

CRITICAL CARE ORDER SET

Atrial Fibrillation with RVR

ICU management of atrial fibrillation with rapid ventricular response. Triage hemodynamics first — unstable AF goes to synchronized cardioversion. Optimize electrolytes, choose a rate- or rhythm-control strategy by the patient's heart function, treat the underlying trigger, and weigh thromboembolic against bleeding risk. Adapt every dose to your institutional protocol and the patient in front of you.

PATIENT -----	MRN -----	WEIGHT (KG) -----	CHA ₂ DS ₂ -VASC -----
ALLERGIES -----	AF ONSET / DURATION -----	ORDERING CLINICIAN -----	CODE STATUS -----

01 Initial assessment & monitoring

NURSING / MONITORING

- ☐ Place in monitored bed (ICU / step-down per local level of care)
- ☐ Continuous cardiac telemetry
- ☐ Vital signs **q15 min** during rate / rhythm interventions, then **q1 h** once stable
- ☐ Strict I/O; daily weights if feasible
- ☐ Neuro checks **q4 h** if hemodynamically unstable or on anticoagulation with bleeding risk
- ☐ Fall precautions if on sedatives / opioids or hypotensive

DIAGNOSTICS — STAT, THEN PRN

- ☐ **12-lead ECG now**, then PRN for rhythm change or after cardioversion

BASIC LABS — STAT

- | | |
|---|---|
| ☐ CBC | ☐ BMP (Na, K, Cl, HCO ₃ , BUN, Cr, glucose) |
| ☐ Magnesium, phosphate | ☐ LFTs |
| ☐ Coags — PT / INR, aPTT | ☐ hs-troponin; BNP / NT-proBNP if indicated |
| ☐ TSH, free T4 (if not recently checked) | ☐ Serum lactate (if hypotensive / sepsis suspected) |

INFECTIOUS WORKUP — IF INDICATED

- ☐ Blood cultures × 2 sets, urine culture, CXR, ± respiratory viral panel

IMAGING

- ☐ TTE — LV function, valvular disease, atrial size, pericardial effusion, RV function, estimated PASP
- ☐ POC bedside ultrasound — IVC, LV function, pericardial effusion, volume status (per ICU team)

02 Hemodynamic triage

UNSTABLE AF — ANY OF THE FOLLOWING ATTRIBUTABLE TO AF

- | | |
|---|---|
| ☐ SBP < 90 mmHg or MAP < 65 mmHg despite fluids / pressors | ☐ Ongoing ischemic chest pain |
| ☐ Acute pulmonary edema / hypoxia | ☐ Altered mental status, syncope |

IF UNSTABLE → ACT NOW

- ☐ Call ICU fellow / attending STAT
- ☐ Prepare for urgent synchronized electrical cardioversion (see Section 6)
- ☐ NPO status now
- ☐ Ensure defibrillator and sedation medications at bedside
- ☐ Large-bore IV access (≥ 2 peripheral IVs or central line)

03 Rate vs rhythm strategy

- ☐ **Primary rate control**
Hemodynamically reasonably stable; HR > 100–110

**Rhythm control**

Failed rate control, ongoing ischemia, acute HF, or intolerance to tachycardia

**Plan for immediate cardioversion**

See Section 6

04**Electrolyte optimization**

TARGETS Maintain K^+ 4.0–4.5 mEq/L and $Mg^{2+} \geq 2.0$ mg/dL (≥ 1.0 mmol/L) — correcting these alone often slows the rate.

IF $K^+ < 4.0$ MEQ/L



KCl 10 mEq IV in 100 mL NS over 1 h × up to 4 doses; recheck K^+ after total 40 mEq or per protocol



Consider oral KCl if enteral route available and not critically unstable

IF $Mg^{2+} < 2.0$ MG/DL OR TORSADOGENIC RISK



Magnesium sulfate 2 g IV in 50–100 mL over 1 h; may repeat to total 4 g as needed



Recheck BMP and Mg after repletion (e.g., in 4–6 h)

05**Rate control medications**

Choose **one primary agent**; alternatives and contraindications below.

5A

Beta-blocker — metoprolol · preferred if BP tolerates, esp. high sympathetic tone



Metoprolol tartrate 2.5–5 mg IV push over 2–5 min; may repeat q5–10 min up to 15 mg total



Hold for SBP < 90, MAP < 65, HR < 60, or signs of shock



Once controlled, convert to oral metoprolol tartrate (e.g., 25–50 mg PO q6h; adjust to HR / BP, renal / hepatic status)

5B

Non-DHP CCB — diltiazem · avoid in decompensated HFrEF / severe hypotension

Check contraindications: LVEF $\leq$ 40% with decompensated HF · SBP < 90–100 mmHg · high-grade AV block without pacer.

- ☐ Optional bolus **0.25 mg/kg IV** over 2 min (max ~20 mg); may follow with 0.35 mg/kg in 15–20 min
- ☐ Infusion start **5–10 mg/h**, titrate by 2.5–5 mg/h q15–30 min (max ~15 mg/h)
- ☐ Titrate to HR 80–110, maintain MAP $\geq$ 65; monitor for hypotension, bradycardia, heart block

5C Amiodarone · decompensated HFrEF, hypotension, or BB/CCB failure / intolerance

- ☐ If BP tolerates a bolus: **150 mg IV** in 100 mL D5W over 10 min
- ☐ Then **1 mg/min $\times$ 6 h**, then **0.5 mg/min $\times$ 18 h** (max 2.2 g / 24 h incl. boluses)
- ☐ If significant hypotension: slower infusion or lower load; close BP monitoring

MONITOR

- ☐ Continuous ECG (QTc, bradycardia, heart block); daily LFTs if infusing > 24–48 h or hepatic impairment; check interactions (warfarin, statins, digoxin)

NOTE Amiodarone may chemically cardiovert — confirm anticoagulation status (Section 7) before use if AF duration > 48 h / unknown.

06 Rhythm control / cardioversion

6A · URGENT SYNCHRONIZED ELECTRICAL CARDIOVERSION

INDICATIONS — AF WITH RVR AND

- | | |
|---|--|
| ☐ Hemodynamic instability (hypotension, shock) | ☐ Ischemic chest pain or evolving MI |
| ☐ Acute pulmonary edema / severe hypoxia | ☐ Persistent severe symptoms unresponsive to rate control |

ORDERS

- ☐ NPO (unless contraindicated); obtain consent for cardioversion if able
- ☐ Place defibrillator pads (AP or AL position); **confirm synchronized mode**
- ☐ Biphasic AF: start **120–200 J**; increase as needed (per device / institutional guideline)

SEDATION / ANALGESIA — ASSUMING NO AIRWAY COMPROMISE

- ☐ **Etomidate 0.15–0.3 mg/kg IV** once (0.15–0.2 in elderly / frail)

OR

- ☐ **Propofol 0.5–1 mg/kg IV** titrated (caution in hypotension; may need vasopressors)
- ☐ Add short-acting opioid (e.g., fentanyl 25–50 mcg IV) as needed
- ☐ Ensure airway equipment and BVM at bedside; RT present if possible

6B · PHARMACOLOGIC CARDIOVERSION

- ☐ Consider amiodarone infusion (as above) for patients without clear contraindications — especially HFrEF or structural heart disease
- ☐ **Avoid class IC agents** (flecainide, propafenone) in structural heart disease

07 Anticoagulation

DECISION Assess thromboembolic risk (**CHA₂DS₂-VASc**) and bleeding risk. In critically ill patients, weigh short-term stroke risk against active bleeding, recent surgery, intracranial pathology, or planned procedures.

7A · AF ONSET < 48 H, NO HIGH EMBOLIC RISK

- ☐ May proceed with immediate cardioversion; start anticoagulation as soon as feasible

7B · AF ONSET > 48 H / UNKNOWN, CARDIOVERSION PLANNED

- ☐ **Option 1:** TEE-guided cardioversion with immediate full anticoagulation
- ☐ **Option 2:** Full anticoagulation ≥ 3 weeks before and ≥ 4 weeks after cardioversion (less applicable to acute ICU AF; for completeness)

7C · ANTICOAGULANT OPTIONS — ICU-FRIENDLY

Unfractionated heparin (UFH) IV

- ☐ Bolus **60–80 units/kg IV** (max 5,000–10,000 units) if no contraindications
- ☐ Infusion start **12–18 units/kg/h**; titrate to aPTT / anti-Xa per nomogram
- ☐ Hold for active major bleeding, platelets < 50,000/ μ L, or per hematology guidance

LMWH — enoxaparin · if renal function adequate, no procedures anticipated

- ☐ **1 mg/kg SC q12h** for CrCl ≥ 30 mL/min
- ☐ **1 mg/kg SC q24h** for CrCl 15–29; avoid < 15 (prefer UFH)

Chronic oral anticoagulants

- ☐ Continue warfarin / DOAC if already receiving and enteral route available, unless contraindicated; bridge per institutional protocol

CONTRAINDICATION CHECKLIST

- ☐ Active major bleeding
- ☐ Neurosurgery / high-risk surgery within defined window
- ☐ Severe coagulopathy, INR > 3.5 not on warfarin (per protocol)
- ☐ Recent intracranial hemorrhage
- ☐ Platelets < 50,000/ μ L (per policy)

08 Ventilation, oxygenation & sedation

- ☐ Supplemental oxygen to maintain SpO₂ $\geq$ 92% (adjust for COPD or other)
- ☐ If tachypnea, work of breathing, or pulmonary edema: consider NIV (BiPAP / CPAP) per respiratory protocol
- ☐ If intubated: adjust sedation to avoid excessive sympathetic drive (pain, agitation)

09 Workup & management of triggers

PEARL AF with RVR in the ICU is usually **driven by something** — treat the trigger and the rate often follows.

- ☐ **Ischemia** — trend troponin, continuous ECG, cardiology consult; manage ACS per protocol
- ☐ **Sepsis** — cultures before antibiotics if feasible, broad-spectrum IV antibiotics, fluids / pressors per shock protocol
- ☐ **Hypoxia / respiratory failure** — ABG, CXR, optimize ventilation
- ☐ **Thyroid disease** — adjust based on TSH / free T4
- ☐ **Other** — postoperative state, volume shifts, pain, withdrawal (alcohol / sedatives), stimulant / catecholamine use: treat the underlying condition

10 Consults

- ☐ **Cardiology** — complex rhythm management, recurrent AF with RVR despite therapy, advanced therapy / ablation planning
- ☐ **Electrophysiology** — recurrent / refractory AF, pre-ablation evaluation
- ☐ **Hematology** — complex anticoagulation or bleeding-risk questions

11 Goals & parameters

PARAMETER	GOAL
Heart rate	Acute: < 110 bpm at rest (lenient); stricter < 80 if ischemia or HF
Blood pressure	MAP $\geq$ 65 mmHg (adjust for chronic HTN, cerebrovascular disease)
Oxygenation	SpO ₂ $\geq$ 92% (or individualized)
Rhythm	Sinus rhythm if pursuing rhythm control, or controlled AF if rate-control strategy

EDUCATIONAL USE ONLY

Not a substitute for clinical judgement. Verify doses, allergies, renal function, and contraindications. Adapt all agents, targets, and thresholds to your institutional protocols, formulary, and the individual patient.

Spreading knowledge
Improving outcomes