Atrial Fibrillation (AF) Management - Adult

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Atrial Fibrillation (AF) Management - Adult

PATIENT PRESENTATION

Suspected new onset Atrial Fibrillation (AF), perform EKG → Atrial Fibrillation (AF) documented on EKG → Initiate transfer to Cardiac Monitoring

ASSESSMENT

- Assessment and prompt treatment of underlying medical condition and/or correction of modifiable risk factors
- Determine duration 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
2 See Appendix A for Risk Factors for the Development of New Onset AF
3 See page 3 (RISKS) for treatment details based on duration

Approved by the Executive Committee of the Medical Staff on 09/27/2016
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, OR
    - Stroke/Transient Ischemic Attack (TIA) or Peripheral Arterial Thromboembolism OR
    - Mechanical valve or Rheumatic valve

**TREATMENT**

- Consider consult with Cardiology for Cardioversion (CV):
  - Pharmacologic
  - Electrical (synchronized at 150 to 200 joules)
  - Initiate anticoagulation therapy if no contraindications4 and evaluate for:
    - Risk for Bleeding
    - Drug-drug interactions5

**FOLLOW-UP**

- Consider long-term anticoagulation therapy as clinically indicated
- See Page 4 for Rate Control
- See Page 5 for Rhythm Control

---

1 See Appendix B for Risk Scores for Patients with Atrial Fibrillation (Stroke and Bleeding Risk)
2 See Appendix C for Chemical CV Exclusion Criteria
3 See Appendix D for Anticoagulation Therapy for Cancer Patients
4 See Appendix E for Contraindications to Anticoagulation Therapy
5 Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at insidemanderson.org (for internal use only)

Approved by the Executive Committee of the Medical Staff on 09/27/2016
**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, and refractory to previous anti-arrhythmic drug therapy.

**Initiate rate controlling medications**

- Rate control less than 110 bpm?
  - Yes: Continue regimen
  - No: Symptomatic, or at risk of hemodynamic instability, or refractory to rate controlling medications?
    - Yes: Consider Rhythm Control, See page 5
    - No: Patient is high risk and candidate for anticoagulation therapy?
      - Yes: Consider Cardiology consult
      - No: Follow-up with Cardiology to review long-term anticoagulation therapy

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 for Cancer Patients.
5. See Appendix E for Contraindications to Anticoagulation Therapy.
6. See Appendix D for Risk Scores for Patients with Atrial Fibrillation (Stroke and Bleeding Risk).
7. Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at insidemdanderson.org (for internal use only).

Follow-up with Cardiology to review long-term anticoagulation therapy.
Atrial Fibrillation (AF) Management - Adult

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1 Rhythm Control
   
   New onset AF with duration less than 48 hours?
   
   Yes
   
   Elective
   
   (synchronized at 150-200 joules)
   
   No
   
   Consider Cardiology consult
   
   CV
   
   Pharmacologic

FOLLOW-UP

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

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

1 See Appendix H for Anticoagulation for Elective CV
2 See Appendix D for Anticoagulation Therapy for Cancer Patients
3 See Appendix E for Contraindications to Anticoagulation Therapy
4 See Appendix B for Risk Scores for Patients with Atrial Fibrillation (Stroke and Bleeding Risk)
5 Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at insidemdanderson.org (for internal use only)
6 See Appendix C for Exclusion Criteria for Pharmacologic Cardioversion (CV)
7 Recommend consult to Cardiology before initiating rhythm controlling medications

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Atrial Fibrillation (AF) Management - Adult

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PRESENTATION

- Initiate emergent electrical CV (unsynchronized at 150-200 joules)
- Normal sinus rhythm (NSR)?

ASSESSMENT

- Assess for QT prolongation
- Establish absence of severe left ventricular dysfunction or HF AND
- Initiate anticoagulation therapy if no contraindications and evaluate for:
  - Risk for Bleeding
  - Drug-drug interactions

TREATMENT

- Yes
- Normal sinus rhythm (NSR)?
- Assess for QT prolongation
- Establish absence of severe left ventricular dysfunction or HF AND
- Initiate anticoagulation therapy if no contraindications and evaluate for:
  - Risk for Bleeding
  - Drug-drug interactions

- No
- Assess for QT prolongation
- Establish absence of severe left ventricular dysfunction or HF AND
- Initiate rhythm controlling medications
- Initiate anticoagulation therapy if no contraindications and evaluate for:
  - Risk for Bleeding
  - Drug-drug interactions

FOLLOW-UP

- Hemodynamically unstable
  - Yes
  - Follow-up with Cardiology to review long-term anticoagulation
  - No
  - Assess for QT prolongation
  - Establish absence of severe left ventricular dysfunction or HF AND
  - Initiate rhythm controlling medications
  - Initiate anticoagulation therapy if no contraindications and evaluate for:
    - Risk for Bleeding
    - Drug-drug interactions

1 See Appendix I for Anticoagulation for Emergent 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 for Cancer Patients
6 See Appendix E for Contraindications to Anticoagulation Therapy
7 See Appendix B for Risk Scores for Patients with Atrial Fibrillation (Stroke and Bleeding Risk)
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

**Patient Factors:**
- Acid-base abnormalities
- Advanced age
- Anemia
- Electrolyte abnormalities
- Fluid overload
- Hypotension
- Hypoxemia
- Male sex
- Obesity

APPENDIX B: Risk Scores for Patients with AF (stroke and bleeding)\(^1\)

**Stroke or Systemic Embolism:**

<table>
<thead>
<tr>
<th>CHADS(_2) VAS(_2) Score</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<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 75 years</td>
<td>1</td>
</tr>
<tr>
<td>D Diabetes mellitus</td>
<td>1</td>
</tr>
<tr>
<td>S(_2) 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(_e) Sex category (1 point for female)</td>
<td>1</td>
</tr>
</tbody>
</table>

**HAS-BLED Score**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>H Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>A Abnormal liver or renal function (1 point each)</td>
<td>1</td>
</tr>
<tr>
<td>S Stroke</td>
<td>1</td>
</tr>
<tr>
<td>B Bleeding</td>
<td>1</td>
</tr>
<tr>
<td>L Labile INR</td>
<td>1</td>
</tr>
<tr>
<td>E Elderly (age greater than 65)</td>
<td>1</td>
</tr>
<tr>
<td>D Drugs or alcohol (1 point each)</td>
<td>1</td>
</tr>
</tbody>
</table>

**High Risk:** greater than or equal to 4

**Bleeding:**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>H Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>A Abnormal liver or renal function (1 point each)</td>
<td>1</td>
</tr>
<tr>
<td>S Stroke</td>
<td>1</td>
</tr>
<tr>
<td>B Bleeding</td>
<td>1</td>
</tr>
<tr>
<td>L Labile INR</td>
<td>1</td>
</tr>
<tr>
<td>E Elderly (age greater than 65)</td>
<td>1</td>
</tr>
<tr>
<td>D Drugs or alcohol (1 point each)</td>
<td>1</td>
</tr>
</tbody>
</table>

**High Risk:** greater than or equal to 3

---

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

---

APPENDIX C: Chemical CV Exclusion Criteria

- Coronary artery disease (CAD)/ Stents
- Ejection Fraction (EF) less than 50%
- Significant valvular disease
- Bundle branch block (BBB) (QRS greater than 120 ms)
- Preexisting 2nd / 3rd 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 the 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(*)*)</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</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 creatinine clearance 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>*Preferred choice, FDA approved for cancer patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual Body Weight (kg)</td>
<td>Month 1 200 IU/kg</td>
<td>Months 2-6 150 IU/kg</td>
<td></td>
</tr>
<tr>
<td>Less than or equal to 56</td>
<td>10,000 IU</td>
<td>7,500 IU</td>
<td></td>
</tr>
<tr>
<td>57-68</td>
<td>12,500 IU</td>
<td>10,000 IU</td>
<td></td>
</tr>
<tr>
<td>69-82</td>
<td>15,000 IU</td>
<td>12,500 IU</td>
<td></td>
</tr>
<tr>
<td>83-98</td>
<td>18,000 IU</td>
<td>15,000 IU</td>
<td></td>
</tr>
<tr>
<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>
<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 creatinine clearance 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; a. 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; b. 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>
<tr>
<td>*Use enoxaparin with caution in patients with platelets less than 100 K/microliter</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

1 **NOTES:**
- Low-Molecular Weight Heparins (LMWH) (preferred agents)
- If LMWHs are not accessible, consider switching to warfarin after 5 days of LMWH therapy. Heparin and warfarin therapy should overlap 5 days.
- Patients who tolerate anticoagulation should be continued on it indefinitely or until active cancer resolves.
- 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) Algorithm.

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APPENDIX D – continued: Anticoagulation Therapy Options for the Cancer Patients

### Warfarin¹ (Selected Vitamin K Antagonist) – For Long-term Management

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>MONITORING</th>
</tr>
</thead>
</table>
| • Overlap warfarin (2.5 – 5 mg PO) with induction therapy (LMWH, Factor Xa Inhibitor, or subcutaneous UFH) beginning on Day 1 of therapy  
• 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 | • INR Goal: 2-3  
• Baseline CBC with platelet count, PT/INR, liver function tests  
• Follow-up for PT/INR within 3-5 days, then at least every month if not more frequently |

### Fondaparinux (Arixtra®) (Factor Xa Inhibitor) – Fondaparinux Dose Subcutaneously Daily

<table>
<thead>
<tr>
<th>ACTUAL BODY WEIGHT (kg)</th>
<th>FONDAPARINUX DOSE</th>
<th>MONITORING</th>
</tr>
</thead>
</table>
| Less than 50  
50 – 100  
Greater than 100 | 5 mg  
7.5 mg  
10 mg | Baseline CBC with platelets, aPTT/PT, serum creatinine  
If CrCl is between 30 - 50 mL/minute: use with caution  
If CrCl is less than 30 mL/minute: contraindicated  
Use fondaparinux with caution in patients with platelets less than 100 K/microliter |

¹ Use of warfarin in cancer patients has been shown to be less effective at preventing clot recurrence than LMWH.

---

Appendix D Continued on Next Page
APPENDIX D - continued: New Oral Anticoagulants (NOAC) (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 NOACs).

<table>
<thead>
<tr>
<th>New Oral Anticoagulants (NOAC)</th>
<th>Rivaroxaban (Xarelto®) Oral Factor Xa Inhibitor</th>
<th>Dabigatran (Pradaxa®) Direct Thrombin Inhibitor</th>
</tr>
</thead>
<tbody>
<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 150 mg twice daily</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 75 mg twice daily</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 No recommendations</td>
</tr>
<tr>
<td>CrCl 30-50 mL/minute AND dronaderone or ketoconazole</td>
<td>75 mg twice daily</td>
<td>CrCl less than 30 mL/minute AND Pgp-I Avoid use</td>
</tr>
<tr>
<td>CrCl 15-30 mL/minute AND Pgp-I Avoid use</td>
<td>Any P-glycoprotein inducer Avoid use</td>
<td></td>
</tr>
</tbody>
</table>

Use in liver disease

CTP class B or C: NOT recommended

No recommendations by manufacturer

Contraindications

Active bleed; spinal puncture, neuroaxial anesthesia

Significant drug-drug interactions¹

P-glycoprotein and CYP 3A4 interactions

P-glycoprotein interactions

Monitoring parameters

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

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 New Oral Anticoagulants (NOAC) 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

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

Appendix D Continued on Next Page
APPENDIX D - continued: New Oral Anticoagulants (NOAC) (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 NOACs).

<table>
<thead>
<tr>
<th>New Oral Anticoagulants (NOAC)</th>
<th>Edoxaban (Savaysa®) Oral Factor Xa Inhibitor</th>
<th>Apixaban (Eliquis®) Oral Factor Xa Inhibitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-valvular atrial fibrillation (NVAF) Not for any heart valve</td>
<td>CrCl greater than 95 mL/minute MUST assess CrCl before initiating</td>
<td>Age greater than or equal to 80 years Weight less than or equal to 60 kg SCr greater than or equal to 1.5 mg/dL</td>
</tr>
<tr>
<td></td>
<td>CrCl greater than 50 mL/minute to 95 mL/minute</td>
<td>60 mg daily</td>
</tr>
<tr>
<td></td>
<td>CrCl 15-50 mL/minute</td>
<td>30 mg daily</td>
</tr>
<tr>
<td></td>
<td>CrCl less than 15 mL/minute</td>
<td>Avoid use</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use in liver disease</th>
<th>CTP class B or C: NOT recommended</th>
<th>CTP class C: NOT recommended</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
<th>Active bleed; spinal puncture, neuroaxial anesthesia</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Significant drug-drug interactions2</th>
<th>P-glycoprotein and CYP 3A4 interactions</th>
</tr>
</thead>
</table>

| Monitoring parameters | • Routine monitoring of coagulation tests not required  
|                       | • Baseline CBC with differential, SCr, and hepatic function tests |

Reasons to avoid use of New Oral Anticoagulants (NOAC) 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

1Edoxaban and Apixaban are currently not on the MD Anderson formulary.
2Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at insidemdanderson.org (for internal use only)
**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
- Neurosurgery, 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 Choice for Rate Control**

<table>
<thead>
<tr>
<th>Clinical Condition</th>
<th>Drug of Choice</th>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive airway disease (asthma, chronic obstructive pulmonary disease)</td>
<td>Calcium channel blockers</td>
<td>Beta&lt;sub&gt;1&lt;/sub&gt; 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>Beta blockers should be used with caution as not to decompensate. Calcium channel blockers are contraindicated.</td>
</tr>
<tr>
<td>Left ventricular systolic dysfunction with or without HF</td>
<td>Beta blockers or digoxin</td>
<td></td>
</tr>
<tr>
<td>No other cardiovascular disease</td>
<td>Beta blockers or calcium channel blockers</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX G: Common Medication Dosage for Rate Control of AF

<table>
<thead>
<tr>
<th></th>
<th>Intravenous Administration</th>
<th>Usual Oral Maintenance Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beta Blockers</strong></td>
<td></td>
<td></td>
</tr>
<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>
<tr>
<td><strong>Nondihydropyridine Calcium Channel Blockers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verapamil</td>
<td>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</td>
<td>180-480 mg once daily (extended release)</td>
</tr>
<tr>
<td>Diltiazem</td>
<td>0.25 mg/kg IV bolus over 2 minutes, then 5-15 mg/hour</td>
<td>120-360 mg once daily (extended release)</td>
</tr>
<tr>
<td><strong>Digitalis Glycosides</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td>0.25 mg IV with repeat dosing to a maximum of 1.5 mg over 24 hours</td>
<td>0.125-0.25 mg once daily</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amiodarone</td>
<td>300 mg IV over 1 hour, then 10-50 mg/hour over 24 hours</td>
<td>100-200 mg once daily</td>
</tr>
</tbody>
</table>

1Refer to Adult Cardiac Medication Monitoring Guidelines policy  
2Multiple dosing schemes exist for the use of amiodarone.
### 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&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Minimum of 4 weeks</td>
</tr>
<tr>
<td>Greater than 48 hours</td>
<td>High</td>
<td>Minimum of 3 weeks&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Long term</td>
</tr>
</tbody>
</table>

<sup>1</sup>Alternatively, anticoagulation can be initiated and once therapeutic, a transesophageal echocardiogram can be performed. If no thrombi are present, then cardioversion 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&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Optional</td>
</tr>
<tr>
<td>Less than 48 hours</td>
<td>High</td>
<td>Initiate immediately&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Long term</td>
</tr>
<tr>
<td>Greater than 48 hours</td>
<td>Low</td>
<td>Initiate immediately&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Minimum of 4 weeks</td>
</tr>
<tr>
<td>Greater than 48 hours</td>
<td>High</td>
<td>Initiate immediately&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Long term</td>
</tr>
</tbody>
</table>

<sup>1</sup>Usually with heparin. Emergent cardioversion 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Hepatic Encephalopathy</td>
<td>None</td>
</tr>
<tr>
<td>Ascites</td>
<td>None</td>
</tr>
<tr>
<td>Serum Albumin</td>
<td>Greater than 3.5 g/dL</td>
</tr>
<tr>
<td>Total Bilirubin</td>
<td>Less than 2 mg/dL</td>
</tr>
<tr>
<td>Prothrombin time prolonged or</td>
<td>less than 4 seconds</td>
</tr>
<tr>
<td>International Normalized Ratio</td>
<td>Less than 1.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 1 or 2, or suppressed with medication</td>
</tr>
<tr>
<td></td>
<td>Mild to moderate (diuretic responsive)</td>
</tr>
<tr>
<td></td>
<td>Severe (diuretic refractory)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 3 or 4, or refractory to medication</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
SUGGESTED READINGS


Atrial Fibrillation (AF) Management - Adult

This practice consensus algorithm is based on majority expert opinion of the Atrial Fibrillation Management work group at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following:

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* Clinical Effectiveness Development Team

This practice algorithm has been specifically developed for MD Anderson using a multidisciplinary approach and taking into consideration circumstances particular to MD Anderson, including the following: MD Anderson’s specific patient population; MD Anderson’s services and structure; and MD Anderson’s clinical information. Moreover, this algorithm is not intended to replace the independent medical or professional judgment of physicians or other health care providers. This algorithm should not be used to treat pregnant women.