ATRIAL FIBRILLATION DECISION AID

What is Atrial Fibrillation?
Atrial fibrillation is an abnormal heart rhythm during which the upper or filling chambers of the heart beat irregularly. Normally the pacemaker of the heart generates an electrical impulse, which is conducted or carried to the lower or pumping chambers of the heart via the electrical conducting tissues (wires) of the heart. This allows a natural sequence of contraction where the upper chambers (atria) beat first thus filling the lower chambers (ventricles). This sequence allows priming of the pumping chambers and contributes as much as 20% of the output of the heart. In atrial fibrillation, the heart's natural pacemaker, the sinus node, no longer generates an electrical impulse. Instead electrical activity occurs irregularly throughout both left and right atria. This irregular electrical impulse is conducted erratically to the ventricles, resulting in an irregular heartbeat which may be excessively fast and vary in volume from beat to beat.

Causes of Atrial Fibrillation
The commonest cause of atrial fibrillation is long-standing high blood pressure. Other common causes include valvular heart disease, weakened heart muscle due to coronary artery disease or cardiomyopathy (viral or unknown cause), degenerative disease of the electrical tissues of the heart, alcohol, hyperthyroidism or in many cases-idiopathic (no cause identifiable).

Symptoms of Atrial Fibrillation
When in atrial fibrillation the patient may feel his/her heart beating rapidly and irregularly (palpitation). Atrial fibrillation may cause chest pain, shortness of breath, dizziness, weakness or fatigue. In some patients there are no accompanying symptoms.

Is Atrial Fibrillation Dangerous?
If atrial fibrillation causes chest pain, shortness of breath, dizziness or congestive heart failure (water in the lungs), the arrhythmia may be dangerous and need to be corrected promptly. Usually however, symptoms are not that severe and the arrhythmia may be dealt with less acutely. The major long-term danger of atrial fibrillation is an increased risk of stroke. The atria of the heart do not contract properly during atrial fibrillation. Blood flow is sluggish within the atria and this may lead to clot formation. If one of these clots breaks loose, it may travel to other parts of the body (embolism) resulting in stroke (cerebral embolism) or blockage of blood vessels throughout the body. Blockage of vessels to the limbs may cause inadequate blood supply (ischaemia) and endanger the limb. Similarly, blockage of a blood vessel in the abdomen may cause abdominal pain and bowel ischaemia, a condition that is life-threatening.

What is the Treatment for Atrial Fibrillation?

In general the treatment of atrial fibrillation consists of:
1. Medications to control the heart rate,
2. Medications to restore normal sinus rhythm and
3. Medications to thin the blood and prevent embolization. The need for chronic blood thinners can be predicted based on certain risk factors, which are detailed on the Atrial Fibrillation Decision Aide information sheet.
4. In some cases, efforts to restore the rhythm to normal sinus rhythm are carried out. These include various anti-arrhythmic medications or electrical means using external paddles under anaesthesia to deliver a synchronized shock to the heart. This procedure is called a cardioversion.
5. In some cases anti-arrhythmic medications must be given long term to maintain normal sinus rhythm.
6. In some cases electrical studies of the heart are carried out along with a procedure to burn around the left atrium where the atrial fibrillation is coming from. This is called an atrial fibrillation ablation procedure.

ATRIAL FIBRILLATION

DECISION AID 2014 UPDATE

The estimate of the likelihood of stroke over one year will depend upon the patient's risk factors. Risk factors for stroke in atrial fibrillation include: Age, hypertension (HTN), diabetes (DM), congestive heart failure (CHF), prior stroke (CVA), transient ischaemia attack (TIA), peripheral embolism (TE), gender and the presence of vascular disease. The most popular risk scoring system is the $CHADS_2$ Index*.

Revised $CHADS_2$ Index*

	CONDITION	POINTS
C	Congestive heart failure	1
H	History of hypertension	1
A	Age ≥ 75 years	1
D	Diabetes	1
S_2	Prior stroke/TIA	2
	TOTAL =	

Risk of Stroke/Year

$CHADS_2$ SCORE	STROKE RISK	95% CI
0	1.9	1.2-3.0
1	2.8	2.0-3.8
2	4.0	3.1-5.1
3	5.9	4.6-7.3
4	8.5	6.3-11.1
5	12.5	8.2-17.5
6	18.2	10.5-27.4

Newer studies have shown improved risk prediction by incorporating age stratification, female gender and presence of vascular disease.

2009 Birmingham Schema (Based on CHA_2DS_2-VASc)**

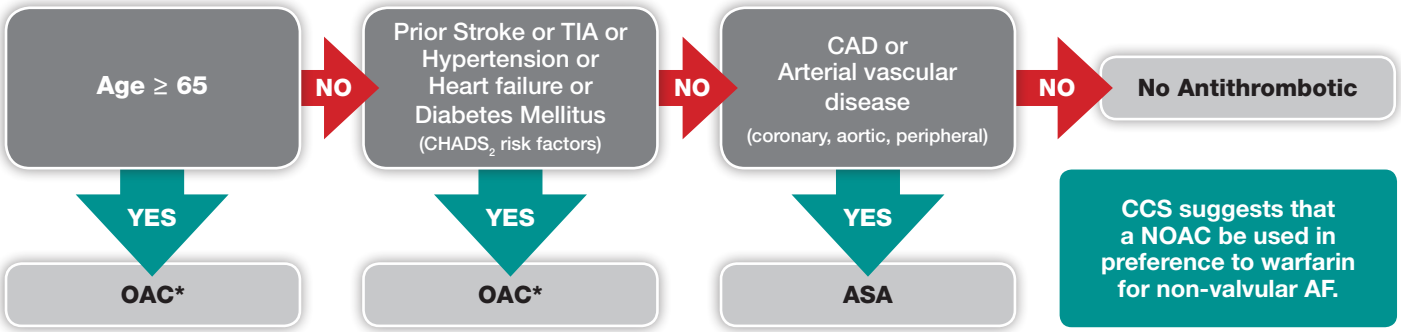
RISK FACTOR	SCORE
Congestive heart failure/LV dysfunction	1
Hypertension	1
Age ≥ 75 y	2
Diabetes mellitus	1
Stroke/TIA/TE	2
Vascular disease (prior myocardial infarction, peripheral artery disease or aortic plaque)	1
Age ≥ 65-74 y	1
Sex category (i.e. female gender)	1
TOTAL =	

LV = left ventricular TE = thromboembolism

* Gage BF, Waterman AD, Shannon, et al. Validation of clinical classification schemes for predicting stroke. Results from the National Registry of Atrial Fibrillation. *JAMA* 2001;285:2864-70)

** Gregory Y. H. Lip, Robby Nieuwlaat, Ron Pisters, Deirdre A. Lane and Harry J. G. M. Crijns. Refining Clinical Risk Stratifion for Predicting Stroke and Thromboembolism in Atrial Fibrillation Using a Novel Risk Factor-Based Approach: The Euro Heart Survey on Atrial Fibrillation. *Chest* 2010;137;263-272.

The 2014 "CCS Algorithm" for OAC Therapy in AF:



Consider and modify (if possible) all factors influencing risk of bleeding on OAC (hypertension, antiplatelet drugs, NSAIDs, excessive alcohol, labile INRs) and specifically bleeding risks for NOACs (low eGFR, age ≥ 75, low body weight)**

*May require lower dosing

2014 Focused Update of the Canadian Cardiovascular Society Guidelines for the Management of Atrial Fibrillation. Canadian Journal of Cardiology 30 (2014) 1114 -1130.

Stroke or Other TE (Thromboembolic) at 1 Year Based on the 2009 Birmingham (CHA_2DS_2-VASc) Scoring System

This table presents the risk of stroke or thromboembolism over one year of follow-up stratified by age and risk factors.

CHA_2DS_2-VASc SCORE	NO.	NUMBER OF TE EVENTS	TE RATE % DURING 1 Y (95% CI)	TE RATE DURING 1 Y, ADJUSTED FOR ASPIRIN PRESCRIPTION %[A]
0	103	0	0 (0-0)	0
1	164	1	0.6 (0-3.4)	0.7
2	184	3	1.6 (0.3- 4.7)	1.9
3	203	8	3.9 (1.7-7.6)	4.7
4	208	4	1.9 (0.5-4.9)	2.3
5	95	3	1.2 (0.7-9.0)	3.9
6	57	2	3.6 (0.4-12.3)	4.5
7	25	2	8.0 (1.0-26.0)	10.1
8	9	1	11.1 (0.3-48.3)	14.2
9	1	1	100 (2.5-100)	100
TOTAL	**1084**	**25**	**P Value for trend 0.003**	

[a] Theoretical TE rates without therapy: corrected for the % of patients receiving aspirin within each group, assuming that aspirin provides a 22% reduction in TE risk, based on Hart et al. 9

Structural Heart Disease

Patients with atrial fibrillation and structural heart disease: hypertensive heart disease, coronary heart disease with LV dysfunction, rheumatic, valvular heart disease, congenital valvular heart disease (bicuspid aortic valve with aortic stenosis, mitral valve prolapse), hypertrophic cardiomyopathy (obstructive or non-obstructive), idiopathic dilated cardiomyopathy or complex congenital heart disease are at high risk for stroke and should be on some form of oral anticoagulation. **NB: NOACs are not indicated for valvular atrial fibrillation.**

Use of this decision aide is intended to help the physician explain the risks and benefits of antiplatelet therapy and oral anticoagulation therapy to patients with atrial fibrillation. After review of the risks and benefits the patient is asked to make a facilitated decision on whether they wish to take oral anticoagulation therapy and whether they would prefer warfarin with required INR monitoring or a NOAC. It should then be determined who will initiate and monitor anticoagulation therapy. Communication between family physician and specialist is essential to ensure appropriate monitoring and/or consider referral to an anticoagulation clinic.

Assess Bleeding Risk

Recommendations for oral anti-coagulant therapy should be tempered by bleeding risk. Bleeding risk can be assessed using the HAS-BLED scoring system.

Clinical characteristics comprising the HAS-BLED bleeding risk score		
LETTER	**CLINICAL CHARACTERISTICS**	**POINTS AWARDED (MAXIMUM 9)**
H	*Hypertension (SBP>160 mm Hg)	1
A	**Abnormal renal or liver function	1 or 2 (one for each)
S	Stroke	1
B	Bleeding	1
L	Labile INRs (TTR <60%)	1
E	Elderly (Age > 65)	1
D	Drugs or alcohol (Antiplatelet/NSAIDs)	1 or 2 (one for each)
	Total:	

* Contrarily to the CHADS score, one point is given for uncontrolled hypertension only
** A=Dialysis, RenalTx,Cr ≥200µmol/L. Cirrhosis or LFTs>3X normal.

HAS-BLED: The risk of major bleeding within one year in atrial fibrillation patients	
RISK FACTORS/ SCORE	**BLEEDS PER 100 PATIENT YEARS**
0	1.13
1	1.02
2	1.88
3	3.74
4	8.7
5	12.5

A novel user-friendly score (HAS-BLED) to assess one-year risk of major bleeding in atrial fibrillation patients: The Euro Heart Survey. R. Pisters, D. A. Lane, R. Nieuwlaat, C. B. de Vos, H. J. G. M. Crijns and G. Y. H. Lip. *Chest*; Prepublished online March 18, 2010.

ATRIAL FIBRILLATION ANTI-COAGULATION CHECKLIST

❑ **Atrial fibrillation** / ❑ **Atrial flutter:** ❑ Paroxysmal ❑ Persistent ❑ Permanent

$CHADS_2$ Score/CHA_2DS_2-VASc Score/HAS-BLED Score:

PRESENT/ ABSENT	$CHADS_2$ CONDITION	PTS.	PRESENT/ ABSENT	CHA_2DS_2-VASC CONDITION	PTS.	CLINICAL CHARACTERISTICS COMPRISING THE HAS-BLED BLEEDING RISK SCORE		PTS.
❑ C	CHF	1	❑ C	CHF/LV dysfunction	1	❑ H	HTN SBP>160 mmHg	1
❑ H	HTN	1	❑ H	HTN	1	❑ A	Abnormal liver or renal function	1
❑ A	Age ≥ 75 Years	1	❑ A2	Age ≥ 75 years	2	❑ S	Stroke	1
❑ D	DM	1	❑ D	DM	1	❑ B	Bleeding	1
❑ S2	Prior CVA/TIA	2	❑ S2	CVA/TIA/TE	2	❑ L	Labile INRs	1
	Total =		❑ V	Vascular disease (MI/PVD/AO plaq)	1	❑ E	Elderly (>65)	1
			❑ A	Age 65-74 Years	1	❑ D	Drugs or Etoh 1 or 2 (one for each)	1 or 2
			❑ SC	Sex category = female gender	1	Maximum 9 points		1 or 2
				Total =		Total =		

Recommendations for anticoagulation based on $CHADS_2$ Index:

SCORE	RISK	ANTICOAGULATION THERAPY CONSIDERATIONS
0	Low • Age < 65. No additional $CHADS_2$ risk factors	No anti-thrombotic therapy or Rx LD-ASA if Vascular Disease: (coronary, peripheral or aortic) (Female gender no longer considered an independent embolic risk factor)
1	Moderate • Patients aged ≥ 65 or • $CHADS_2$ ≥ 1	OAC* (oral anti-coagulation): Either NOACs (DOACs) or warfarin to raise INR to 2.0-3.0. CCS suggests that a NOAC be used in preference to warfarin for non-valvular AF.
≥ 2	High Use warfarin for atrial fibrillation with: • Mechanical prosthetic valve • Rheumatic mitral stenosis • eGFR 15-30 mL/ min/1. 73 m^2 See Level of Intensity/ Indication Table	OAC* (Oral anti-coagulation): Either NOAC (DOAC) preferred over warfarin (LD-VKA:INR 2.0-3.0): • Dabigatran (Pradaxa®): 150 mg BID. (Dabigatran 110 mg BID if age > 80 yrs or > 75yrs with bleeding risk factors (HTN > 160/, SCr > 200 µmol/L, hepatic dysfunction, hemorrhagic stroke, bleeding, labile INR, ASA/NSAID or Etoh). Avoid if e-GFR ≤ 30 mL/min. • Rivaroxaban (Xarelto®): 20 mg OD (Moderate renal impairment e-GFR 30-49 mL/min reduce Rivaroxaban dose to 15 mg daily. Avoid if e-GFR ≤ 30 mL/min. No dosing adjustment for age) • Apixaban (Eliquis®): 5 mg BID. No dose adjustment for mild to moderate renal impairment or CrCl 25-30 mL/min. Avoid if CrCl ≤ 25 mL/min. Reduce to 2.5 mg BID if two of : Age ≥ 80, weight ≤ 60 kg or SeCr ≥ 133 µmol/L.

Warfarin vs. Novel Oral Anticoagulants (NOACs):

Warfarin (Coumadin®) therapy requires frequent blood monitoring of prothrombin time (PT) or INR. Patients with atrial fibrillation require an INR of 2.5 (range between 2 and 3) to ensure optimal stroke risk reduction. Warfarin dose is adjusted according to periodic blood tests in order to maintain the INR in the therapeutic range (2 to 3). Novel oral anticoagulants include dabigatran (Pradaxa®), rivaroxaban (Xarelto®) and apixaban (Eliquis®). Compared to warfarin, dabigatran and apixaban have greater efficacy and rivaroxaban has similar efficacy for stroke prevention. Dabigatran and rivaroxaban have equivalent bleeding risk to warfarin and apixaban has less. All three novel oral anti-coagulants have less risk of serious intracranial bleeding compared to warfarin. (CCS Focused Update Atrial Fibrillation Guidelines 2012. *Canadian Journal of Cardiology* 28 (2012) 125-136.)

Decision: ❑ **LD-ASA** ❑ **Clopidogrel** ❑ **VKA** ❑ **Dabigatran** ❑ **Rivaroxaban** ❑ **Apixaban**

Patient: _____ Laboratory: _____

Diagnosis: _____ Target INR: _____

Antithrombotic Therapy Selection: Level of Intensity Based on Indication

CLINICAL SCENARIO	THERAPY
❑ Atrial fibrillation: ❑ Atrial flutter: ❑ Paroxysmal ❑ Persistent ❑ Permanent ❍ Lone Atrial Fibrillation ❍ Idiopathic/Degenerative ❍ HTN Heart Disease ❍ Cardiomyopathy/LV dysfunction ❍ Valvular heart disease ❍ Hyperthyroidism ❍ Post-operative (Thoracic/Cardiac) ❍ Other:_____	❑ NOAC (DOAC): ❍ Apixaban 5 mg BID ❍ Apixaban 2.5 mg BID ❍ Dabigatran 150 mg BID ❍ Dabigatran 110 mg BID ❍ Rivaroxaban 20 mg OD ❍ Rivaroxaban 15 mg OD ❑ Low dose (LD) VKA* (INR 2.0-3.0) ❑ LD ASA ❑ Clopidogrel
❑ Mechanical prosthetic valve	Add LD ASA to VKA if low risk of bleeding
❑ **Long-term anticoagulation** ❍ Aortic mechanical valve ❍ Mechanical mitral valve ❍ Dual mechanical AV/MV	 Low-dose (LD) VKA* (INR 2.5: range 2.0-3.0) Medium-dose (MD) VKA* (INR 3.0: range 2.5-3.5) Medium-dose (MD) VKA* (INR 3.0: range 2.5-3.5)
❑ Concomitant atherosclerosis	Add LD ASA or Clopidogrel
❑ Bioprosthetic valve	
❍ Routine: patient in NSR	LD VKA* X 3 months then LD ASA
❑ AF, LA thrombus, thromboembolism	LD VKA* (INR 2.5: range 2.0-3.0)

*VKA = Vitamin K antagonist

References:

1. ATPT 9TH ED: ACCP GUIDELINES - Antithrombotic and Thrombolytic Therapy for Valvular Disease. CHEST 2012; 141(2)(Suppl):e576S–e600S.
2. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Circulation. 2014;129:e521-e643.

DATE D/M/Y	INR	WARFARIN DOSE mg	CALLED ✓	NEXT CHECK	BILLED ✓	WT LBS/KG	CR/ EGFR	TIA/CVA PVE	BLEEDING (SITE/MAJOR/MINOR)	HGB	LFTs
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						
			☐		☐						

NOAC COMPARISON TABLES

Evidence: Clinical trials are not directly comparable due to differing entry criteria/risk levels

Superiority
Non-inferiority

	RELY[1]			ROCKET –AF[2]			ARISTOTLE[3]		
CHADS SCORE	2.1-2.2			3.46-3.48			2.1		
Event	Warfarin	Dabiga-tran 150 mg	Dabiga-tran 110 mg	Event	Warfarin	Rivaroxa-ban	Event	Warfarin	Apixa-ban
Major bleeding	3.36	3.11	2.71	Major bleeding	3.4	3.6	Major bleeding	3.09	2.13
Minor bleeding	16.37	14.84	13.16	Minor bleeding	11.4	11.8	Minor bleeding		
All bleeding	18.15	16.42	14.62	All bleeding	14.5	14.9	All bleeding	25.8	18.1
CVA or embolism	1.69	1.11	1.53	CVA or Non-CNS embolism	2.2	1.7	CVA or Non-CNS embolism	1.60	1.27
All cause mortality	4.13	3.64	3.75	All cause mortality	4.9	4.5	All cause mortality	3.94	3.52
Vascular mortality	2.69	2.28	2.43	Vascular mortality	3.63	3.11	Vascular mortality		
Ischaemic/ unspecified CVA	1.2	0.92	1.34	Ischaemic CVA	1.52	1.40	Ischaemic CVA	1.05	0.97
Hemmorhagic CVA	0.38	0.10	0.12	Hem-morhagic CVA	0.7	0.5	Hem-morhagic CVA	0.47	0.24
MI	0.53	0.74	0.72		1.1	0.9		0.61	0.53

The clinician should discuss the risks and benefits of dabigatran, rivaroxaban or apixaban compared to warfarin or other coumarin derivatives before considering initiating or switching. NB: For patients with stable INR already on warfarin or coumarin derivatives it may be appropriate to remain on warfarin.

NOAC Dosing

DABIGATRAN (LU CODE 431)	**RIVAROXABAN** (LU CODE 435)	**APIXABAN** (LU CODE 448)
Age < 80 –150 mg twice daily	e-GFR > 50 ml/m – 20 mg daily	5 mg twice daily
Age ≥ 80 – 110 mg twice daily or > 75 yrs with bleeding risk factors: (HTN > 160/, SCr > 200 µmol/L, hepatic dysfunction, hemorrhagic stroke, bleeding, labile INR, ASA/ NSAID or Etoh)	e-GFR ≥ 30-49 ml/m – 15 mg daily	2.5 mg twice daily if two of: • Age ≥ 80 years • BW ≤ 60 kg • Se Cr ≥ 133 µmol/L
e-GFR<30–do not Rx dabigatran	e-GFR<30– do not Rx rivaroxaban	CrCl<15 ml/m–do not Rx apixaban
NB: Renal function can decline on Rx - Monitor renal function annually or more frequently in high risk patients (HF, CKD, diuretics, acute medical/surgical illness)		

1. Connolly SJ, Ezekowitz MD, Yusuf S, et al. Dabigatran versus warfarin in patients with atrial fibrillation. *New Engl J Med* 2009;361:1139-51.
2. Patel MR, Mahaffey KW, Garg J, et al. Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. *New Engl J Med* 2011;365:883-91.
3. Granger CB, Alexander JH, McMurray JJV, et al. Apixaban versus warfarin in patients with atrial fibrillation. *New Engl J Med* 2011;365:981-93.