Schematic of Emergency Department Atrial Fibrillation (AF) Algorithm

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Initial ED Evaluation

1. **Confirm AF or atrial flutter with 12-lead ECG.**
2. **Confirm absence of WPW, acute ischemia, or other conditions where AV nodal blocker treatment maybe contraindicated.**
3. **Begin initial evaluation and treatment:**
   - **Clinically unstable patients must be immediately electrically cardioverted, especially when hemodynamic decompensation is a concern**
   - **Order telemetry + pulse oximeter monitoring**
   - **NPO (until need for cardioversion is ruled out)**
   - **Avoid rhythm control agents/cardioversion when stable until intracardiac thrombus risk is defined/ mitigated**
4. **Order/reviewthe followingtests:**
   - CBC
   - CMP
   - Magnesium
   - TSH/T4
   - PT/INR
   - CXR
   - +/-Troponin, D-dimer, etc. PRN per H&P
5. Document onset & previous history of AF/flutter
6. Document current anticoagulation status (agent, compliance, INR if warfarin used, use of any antiplatelet agents)
7. Document thromboembolic and bleeding risks with CHA_2DS_2-VASc & HAS-BLED scores
8. Document any anticoagulant-defining patient characteristics (prosthetic heart valve, hypercoagulability, HOCM, history of recent heparin-induced thrombocytopenia, etc.)
9. **Confirm rate is controlled and stable:**
   If HR ≥ 100bpm and SBP ≥ 100 mmHg
   - Diltiazem
     - Initial dose: 10mg to 20mg IV bolus (0.25 mg/kg dose over 2 min)
     - 2nd dose: 15mg to 25mg IV bolus (0.35 mg/kg dose over 2 min), q15 min PRN
     - Infusion: 5 mg/hr, titrate by 5 mg/hr q15 min (max: 15 mg/hr) to HR < 100
     - Cautions: Avoid in severe or decompensated HF. May cause hypotension, consider pre treatment with calcium gluconate 1-2 g IV.
   - Metoprolol
     - Initial Dose: 2.5-5 mg IV bolus over 1-2 min May repeat q 5 mins PRN x 3 to HR <100 Maintenance: 25 mg PO BID
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   - Esmolol
     - Loading dose: 500 mcg/kg IV bolus over 1 min. May repeat PRN x 2
     - Infusion: 50 mcg/kg/min, titrate by 25 mcg/ kg/min (max: 300 mcg/kg/min) to HR < 100
   - Digoxin
     - Not first line. Consider in advanced HF or mild hypotension, and when rate control not achieved with BBs/CCBs
     - Loading dose: 250 mcg q2 hrs IV/PO (max: 1.5 mg)
     - Maintenance: 125-375 mcg IV/PO qD

Is admission necessary for further care?

ED/CDU vs Admit Decision
10a. Sustained systolic blood pressure <100mmHg? → Yes → At some sites, a sustained systolic BP ≤ 100mmHg (thought to be abnormal for patient) typically requires inpatient management.

No ↓

ED/CDU vs Admit Decision
10b. Concerning symptons after HR < 100 bpm: marked dyspnea, angina, near syncope, possibility of ACS/MI? → Yes → If after rate control to HR < 100 bpm, the patient still has concerning symptoms, such as marked dyspnea, angina, near syncope, or if formal evaluation for ACS/MI is clinically needed, it is reasonable to admit the patient for further management.

No ↓

ED/CDU vs Admit Decision
10c. Intravenous rate control medication deemed necessary after initial rate control attempt?*
**Infusion can be managed in the CDU at some centers.* → Yes → At some sites, ongoing IV rate control infusion will require admission. However, some centers allow such care in the ED/CDU. Pharmacologic or electrical cardioversion should be considered if symptoms persist despite provision of rate control or if rate control is difficult to establish

No ↓

ED/CDU vs Admit Decision
10d. Acute comorbidities: ACS/ MI, HF, CVA/TIA, PE, renal failure, thyrotoxicosis, sepsis? → Yes → Patients with concerning acute comorbidities, should be admitted to the hospital for further diagnostic testing and management.

No ↓

ED/CDU vs Admit Decision
10e. Recent comorbidities: CVA/TIA past 3 months, ACS/MI past 1 month, anemia (Hgb < 10) past 3 months? → Yes → If the patient has had recent comorbidities, such as CVA/TIA in the past 3 months, ACS/MI in the past 1 month, or anemia (Hgb <10) in the past 3 months, it is reasonable to place the patient in observation status or to admit the patient for further diagnostic testing and management.

No ↓

ED/CDU vs Admit Decision
10f. Excluded comorbidities: pregnancy, pediatrics, psychosis, end stage organ failure, dialysis dependent renal failure, hypoxemia (SaO2 <92%), severe pain requiring >2 doses of narcotics, inability to comprehend instructions, known or suspected decompensated systolic or diastolic heart failure, mechanical valve or known rheumatic heart disease → Yes → These comorbidities exclude patients from placement in the CDU. See observation protocol for more detailed exclusion criteria

No ↓

ED/CDU Management of AF

Confirm that admission is not necessary for further care, and that it is appropriate to manage the patient with observation in the ED/CDU.
(See AF Observation Protocol for complete inclusion and exclusion criteria)

11a. Anticoagulation: Assess Current Status and Provide Appropriate Tx

- **No active anticoagulation**
  - Initiate anticoagulation if CHA2DS2-VASc score is ≥ 2 and bleeding risk is low or moderate (HAS-BLED score)
  - Consider ASA or anticoagulation as appropriate for CHA2DS2-VASc = 1
  - No anticoagulation is preferred therapy for CHA2DS2-VASc = 0
- **Subtherapeutic Anticoagulation -** (warfarin: INR < 2; NOAC: at least 1 missed dose in last 21 days)
  - Reinforce need for anticoagulation
  - Resume NOAC immediately
  - Resume warfarin until INR is therapeutic (2.0-3.0). Consider need for parenteral bridging with LMWH as single dose prior to disposition. Can typically be done as an outpatient.
- **Therapeutic Anticoagulation -** (warfarin: INR ≥ 2; NOAC: no missed dose in last 21 days)
  - Continue therapeutic anticoagulation regimen

11b. Rate Control:

- Titrate/finalize PO rate control with goal of HR ≤ 100bpm at rest but with SBP > 100mmHg
  Therapeutic options include:
  -Metoprolol Tartrate 25-50mg PO BID (On Walmart $4 list)
  -Diltiazem CD 120-240 mg PO Daily

11c. Rhythm Control

- Assess symptoms and response to therapy after rate control, and consider electrical or pharmacological cardioversion for persistent symptoms or when rate control is difficult to establish
- 4 weeks of anticoagulation should be provided following electrical or pharmacological cardioversion regardless of CHA2DS2-VASc score

If AF onset is thought to be <48h, cardioversion can be performed immediately

1. *DC Cardioversion (analgesia & sedation per provider discretion)*
   - *Biphasic with AP pad placement at 200J*
2. *Pharmacologic (Choose one, proceed to DCCV if pharmacological cardioversion has not occurred within 6 hours after administration)*
   - *Propafenone 600 mg PO or 450 mg PO if <70 kg*
     - *Only use in absence of severe LVH, structural abnormalities, conduction abnormalities, HF, or prior MI*
     - *Monitor rhythm for at least 4-8 hours after dose*
   - *Flecainide 300mg PO or 200 mg PO if <70 kg*
     - *Only use in absence of severe LVH, structural abnormalities, conduction abnormalities, HF, or prior MI*
     - *Monitor rhythm for at least 4-8 hours after dose*
   - *Ibutilide 1mg IV over 10 minutes, repeat x 1 if arrhythmia does not terminate after 10 min.*
     - *Only use in absence of severe LV dysfunction or QTc > 480ms*
     - *Monitor rhythm for QT prolongation/risk of torsades for at least 4-8 hours*
   - *Amiodarone 150 mg IV bolus, may repeat 150 mg IV x 1, followed by 1 mg/min infusion for 6 hours, then 0.5 mg/min*
     - *Consider in patients with HF of hypotension, and when rate control not achieved with calcium channel blockers and beta blockers*

If AF duration is uncertain or ≥ 48 hours, see below:

- *No anticoagulation*
  - *TTE or 3 weeks anticoagulation required prior to electrical or pharmacological cardioversion.*
- *Subtherapeutic Anticoagulation - (warfarin:INR< 2; NOAC: at least 1 missed dose in last 21 days)*
  - *TTE or 3 weeks anticoagulation required prior to electrical or pharmacological cardioversion.*
- *Therapeutic Anticoagulation - (warfarin:INR≥ 2; NOAC: no missed dose in last 21 days)*
  - *Immediate cardioversion can be considered*
  - *Continue therapeutic anticoagulation regimen*

Is it safe to discharge the patient?

Disposition After ED/CDU Observation

12. Are all criteria met?
- Rhythm: AFib /AFL or sinus brady/normal sinus
- Heart Rate: 50 – 100bpm at rest
- Systolic blood pressure: 100-160mmHg
- Symptoms: Minimal or none
- Anticoagulation: appropriately anticoagulated

→ If the patient exhibits 1 or more of the criteria listed, it is preferable to admit the patient to the hospital for further care.

Prior to Discharge

13. Was patient seen by cardiology / EP in ED/CDU? →
- Schedule close interval (< 72h) cardiology / EP follow up per protocol
- Provide printed AFib and anticoagulant patient education material
- Rx for new anticoagulant and other medications as needed
- Provide anticoagulation discount card to ensure patient compliance
- Consider directing patient to affiliated/adjacent pharmacy if available for patient compliance

NOAC Therapy Guidelines for AF

4 weeks of anticoagulation should be provided following electrical or pharmacological cardioversion regardless of CHA2DS2-VASc score

1. Abixiban 5mg PO BID. Reduce dose to 2.5mg BID if:
   - Two of following are present (Age>80, Weight<60kg, Cr>1.5 mg/dL) OR
   - If patient is taking/planning use of strong inhibitor of cytochrome P450 3A4 and P-glycoprotein inhibitors (ketoconazole, intraconazole, ritonavir, clarithromycin)
2. Rivaroxaban 20mg PO qD for Cr clearance >50 ml/min or 15 mg qD for Cr clearance <50ml/min
   - In patients with renal insufficiency, avoid use if patient is taking/planning use of strong inhibitor of cytochrome P450 3A4 (ketoconazole, intraconazole, ritonavir, clarithromycin)
3. Dabigatran 150 mg PO BID (CrCl > 30 ml/min)
   - Reduce dose to 75 mg PO BID if CrCl = 15-30 mL/min
   - Avoid use if CrCl < 30mL/min

Disclaimer:

Ultimately, a thorough history, physical, and careful ECG interpretation will guide management. Clinical decision rules and protocols should not be used in isolation and clinical judgment may be used to override this pathway at the discretion of the provider.

Please email Ali.Farzad@bswhealth.org with any questions, feedback, or suggestions.