

Unstable tachyarrhythmia

Unstable tachyarrhythmia — the broken rhythm is now the reason the patient is dying, and you must fix it in minutes.

THE ONE-LINE TRUTH

The heart is beating so fast that it cannot fill with blood between beats, so the amount of blood pumped out drops and the body goes into shock.

The chain — how it unfolds

1. An ectopic focus or reentry circuit takes over and fires electrical signals faster than the sinus node. — why: The sinus node normally controls the rate, but when a different spot in the atria, AV node, or ventricles starts firing faster—or when electricity spins in a loop that triggers itself over and over—that abnormal rhythm hijacks control and the heart rate shoots up to 150, 200, or more beats per minute.
2. Diastole (the heart's relaxation and filling time) almost disappears. — why: At 200 beats per minute, the heart is squeezing three times per second, so there is almost no time between beats for the ventricles to relax and fill with blood from the atria.
3. The atrial kick is lost or out of sync. — why: In many fast rhythms, the atria are either fibrillating (quivering uselessly) or contracting at the wrong time, so the final 20 percent push of blood into the ventricles is gone, making the filling problem even worse.
4. Stroke volume (the amount of blood pumped with each beat) drops sharply. — why: The ventricles are squeezing when they are nearly empty, so even though the heart is beating fast, almost no blood is ejected with each contraction.
5. Cardiac output (total blood pumped per minute) falls below what the body needs, and blood pressure drops. — why: Cardiac output equals stroke volume times heart rate. Even though the rate is very high, the stroke volume is so low that total output falls, and organs begin to starve for oxygen.
6. The body releases catecholamines (adrenaline and noradrenaline) to try to boost output. — why: The brain senses low blood pressure and triggers the sympathetic nervous system to make the heart beat harder and faster, but this only makes the rate go higher and shortens diastole even more, worsening the spiral.

7. The heart muscle itself becomes blood-starved (ischemic) (starved of oxygen). — why: The coronary arteries deliver blood to the heart muscle only during diastole when the heart is relaxed and the vessels are not squeezed shut. A heart beating 200 times per minute with almost no rest time cannot get enough oxygen, so the muscle weakens and can start to die—even if the coronary arteries are wide open.
8. The patient develops confusion, chest pain, shortness of breath, and signs of shock. — why: The brain, heart, lungs, and kidneys are not getting enough blood, so the patient becomes confused (low brain oxygen), has chest pain (heart starved blood flow (ischemia)), breathes fast and has crackling lungs (fluid backs up into the lungs), has cold clammy skin and weak pulses (shock), and makes little urine (kidney failure).

Spot it — what you see, and why

- Low blood pressure (systolic below 90): When the heart beats too fast (usually over 150), the chambers don't have enough time to fill with blood between beats, so less blood gets pumped out with each squeeze — like trying to fill a water balloon while someone keeps squeezing it before it's full. Less blood out means lower pressure in the arteries.
- Confusion, trouble speaking, or acting strangely: The brain needs a steady stream of oxygen-rich blood to work right. When the heart is racing and pumping poorly, not enough blood reaches the brain — like dimming the lights when the power drops — so thinking gets fuzzy and the person may seem 'out of it.'
- Chest pain or pressure: The heart muscle itself needs oxygen from the coronary arteries (the blood vessels that feed the heart). When the heart is beating extremely fast, it burns through oxygen faster than the blood can deliver it — starved blood flow (ischemia) (not enough blood reaching the tissue to feed it) — and the muscle starts to hurt, like a cramp.
- Shortness of breath or rapid breathing: The left side of the heart can't keep up with the fast rate, so blood backs up into the lungs — pulmonary edema (fluid flooding the lungs) (fluid leaking into the tiny air sacs). This crowds out space for oxygen, making every breath feel like sucking air through a wet sponge.
- Very fast pulse (usually over 150 beats per minute at rest): An abnormal electrical circuit or focus in the heart fires signals much faster than the normal sinus node (the heart's natural pacemaker). The heart obeys these rapid signals and beats way too fast — like a drummer playing double-time without stopping.
- Feeling dizzy or about to faint (presyncope): Less blood pumped per minute means less reaches the brain. The brain's blood flow drops just enough to make you feel lightheaded — like standing up too fast — warning that you might pass out if it gets worse.

Red flags — act now

- Systolic blood pressure below 90 mmHg
- Altered mental status (confused, not responding normally, or unresponsive)
- Chest pain or signs of heart attack (acute heart attack (myocardial infarction))
- Signs of heart failure (fluid in the lungs causing extreme shortness of breath, inability to lie flat)
- Loss of consciousness or about to pass out

Treat it — in this order

1. Synchronized cardioversion (an electric shock timed to the R wave on the ECG) → Stops the chaotic or too-fast rhythm by resetting every heart cell at the same moment, giving the sinus node (the heart's natural pacemaker in the right atrium) a chance to take control again. Blood output jumps back up because the heart can now fill and squeeze in a normal rhythm.
2. Adenosine IV push 6 mg (followed by 12 mg if no response) for stable narrow regular a fast heart rate (tachycardia) → Blocks the AV node (the electrical gate between the top and bottom chambers) for about one second, which breaks a reentry loop (a signal spinning in a circle) if one exists. The sinus node then restarts normal rhythm, fill time returns, and blood output climbs.
3. Diltiazem IV or metoprolol IV (beta-blocker) for stable atrial fibrillation (an irregular, quivering heartbeat) with rapid ventricular response → Slows how many signals get through the AV node per minute, so the ventricles (bottom chambers) beat slower even though the atria (top chambers) are still quivering. Longer fill time means more blood per beat, so output and blood pressure improve even though the rhythm stays irregular.
4. Amiodarone IV 150 mg over 10 minutes or procainamide IV 20–50 mg/min for stable wide regular a fast heart rate (tachycardia) → Slows down the fast-firing cells or breaks a reentry circuit by making the heart muscle slower to conduct electricity. This gives the sinus node a chance to regain control and restore a normal rhythm.
5. Immediate unsynchronized defibrillation (shock without timing) for pulseless ventricular a fast heart rate (tachycardia) or ventricular fibrillation → Stops the chaotic quivering or disorganized firing in the ventricles so the heart can restart organized electrical activity. Without this, the brain and organs get zero blood and die within minutes.

Your top priorities at the bedside

1. Place the patient on continuous cardiac monitoring and pulse oximetry, and obtain a 12-lead ECG within 1 minute. — why: The ECG shows whether the QRS complex (the electrical signal through the ventricles) is narrow or wide and whether the rhythm is regular, which determines the exact treatment protocol and whether the patient needs immediate cardioversion.
2. Establish large-bore IV access in two sites immediately. — why: Unstable a fast heart rate (tachycardia) may require rapid IV medication pushes like adenosine or amiodarone, and if the patient crashes we need reliable access for emergency drugs and fluids without delay.
3. Obtain a manual blood pressure every 2 to 5 minutes and assess mental status continuously. — why: Blood pressure under 90 systolic or new confusion means the a fast heart rate (tachycardia) has become unstable and the patient needs synchronized cardioversion right now because the brain and organs are not getting enough blood flow.