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Atrial Fibrillation (AF) Management - Adult

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.

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

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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):
  - Pharmacologic²
  - Electrical (synchronized at 150 to 200 joules)
  - Initiate anticoagulation¹ therapy if no contraindications⁴ and evaluate for:
    - Risk for Bleeding³
    - Drug-drug interactions⁵

- Consider long-term anticoagulation therapy as clinically indicated

**FOLLOW-UP**

- 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)
Atrial Fibrillation (AF) Management - Adult

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.

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

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 B 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

Rate control less than 110 bpm?

- Continue rate controlling medications
- Initiate anticoagulation therapy if no contraindications and evaluate for:
  - Risk for Bleeding
  - Drug-drug interactions
  - Consider admit/transfer to Intensive Care Unit (ICU)

Symptomatic, or at risk of hemodynamic instability, or refractory to rate controlling medications?

Yes

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

No

Patient is high risk and candidate for anticoagulation therapy?

Yes

Consider Rhythm Control, See page 5

No

Consider Cardiology consult

1. Continue rate controlling medications
2. Initiate anticoagulation therapy if no contraindications and evaluate for:
   - Risk for Bleeding
   - Drug-drug interactions
   - Consider admit/transfer to Intensive Care Unit (ICU)

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

Consider Cardiology consult
Atrial Fibrillation (AF) Management - Adult

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.

Rhythm Control

New onset AF with duration less than 48 hours?

Yes

No

Elective¹ electrical (synchronized at 150-200 joules)

Pharmacologic⁶

CV

Initiate anticoagulation therapy² if no contraindications³ and evaluate for:

- Risk for Bleeding⁴
- Drug-drug interactions⁵

Assess for:

- Drug-drug interactions⁵
- QT prolongation
- Establish absence of severe left ventricular dysfunction or HF AND
- Initiate rhythm controlling medications⁷

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

Follow-up

FOLLOW-UP

Initiate anticoagulation therapy² if no contraindications³ and evaluate for:

- Risk for Bleeding⁴
- Drug-drug interactions⁵

Assess for:

- Drug-drug interactions⁵
- QT prolongation
- Establish absence of severe left ventricular dysfunction or HF AND
- Initiate rhythm controlling medications⁷

Recommend consult to Cardiology before initiating 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 Consider Cardiology consult before initiating rhythm controlling medications.
**ASSESSMENT**

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 insidemdanderson.org (for internal use only)

**TREATMENT**

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

**PRESENTATION**

- Hemodynamically unstable

**ASSESSMENT**

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

**TREATMENT**

- 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**

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

---

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
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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)

Stroke or Systemic Embolism:

<table>
<thead>
<tr>
<th>CHADS2 VAS2 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>S2 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>
</tbody>
</table>

High Risk: greater than or equal to 4

Bleeding:

<table>
<thead>
<tr>
<th>HAS-BLED Score</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

KEY: INR= International normalized ratio  TIA= Transient ischemic attack

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
- Severe hepatic or renal insufficiency with creatinine clearance (CrCl) less than 35 mL/minute

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### APPENDIX D: Anticoagulation Therapy Options for the Cancer Patients

**LMWH¹ Regimens for Treatment of Cancer Associated Thrombosis**

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE / ROUTE / FREQUENCY</th>
<th>MONITORING²</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></td>
<td>• Baseline CBC with platelets, aPTT, PT and serum creatinine</td>
</tr>
<tr>
<td><em>Preferred choice, FDA approved for cancer patients</em></td>
<td>Actual Body Weight (kg)</td>
<td>Month 1 200 IU/kg</td>
<td>Months 2-6 150 IU/kg</td>
</tr>
<tr>
<td>Less than or equal to 56</td>
<td>10,000 IU</td>
<td>7,500 IU</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</td>
</tr>
<tr>
<td>57-68</td>
<td>12,500 IU</td>
<td>10,000 IU</td>
<td>• 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)</td>
</tr>
<tr>
<td>69-82</td>
<td>15,000 IU</td>
<td>12,500 IU</td>
<td>• 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>83-98</td>
<td>18,000 IU</td>
<td>15,000 IU</td>
<td>• 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>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>Same as above</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></td>
<td>• If creatinine clearance less than 30 mL/minute: use 1 mg/kg once daily</td>
</tr>
<tr>
<td><em>Limited data suggest once per day dosing is inferior in cancer patients</em></td>
<td></td>
<td></td>
<td>• Obtain anti-Xa level in patients with weight greater than 150 kg or less than 50 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Same as above</td>
<td>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)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Same as above</td>
<td>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>
</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.
- Patients 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.
APPENDIX D – continued: Anticoagulation Therapy Options for the Cancer Patients

**Warfarin** (Selected Vitamin K Antagonist) – For Long-term Management

**TREATMENT**
- 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
- 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.

**MONITORING**
- Baseline CBC with platelets, aPTT/PT, serum creatinine
- 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>
<tbody>
<tr>
<td>Less than 50</td>
<td>5 mg</td>
<td>Baseline CBC with platelets, aPTT/PT, serum creatinine</td>
</tr>
<tr>
<td>50 – 100</td>
<td>7.5 mg</td>
<td></td>
</tr>
<tr>
<td>Greater than 100</td>
<td>10 mg</td>
<td></td>
</tr>
</tbody>
</table>

**Unfractionated Heparin (UFH)**

- If fixed dose, unmonitored subcutaneous UFH is chosen.
- 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

**TREATMENT**
- Baseline CBC with platelets

**MONITORING**
- aPTT/PT, serum creatinine

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>Non-valvular atrial fibrillation (NVAF)</td>
<td>CrCl greater than 50 mL/minute</td>
<td>CrCl greater than 30 mL/minute</td>
</tr>
<tr>
<td>Not for any heart valve</td>
<td>20 mg once daily with food in evening</td>
<td>150 mg twice daily</td>
</tr>
<tr>
<td>CrCl 15-50 mL/minute</td>
<td>CrCl 15-30 mL/minute</td>
<td>75 mg twice daily</td>
</tr>
<tr>
<td>CrCl less than 15 mL/minute or ESRD</td>
<td>15 mg once daily with food in evening</td>
<td>CrCl less than 15 mL/minute or HD</td>
</tr>
<tr>
<td>Avoid use</td>
<td>CrCl 30-50 mL/minute</td>
<td>No recommendations</td>
</tr>
<tr>
<td>CrCl greater than 30 mL/minute</td>
<td>AND</td>
<td>75 mg twice daily</td>
</tr>
<tr>
<td>drotaverine or ketoconazole</td>
<td>AND</td>
<td>Pgp-I</td>
</tr>
<tr>
<td>CrCl less than 30 mL/minute</td>
<td>Avoid use</td>
<td>Avoid use</td>
</tr>
<tr>
<td>Pgp-I</td>
<td></td>
<td>Any P-glycoprotein inducer</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 interactions

| 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 insidermdanderson.org (for internal use only)
### 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)</td>
<td>CrCl greater than 95 mL/minute MUST assess CrCl before initiating</td>
<td>Age greater than or equal to 80 years</td>
</tr>
<tr>
<td></td>
<td>CrCl greater than 50 mL/minute to 95 mL/minute</td>
<td>Weight less than or equal to 60 kg</td>
</tr>
<tr>
<td></td>
<td>CrCl 15-50 mL/minute</td>
<td>SCr greater than or equal to 1.5 mg/dL</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 interactions**
- 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 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 Edoxaban and Apixaban are currently not on the MD Anderson formulary.
2 Assessing for drug-drug interactions: Lexicomp® or Micromedex®, available at insidemanderson.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>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>
# 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>For primary biliary cirrhosis</td>
<td>1 – 4 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>

*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

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.

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:

- Carla Baker, MS, RN, ACNP
- Jean-Bernard Durand, MD
- Vijaya Gottumukkala, MD
- Michael Kroll, MD
- Eileen M. Le, MSN, RN, GNP-BC, NP-C, AOCNP
- Amy Pai, PharmD
- Christina Perez
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DEVELOPMENT CREDITS

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* Clinical Effectiveness Development Team