

Bone infection

Bone infection — get imaging (X-ray then MRI), take a culture from the bone itself, give IV antibiotics for weeks, and cut out dead bone if medicine alone won't clear it.

THE ONE-LINE TRUTH

Bone gets infected when bacteria arrive from a nearby wound, surgery, or the bloodstream and multiply faster than the body can fight them off.

The chain — how it unfolds

1. Bacteria enter bone and begin to multiply. — why: Whether they arrive through a wound, surgical hardware, or the bloodstream, bacteria find a foothold faster than the immune system can clear them—especially in areas with poor blood flow.
2. Inflammation and pus build up inside the bone. — why: White blood cells rush in and release enzymes to kill the invaders, but the pus and swelling have nowhere to go inside the rigid bone, so pressure climbs.
3. Rising pressure squeezes blood vessels shut. — why: The bone's own shell (cortex) becomes a cage: swelling inside compresses the tiny arteries and veins, cutting off oxygen and trapping dead tissue and bacteria.
4. Islands of dead bone (sequestra) form. — why: Without blood flow, chunks of bone die. Antibiotics can't reach dead tissue, so bacteria hide inside these islands and keep the infection alive even after weeks of treatment.
5. Chronic infection and sinus tracts develop. — why: Pus burrows through soft tissue to drain at the skin, creating a tunnel (sinus tract) that won't heal as long as infected dead bone remains inside—leading to months or years of drainage, pain, and flare-ups.
6. Without treatment, bone destruction spreads or sepsis occurs. — why: Ongoing infection eats away more bone, weakens it to the point of fracture, or seeds the bloodstream (sepsis), which can damage distant organs and become life-threatening.
7. Surgery removes dead bone; antibiotics clear remaining bacteria. — why: Cutting out the sequestrum and any infected hardware lets blood flow return and antibiotics reach live tissue, which is the only way to truly cure deep bone infection and close those draining wounds.

Spot it — what you see, and why

- Pain right over the infected bone that gets worse when you press or move it: Bacteria multiply inside the bone, triggering swelling and inflammation in a tight space that cannot stretch — like blowing up a balloon inside a brick — which presses on nerves and causes sharp, deep pain.
- Warmth, redness, and swelling of the skin over the bone: The body rushes more blood to the infected area to deliver white blood cells and oxygen — extra blood makes the skin warmer and redder, and leaky blood vessels let fluid escape into the tissue, causing swelling.
- Fever and chills: The immune system detects bacteria in the bone and releases chemical messengers called cytokines that reset the brain's thermostat in the hypothalamus (the body's temperature control center) to a higher setting, causing fever to help white blood cells fight better.
- An open sore or draining wound near the bone that won't heal, especially in people with diabetes or poor circulation: Chronic wounds break the skin barrier and let bacteria travel down to the bone; once bacteria are deep in bone tissue, the infection keeps the wound from healing because bacteria constantly re-seed the surface and inflammation damages tissue faster than it can repair.
- New or worsening limping, inability to bear weight, or refusal to use an arm or leg (especially in children): Moving or putting weight on the infected bone stretches inflamed tissue and bone lining, sending sharp pain signals — children and adults naturally protect the painful limb by avoiding movement.
- Bone tenderness or a positive probe-to-bone test in someone with a diabetic foot ulcer: In people with diabetes and chronic foot ulcers, skin and soft tissue often break down deep enough that bacteria reach the bone underneath; a sterile metal probe inserted into the ulcer will hit hard bone instead of soft tissue if infection has eaten into the bone.

Red flags — act now

- Fever above 101.5°F (38.6°C) with bone pain, especially in a child or after surgery or injury
- Severe pain that does not improve with rest or over-the-counter pain medicine
- Red streaks spreading from the area, confusion, very fast heartbeat, or low blood pressure (signs bacteria are spreading into the bloodstream)
- A non-healing wound or ulcer over a bony area, especially in someone with diabetes, peripheral artery disease, or a weakened immune system
- New inability to move a limb, numbness, tingling, or loss of pulse below the infection site (may mean the infection is pressing on nerves or blood vessels)

Treat it — in this order

1. Blood cultures (two sets) and bone biopsy before starting antibiotics (unless patient is septic and unstable) → Grows the exact germ causing osteomyelitis so you know which antibiotic kills it, instead of guessing. Stops you from treating the wrong bacteria and lets you narrow therapy once results come back (usually 2–3 days).
2. Empiric IV antibiotics started immediately if patient is septic: vancomycin 15–20 mg/kg every 8–12 hours PLUS ceftriaxone 2 g daily or ciprofloxacin 400 mg every 12 hours → Kills *Staphylococcus aureus* (including MRSA) with vancomycin and covers gram-negative bacteria (like *E. coli* and *Pseudomonas*) that can infect bone, especially in diabetic foot or spine infections. Vancomycin penetrates bone tissue where many other drugs cannot reach.
3. Surgical debridement: remove all dead bone (sequestrum), pus, and infected hardware if present → Takes away infected tissue and dead bone that antibiotics cannot reach because they have no blood supply. Lets fresh blood flow back into the cleaned bone so white blood cells and antibiotics can finish the job. Removes biofilm on hardware that shields bacteria.
4. Pathogen-directed IV antibiotics for 4–6 weeks total (2–4 weeks IV, then switch to oral with high bioavailability like fluoroquinolones, linezolid, or trimethoprim-sulfamethoxazole based on culture results) → Long therapy gives bone time to heal and new bone to grow in where infection was removed. Switching to oral antibiotics after the first few weeks lets you finish treatment at home instead of staying in the hospital for six weeks.
5. Optimize blood sugar control ($HbA1c < 7\%$) and stop smoking; evaluate blood vessels in diabetic foot with ankle-brachial index or vascular ultrasound → Better blood flow and lower blood sugar help white blood cells reach the infection and oxygen reach the bone so it can heal. Stopping smoking opens up small blood vessels. Fixing blocked arteries (revascularization) restores blood supply to blood-starved (ischemic) bone.

Your top priorities at the bedside

1. Obtain two sets of blood cultures from different sites before giving any antibiotics, unless patient shows sepsis (low blood pressure, confusion, or organ failure) — why: Blood cultures catch bacteria floating in bloodstream and tell doctors which antibiotic will kill the germ (sensitivity testing); giving antibiotics first makes cultures falsely negative and leaves treatment guessing; septic patients need antibiotics within one hour so cultures are drawn fast then antibiotics start immediately
2. Check vital signs every 4 hours and watch for fever above 100.4 degrees, heart rate over 90, or blood pressure dropping below 90 systolic — why: Bone infection can release bacteria into blood (bacteremia) causing sepsis where blood vessels leak fluid and blood pressure drops (septic shock); early detection allows fluid resuscitation and ICU transfer before organs fail

3. Assess pain level every shift using 0 to 10 scale and give prescribed pain medicine; position affected limb with pillows to reduce swelling and pressure on bone — why: Infected bone swells inside hard bone shell causing severe pressure pain; pus buildup stretches the periosteum (bone covering) which has many pain nerves; controlling pain lets patient move and prevents blood clots from lying still