Dysrhythmias and ECGs

Alarms and artifact, the main rhythms, shocks, heart blocks, devices, 12-lead placement

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1 AT A GLANCE

A monitor can show a deadly rhythm in a client who's fine, so the first rule of rhythms is simple: look at the client.

Telemetry alarms

- The monitor names the rhythm, but it isn't always right. Loose electrodes and movement cause artifact, which can look just like ventricular beats.
- ★ Any alarm: **look at the client, check a pulse and output, then act on the rhythm**. Then check the leads and electrodes.
- Low output: low pressure, a weak pulse, slow refill, chest pain, dizziness, confusion.
- Ventricular tachycardia, ventricular fibrillation and complete heart block can all cause cardiac arrest quickly.

The waveform

Part	What it shows
P wave	The atria firing
★ **QRS complex**	The ventricles' electrical depolarization. **It doesn't prove a pulse**: in pulseless electrical activity, there's a rhythm but no pulse
T wave	The ventricles recovering, ready for the next beat
Regular rhythm	The spaces between beats stay the same from one beat to the next

Sinus and atrial rhythms

Rhythm	Looks like	Key nursing point
Sinus bradycardia	Normal-looking, under 60	Can be normal in athletes. Symptoms: assess output, withhold cardiac drugs if indicated, notify the provider; atropine or pacing may be needed
Sinus tachycardia	Normal-looking, over 100	Treat the cause, not the number: stress, exercise, caffeine, fever, low fluid volume, anemia, low oxygen
★ **Atrial fibrillation**	Irregularly irregular; no clear P waves; wavy baseline	**Stroke risk**: teach the warning signs, expect anticoagulation. Stable: rate or rhythm drugs; unstable: urgent synchronized cardioversion. Automatic BP can be inaccurate
Atrial flutter	Fast, regular sawtooth waves, about 250 to 300 a minute	Lowers output, raises stroke risk; treated much like atrial fibrillation
SVT	Fast; no fixed rate defines it. QRS often narrow, may be wide; P waves often hidden	Little time to fill, so output may fall: assess for low output

Ventricular and arrest rhythms

Rhythm	Looks like	Action
PVCs	An early beat from the ventricle; wide, bizarre QRS	Occasional ones are common. Frequent ones can signal a serious problem; ones from more than one spot are more dangerous. A PVC on the T wave can trigger V-tach
★ **V-tach**	Wide complexes, no visible P or T waves, often over 120 a minute	**Is there a pulse?** Pulse: synchronized cardioversion if unstable, IV antidysrhythmics if stable. No pulse: CPR and defibrillate
★ **Torsades de pointes**	Twisting, polymorphic V-tach with a long QT	Can turn into V-fib. Sustained: **unsynchronized shock, even with a pulse**
★ **V-fib**	Chaotic quivering; no pattern, no output	CPR, call for help, **defibrillate fast**; IV antidysrhythmics follow
★ **Asystole**	Flat line; no electrical activity	No pulse: CPR, epinephrine as ordered; check leads without pausing CPR. **No shock**
PEA	A rhythm on the monitor, but no pulse	Like asystole: CPR, airway, epinephrine, a search for reversible causes. **No shock**

Heart blocks

Block	Pattern	Usual care
First-degree	Long PR, over 0.2 seconds; no dropped beats	Often none
Second-degree, Mobitz I	PR lengthens, then a beat drops	Usually none
★ **Second-degree, Mobitz II**	Constant PR; beats drop without warning	Usually a **permanent pacemaker**; can progress to complete block
Third-degree (complete)	Atria and ventricles beat on their own	Permanent pacemaker if the cause can't be reversed

Electrolytes and the ECG

Problem	ECG change
High potassium	Peaked T waves first; higher still, a wide QRS that can slide toward a sine-wave pattern
★ **Low potassium**	Flat T waves, U waves, a long QT: **risk of torsades**
Low calcium or magnesium	Long QT
High calcium	Can shorten the QT

Rate-slowing drugs: Before metoprolol or digoxin, check the apical pulse. Under 60: hold the drug and call the prescriber, unless other parameters are ordered.

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Dysrhythmias and ECGs

1 AT A GLANCE, CONTINUED

Shock, drug or pacing?

Situation	Usual answer
★ **No pulse: V-fib or pulseless V-tach**	CPR and defibrillation
A pulse, but unstable and fast	Synchronized cardioversion; sustained polymorphic V-tach gets an unsynchronized shock
★ **Asystole or PEA**	CPR and epinephrine, **never a shock**
Slow with symptoms, or a serious block	Atropine, or pacing
Stable atrial fibrillation	Rate or rhythm drugs, and anticoagulation

Pacemakers and ICDs

- A pacemaker paces a slow or irregular heartbeat; an ICD can also shock a deadly rhythm back to normal. Carry the device card.
- ★ Keep the incision dry for 4 to 5 days. **Arm limits come from the surgeon**, for that client and that device.
- Report wound infection, the old symptoms coming back, dizziness, breathlessness, chest pain, hiccups that won't stop, or fainting.
- Most appliances are safe. Phone on the opposite side. Distances from tools, speakers and magnets: follow the manufacturer's guidance for that model.
- Airport security: show the card. Talk to the provider before any MRI.
- ★ ICD: **report every shock**. A shock and still unwell, or fainting: get emergency help.

Cardioversion and defibrillation

- Cardioversion: a low-energy shock timed to the QRS, for selected rhythms with a pulse (SVT, rapid atrial fibrillation or flutter, V-tach with a pulse), not torsades. Planned: consent and sedation.
- Atrial fibrillation over 48 hours, or onset unknown: an echo through the esophagus checks for clots first.
- Set the machine to synchronize; everyone stands clear.
- Defibrillation: immediate, unsynchronized; no consent needed. CPR, pads on quickly; don't touch the client while it analyzes.
- ★ Compress while it charges; **resume CPR right after the shock, for about 2 minutes** before the next rhythm check.

12-lead ECG: chest leads

Lead	Where
★ **V1**	4th intercostal space, right sternal border
V2	4th space, left sternal border
V3	Midway between V2 and V4
★ **V4**	5th space, midclavicular line
V5, V6	Level with V4: anterior axillary line, then midaxillary line

Who reads it: The machine's printout can't diagnose alone. A provider reads the 12-lead; trained nurses interpret rhythms, spot urgent changes and escalate. Abnormal pattern: assess the client first.

2 PRIORITY AND SAFETY CALLS

★ Alarm shows V-fib, but the client is sitting up and talking: **check the electrodes and leads for artifact**.

★ Flat line, unresponsive, no pulse, leads attached: **start CPR and call for help**; confirmed asystole isn't shockable.

Monomorphic V-tach with a pulse and low blood pressure is unstable: expect prompt synchronized cardioversion. A stable client may get IV antidysrhythmics first.

New atrial fibrillation: teach stroke warning signs; expect anticoagulation.

3 EXAM ANCHORS

1. Look at the client first, then the monitor, and assess output with every new rhythm.
2. Atrial fibrillation means stroke risk and anticoagulation.
3. No pulse with V-fib or V-tach: CPR and defibrillate. Unstable with a pulse: synchronized cardioversion, except polymorphic V-tach.
4. Asystole and pulseless electrical activity: CPR and epinephrine, never a shock.
5. Serious blocks need pacing. Follow the surgeon's arm instructions; report every ICD shock.
6. V1 and V2 go in the fourth space, and V4 in the fifth, at the midclavicular line.

4 SELF-QUIZ

1. First-degree block: a PR interval over _____ seconds.
2. Atrial flutter: sawtooth waves of about 250 to _____ a minute.
3. After a shock, resume CPR for about _____ minutes before the next rhythm check.
4. V1 goes in the fourth intercostal space, at the _____ sternal border.
5. Low potassium brings flat T waves and _____ waves.

ANSWER KEY 1. 0.2 · 2. 300 · 3. 2 · 4. right · 5. U

5 SOURCES

1. Open RN, Nursing Advanced Skills, 7.4 ECG Patterns and Dysrhythmias. wtcs.pressbooks.pub/nursingadvancedskills/chapter/7-4-e…
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3. American Heart Association, Adult Advanced Life Support guidelines. cpr.heart.org/en/resuscitation-science/cpr-and-ec…
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5. Open RN, Nursing Advanced Skills, Checklist: Obtain a 12-Lead ECG. wtcs.pressbooks.pub/nursingadvancedskills/chapter/7-6-c…

Built from RN PocketPal course lessons: Dysrhythmias, telemetry and pacemakers (c08-l03); Point-of-care testing, ECGs and specimens (c06-l05). Every line on this sheet comes from those lesson scripts.

CARDIOVASCULAR

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