Atrial Fibrillation (AF) Management - Adult

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Atrial Fibrillation (AF) Management - Adult

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PATIENT PRESENTATION

Suspected new onset AF

ASSESSMENT

Perform EKG to confirm AF

Initiate transfer to cardiac monitoring\(^1,2\)

Assessment and prompt treatment of underlying medical condition and/or correction of modifiable risk factors\(^3\)

Determine duration\(^4\) of AF (less than 48 hours or greater than 48 hours).

Hemodynamically stable?

Yes → See Page 3

No → See Page 6

\(^1\) Refer to Adult Cardiac Monitoring Admission and Discharge Policy (\#CLN0511)

\(^2\) Transfer to cardiac monitoring may not be necessary for newly-diagnosed, rate controlled asymptomatic patients in the outpatient setting

\(^3\) See Appendix A for Risk Factors for the Development of New Onset AF

\(^4\) See Page 3 (RISKS) for treatment details based on duration
**Atrial Fibrillation (AF) Management - Adult**

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**PRESENTATION**

- Hemodynamically stable
- Assess stroke risk using CHA²DS₂-VASc₁

**RISKS**

- **Low risk**
  - On therapeutic anticoagulation greater than 3 weeks
  - Onset less than 48 hours

- **High risk**
  - No prior therapeutic anticoagulation therapy greater than or equal to 3 weeks and one of the following:
    - Onset greater than 48 hours or unknown
    - Stroke/transient ischemic attack (TIA) or peripheral arterial thromboembolism within 6 months
    - Mechanical valve or rheumatic heart disease
    - Previously or currently on dual antiplatelet therapy (DAPT⁴)

**TREATMENT**

- Consider consult with Cardiology for cardioversion (CV):
  - Pharmacologic²
  - Electrical (synchronized at 100 to 200 joules)
  - Initiate anticoagulation therapy if no contraindications¹ and evaluate for:
    - Risk for bleeding¹
    - Drug-drug interactions⁵

- No emergent CV treatment
- Consider Cardiology consult

**FOLLOW-UP**

- Consider long-term anticoagulation therapy as clinically indicated

See Page 4 for Rate Control

---

¹ See Appendix B for Risk Scores for Patients with AF (stroke and bleeding)
² See Appendix C for Chemical CV Exclusion Criteria
³ See Appendix D for Anticoagulation Therapy Options for Cancer Patients
⁴ See Appendix E for Contraindications to Anticoagulation Therapy
⁵ Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at inside.mdanderson.org (for internal use only)
⁶ Consider Benign Hematology consult
**Atrial Fibrillation (AF) Management - Adult**

**Rate Control**

Factors to consider for treatment include:
- Persistent AF
- Fewer symptoms
- Age greater than 65 years
- Hypertension
- No history of heart failure (HF)
- Patient preference
- Refractory to previous anti-arrhythmic drug therapy

1. Initiate rate controlling medications\(^1,2,3\) 
2. Rate control less than 110 bpm? 
   
   - Yes
   - Continue regimen
   - Follow-up with Cardiology to review long-term anticoagulation therapy
   
   - No
   - Symptomatic, or at risk of hemodynamic instability, or refractory to rate controlling medications? 
     
     - Yes
     - Patient is high risk and candidate\(^4\) for anticoagulation therapy?
       
       - Yes
       - Consider admit/transfer to Intensive Care Unit (ICU)\(^5\)
       
       - No
       - Follow-up with Cardiology to review long-term anticoagulation therapy
     
     - No
     - Continue rate controlling medications\(^1\)
     
     - Initiate anticoagulation therapy\(^4\) if no contraindications\(^5\) and evaluate for:

       - Risk for bleeding\(^6\)
       - Drug-drug interactions\(^7\)
       - Consider admit/transfer to Intensive Care Unit (ICU)\(^5\)

3. Criteria for admit/transfer to ICU:
   - Progressive hemodynamic instability
   - Failure to respond to rate control agents

4. Assessing for drug-drug interactions: Lexicomp\(^8\) or Micromedex\(^9\), available at inside.mdanderson.org (for internal use only)

5. Follow-up with Cardiology to review long-term anticoagulation therapy

6. Consider Rhythm Control, see Page 5

\(^1\) Beta blockers, calcium channel blockers, digoxin, amiodarone

\(^2\) See Appendix F for Special Considerations Regarding Drug Choice for Rate Control

\(^3\) See Appendix G for Common Medication Dosage for Rate Control of AF

\(^4\) See Appendix D for Anticoagulation Therapy Options for Cancer Patients

\(^5\) See Appendix E for Contraindications to Anticoagulation Therapy

\(^6\) See Appendix B for Risk Scores for Patients with AF (stroke and bleeding)

\(^7\) Assessing for drug-drug interactions: Lexicomp\(^8\) or Micromedex\(^9\), available at inside.mdanderson.org (for internal use only)

\(^8\) Criteria for admit/transfer to ICU:

- Progressive hemodynamic instability
- Failure to respond to rate control agents

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Atrial Fibrillation (AF) Management - Adult

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FOLLOW-UP

Rhythm Control

New onset AF with duration less than 48 hours?

Yes

Elective

(synchronized at 150-200 joules)

Pharmacologic

Initiate anticoagulation therapy if no contraindications and evaluate for:

- Risk for bleeding
- Drug-drug interactions

Assess for:

- Drug-drug interactions
- QT prolongation
- Establish absence of severe left ventricular dysfunction or HF and
- Initiate rhythm controlling medications

Follow-up with Cardiology to review long-term anticoagulation therapy

No

CV

Consider Cardiology consult

1 See Appendix H for Anticoagulation Therapy for Elective Cardioversion (CV)
2 See Appendix D for Anticoagulation Therapy Options for Cancer Patients
3 See Appendix E for Contraindications to Anticoagulation Therapy
4 See Appendix B for Risk Scores for Patients with AF (stroke and bleeding)
5 Assessing for drug-drug interactions: Lexicon® or Micromedex®, available at inside.mdanderson.org (for internal use only)
6 See Appendix C for Chemical CV Exclusion Criteria

Recommend consult to Cardiology before initiating rhythm controlling medications

1 See Appendix H for Anticoagulation Therapy for Elective Cardioversion (CV)
2 See Appendix D for Anticoagulation Therapy Options for Cancer Patients
3 See Appendix E for Contraindications to Anticoagulation Therapy
4 See Appendix B for Risk Scores for Patients with AF (stroke and bleeding)
5 Assessing for drug-drug interactions: Lexicon® or Micromedex®, available at inside.mdanderson.org (for internal use only)
6 See Appendix C for Chemical CV Exclusion Criteria

Recommend consult to Cardiology before initiating rhythm controlling medications

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### PRESENTATION

- Hemodynamically unstable

### ASSESSMENT

- Initiate emergent\(^1\) electrical CV (unsynchronized at 150-200 joules), per advanced cardiac life support (ACLS)

### TREATMENT

- Assess for QT prolongation
- Establish absence of severe left ventricular dysfunction or HF and
- Initiate rate\(^2,3,4\) or rhythm controlling medications
- Initiate anticoagulation therapy\(^1,5\) if no contraindications\(^6\) and evaluate for:
  - Risk for bleeding\(^7\)
  - Drug-drug interactions\(^8\)

### FOLLOW-UP

- Hemodynamically unstable
  - Yes
    - Normal sinus rhythm (NSR)\(^7\)
    - Follow-up with Cardiology to review long-term anticoagulation
  - No
    - Initiate rhythm controlling medications
    - Initiate anticoagulation therapy\(^1,5\) if no contraindications\(^6\) and evaluate for:
      - Risk for bleeding\(^7\)
      - Drug-drug interactions\(^8\)

---

1. See Appendix I for Anticoagulation for Emergent Cardioversion (CV)
2. Beta blockers, calcium channel blockers, digoxin, amiodarone
3. See Appendix F for Special Considerations Regarding Drug Choice for Rate Control
4. See Appendix G for Common Medication Dosage for Rate Control of AF
5. See Appendix D for Anticoagulation Therapy Options for Cancer Patients
6. See Appendix E for Contraindications to Anticoagulation Therapy
7. See Appendix B for Risk Scores for Patients with AF (stroke and bleeding)
8. Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at inside.mdanderson.org (for internal use only)
APPENDIX A: Risk Factors for the Development of New-Onset AF

<table>
<thead>
<tr>
<th>Patient Factors:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid-base abnormalities</td>
<td>Hypotension</td>
</tr>
<tr>
<td>Advanced age</td>
<td>Hypoxemia</td>
</tr>
<tr>
<td>Anemia</td>
<td>Male sex</td>
</tr>
<tr>
<td>Electrolyte abnormalities</td>
<td>Obesity</td>
</tr>
<tr>
<td>Fluid overload</td>
<td>Recent (within 24-48 hours) thoracic surgery (e.g., esophageal, lung, heart)</td>
</tr>
</tbody>
</table>

APPENDIX B: Risk Scores for Patients with AF (stroke and bleeding)

TIA = transient ischemic attack

1 If patient has high risk of bleeding on full dose anticoagulation, consider aspirin 81 mg for anticoagulation

<table>
<thead>
<tr>
<th>Stroke or Systemic Embolism:</th>
<th>Bleeding:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHADS&lt;sub&gt;2&lt;/sub&gt; VAS&lt;sub&gt;2&lt;/sub&gt; Score</strong></td>
<td><strong>HAS-BLED Score</strong></td>
</tr>
<tr>
<td>Condition</td>
<td>Points</td>
</tr>
<tr>
<td>C Congestive Heart Failure</td>
<td>1</td>
</tr>
<tr>
<td>H Hypertension: blood pressure consistently above 140/90 mmHg (or treated hypertension on medication)</td>
<td>1</td>
</tr>
<tr>
<td>A Age greater than or equal to 75 years</td>
<td>2</td>
</tr>
<tr>
<td>D Diabetes mellitus</td>
<td>1</td>
</tr>
<tr>
<td>S&lt;sub&gt;2&lt;/sub&gt; Prior stroke or TIA or thromboembolism</td>
<td>2</td>
</tr>
<tr>
<td>V Vascular disease</td>
<td>1</td>
</tr>
<tr>
<td>A Age 65-74</td>
<td>1</td>
</tr>
<tr>
<td>S&lt;sub&gt;e&lt;/sub&gt; Sex category (1 point for female)</td>
<td>1</td>
</tr>
</tbody>
</table>

APPENDIX C: Chemical CV Exclusion Criteria

- Bundle branch block (BBB) (QRS greater than 120 ms)
- Preexisting 2<sup>nd</sup>/3<sup>rd</sup> degree atrioventricular block (AVB)
- Prolonged QT (QTc greater than 480) or Brugada
- Potassium less than 3 mEq/liter
- Patient already on an antiarrhythmic
- Pregnancy
- Severe hepatic or renal insufficiency with creatinine clearance (CrCl) less than 35 mL/minute
# APPENDIX D: Anticoagulation Therapy Options for Cancer Patients

## LMWH\(^1\) Regimens for Treatment of Cancer Associated Thrombosis

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE / ROUTE / FREQUENCY</th>
<th>MONITORING(^2)</th>
<th>DOSE ADJUSTMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalteparin (Fragmin(^<em>))(^</em>)</td>
<td>Round to nearest International Units (IU) dose, given subcutaneously daily</td>
<td>• Baseline CBC with platelets, aPTT, PT and serum creatinine&lt;br&gt; • For surgical patients, platelets every 3 days between days 4 and 14 after beginning LMWH then as clinically indicated&lt;br&gt;</td>
<td>• Consider reducing the daily dose by 50% when platelets are between 20 K/microliter - 50 K/microliter and to 5,000 IU when platelets are less than 20 K/microliter&lt;br&gt; • If CrCl is less than 30 mL/minute: adjust dose to obtain anti-Xa level of 0.5-1.5 IU/mL (4-6 hours after fourth dose)&lt;br&gt; • Obtain anti-Xa level in patients weighing greater than 150 kg or less than 50 kg, and adjust dose to obtain anti-Xa level of 1.5 IU/mL (4-6 hours after fourth dose)</td>
</tr>
<tr>
<td></td>
<td>Actual Body Weight (kg)</td>
<td>Month 1 200 IU/kg Months 2-6 150 IU/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Less than or equal to 56</td>
<td>10,000 IU 7,500 IU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>57-68</td>
<td>12,500 IU 10,000 IU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>69-82</td>
<td>15,000 IU 12,500 IU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>83-98</td>
<td>18,000 IU 15,000 IU</td>
<td></td>
</tr>
<tr>
<td>*Preferred choice, FDA approved for cancer patients</td>
<td>Greater than or equal to 99</td>
<td>Limited data suggests dalteparin 200 IU/kg based on actual body weight (with no dose capping) in one or two divided doses. An alternative option is enoxaparin 1 mg/kg twice daily. Consider monitoring anti-Xa levels and adjust dose as needed.</td>
<td></td>
</tr>
<tr>
<td>Enoxaparin (Lovenox(^*))</td>
<td>1 mg/kg subcutaneously every 12 hours or 1.5 mg/kg* subcutaneously once daily in selected patients</td>
<td>Same as above</td>
<td>• If CrCl less than 30 mL/minute: use 1 mg/kg once daily&lt;br&gt; • Obtain anti-Xa level in patients with weight greater than 150 kg or less than 50 kg&lt;br&gt;   ○ For 1 mg/kg every 12 hour dosing regimen: adjust dose to obtain anti-Xa level of 0.6 – 1 IU/mL (4-6 hours after fourth dose)&lt;br&gt;   ○ For 1.5 mg/kg once daily dosing regimen: adjust dose to obtain anti-Xa level of 1 - 1.5 IU/mL (4-6 hours after fourth dose)</td>
</tr>
</tbody>
</table>

\(^1\) Notes: • Low-Molecular Weight Heparins (LMWH) (preferred agents)<br> • If LMWHs are not accessible, consider switching to warfarin after 5 days of LMWH therapy. Heparin and warfarin therapy should overlap 5 days.<br> • Patients who tolerate anticoagulation should be continued on it indefinitely or until active cancer resolves<br> • Patient should be observed closely for bleeding and signs and symptoms of neurological impairment if therapy is administered during or immediately following diagnostic lumbar puncture, epidural anesthesia, or spinal anesthesia

\(^2\) If lab results indicate heparin induced thrombocytopenia, follow management per Heparin Induced Thrombocytopenia (HIT) Treatment algorithm

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Atrial Fibrillation (AF) Management - Adult
APPENDIX D: Anticoagulation Therapy Options for Cancer Patients - continued

### Unfractionated Heparin (UFH)

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>MONITORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• IV heparin infusion(^1) (Refer to Adult Heparin Infusion Order Set for dosing)</td>
<td>Baseline CBC with platelets, aPTT/PT, serum creatinine</td>
</tr>
<tr>
<td>• If fixed dose, unmonitored subcutaneous UFH is chosen</td>
<td></td>
</tr>
<tr>
<td>○ Initial dose: 333 units/kg subcutaneously times one dose, followed by 250 units/kg subcutaneously twice daily in addition to warfarin for at least 5 days until the INR is greater than 2 for 24 hours</td>
<td></td>
</tr>
</tbody>
</table>

### Warfarin\(^2\) (Selected Vitamin K Antagonist) – For long-term management

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>MONITORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Overlap warfarin (2.5 – 5 mg PO) with induction therapy (LMWH, Factor Xa Inhibitor, or subcutaneous UFH) beginning on Day 1 of therapy</td>
<td>• INR Goal: 2-3</td>
</tr>
<tr>
<td>• Continue induction therapy subcutaneously until INR greater than or equal to 2 for two days, AND patient has received at least 4-5 days of induction therapy overlap</td>
<td>• Baseline CBC with platelet count, PT/INR, liver function tests</td>
</tr>
<tr>
<td></td>
<td>• Follow-up for PT/INR within 3-5 days, then at least every month if not more frequently</td>
</tr>
</tbody>
</table>

### Fondaparinux (Arixtra\(^6\)) (Factor Xa Inhibitor) – Fondaparinux dose subcutaneously daily

| ACTUAL BODY WEIGHT (kg) | FONDAPARINUX DOSE | MONITORING | |
|------------------------|-------------------|------------|
| Less than 50           | 5 mg              | Baseline CBC with platelets, aPTT/PT, serum creatinine |
| 50 – 100               | 7.5 mg            | |
| Greater than 100       | 10 mg             | |

\(^1\) Indications for IV heparin infusion: post-operative patients, neurosurgery patients, presence of mechanical heart valves, and history of spinal block

\(^2\) Use of warfarin in cancer patients has been shown to be less effective at preventing clot recurrence than LMWH

Continued on next page
## APPENDIX D: Anticoagulation Therapy Options for Cancer Patients - continued

Direct Oral Anticoagulants (DOACs) (ATTENTION: Expert panels DO NOT RECOMMEND use of these drugs in patients with cancer. A multidisciplinary consultation is strongly recommended with Benign Hematology, Cardiology, and/or General Internal Medicine. Each case needs to be individually assessed prior to use of DOACs).

<table>
<thead>
<tr>
<th>DOACs</th>
<th>Rivaroxaban (Xarelto®) Oral Factor Xa Inhibitor</th>
<th>Dabigatran (Pradaxa®) Direct Thrombin Inhibitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-valvular atrial fibrillation (NVAF) Not for any heart valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CrCl greater than 50 mL/minute</td>
<td>20 mg once daily with food in evening</td>
<td>CrCl greater than 30 mL/minute</td>
</tr>
<tr>
<td>CrCl 15-50 mL/minute</td>
<td>15 mg once daily with food in evening</td>
<td>CrCl 15-30 mL/minute</td>
</tr>
<tr>
<td>CrCl less than 15 mL/minute or ESRD</td>
<td>Avoid use</td>
<td>CrCl less than 15 mL/minute or HD</td>
</tr>
<tr>
<td>Use in liver disease</td>
<td>CTP class B or C: NOT recommended</td>
<td>No recommendations by manufacturer</td>
</tr>
<tr>
<td>Contraindications</td>
<td>Active bleed; spinal puncture, neuroaxial anesthesia</td>
<td></td>
</tr>
<tr>
<td>Significant drug-drug interactions¹</td>
<td>P-glycoprotein and CYP 3A4 interactions</td>
<td>P-glycoprotein interactions</td>
</tr>
<tr>
<td>Monitoring parameters</td>
<td>• Routine monitoring of coagulation tests not required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Baseline CBC with differential, SCr, and hepatic function tests</td>
<td></td>
</tr>
</tbody>
</table>

Pgp-I = P-glycoprotein inhibitor; CrCl = creatinine clearance (mL/minute); SCr = serum creatinine; ESRD = end stage renal disease; HD = hemodialysis; CTP = Child-Turcotte-Pugh score

### Reasons to avoid use of DOACs in the cancer population:
- Limited number of patients with cancer studied in NOAC clinical trials
- Lack of standardized testing for monitoring
- Limited availability of reversal agents
- Complicated drug-drug interactions with chemotherapy agents

¹Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at insidemdanderson.org (for internal use only)

Continued on next page
APPENDIX D: Anticoagulation Therapy Options for Cancer Patients - continued

Direct Oral Anticoagulants (DOAC) (ATTENTION: Expert panels DO NOT RECOMMEND use of these drugs in patients with cancer. A multidisciplinary consultation is strongly recommended with Benign Hematology, Cardiology, and/or General Internal Medicine. Each case needs to be individually assessed prior to use of DOACs).

<table>
<thead>
<tr>
<th>DOACs</th>
<th>Edoxaban (Savaysa®)¹ Oral Factor Xa Inhibitor</th>
<th>Apixaban (Eliquis®)¹ Oral Factor Xa Inhibitor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CrCl greater than 95 mL/minute MUST assess CrCl before initiating</td>
<td>Avoid use</td>
</tr>
<tr>
<td></td>
<td>Weight less than or equal to 60 kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.5 mg/dL</td>
<td>0-1 criterion: 5 mg twice daily</td>
</tr>
<tr>
<td></td>
<td>2-3 criteria: 2.5 mg twice daily</td>
<td></td>
</tr>
<tr>
<td>Non-valvular atrial fibrillation (NVAF)</td>
<td>CrCl greater than 50 mL/minute to 95 mL/minute</td>
<td>60 mg daily</td>
</tr>
<tr>
<td>Not for any heart valve</td>
<td>CrCl 15-50 mL/minute</td>
<td>30 mg daily</td>
</tr>
<tr>
<td></td>
<td>(ketoconazole, itraconazole, ritonavir, clarithromycin) and P-gp inhibitors</td>
<td>Decrease current dose by 50%</td>
</tr>
<tr>
<td></td>
<td>CrCl less than 15 mL/minute</td>
<td>Avoid use</td>
</tr>
</tbody>
</table>

Use in liver disease

CTP class B or C: NOT recommended
CTP class C: NOT recommended

Contraindications

Active bleed; spinal puncture, neuroaxial anesthesia

Significant drug-drug interactions²

P-glycoprotein and CYP 3A4 interactions

Monitoring parameters

- Routine monitoring of coagulation tests not required
- Baseline CBC with differential, SCr, and hepatic function tests

Reasons to avoid use of DOACs in the cancer population:

- Limited number of patients with cancer studied in DOAC clinical trials
- Lack of standardized testing for monitoring
- Limited availability of reversal agents
- Complicated drug-drug interactions with chemotherapy agents
- Edoxaban and apixaban are currently not on the MD Anderson formulary

¹Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at insidemdanderson.org (for internal use only)

²Processing for drug-drug interactions: Cerebrospinal fluid, paraproteinemia, neuropathy, and other neurological conditions are contraindications.
APPENDIX E: Contraindications to Anticoagulation Therapy

**Absolute contraindications:**
- Cerebral hemorrhage, hemorrhage in the eye or vital organs, or a drop in hemoglobin of 2 grams/dL in 24 hours
- Neurosurgery¹, ocular surgery (excluding cataract), or intracranial bleeding within past 10 days

**Relative contraindications:**
- Brain metastases with higher risk of bleeding (renal, choriocarcinoma, melanoma, thyroid cancer)
- Spinal procedure and/or epidural placement
- Major trauma or head trauma
- Major abdominal surgery within 48 hours
- Severe hypertension (systolic BP greater than 200 mmHg, diastolic BP greater than 120 mmHg)
- Endocarditis/pericarditis
- Gastrointestinal or genitourinary bleeding within past 14 days
- Preexisting coagulopathy
- Thrombocytopenia less than 50 K/microliter
- Hypersensitivity to heparin, LMWH, or HIT
- Patient on active protocol that prohibits use of anticoagulation
- Bleeding diathesis

APPENDIX F: Special Considerations Regarding Drug Choice² for Rate Control

<table>
<thead>
<tr>
<th>Clinical Condition</th>
<th>Drug of Choice²</th>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive airway disease (asthma, chronic obstructive pulmonary disease)</td>
<td>Calcium channel blockers</td>
<td>Beta₁ selective beta blockers may be used with caution</td>
</tr>
<tr>
<td>Hypertension and HF with normal left ventricular systolic function</td>
<td>Beta blockers or calcium channel blockers</td>
<td></td>
</tr>
<tr>
<td>Left ventricular systolic dysfunction with or without HF</td>
<td>Beta blockers or digoxin</td>
<td>Beta blockers should be used with caution as not to decompensate. Calcium channel blockers are contraindicated.</td>
</tr>
<tr>
<td>No other cardiovascular disease</td>
<td>Beta blockers or calcium channel blockers</td>
<td></td>
</tr>
</tbody>
</table>

¹ IV heparin administration acceptable
² Obtain EKG for baseline pre-excitation
### APPENDIX G: Common Medication Dosage for Rate Control of AF\(^1,2\)

<table>
<thead>
<tr>
<th>Beta Blockers</th>
<th>Intravenous Administration</th>
<th>Usual Oral Maintenance Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metoprolol tartrate</td>
<td>2.5-5 mg IV bolus over 2 minutes; up to 3 doses</td>
<td>25-100 mg twice daily</td>
</tr>
<tr>
<td>Metoprolol XL (succinate)</td>
<td>N/A</td>
<td>50-400 mg once daily</td>
</tr>
<tr>
<td>Atenolol</td>
<td>N/A</td>
<td>25-100 mg once daily</td>
</tr>
<tr>
<td>Esmolol</td>
<td>500 mcg/kg IV bolus over 1 minute, then 50-300 mcg/kg/minute IV</td>
<td>N/A</td>
</tr>
<tr>
<td>Propranolol</td>
<td>1 mg IV over 1 minute, up to 3 doses at 2-minute intervals</td>
<td>10-40 mg three to four times a day</td>
</tr>
<tr>
<td>Nadolol</td>
<td>N/A</td>
<td>10-240 mg four times a day</td>
</tr>
<tr>
<td>Carvedilol</td>
<td>N/A</td>
<td>3.125-25 mg twice daily</td>
</tr>
<tr>
<td>Bisoprolol</td>
<td>N/A</td>
<td>2.5-10 mg once daily</td>
</tr>
</tbody>
</table>

#### Nondihydropyridine Calcium Channel Blockers

| Verapamil                           | 0.075-0.15 mg/kg IV bolus over 2 minutes; may give an additional 10 mg after 30 minutes if no response, then 0.005 mg/kg/minute infusion | 180-480 mg once daily (extended release) |
| Diltiazem                           | 0.25 mg/kg IV bolus over 2 minutes, then 5-15 mg/hour | 120-360 mg once daily (extended release) |

#### Digitalis Glycosides

| Digoxin                             | 0.25 mg IV with repeat dosing to a maximum of 1.5 mg over 24 hours | 0.125-0.25 mg once daily |

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\(^1\) Refer to Adult Cardiac Medication Monitoring Guidelines Policy (#CLN0500)

\(^2\) Not to be used if evidence of pre-excitation on EKG

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APPENDIX H: Anticoagulation Therapy for Elective Cardioversion (CV)

<table>
<thead>
<tr>
<th>Duration of AF</th>
<th>Thromboembolism Risk</th>
<th>Anticoagulation Before CV</th>
<th>Anticoagulation After CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 48 hours</td>
<td>Low</td>
<td>Optional</td>
<td>Minimum of 4 weeks</td>
</tr>
<tr>
<td>Less than 48 hours</td>
<td>High</td>
<td>Periprocedural</td>
<td>Long term</td>
</tr>
<tr>
<td>Greater than 48 hours</td>
<td>Low</td>
<td>Minimum of 3 weeks(^1)</td>
<td>Minimum of 4 weeks</td>
</tr>
<tr>
<td>Greater than 48 hours</td>
<td>High</td>
<td>Minimum of 3 weeks(^1)</td>
<td>Long term</td>
</tr>
</tbody>
</table>

\(^1\) Alternatively, anticoagulation can be initiated and once therapeutic, a transesophageal echocardiogram should be performed, especially for patients with CHADS\(^2\)-VAS\(_e\) score of 2 or more. If no thrombi are present, then CV can be performed.

APPENDIX I: Anticoagulation for Emergent Cardioversion (CV)

<table>
<thead>
<tr>
<th>Duration of AF</th>
<th>Thromboembolism Risk</th>
<th>Anticoagulation Before CV</th>
<th>Anticoagulation After CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 48 hours</td>
<td>Low</td>
<td>Initiate immediately(^1)</td>
<td>Optional</td>
</tr>
<tr>
<td>Less than 48 hours</td>
<td>High</td>
<td>Initiate immediately(^1)</td>
<td>Long term</td>
</tr>
<tr>
<td>Greater than 48 hours</td>
<td>Low</td>
<td>Initiate immediately(^1)</td>
<td>Minimum of 4 weeks</td>
</tr>
<tr>
<td>Greater than 48 hours</td>
<td>High</td>
<td>Initiate immediately(^1)</td>
<td>Long term</td>
</tr>
</tbody>
</table>

\(^1\) Usually with heparin. Emergent CV should not be delayed while waiting for anticoagulation.
APPENDIX J: Child-Turcotte-Pugh (CTP) Scoring System

<table>
<thead>
<tr>
<th>Chemical and Biochemical Parameters</th>
<th>Points for Increasing Abnormality</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatic encephalopathy</td>
<td>None</td>
<td>Grade 1 or 2, or suppressed with medication</td>
<td>Grade 3 or 4, or refractory to medication</td>
</tr>
<tr>
<td>Ascites</td>
<td>None</td>
<td>Mild to moderate (diuretic responsive)</td>
<td>Severe (diuretic refractory)</td>
</tr>
<tr>
<td>Serum albumin</td>
<td>Greater than 3.5 g/dL</td>
<td>2.8 – 3.5 g/dL</td>
<td>Less than 2.8 g/dL</td>
</tr>
<tr>
<td>Total bilirubin</td>
<td>Less than 2 mg/dL</td>
<td>2 – 3 mg/dL</td>
<td>Greater than 3 mg/dL</td>
</tr>
<tr>
<td>For primary biliary cirrhosis</td>
<td>1 – 4 mg/dL</td>
<td>4 – 10 mg/dL</td>
<td>Greater than 10 mg/dL</td>
</tr>
<tr>
<td>Prothrombin time prolonged or INR</td>
<td>less than 4 seconds</td>
<td>4 – 6 seconds</td>
<td>Greater than 6 seconds</td>
</tr>
<tr>
<td></td>
<td>Less than 1.7</td>
<td>1.7 – 2.3</td>
<td>Greater than 2.3</td>
</tr>
</tbody>
</table>

*CTP score is obtained by adding the score for each parameter.

CTP class:
Class A = 5 to 6 points
Class B = 7 to 9 points
Class C = 10 to 15 points
Atrial Fibrillation (AF) Management - Adult

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SUGGESTED READINGS


This practice consensus statement is based on majority opinion of the Atrial Fibrillation Management experts at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

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- Wendy Garcia, BS*
- Vijaya Gottumukkala, MD (Anesthesiology & Perioperative Medicine)
- Kaveh Karimzad, MD (Cardiology)
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- Amy Pai, PharmD*
- Sunil Sahai, MD (General Internal Medicine)
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