Acute AF with Tachycardia (> 110 bpm) in ED

- If the cause of tachycardia is not clearly related to acute AF (e.g. sepsis or hypovolaemia), treat the cause.
- Attempting rhythm or rate control without treating the cause of tachycardia may result in harm.

1. Haemodynamic Instability – Haemodynamic state is a continuum; there is no clear cut off for stable vs unstable. However, instability is characterised by symptomatic low SBP (< 100 mmHg or low compared to usual SBP), poor peripheral circulation, moderate to severe angina chest pain ± ischaemic ECG, acute moderate to severe heart failure and/or poor cerebral perfusion. It is uncommon for acute lone AF, with no significant acute comorbid illness, to present with instability – look for alternative causes and treat those first if present.

Is there risk with DC Cardioversion (DCC)?
- Digoxin Toxicity
- Severe Hypokalaemia (K^+ < 3.0)

Treat DCC risk urgently and reassess

a. **Onset < 48 hours → Urgent DCC ± Antithrombotic Therapy**

b. **Onset ≥ 48 hours or uncertain**;

i) If already adequately anticoagulated for at least 3 weeks → **Urgent DCC**

ii) Not anticoagulated → **Urgent Cardiology consult regarding TOE-Guided Cardioversion ± Antithrombotic Therapy**

Wolff-Parkinson-White Syndrome (WPW) – i.e. History of WPW, Delta wave on previous ECG, or consider if irregular very rapid (> 200 bpm) wide complex tachycardia +/- polymorphic QRS.

NOTE: Adenosine, Non-dihydropyridine Calcium Channel Blockers, β-Blockers, amiodarone and digoxin are contraindicated in WPW with AF and tachycardia. First line treatment is DCC. If DCC is contraindicated, fails or patient doesn't consent; refer to Cardiology for IV antiarrhythmic.

2. Stable

a. **Onset < 48 hours**

- **RATE CONTROL ± Antithrombotic Therapy preferred if;**
  - Age ≥ 65 (asymptomatic, recurrent AF).
  - Untreated reversible cause [1].
  - History of congestive heart failure, valve disease or prosthetic valve, coronary artery disease → Consult Cardiology.
  - Stroke or TIA in the last 4 weeks → Consult Neurology
- **RHYTHM CONTROL ± Antithrombotic Therapy preferred if**;
  - No indication for Rate Control (above)
  - OR unacceptable arrhythmia related symptoms (palpitations, dizziness, fatigue and dyspnoea), acute heart failure, can't tolerate rate-control drugs, pre-excitation, or ≥ 65 yo with first episode of non-valvular AF.

NOTE: Patients with stable PAF < 24 hours may be offered "**Wait and See**" = Rate control + Antithrombotic therapy and ED review of rhythm within 24 hours (≈ 60% spontaneously revert in 48 hours of onset).

b. **Onset ≥ 48 hours or uncertain**

i) If already adequately anticoagulated for at least 3 weeks → **treat as for Onset < 48 hours**

ii) Not anticoagulated → **RATE CONTROL ± Antithrombotic therapy**

NOTE: TOE-Guided Cardioversion is also an option.

ED Investigations; FBP, U&Es, and ECG ± TFTs ± CXR (heart failure, infection or significant lung disease suspected) ± Digoxin level + Other investigations for any acute comorbid condition as indicated.

NOTE:- Mg^{++} deficiency may be present with normal serum magnesium. 'Routine' testing of serum Mg^{++} is not necessary.
- BNP may be elevated in the absence of heart failure (therefore less specific for heart failure).
- Troponin may be elevated in the absence of coronary artery disease (therefore less specific for ACS).

RATE CONTROL

- Treat Cause if Needed [1].
- **NOTE**: Stable patients with isolated acute AF and tachycardia < 140 bpm, not receiving IV rhythm or rate controlling drugs do not need cardiac monitoring (may alter MET criteria).
- Rate Control Options (consider contraindications for each agent);
  - IV Metoprolol (1 – 5 mg slow push (1 – 2 mg/minute), repeat after 5 minutes if needed, up to 15 mg)
  - IV Amiodarone (300 mg loading dose followed by infusion or oral amiodarone)
  - PO β Blocker (e.g. Metoprolol 25 – 50 mg BD)
  - PO non-dihydropyridine Calcium Channel Blocker (i.e. cardiac specific, e.g. verapamil 40 – 80 mg BD or TDS, diltiazem 60 – 240 mg /day)

  Digoxin is a second line drug, it only controls resting tachycardia and IV digoxin has no great advantage over oral.
  IV Digoxin may be considered if patient is hypotensive
- IV Magnesium may be of benefit.
- Admit if rate not controlled or other acute medical issue needs treatment.
- Discharge if HR ≤ 110.
- Anticoagulation if CHA2DS2-VASc ≥ 2, valvular heart disease, or if planning elective DCC.
- GP follow up;
  - If only reason for rate control was AF ≥ 48 hours, consider elective DCC after 3 weeks of anticoagulation
  - Recommend OP Echocardiogram

1. **Acutely Reversible Causes**; electrolyte imbalance, digoxin toxicity, hyperthyroidism, sepsis (particularly pneumonia), recreational drug and binge alcohol use ("holiday heart"), pericarditis, myocarditis, ACS, and PE.
Significant risk factors for AF also include valvular heart disease, HOCM and left ventricular hypertrophy, hypertension, heart failure, post heart surgery, pulmonary hypertension, severe lung disease, and obstructive sleep apnoea.

Acute AF with Tachycardia (> 110 bpm) in ED

RHYTHM CONTROL

If patient doesn't consent to DCC, has severe comorbidity, or procedural sedation contraindicated → Refer to Cardiology for Pharmaceutical Cardioversion; IV agents available at SCGH are Flecainide and Amiodarone.

DC Cardioversion (DCC) – overall ≈ 90% probability of cardioversion to sinus rhythm in ED

Is there a risk with DC Cardioversion (DCC)?
- Digoxin Toxicity
- Severe Hypokalaemia (K^+ < 3.0)

Treat DCC risk first and reassess

- NPO 4 hours & Consent.
- IV Amiodarone or Magnesium may be of benefit prior to DCC.
- Enoxaparin 1 mg/kg (if not contraindicated and not anticoagulated).
- Procedural Sedation.
- Anterior-Posterior pads (8 cm from implanted devices).
- 150 - 200 J initial synchronized shock.
- Repeat with higher Joules if needed.
- Discharge when sinus rhythm, recovered from sedation and no other reason to admit.
- Continue anticoagulation for 4 weeks if **CHA_2DS_2-VASc** ≥ 2
- GP follow up – Recommend OP Echocardiogram if suspected underlying structural/functional heart disease

DCC Fails → Consult Cardiology regarding further use of antiarrhythmic drugs versus Rate Control.

Chest Pain with Acute AF and Tachycardia – ACS?

Mild chest discomfort associated with acute tachycardia that resolves with treatment of the AF is relatively common. It may be a non-specific symptom of the arrhythmia, related to mild pulmonary congestion or related to stable CAD (equivalent to exertion angina).

However, AF may be a complication of myocardial infarction, or it may occur coincidentally or possibly trigger an ACS (uncommon).

ACS should be considered for;
- Moderate to severe chest pain consistent with angina, especially if commenced before other symptoms of AF or persists after treatment
- Acute St/t wave changes suggestive of ischaemia, especially if they persist after resolution of tachycardia
- Chest pain with ECG changes consistent with acute STEMI → discuss with senior ED doctor for urgent consultation with Cardiologist

If there are symptoms suggestive of ACS then apply the current **SCGH ED Chest Pain Pathway.**

ANTITHROMBOTIC THERAPY

- Assess ALL patients for anticoagulation - Warfarin for valvular AF, otherwise NOAC.
- Recommend anticoagulation to all patients with valvular AF, regardless of CHA_2DS_2-VASc.

NOTE: Warfarin or NOAC alone is not yet considered adequate prophylaxis for CAD and antiplatelet drugs should be continued. However, this does increase the risk of complications related to bleeding, particularly with dual-agent therapy. Consult Cardiology if taking antiplatelet agents.

	Risk Factor	Score
C	Congestive heart failure/Left ventricular	1
H	Hypertension — high blood pressure	1
A_2	Age≥75	2
D	Diabetes mellitus	1
S_2	Stroke/TIA/TE (thromboembolism)	2
V	Vascular disease — CAD, MI, PVD or aortic	1
A	Age 65-74	1
Sc	Sex category — Female gender	1

Men - **CHA_2DS_2-VASc** ≥ 1 – Consider anticoagulation or antiplatelet therapy.
CHA_2DS_2-VASc ≥ 2 – Recommend anticoagulation.
- Give ENOXAPARIN 1mg/kg if not on NOAC or warfarin (INR 2.0 – 3.0)
- Anticoagulation for at least 4 weeks after cardioversion

	Risk Factor	Score
H	Hypertension (Systolic>=160mmHG)	1
A	Abnormal renal[1] & liver[2] function (1 point	1 or 2
S	Stroke in past	1
B	Bleeding	1
L	Labile INRs	1
E	Age ≥ 65 years	1
D	Taking other drugs & alcohol (1 point each)	1 or 2

1. Chronic dialysis or renal transplantation or serum creatinine ≥ 200µmol/L.
2. Chronic hepatic disease (e.g. cirrhosis) or biochemical evidence of significant hepatic derangement (e.g. bilirubin >2 times ULN, in association with AST/ALT/Alk Phos > 3 times ULN.

HAS-BLED ≥ 3 - Consult with Cardiology before anticoagulating

NOAC for thromboembolism prophylaxis in AF - Recommendation of the WA Therapeutic Advisory Group (WATAG.org.au)
NOTE: Refer to drug literature and senior medical staff for specific issues with each agent.

	dabigatran (Pradaxa®)	**rivaroxaban (Xarelto®)**	**apixaban (Equilis®)**
CrCl ≥ 50mL/min	150 mg twice daily	20 mg once daily	5 mg twice daily
CrCl 31 – 50 mL/min	110 mg twice daily	15 mg once daily	2.5 mg twice daily if at least 2 of the following: • Older than 80 y • Weight ≤ 60 kg • SCr ≥ 133 micromol/L
CrCl 15 – 30 mL/min	contraindicated	contraindicated	
Special populations	Older than 75 years: 110 mg twice daily	Not applicable	

CrCl - Cockcroft–Gault formula; Creatinine clearance; (CrCl) mL/min = (140 – age) × (weight in kg) / 0.815 x serum creatinine (micromol/L)

Also See "Department of Health, Western Australia. Quick reference guide: Atrial Fibrillation Information for the Health Practitioner. Perth: Health Strategy and Networks, Department of Health, Western Australia; 2014."
http://www.healthnetworks.health.wa.gov.au/docs/QuickReferenceGuide_AtrialFibrillation.pdf