The first step for stroke prevention is detecting risks for thromboembolism and bleeding.
The CHA$_2$DS$_2$-VASc score is recommended for stroke risk prediction in patients with AF.

Bleeding risk scores should be considered in AF patients on oral anticoagulation to identify modifiable risk factors for major bleeding.

Biomarkers such as high-sensitivity troponin and natriuretic peptide may be considered to further refine stroke and bleeding risk in AF patients.

The first step for stroke prevention is detecting risks for thromboembolism and bleeding.
Stroke prevention in patients with atrial fibrillation

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Level&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral anticoagulation therapy to prevent thromboembolism is recommended for all male AF patients with a CHA&lt;sub&gt;2&lt;/sub&gt;DS&lt;sub&gt;2&lt;/sub&gt;-VASc score of 2 or more.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Oral anticoagulation therapy to prevent thromboembolism is recommended in all female AF patients with a CHA&lt;sub&gt;2&lt;/sub&gt;DS&lt;sub&gt;2&lt;/sub&gt;-VASc score of 3 or more.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Oral anticoagulation therapy to prevent thromboembolism should be considered in male AF patients with a CHA&lt;sub&gt;2&lt;/sub&gt;DS&lt;sub&gt;2&lt;/sub&gt;-VASc score of 1, considering individual characteristics and patient preferences.</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>Oral anticoagulation therapy to prevent thromboembolism should be considered in female AF patients with a CHA&lt;sub&gt;2&lt;/sub&gt;DS&lt;sub&gt;2&lt;/sub&gt;-VASc score of 2, considering individual characteristics and patient preferences.</td>
<td>Ila</td>
<td>B</td>
</tr>
</tbody>
</table>
Guidelines recommend the use of oral anticoagulants to reduce the incidence of stroke in patients with AF, regardless of the approach used to manage the arrhythmia.

However, in the real life more than a half of the patients with AF are not adequately anti-coagulated.
Limitations and Challenges Associated With Warfarin

- Anticoagulation clinics
- Narrow therapeutic index & drug-diet interactions
  - Requires frequent monitoring.
  - Genotype testing?
- Long half-life
  - Heparin "overlap" often necessary
- Slow onset of action
- Periprocedural anticoagulation difficult

Complicates management of:
- Bleeding patient
- Patient with high INR

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Timeline of findings from landmark trials in AF

1995
- First maze surgery for AF treatment published
- ACE-I/ARBs prevent AF in heart failure

2000
- ARBs prevent AF in hypertension & LVH
- VKA superior to aspirin for stroke prevention in AF
- VKA reduces stroke in AF by 2/3
- Ximelagatran as effective as VKA

2005
- ARBs do not prevent AF or adverse outcomes in patients without hypertension
- Dabigatran at least as effective as VKA in AF
- Amiodarone not superior to rate control in heart failure

2010
- PUFA do not prevent AF
- MRA prevent AF in HFrEF patients pre-treated with ACE-I/ beta-blockers
- Apixaban at least as effective as VKA in AF
- Lenient rate control acceptable

2015
- MRA prevent AF in HFrEF patients pre-treated with ACE-I
- Rixaroxaban and Apixaban at least as effective as VKA in AF
- Dronedarone harms in permanent AF
- Edoxaban at least as effective as VKA in AF
- First-line PVI maintains SR better than antiarrhythmic drugs

Meta-analysis and healthcare databases:
- NOACs safer and slightly more effective compared to VKA
- Beta-blockers without prognostic benefit in AF patients with HFrEF
- Dronedarone improves outcomes in non-permanent AF
- Lenient rate control acceptable

Bipolar RF more effective than conventional RF for stand-alone AF surgery
- Concomitant maze surgery maintains SR but increases risk of permanent pacemaker

Cryoenergy as effective as RF for PVI
- PVI alone as effective as complex ablation in persistent AF
When oral anticoagulation is initiated in a patient with AF who is eligible for a NOAC (apixaban, dabigatran, edoxaban, or rivaroxaban), a NOAC is recommended in preference to a Vitamin K antagonist.
Secondary stroke prevention

NOACs are recommended in preference to VKAs or aspirin in AF patients with a previous stroke.

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NOACs (apixaban, dabigatran, edoxaban, and rivaroxaban) are not recommended in patients with mechanical heart valves (Level of evidence B) or moderate-to-severe mitral stenosis (Level of evidence C).

Vitamin K antagonist therapy (INR 2.0–3.0 or higher) is recommended for stroke prevention in AF patients with moderate-to-severe mitral stenosis or mechanical heart valves.
After elective coronary stenting for stable coronary artery disease in AF patients at risk of stroke, combination triple therapy with aspirin, clopidogrel and an oral anticoagulant should be considered for 1 month to prevent recurrent coronary and cerebral ischaemic events.
After an ACS with stent implantation in AF patients at risk of stroke, combination triple therapy with aspirin, clopidogrel and an oral anticoagulant should be considered for 1–6 months to prevent recurrent coronary and cerebral ischaemic events.
Occlusion or exclusion of the left atrial appendage

<table>
<thead>
<tr>
<th>Recommendations</th>
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<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>After surgical occlusion or exclusion of the LAA, it is recommended to continue anticoagulation in at-risk patients with AF for stroke prevention.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>LAA occlusion may be considered for stroke prevention in patients with AF and contra-indications for long-term anticoagulant treatment (e.g. those with a previous life-threatening bleed without a reversible cause).</td>
<td>I Ib</td>
<td>B</td>
</tr>
<tr>
<td>Surgical occlusion or exclusion of the LAA may be considered for stroke prevention in patients with AF undergoing cardiac surgery.</td>
<td>I Ib</td>
<td>B</td>
</tr>
<tr>
<td>Surgical occlusion or exclusion of the LAA may be considered for stroke prevention in patients undergoing thoracoscopic AF surgery.</td>
<td>I Ib</td>
<td>B</td>
</tr>
</tbody>
</table>

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Society Guidelines

2014 Focused Update of the Canadian Cardiovascular Society Guidelines for the Management of Atrial Fibrillation

Atul Verma, MD, a John A. Cairns, MD, b L. Brent Mitchell, MD, c Laurent Macle, MD, d
Ian G. Stiell, MD, e David Gladstone, MD, f Michael Sean McMurtry, MD, g Stuart Connolly, MD, h
Jafna L. Cox, MD, i Paul Dorian, MD, j Noah Ivers, MD, k Kori Leblanc, PharmD, l
Stanley Nattel, MD, d and Jeff S. Healey, MD h; for the CCS Atrial Fibrillation Guidelines Committee

Canadian Journal of Cardiology 30 (2014) 1114–1130
2014 Focused Updates of the Canadian Cardiovascular Society Atrial Fibrillation Guidelines prefer the NOAC versus warfarin.
2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society
## Risk-Based Antithrombotic Therapy

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
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<tbody>
<tr>
<td>For patients with nonvalvular AF with prior stroke, transient ischemic attack, or a CHA$_2$DS$_2$-VASc score of 2 or greater, oral anticoagulants are recommended. Options include:</td>
<td></td>
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</tr>
<tr>
<td>- warfarin (INR 2.0 TO 3.0), or</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>- dabigatran, or</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>- rivaroxaban, or</td>
<td>I</td>
<td>B</td>
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<tr>
<td>- apixaban.</td>
<td>I</td>
<td>B</td>
</tr>
</tbody>
</table>

Among patients treated with warfarin, the INR should be determined at least weekly during initiation of antithrombotic therapy and at least monthly when anticoagulation (INR in range) is stable.

For patients with nonvalvular AF unable to maintain a therapeutic INR level with warfarin, use of a direct thrombin or factor Xa inhibitor (dabigatran, rivaroxaban, or apixaban) is recommended.

Re-evaluation of the need for and choice of antithrombotic therapy at periodic intervals is recommended to reassess stroke and bleeding risks.
## Risk-Based Antithrombotic Therapy

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<th>LOE</th>
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</thead>
<tbody>
<tr>
<td>For patients with nonvalvular AF and a CHA₂DS₂-VASc score of 0, it is reasonable to omit antithrombotic therapy.</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>For patients with nonvalvular AF with a CHA₂DS₂-VASc score of 2 or greater and who have end-stage CKD (CrCl &lt;15 mL/min) or are on hemodialysis, it is reasonable to prescribe warfarin (INR 2.0 to 3.0) for oral anticoagulation.</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>For patients with nonvalvular AF and a CHA₂DS₂-VASc score of 1, no antithrombotic therapy or treatment with an oral anticoagulant or aspirin may be considered.</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>For patients with nonvalvular AF and moderate-to-severe CKD with CHA₂DS₂-VASc scores of 2 or greater, treatment with reduced doses of direct thrombin or factor Xa inhibitors may be considered (e.g., dabigatran, rivaroxaban, or apixaban), but safety and efficacy have not been established.</td>
<td>IIb</td>
<td>C</td>
</tr>
</tbody>
</table>
AHA/ASA Guideline

Guidelines for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack
A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists. Endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons

(Stroke. 2014;45:2160-2236.)
AF Recommendations

1. For patients who have experienced an acute ischemic stroke or TIA with no other apparent cause, prolonged rhythm monitoring (≈30 days) for AF is reasonable within 6 months of the index event (Class IIa; Level of Evidence C). (New recommendation)

2. VKA therapy (Class I; Level of Evidence A), apixaban (Class I; Level of Evidence A), and dabigatran (Class I; Level of Evidence B) are all indicated for the prevention of recurrent stroke in patients with nonvalvular AF, whether paroxysmal or permanent. The selection of an antithrombotic agent should be individualized on the basis of risk factors, cost, tolerability, patient preference, potential for drug interactions, and other clinical characteristics, including renal function and time in INR therapeutic range if the patient has been taking VKA therapy. (Revised recommendation)

3. Rivaroxaban is reasonable for the prevention of recurrent stroke in patients with nonvalvular AF (Class IIa; Level of Evidence B). (New recommendation)