleeding | Apixaban | Reduced dose (unspecified) | NR | Dabigatran | NR | 0.42 | 0.25 | 0.7 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | GI bleeding | Apixaban | Standard dose (unspecified) | NR | Rivaroxaban | NR | 0.57 | 0.38 | 0.86 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | GI bleeding | Apixaban | Reduced dose (unspecified) | NR | Rivaroxaban | NR | 0.51 | 0.32 | 0.8 | NR | NR |
| Chonnam National University Hospital (Korea) | Jeong 2019 | GI bleeding | Rivaroxaban | 15 or 20 mg | 804 | Warfarin | 804 | 0.75 | 0.37 | 1.52 | NR | 0.426 |
| Norwegian Prescription Database, the Norwegian Patient Registry, the Norwegian Cause of Death Registry and the National Registry. | Kjerpeseth 2019 | GI bleeding | Dabigatran | Mixed; unspecified | 5984 | Warfarin | 6435 | 1.1 | 0.82 | 1.48 | NR | NR |
| Norwegian Prescription Database, the Norwegian Patient Registry, the Norwegian Cause of Death Registry and the National Registry. | Kjerpeseth 2019 | GI bleeding | Rivaroxaban | Mixed; unspecified | 7851 | Warfarin | 6435 | 1.21 | 0.92 | 1.59 | NR | NR |
| Norwegian Prescription Database, the Norwegian Patient Registry, the Norwegian Cause of Death Registry and the National Registry. | Kjerpeseth 2019 | GI bleeding | Apixaban | Mixed; unspecified | 10550 | Warfarin | 6435 | 0.7 | 0.52 | 0.93 | NR | NR |
| Martini Hospital Groningen, the Netherlands | Korenstra 2015 | GI bleeding | Dabigatran | NR | 383 | Acenocoumarol | NR | 0.29\* | NR | NR | 1.095 | 0.24 |
| Japan Medical Data Vision Co. | Koretsune 2018 | GI bleeding | Dabigatran | 110 or 150 mg | 4606 | Warfarin | 4606 | 0.24 | 0.08 | 0.69 | NA | NA |
| Symphony Health Solutions’ Patient Transactional Datasets | Laliberte 2014 | GI bleeding | Rivaroxaban | Dosing pattern, mg per day, mean (SD): Rivaroxaban : 19.1 (2.1) | 3654 | Warfarin | 14616 | 1.27 | 0.99 | 1.63 | NR | 0.059 |
| Clinical Data Analysis and Reporting System (CDARS) of the Hong Kong Hospital Authority | Lau 2017 | GI bleeding | Dabigatran | 75, 110 or 150 mg | 2580 | Warfarin | 2580 | 2.21\* | 1.28 | 3.83 | NR | <0.05 |
| Clinical Data Analysis and Reporting System (CDARS) of the Hong Kong Hospital Authority | Lau 2017 | GI bleeding | Dabigatran | 110 mg | 1991 | Warfarin | 1991 | 2.76\* | 1.43 | 5.33 | NR | <0.05 |
| Chonnam National University Hospital (Korea) | Lee 2017 | GI bleeding | Dabigatran | 150 mg | 183 | Warfarin | 549 | 0.54 | 0.12 | 2.46 | NR | 0.426 |
| Chonnam National University Hospital (Korea) | Lee 2017 | GI bleeding | Dabigatran | 110 mg | 366 | Warfarin | 549 | 0.25 | 0.07 | 0.88 | NR | 0.03 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | GI bleeding | Edoxaban | 30 or 60 mg | 4061 | Warfarin | 12183 | 0.597 | 0.363 | 0.93 | NR | 0.03 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | GI bleeding | Edoxaban | 60 mg | 1815 | Warfarin | 5445 | 0.402 | 0.14 | 0.913 | NR | 0.044 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | GI bleeding | Edoxaban | 30 mg | 2371 | Warfarin | 7113 | 0.744 | 0.421 | 1.228 | NR | 0.11 |
| Korean National Health Insurance Service (NHIS) | Lee 2019 | GI bleeding | Edoxaban | 15/10, or 20 mg | 12369 | Rivaroxaban | 4123 | 0.732 | 0.442 | 1.49 | NR | 0.198 |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | GI bleeding | Dabigatran | 150 mg | 5996 | Rivaroxaban 20 mg | 14852 | 0.819 | 0.59 | 1.118 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | GI bleeding | Apixaban | 5 mg | 10187 | Rivaroxaban 20 mg | 14852 | 0.661 | 0.497 | 0.87 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | GI bleeding | Edoxaban | 60 mg | 6390 | Rivaroxaban 20 mg | 14852 | 0.729 | 0.496 | 1.043 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | GI bleeding | Rivaroxaban | Mixed | 35965 | Warfarin | 25420 | 0.803 | 0.701 | 0.921 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | GI bleeding | Dabigatran | Mixed | 17745 | Warfarin | 25420 | 0.697 | 0.585 | 0.828 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | GI bleeding | Apixaban | Mixed | 22177 | Warfarin | 25420 | 0.56 | 0.469 | 0.666 | NR | NR |
| Korean Health Insurance Review Health Bigdata Hub | Lee 2019 | GI bleeding | Edoxaban | Mixed | 15496 | Warfarin | 25420 | 0.63 | 0.51 | 0.774 | NR | NR |
| ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | Li 2018 | GI bleeding | Apixaban | 5 mg | 31827 | Warfarin | 31827 | 0.62 | 0.54 | 0.72 | NR | <0.001 |
| ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | Li 2018 | GI bleeding | Apixaban | 2.5 mg | 6600 | Warfarin | 6600 | 0.57 | 0.44 | 0.75 | NR | <0.001 |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | GI bleeding | Apixaban | 2.5 or 5 mg | 100977 | Warfarin | 100977 | 0.6 | 0.55 | 0.65 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | GI bleeding | Dabigatran | 75 or 150 mg | 36990 | Warfarin | 36990 | 0.91 | 0.81 | 1.02 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | GI bleeding | Rivaroxaban | 10, 15, or 20 mg | 125068 | Warfarin | 125068 | 1.24 | 1.17 | 1.31 | NR | NR |
| Prescribing Information System (PIS), Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Mueller 2018 | GI bleeding | Apixaban | NR | 6200 | Rivaroxaban | 7265 | 0.68 | 0.46 | 0.99 | NR | 0.045 |
| Prescribing Information System (PIS), Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Mueller 2018 | GI bleeding | Dabigatran | NR | 1112 | Rivaroxaban | 7265 | 1.03 | 0.63 | 1.68 | NR | 0.907 |
| National Minimum Dataset (NMDS)- the national collection of all public and private hospital discharge information (Ministry of Health New Zealand; 2014) | Nishtala 2016 | GI bleeding | Dabigatran | 110 or 150 mg | 4385 | Warfarin | 4385 | 1.16 | 0.87 | 1.56 | NR | NR |
| National Minimum Dataset (NMDS)- the national collection of all public and private hospital discharge information (Ministry of Health New Zealand; 2014) | Nishtala 2016 | GI bleeding | Dabigatran | 150 mg | 2153 | Warfarin | NR | 0.809 | 0.475 | 1.377 | NR | NR |
| National Minimum Dataset (NMDS)- the national collection of all public and private hospital discharge information (Ministry of Health New Zealand; 2014) | Nishtala 2016 | GI bleeding | Dabigatran | 110 mg | 3395 | Warfarin | NR | 1.048 | 0.7 | 1.57 | NR | NR |
| Truven MarketScan | Norby 2017 | GI bleeding | Rivaroxaban | 10, 15, or 20 mg | 11845 | Dabigatran | 16957 | 1.28 | 1.06 | 1.54 | NR | 0.01 |
| Truven MarketScan | Norby 2017 | GI bleeding | Rivaroxaban | 10, 15, or 20 mg | 32495 | Warfarin | 45496 | 1.07 | 0.95 | 1.2 | NR | 0.29 |
| Japanese Medical Data Center (JMDC Inc.) | Ohshima 2020 | GI bleeding | Dabigatran | NR | 465 | Warfarin | 1071 | 0.94 | 0.38 | 2.29 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | GI bleeding | Dabigatran | 20 or 15 mg | 10413 | Apixaban | 10413 | 1.48 | 1.28 | 1.7 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | GI bleeding | Dabigatran | 150 or 110 mg | 10052 | Rivaroxaban | 10052 | 1.04 | 0.93 | 1.16 | NR | NR |
| Registry at the Malaysia’s National Heart Institute | Yap 2015 | GI bleeding | Dabigatran | 110 or 150 mg | 500 | Warfarin | 500 | 1‡ | NR | NR | 1 | 0.69 |
| United States Renal Data System | Siontis 2018 | GI bleeding | Apixaban | 2.5 or 5 mg | 2351 | Warfarin | 7053 | 0.86 | 0.72 | 1.02 | NR | 0.09 |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | GI bleeding | Apixaban | 2.5 or 5 mg | 12311 | Warfarin | 12311 | 0.7 | 0.52 | 0.95 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | GI bleeding | Dabigatran | 110 or 150 mg | 6574 | Warfarin | 6574 | 1.05 | 0.81 | 1.35 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | GI bleeding | Rivaroxaban | 15 or 20 mg | 8323 | Warfarin | 8323 | 1.32 | 1.04 | 1.67 | NR | NR |
| Danish National Patient Register | Staerk 2018 | GI bleeding | Rivaroxaban | 15 mg | 2098 | Dabigatran | 4414 | 1.09‡ | NR | NR | 0.17 | NR |
| Danish National Patient Register | Staerk 2018 | GI bleeding | Apixaban | 2.5 mg | 3861 | Dabigatran | 4414 | 0.69‡ | NR | NR | 0.17 | NR |
| Danish National Patient Register | Staerk 2015 | GI bleeding | Dabigatran | 150 mg | 1844 | Warfarin | 4534 | 1.43 | 0.58 | 3.52 | NR | NR |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | GI bleeding | Rivaroxaban | 15 or 20 mg | 59449 | Phenprocoumon | 59449 | 1.28 | 1.17 | 1.4 | NR | 0 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | GI bleeding | Dabigatran | 110 or 150 mg | 23654 | Phenprocoumon | 59449 | 1.21 | 1.03 | 1.42 | NR | 0.0175 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | GI bleeding | Apixaban | 2.5 or 5 mg | 4894 | Phenprocoumon | 59449 | 0.7 | 0.48 | 1.01 | NR | 0.0535 |
| DoD Database | Villines 2018 | GI bleeding | Dabigatran | 150 mg | 4802 | Apixaban | 4802 | 1.5 | 1.02 | 2.23 | NR | 0.042 |
| DoD Database | Villines 2018 | GI bleeding | Dabigatran | 150 mg | 12763 | Rivaroxaban | 12763 | 0.89 | 0.74 | 1.07 | NR | 0.207 |
| DoD Database | Villines 2015 | GI bleeding | Dabigatran | 150 mg | 11484 | Warfarin | 11484 | 1.14 | 0.93 | 1.4 | NR | 0.21 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Dabigatran | <300 or 300+mg | 5537 [calculated] | Warfarin | NR | 1.08 | 0.83 | 1.41 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Rivaroxaban | <20 or 20+ mg | 4347 [calculated] | Warfarin | NR | 1.21 | 1.01 | 1.45 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Apixaban | <10 or 10+ mg | 10601 [calculated] | Warfarin | NR | 0.76 | 0.58 | 0.99 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Dabigatran | >300 mg/d | NR | Warfarin | NR | 0.86 | 0.51 | 1.44 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Rivaroxaban | >20 mg/d | NR | Warfarin | NR | 1.14 | 0.93 | 1.4 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Apixaban | >10 mg/d | NR | Warfarin | NR | 0.81 | 0.58 | 1.13 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Dabigatran | <300 mg/d | NR | Warfarin | NR | 1.28 | 0.94 | 1.74 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Rivaroxaban | <20 mg/d | NR | Warfarin | NR | 1.34 | 0.98 | 1.83 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | GI bleeding | Apixaban | <10 mg/d | NR | Warfarin | NR | 0.7 | 0.45 | 1.09 | NR | NR |
| Danish National Patient Register | Andersson 2018 | Composite S/SE | Apixaban | 5 mg | 3235 | Dabigatran | 3235 | 1.27 | 0.82 | 1.96 | NR | NR |
| Danish National Patient Register | Andersson 2018 | Composite S/SE | Apixaban | 5 mg | 3676 | Rivaroxaban | 3676 | 1.25 | 0.87 | 1.78 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2020 | Composite S/SE | Dabigatran | Mixed: 110 mg (63.8%) | 20489 | VKA | 20489 | 0.75 | 0.63 | 0.88 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2020 | Composite S/SE | Rivaroxaban | Mixed: 15 mg (40%) | 23053 | VKA | 23053 | 0.98 | 0.85 | 1.14 | NR | NR |
| DOD Database | Gupta 2019 | Composite S/SE | Dabigatran | 75 mg | 566 | Warfarin | 566 | 0.72 | 0.25 | 2.04 | NR | vs. Standard dose: 0.857 |
| DOD Database | Gupta 2019 | Composite S/SE | Rivaroxaban | 15 mg | 2561 | Warfarin | 2561 | 0.77 | 0.49 | 1.2 | NR | vs. Standard dose: 0.694 |
| DOD Database | Gupta 2019 | Composite S/SE | Apixaban | 2.5 mg | 1893 | Warfarin | 1893 | 0.72 | 0.38 | 1.39 | NR | vs. Standard dose: 0.315 |
| DOD Database | Gupta 2019 | Composite S/SE | Dabigatran | 75 or 150 mg | 3691 | Warfarin | 3691 | 0.68 | 0.43 | 1.07 | NR | 0.096 |
| DOD Database | Gupta 2019 | Composite S/SE | Rivaroxaban | 15 or 20 mg | 8226 | Warfarin | 8226 | 0.83 | 0.64 | 1.09 | NR | 0.187 |
| DOD Database | Gupta 2019 | Composite S/SE | Apixaban | 2.5 or 5 mg | 7607 | Warfarin | 7607 | 0.55 | 0.39 | 0.77 | NR | <0.001 |
| DOD Database | Gupta 2019 | Composite S/SE | Dabigatran | 150 mg | 3125 | Warfarin | 3125 | 0.64 | 0.39 | 1.07 | NR | Ref (comparing dosages) |
| DOD Database | Gupta 2019 | Composite S/SE | Rivaroxaban | 20 mg | 5665 | Warfarin | 5665 | 0.86 | 0.61 | 1.22 | NR | Ref (comparing dosages) |
| DOD Database | Gupta 2019 | Composite S/SE | Apixaban | 5 mg | 5714 | Warfarin | 5714 | 0.49 | 0.32 | 0.73 | NR | Ref (comparing dosages) |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Composite S/SE | Apixaban | Standard dose (unspecified) | NR | Dabigatran | NR | 1.05 | 0.63 | 1.75 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Composite S/SE | Apixaban | Reduced dose (unspecified) | NR | Dabigatran | NR | 0.89 | 0.56 | 1.42 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Composite S/SE | Apixaban | Standard dose (unspecified) | NR | Rivaroxaban | NR | 0.84 | 0.58 | 1.22 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | Composite S/SE | Apixaban | Reduced dose (unspecified) | NR | Rivaroxaban | NR | 0.7 | 0.46 | 1.06 | NR | NR |
| Chonnam National University Hospital (Korea) | Jeong 2019 | Composite S/SE | Rivaroxaban | 15 or 20 mg | 804 | Warfarin | 804 | 0.69 | 0.37 | 1.32 | NR | 0.266 |
| Japan Medical Data Vision Co. | Kohsaka 2018 | Composite S/SE | Apixaban | 2.5 or 5 mg | 11972 | Warfarin | 11972 | 0.637 | 0.478 | 0.85 | NR | 0.002 |
| Symphony Health Solutions’ Patient Transactional Datasets | Laliberte 2014 | Composite S/SE | Rivaroxaban | Dosing pattern, mg per day, mean (SD): Rivaroxaban : 19.1 (2.1) | 3654 | Warfarin | 14616 | 0.77 | 0.55 | 1.09 | NR | 0.1364 |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Apixaban | 5 mg | 76107 | Warfarin | 100977 | 0.63 | 0.56 | 0.7 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Dabigatran | 150 mg | 30997 | Warfarin | 36990 | 0.75 | 0.63 | 0.88 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Rivaroxaban | 20 mg | 88157 | Warfarin | 125068 | 0.75 | 0.69 | 0.83 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Apixaban | 2.5 or 5 mg | 100977 | Warfarin | 100977 | 0.64 | 0.58 | 0.7 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Dabigatran | 75 or 150 mg | 36990 | Warfarin | 36990 | 0.82 | 0.71 | 0.95 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Rivaroxaban | 10, 15, or 20 mg | 125068 | Warfarin | 125068 | 0.79 | 0.73 | 0.85 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Apixaban | 2.5 mg | 24870 | Warfarin | 100977 | 0.54 | 0.46 | 0.63 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Dabigatran | 75 mg | 5993 | Warfarin | 36990 | 0.93 | 0.71 | 1.23 | NR | NR |
| ARISTOPHANES: Medicare and Medicaid Services Medicare data and 4 commercial claims databases in the US: MarketScan, PharMetrics, Optum (Clinformatics Data Mart), and Humana | Lip 2018 | Composite S/SE | Rivaroxaban | 10 or 15 mg | 36911 | Warfarin | 125068 | 0.79 | 0.7 | 0.89 | NR | NR |
| Japanese Medical Data Center (JMDC Inc.) | Ohshima 2020 | Composite S/SE | Dabigatran | NR | 465 | Warfarin | 1071 | 0.48 | 0.25 | 0.91 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Composite S/SE | Dabigatran | 20 or 15 mg | 10413 | Apixaban | 10413 | 0.88 | 0.75 | 1.02 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Composite S/SE | Dabigatran | 150 mg | 6498 | Apixaban | 8514 | 0.82 | 0.65 | 1.03 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Composite S/SE | Dabigatran | 110 mg | 3754 | Apixaban | 1899 | 0.69 | 0.54 | 0.88 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Composite S/SE | Dabigatran | 150 or 110 mg | 10052 | Rivaroxaban | 10052 | 0.88 | 0.76 | 1.02 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Composite S/SE | Dabigatran | 150 mg | 6498 | Rivaroxaban | 8115 | 1.05 | 0.86 | 1.28 | NR | NR |
| Norwegian Patient Registry | Rutherford 2019 | Composite S/SE | Dabigatran | 110 mg | 3754 | Rivaroxaban | 2137 | 0.76 | 0.59 | 0.98 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Composite S/SE | Apixaban | 2.5 or 5 mg | 12311 | Warfarin | 12311 | 0.92 | 0.7 | 1.2 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Composite S/SE | Dabigatran | 110 or 150 mg | 6574 | Warfarin | 6574 | 0.85 | 0.67 | 1.08 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | Composite S/SE | Rivaroxaban | 15 or 20 mg | 8323 | Warfarin | 8323 | 0.95 | 0.77 | 1.19 | NR | NR |
| GE Centricity EMR database | Wanat 2019 | Composite S/SE | Apixaban | NR | 10189 | Warfarin | 10189 | 0.84† | 0.79 | 0.88 | NR | <0.00 |
| Korean National Health Insurance Service (NHIS) | Yu 2018 | All-cause mortality | Edoxaban | 60 mg | 2840 | Warfarin | 2840 | 0.34 | 0.22 | 0.53 | NR | NR |
| Optum Clinformatics Extended Data Mart—Date of Death Database | Alberts 2020 | All-cause mortality | Rivaroxaban | NR | 6876 | Warfarin | 13597 | 0.8 | 0.74 | 0.86 | NR | NR |
| Internal and Cardiovascular Medicine – Stroke Unit of the University of Perugia, Italy | Becattini 2018 | All-cause mortality | Rivaroxaban | 75, 110 or 150 mg | 304 | Dabigatran | 126 | 1.2 | 0.57 | 2.51 | NR | 0.631 |
| Internal and Cardiovascular Medicine – Stroke Unit of the University of Perugia, Italy | Becattini 2018 | All-cause mortality | Apixaban | 75, 110 or 150 mg | 15 | Dabigatran | 126 | 1.04 | 0.45 | 2.38 | NR | 0.926 |
| Système National des Données de Santé (SNDS) | Blin 2020 | All-cause mortality | Dabigatran | Mixed: 110 mg (63.8%) | 20489 | VKA | 20489 | 0.74 | 0.67 | 0.82 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2020 | All-cause mortality | Rivaroxaban | Mixed: 15 mg (40%) | 23053 | VKA | 23053 | 0.77 | 0.71 | 0.84 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | All-cause mortality | Dabigatran | 150 mg | 6565 (person-years) | VKA | 27,242 (person-years) | 0.38 | 0.31 | 0.48 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | All-cause mortality | Dabigatran | 110 mg | 8,980 (person-years) | VKA | 27,242 (person-years) | 0.81 | 0.74 | 0.89 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | All-cause mortality | Rivaroxaban | 20 mg | 31171 | VKA | 31171 | 0.67 | 0.61 | 0.73 | NR | NR |
| Système National des Données de Santé (SNDS) | Blin 2019 | All-cause mortality | Rivaroxaban | 15 mg | 23314 | VKA | 23314 | 0.85 | 0.79 | 0.9 | NR | NR |
| Korean National Health Insurance Service (NHIS) | Cha 2017 | All-cause mortality | Rivaroxaban | 10, 15, or 20 mg | 5681 | Warfarin | 23222 | 0.923 | 0.764 | 1.104 | NR | NR |
| Korean National Health Insurance Service (NHIS) | Cha 2017 | All-cause mortality | Dabigatran | 110 or 150 mg | 3741 | Warfarin | 23222 | 0.52 | 0.386 | 0.684 | NR | NR |
| Korean National Health Insurance Service (NHIS) | Cha 2017 | All-cause mortality | Apixaban | 2.5 or 5 mg | 2189 | Warfarin | 23222 | 0.323 | 0.177 | 0.534 | NR | NR |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Apixaban | 2.5 or 5 mg | 5843 | Warfarin | 19375 | 0.58 | 0.51 | 0.66 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Dabigatran | 110 or 150 mg | 20079 | Warfarin | 19375 | 0.61 | 0.54 | 0.68 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Rivaroxaban | 10, 15, or 20 mg | 27777 | Warfarin | 19375 | 0.57 | 0.51 | 0.65 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Apixaban | 5 mg | 2220 | Warfarin | NR | 0.23 | 0.17 | 0.31 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Dabigatran | 150 mg | 2319 | Warfarin | NR | 0.45 | 0.33 | 0.63 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Rivaroxaban | 20 mg | 1777 | Warfarin | NR | 0.45 | 0.3 | 0.7 | NR | 0.0003 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Apixaban | 2.5 mg | 3623 | Warfarin | NR | 0.8 | 0.7 | 0.92 | NR | 0.002 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Dabigatran | 110 mg | 17760 | Warfarin | NR | 0.63 | 0.56 | 0.71 | NR | <0.0001 |
| Taiwan National Health Insurance Research Database (NHIRD) | Chan 2018 | All-cause mortality | Rivaroxaban | 10 or 15 mg | 26000 | Warfarin | NR | 0.58 | 0.52 | 0.66 | NR | <0.0001 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | All-cause mortality | Dabigatran | 110 mg | 12593 | Warfarin | 10409 | 0.75 | 0.66 | 0.85 | NR | <0.0001 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | All-cause mortality | Rivaroxaban | 10 or 15 mg | 21000 | Warfarin | 10409 | 0.74 | 0.65 | 0.83 | NR | <0.0001 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | All-cause mortality | Apixaban | 2.5 mg | 12502 | Warfarin | 10409 | 0.78 | 0.69 | 0.89 | NR | 0.0002 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | All-cause mortality | Dabigatran | 150 mg | 12593 | Warfarin | 10409 | 0.87 | 0.7 | 1.09 | NR | 0.2231 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | All-cause mortality | Rivaroxaban | 20 mg | 21000 | Warfarin | 10409 | 0.83 | 0.72 | 0.95 | NR | 0.0079 |
| Korean National Health Insurance Service (NHIS) | Cho 2019 | All-cause mortality | Apixaban | 5 mg | 12502 | Warfarin | 10409 | 0.63 | 0.51 | 0.77 | NR | <0.0001 |
| Système National des Données de Santé (SNDS) | Fauchier 2019 | All-cause mortality | Dabigatran | 110 mg | 5925 | VKA | 5925 | 0.87 | 0.78 | 0.97 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | All-cause mortality | Dabigatran | 75, 110 or 150 mg | 3322 | Warfarin | 12919 | 0.82 | 0.67 | 1.01 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | All-cause mortality | Rivaroxaban | 10, 15, or 20 mg | 2370 | Warfarin | 12919 | 0.92 | 0.75 | 1.14 | NR | NR |
| Stockholm administrative health data register | Forslund 2017 | All-cause mortality | Apixaban | 2.5 or 5 mg | 3587 | Warfarin | 12919 | 1.05 | 0.86 | 1.29 | NR | NR |
| CMS | Graham 2019 | All-cause mortality | Rivaroxaban | 20 mg | 106369 | Warfarin | 183003 | 0.81 | 0.75 | 0.88 | NR | NR |
| CMS | Graham 2019 | All-cause mortality | Apixaban | 5 mg | 106369 | Warfarin | 72921 | 0.66 | 0.6 | 0.74 | NR | NR |
| CMS | Graham 2019 | All-cause mortality | Dabigatran | 150 mg | 86293 | Warfarin | 183003 | 0.73 | 0.67 | 0.8 | NR | NR |
| CMS | Graham 2016 | All-cause mortality | Rivaroxaban | 15 mg | 24435 | Dabigatran | 12730 | 1.05 | 0.88 | 1.25 | NR | NR |
| CMS | Graham 2015 | All-cause mortality | Dabigatran | 75 or 150 mg | 67207 | Warfarin | 67207 | 0.86 | 0.77 | 0.96 | NR | 0.006 |
| CMS | Graham 2015 | All-cause mortality | Dabigatran | 75 mg | 10522 | Warfarin | 10522 | 0.95 | 0.78 | 1.16 | NR | NR |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Apixaban | 2.5 or 5 mg | 10117 | Phenprocoumon | 23823 | 0.97 | 0.89 | 1.06 | NR | 0.506 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Dabigatran | 110 or 150 mg | 5122 | Phenprocoumon | 23823 | 0.83 | 0.72 | 0.95 | NR | 0.006 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Rivaroxaban | 15 or 20 mg | 22143 | Phenprocoumon | 23823 | 1.03 | 0.96 | 1.11 | NR | 0.366 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Apixaban | 5 mg | 6376 | Phenprocoumon | 23823 | 0.84 | 0.74 | 0.96 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Dabigatran | 150 mg | 2526 | Phenprocoumon | 23823 | 0.56 | 0.41 | 0.75 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Rivaroxaban | 20 mg | 15923 | Phenprocoumon | 23823 | 0.92 | 0.84 | 1.01 | NR | Ref (comparing dosages) |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Apixaban | 2.5 mg | 3741 | Phenprocoumon | 23823 | 1.07 | 0.97 | 1.19 | NR | 0.004 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Dabigatran | 110 mg | 2596 | Phenprocoumon | 23823 | 0.92 | 0.79 | 1.06 | NR | 0.004 |
| Germany's Applied Health Research Database (formerly Health Risk Institute) (CARBOS-E Study) | Hohnloser 2018 | All-cause mortality | Rivaroxaban | 15 mg | 6220 | Phenprocoumon | 23823 | 1.17 | 1.07 | 1.27 | NR | <0.001 |
| Diabetes P4P database | Hsu 2018 | All-cause mortality | Dabigatran | 110 or 150 mg | 305 | Warfarin | 305 | 0.271 | 0.119 | 0.617 | NR | 0.0019 |
| Diabetes P4P database | Hsu 2018 | All-cause mortality | Rivaroxaban | 10 or 15 mg | 300 | Warfarin | 301 | 1.407 | 0.597 | 3.318 | NR | 0.4354 |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | All-cause mortality | Apixaban | Standard dose (unspecified) | NR | Dabigatran | NR | 0.95 | 0.7 | 1.29 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | All-cause mortality | Apixaban | Reduced dose (unspecified) | NR | Dabigatran | NR | 1.41 | 1.1 | 1.8 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | All-cause mortality | Apixaban | Standard dose (unspecified) | NR | Rivaroxaban | NR | 0.83 | 0.66 | 1.03 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Jansson 2020 | All-cause mortality | Apixaban | Reduced dose (unspecified) | NR | Rivaroxaban | NR | 0.95 | 0.79 | 1.16 | NR | NR |
| Chonnam National University Hospital (Korea) | Jeong 2019 | All-cause mortality | Rivaroxaban | 15 or 20 mg | 804 | Warfarin | 804 | 0.31 | 0.15 | 0.64 | NR | 0.002 |
| Danish National Patient Register | Larsen 2016 | All-cause mortality | Apixaban | 5 mg | 6349 | Warfarin | 35436 | 0.65 | 0.56 | 0.75 | NR | NR |
| Danish National Patient Register | Larsen 2016 | All-cause mortality | Dabigatran | 150 mg | 12701 | Warfarin | 35436 | 0.63 | 0.48 | 0.82 | NR | NR |
| Danish National Patient Register | Larsen 2016 | All-cause mortality | Rivaroxaban | 20 mg | 7192 | Warfarin | 35436 | 0.92 | 0.82 | 1.03 | NR | NR |
| Chonnam National University Hospital (Korea) | Lee 2017 | All-cause mortality | Dabigatran | 150 mg | 183 | Warfarin | 549 | 0.47 | 0.14 | 1.63 | NR | 0.236 |
| Chonnam National University Hospital (Korea) | Lee 2017 | All-cause mortality | Dabigatran | 110 mg | 366 | Warfarin | 549 | 0.46 | 0.19 | 1.1 | NR | 0.081 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | All-cause mortality | Edoxaban | 60 mg | 1815 | Warfarin | 5445 | 0.603 | 0.356 | 0.959 | NR | 0.043 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | All-cause mortality | Edoxaban | 30 or 60 mg | 4061 | Warfarin | 12183 | 0.716 | 0.549 | 0.918 | NR | 0.01 |
| Korean National Health Insurance Service (NHIS) | Lee 2018 | All-cause mortality | Edoxaban | 30 mg | 2371 | Warfarin | 7113 | 0.764 | 0.575 | 0.997 | NR | 0.047 |
| Korean National Health Insurance Service (NHIS) | Lee 2019 | All-cause mortality | Edoxaban | 15/10 mg | 6924 | Rivaroxaban | 2308 | 0.937 | 0.696 | 1.238 | NR | 0.655 |
| ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | Lip 2018 | All-cause mortality | Apixaban | 2.5 or 5 mg | 75088 | Warfarin | 75088 | 0.65 | 0.62 | 0.68 | NR | NR |
| ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | Lip 2018 | All-cause mortality | Dabigatran | 75 or 150 mg | 24506 | Warfarin | 24506 | 0.7 | 0.64 | 0.76 | NR | NR |
| ARISTOPHANES: CMS, MarketScan, PharMetrics, Optum, and Humana | Lip 2018 | All-cause mortality | Rivaroxaban | 10, 15, or 20 mg | 92115 | Warfarin | 92115 | 0.78 | 0.75 | 0.81 | NR | NR |
| Prescribing Information System (PIS), Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Mueller 2018 | All-cause mortality | Apixaban | NR | 6200 | Rivaroxaban | 7265 | 0.82 | 0.68 | 0.99 | NR | 0.04 |
| Prescribing Information System (PIS), Scottish Morbidity Records/Hospital Inpatients and Outpatient attendance datasets, National Records of Scotland | Mueller 2018 | All-cause mortality | Dabigatran | NR | 1112 | Rivaroxaban | 7265 | 0.65 | 0.49 | 0.86 | NR | 0.003 |
| Danish National Patient Register | Nielsen 2017 | All-cause mortality | Apixaban | 2.5 mg | 4400 | Warfarin | 38893 | 1.48 | 1.31 | 1.67 | NR | NR |
| Danish National Patient Register | Nielsen 2017 | All-cause mortality | Dabigatran | 110 mg | 4762 | Warfarin | 38893 | 1.04 | 0.96 | 1.13 | NR | NR |
| Danish National Patient Register | Nielsen 2017 | All-cause mortality | Rivaroxaban | 15 mg | 3476 | Warfarin | 38893 | 1.52 | 1.36 | 1.7 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | All-cause mortality | Apixaban | 5 mg | 325 | Warfarin | 325 | 0.4 | 0.18 | 0.87 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | All-cause mortality | Rivaroxaban | 20 mg | 548 | Warfarin | 548 | 0.69 | 0.44 | 1.09 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | All-cause mortality | Apixaban | 2.5 mg | 521 | Warfarin | 521 | 0.72 | 0.49 | 1.06 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | All-cause mortality | Rivaroxaban | 15 mg | 763 | Warfarin | 763 | 0.96 | 0.7 | 1.31 | NR | NR |
| The Australian Government Department of Veterans’ Affairs (DVA) administrative claims database | Pratt 2019 | All-cause mortality | Dabigatran | 110 mg | 357 | Warfarin | 357 | 0.72 | 0.43 | 1.19 | NR | NR |
| United States Renal Data System | Siontis 2018 | All-cause mortality | Apixaban | 2.5 or 5 mg | 2351 | Warfarin | 7053 | 0.85 | 0.71 | 1.01 | NR | 0.06 |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | All-cause mortality | Apixaban | 2.5 or 5 mg | 12311 | Warfarin | 12311 | 0.83 | 0.72 | 0.96 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | All-cause mortality | Dabigatran | 110 or 150 mg | 6574 | Warfarin | 6574 | 0.81 | 0.7 | 0.93 | NR | NR |
| The Swedish anticoagulation quality registry (Auricula) | Sjalander 2018 | All-cause mortality | Rivaroxaban | 15 or 20 mg | 8323 | Warfarin | 8323 | 1.02 | 0.9 | 1.15 | NR | NR |
| Truven MarketScan | Song 2017 | All-cause mortality | Dabigatran | 75, 110 or 150 mg | 18980 | Warfarin | NR | 0.86‡ | NR | NR | 0.186 | 0.772 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | All-cause mortality | Rivaroxaban | 15 or 20 mg | 59449 | Phenprocoumon | 59449 | 1.17 | 1.11 | 1.22 | NR | 0 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | All-cause mortality | Dabigatran | 110 or 150 mg | 23654 | Phenprocoumon | 59449 | 1.04 | 0.95 | 1.13 | NR | 0.4074 |
| "Integrated Analyses" (IntegAna) database of the Scientific Institute of the AOK (WIdO). | Ujeyl 2018 | All-cause mortality | Apixaban | 2.5 or 5 mg | 4894 | Phenprocoumon | 59449 | 1.14 | 0.97 | 1.34 | NR | 0.1211 |
| DoD Database | Villines 2018 | All-cause mortality | Dabigatran | 150 mg | 4802 | Apixaban | 4802 | 1.02 | 0.72 | 1.47 | NR | 0.895 |
| DoD Database | Villines 2018 | All-cause mortality | Dabigatran | 150 mg | 12763 | Rivaroxaban | 12763 | 1.01 | 0.83 | 1.23 | NR | 0.936 |
| DoD Database | Villines 2015 | All-cause mortality | Dabigatran | 75 or 150 mg | 12793 | Warfarin | 12793 | 0.64 | 0.55 | 0.74 | NR | <0.0001 |
| DoD Database | Villines 2015 | All-cause mortality | Dabigatran | 150 mg | 11484 | Warfarin | 11484 | 0.56 | 0.47 | 0.66 | NR | <0.0001 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Dabigatran | <300 or 300+mg | 5537 [calculated] | Warfarin | NR | 0.99 | 0.87 | 1.13 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Rivaroxaban | <20 or 20+ mg | 4347 [calculated] | Warfarin | NR | 1.19 | 1.09 | 1.29 | NR | <0.01 |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Apixaban | <10 or 10+ mg | 10601 [calculated] | Warfarin | NR | 1.13 | 1.01 | 1.25 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Dabigatran | >300 mg/d | NR | Warfarin | NR | 0.9 | 0.68 | 1.19 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Rivaroxaban | >20 mg/d | NR | Warfarin | NR | 1.1 | 0.99 | 1.21 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Apixaban | >10 mg/d | NR | Warfarin | NR | 0.98 | 0.83 | 1.15 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Dabigatran | <300 mg/d | NR | Warfarin | NR | 1.01 | 0.87 | 1.18 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Rivaroxaban | <20 mg/d | NR | Warfarin | NR | 1.29 | 1.14 | 1.47 | NR | NR |
| QResearch and Clinical Practice Research Datalink (CPRD) databases. Data were also linked to mortality data supplied by the Office for National Statistics. | Vinogradova 2018 | All-cause mortality | Apixaban | <10 mg/d | NR | Warfarin | NR | 1.27 | 1.12 | 1.45 | NR | NR |

Abbreviations: CDARS = Clinical Data Analysis and Reporting System; CI = confidence interval; CIHI = Canadian Institute for Health Information; CMS = Centers for Medicare & Medicaid Services; CPRD = Clinical Research Practice Datalink; DOD = date of death; DVA = Department of Veterans’ Affairs; EMR = electronic medical record; FDA = Food and Drug Administration; GI = gastrointestinal; HIRE = HealthCore Integrated Research Environment; HR = hazard ratio; ICH = International Council for Harmonisation; IMS = Intercontinental Medical Statistics; IntegAna = integrated analysis; JMDC = Japanese Medical Data Center; NHIRD = Taiwan National Health Insurance Research Database; NHIS = Korean National Health Insurance Service; NMDS = National Minimum Dataset; NR = not reported; OHIP = Ontario Health Insurance Plan; P4P = pay-for-performance; PIS = Prescribing Information System; SD = standard deviation; SE = standard error; SNDS = Système National des Données de Santé; US = United States; VKA = vitamin K antagonist; WIdO = Scientific Institute of the AOK