

Acute Bronchitis

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THE STORY IN ONE SENTENCE

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“Swollen airways, tons of cough, no antibiotics needed. The deep lungs stay clear.”

Normal anatomy — the body's job

Air comes in through your nose or mouth, travels down your windpipe (trachea), and splits into two big tubes called bronchi—one going to each lung. Those bronchi keep branching into smaller and smaller tubes, like a tree, until they reach tiny air sacs (alveoli) where oxygen jumps into your blood. The bronchi are lined with a thin layer of cells and tiny waving hairs (cilia) that sweep mucus and germs back up so you can cough or swallow them away.

BODY'S JOB

The bronchi are the highway that carries air down to the air sacs. Their lining traps dust and germs and sweeps them out so the deep part of your lung stays clean.

1. Trachea — The windpipe—the main tube that runs from your throat down toward your lungs.
2. Bronchi — The two big branches that split off and carry air into your right and left lung.
3. Airway lining and cilia — Cells that make a little mucus and tiny hairs that sweep it up and out, like a broom.
4. Alveoli — Tiny air sacs deep in the lung where oxygen crosses into your blood.

What breaks

A virus lands on the lining of the bronchi and infects the cells there. Your body sends inflammation (redness, heat, and swelling) to fight the virus. The lining puffs up, makes extra mucus, and some damaged cells fall off. The airways get jumpy and can tighten easily, so you cough and sometimes wheeze a little. The important part: the swelling stays in the big airways. It does NOT fill the tiny air sacs deep in the lung the way pneumonia does, so your oxygen level usually stays normal.

CLINICAL TERM

Acute inflammation of the bronchial lining (short-lasting, most often from a virus)

How the body compensates

Your body tries to clear the irritated airways. Coughing is the main tool—it pushes out mucus and dead cells. Mucus glands make more mucus to trap the virus. Because the tiny air sacs stay open and working, your oxygen level stays normal, so you do not get short of breath when you are sitting still. If the airways stay jumpy, your breathing may sound a little wheezy for a while, even after the virus is gone.

1. Coughing kicks in to push mucus and damaged cells out of the big airways.
2. Mucus glands make extra mucus to trap and flush out the virus.
3. The tiny air sacs deep in the lung stay open, so oxygen levels stay normal and you do not get short of breath at rest.
4. Jumpy airways can cause a mild wheeze and a cough that lingers for days to weeks after the virus clears.

Domino effect

1. A virus that spreads through the air infects the lining of the bronchi. — More than 90 out of 100 cases of acute bronchitis are caused by a virus—the same ones that cause colds and flu.
2. Your body sends inflammation to fight the virus. — Inflammation is your immune system's normal way of attacking infected airway cells.
3. The airway lining swells and makes extra mucus. — Swelling and mucus are how your body traps and washes out the germ.
4. Some lining cells get damaged and fall off. — The virus hurts the cells and the tiny sweeping hairs (cilia), so mucus piles up.
5. Cough sensors get triggered over and over. — Mucus and swelling irritate the cough nerves, driving the main cough symptom.

6. Airways become jumpy (overly sensitive) for a while. — The damaged, swollen lining overreacts to any irritant, so the cough and mild wheeze can last one to three weeks.
7. The virus clears and the lining heals on its own. — Acute bronchitis fixes itself—your body clears it without needing antibiotics.

Symptoms · what the patient feels, and why

- Cough that lasts one to three weeks: The virus makes the lining of your breathing tubes (bronchi) swell and produce extra mucus. Even after the virus starts to leave, the swelling and mucus keep tickling the cough nerves, so the cough goes on for days or weeks.
- Cough may be dry or bring up mucus (clear, white, yellow, or green): Your airway lining makes extra mucus to trap and wash away the virus. The color comes from white blood cells that fought the infection—it does NOT mean bacteria are there.
- Cold symptoms came first (runny nose, sore throat, low-grade fever): The same virus that gave you a head cold traveled down into the larger breathing tubes in your chest. That is why you felt a cold first, then the cough started a few days later.
- Chest feels sore or tight from coughing: Coughing hard again and again strains the muscles between your ribs and across your chest wall, making them ache like sore muscles after exercise.
- Feeling tired or worn out: Your immune system is working around the clock to fight the virus, and constant coughing drains your energy, so you feel exhausted even if you are resting.
- Mild wheeze or whistling sound when breathing: The swollen, irritated airways get jumpy and narrow a little bit. When air squeezes through the narrowed tubes, it makes a whistling sound.
- No pneumonia signs: normal breathing rate, normal oxygen level, clear lungs when listening: Acute bronchitis stays in the large breathing tubes and does NOT spread into the tiny air sacs (alveoli) where oxygen moves into your blood. That is why your oxygen stays normal and a doctor hears clear breath sounds, not crackles.
- High fever (over 100.4°F or 38°C), fast breathing, or trouble breathing at rest: These signs are NOT part of simple bronchitis. They tell you the infection may have moved deeper into the air sacs (pneumonia) or another serious problem is happening.
- Coughing up blood: Blood in the mucus is not part of simple bronchitis. It means you need to check for pneumonia, tuberculosis, a blood clot in the lung, or rarely cancer.

Focused exam

- Normal oxygen level ($\geq 95\%$ on room air) and normal breathing rate (12–20 breaths per minute at rest): This tells you the tiny air sacs deep in the lungs—where oxygen jumps into the blood—are working fine. In bronchitis, only the big airways are swollen and full of mucus; the oxygen-exchange rooms stay clear, so oxygen stays normal.
- Clear lungs or scattered wheezes and coarse rattling breath sounds (rhonchi) (rumbling sounds) that shift or disappear when the person coughs: These sounds come from mucus rattling around in the big airways, not from fluid filling the deep lung tissue. Because the mucus moves when you cough, the sounds move too—classic for bronchitis.
- Crackles (sharp popping sounds) heard in just one spot, dull sound when you tap the chest, or fever with fast heart rate (>100 beats/min) and fast breathing (>20 breaths/min): These clues suggest pneumonia—infection filling the tiny air sacs in the lung tissue itself, not simple bronchitis. A chest X-ray is needed now to look for an infiltrate (cloudy patch where pus or fluid has pooled).
- Low oxygen (<90 – 92% on room air), blue lips or fingernails, or working hard to breathe (using neck or belly muscles, flaring nostrils): Bronchitis alone does not drop oxygen or make breathing hard. This means something more serious—like pneumonia, heart failure, or a blood clot in the lung—is blocking oxygen from getting into the blood.
- Cough lasting more than three weeks, coughing up blood, unintended weight loss, or drenching night sweats: Acute bronchitis should fade in one to three weeks. A cough that drags on, or red-flag symptoms like blood or weight loss, raises the chance of tuberculosis, cancer, or chronic lung disease and needs a chest X-ray and more testing.

Diagnostics · every test answers a question

- Clinical diagnosis (history and physical exam) → Does this look like a self-limited viral cough, or could it be pneumonia or another serious lung problem?
- Chest X-ray (only if pneumonia is a real concern) → Is there an infiltrate (a cloudy area where fluid or pus has filled the tiny air sacs) in the lung tissue?
- Pulse oximetry (oxygen level measured with a sensor on the finger) → Is oxygen getting into the blood normally?
- Pertussis (whooping cough) testing—nasopharyngeal swab PCR or culture → Is this *Bordetella pertussis* bacteria (whooping cough) rather than a common virus?
- Rapid influenza test or COVID-19 PCR (only during flu or COVID season, or if there is known exposure) → Is this influenza or COVID-19, which have specific treatments and isolation rules?
- Coughed-up mucus (Sputum) culture or Gram stain (almost never done in otherwise healthy people with acute bronchitis) → Is there a specific unusual bacteria growing in the airways?

Treatment logic

- Supportive care: rest, fluids, and time → Keeps the person comfortable and lets the body's immune system fight off the virus on its own, which is the real cure. Most people feel better in 7–10 days; the cough may linger 1–3 weeks.
- Symptom relief: fever reducers and pain relievers (acetaminophen or ibuprofen), honey (1 teaspoon) for cough in children over one year old → Eases fever, body aches, sore throat, and cough so the person can sleep and do normal things. Honey has been shown in trials to calm cough better than placebo in children (and is safe and cheap).
- NO antibiotics for otherwise healthy patients → Avoids side effects (diarrhea, rash, yeast infections, allergic reactions), prevents antibiotic resistance (a growing public health threat), and saves money. Antibiotics do NOT help a viral illness—multiple Cochrane reviews and CDC/American College of Physicians guidelines agree.
- Inhaled bronchodilator (albuterol metered-dose inhaler, 2 puffs every 4–6 hours as needed) only if there is wheeze or a sense of chest tightness → Relaxes the smooth muscle wrapped around the airways, opening them up and easing wheeze and cough in patients who have airway twitchiness (like people with asthma or a history of wheezing with colds).
- Avoid over-the-counter cough and cold medicines in children under 4 years old → Prevents rare but serious side effects (seizures, fast heart rate, drowsiness leading to dangerous breathing slowing) that can happen in young children. The American Academy of Pediatrics and FDA say these medicines do not work well in little kids and are not safe.
- Patient education: explain the natural course, when to return, and why antibiotics are not needed → Reduces anxiety, sets realistic expectations (cough may last 1–3 weeks), and prevents unnecessary return visits or calls asking for antibiotics. Studies show that clear explanations lower antibiotic prescribing without hurting patient satisfaction.

Medications

Acetaminophen (Tylenol) · Pain and fever reducer (analgesic and antipyretic)

Acetaminophen turns down the brain's temperature switch and blocks pain signals so fever drops and chest soreness, headache, and body aches ease while your immune system clears the virus.

1. Acetaminophen blocks an enzyme called COX in the brain that makes prostaglandins (chemicals that raise temperature and amplify pain signals).
2. With fewer prostaglandins, the hypothalamus lowers your body's temperature set-point.
3. Pain signals traveling through the spinal cord are also dampened.
4. Fever falls within 30 to 60 minutes and aches fade, so you can rest and recover.

SAFETY WATCH

Never take more than 3,000 mg in 24 hours for adults (check all cold and flu medicines—many contain hidden acetaminophen). Too much damages the liver and can cause liver failure. · Ask a doctor before use if you drink alcohol regularly or have liver disease. · Do not use in children under 3 months without a doctor's guidance.

Ibuprofen (Advil, Motrin) · Nonsteroidal anti-inflammatory drug (NSAID)

Ibuprofen blocks chemicals that cause fever, pain, and swelling in the chest wall and airways, so soreness eases and fever drops while your body fights the infection.

1. Ibuprofen blocks COX-1 and COX-2 enzymes all over the body that make prostaglandins (chemicals that trigger inflammation, pain, and fever).
2. With prostaglandins blocked, swelling and pain in chest muscles and airways drop.
3. The hypothalamus resets the body's temperature lower.
4. Fever falls and aches ease within 30 to 60 minutes.

SAFETY WATCH

Can irritate and damage the stomach lining, causing bleeding or ulcers—especially on an empty stomach or with long-term use. · Can harm kidneys if you are dehydrated or already have kidney disease. Drink fluids. · Avoid if you have a history of stomach ulcers, heart failure, or are in the third trimester of pregnancy. · Do not use in infants under 6 months without a doctor's guidance.

Albuterol (ProAir, Ventolin, Proventil) — only if wheezing or known reactive airway disease · Short-acting beta-2 agonist bronchodilator (SABA)

Albuterol relaxes the tight muscle bands wrapped around the breathing tubes in the lungs, opening the airways within minutes so wheezing eases and breathing becomes easier.

1. Albuterol locks onto beta-2 receptors on airway smooth muscle.
2. This triggers a chemical cascade inside the muscle cell that raises cyclic AMP (a messenger molecule).
3. High cyclic AMP tells the muscle to relax.
4. The airway diameter widens within 5 to 15 minutes.
5. Air flows more easily, wheezing drops, and coughing becomes less forced.

SAFETY WATCH

Can make the heart race (tachycardia) and cause hand tremors because beta-2 receptors also sit on heart and skeletal muscle. · Use only when there is actual wheezing or the person has a history of asthma or reactive airways—not for every cough. · Overuse can lead to rebound bronchospasm (airways clamp tighter when the drug wears off). · Tell your doctor if you have heart rhythm problems or take other stimulants.

Dextromethorphan (Robitussin DM, Delsym) — only for nighttime cough relief if needed · Cough suppressant (antitussive)

Dextromethorphan turns down the cough center in the brainstem so the urge to cough lessens, helping you sleep when a dry, hacking cough keeps you awake.

1. Dextromethorphan binds to receptors in the medulla that trigger the cough reflex.
2. It raises the threshold needed to activate that reflex—meaning it takes a stronger irritation to make you cough.
3. Frequent, non-productive coughing drops, especially at night.
4. Sleep and rest improve.

SAFETY WATCH

Do not use if you are coughing up a lot of thick mucus—you need to clear that out, not suppress the cough. · Can cause drowsiness; do not drive after taking it. · Never combine with other cough or cold medicines that also contain dextromethorphan—overdose can cause confusion and hallucinations. · Do not use in children under 4 years. Ask a doctor before use in children 4–6 years.

Guaifenesin (Mucinex, Robitussin chest congestion) — if thick mucus is hard to cough up · Expectorant (mucus thinner)

Guaifenesin helps thin thick, sticky mucus in the airways so it becomes easier to cough up and clear out, keeping airways open and reducing chest congestion.

1. Guaifenesin increases the water content in the mucus layer coating the airways.
2. Thicker mucus loosens and becomes more fluid.
3. Cilia (tiny hairs lining the airways) can sweep the thinner mucus up toward the throat more easily.
4. Productive coughing clears mucus out, and chest tightness eases.

SAFETY WATCH

Drink at least 6 to 8 glasses of water daily—guaifenesin cannot thin mucus if you are dehydrated. · Generally safe with few side effects. · Do not use in children under 4 years. Ask a doctor before use in children 4–6 years. · If cough lasts more than 7 days, comes back, or is accompanied by fever, rash, or lasting headache, see a doctor.

Red flags

- High fever, fast heart rate, fast breathing, or low oxygen level—think pneumonia and get a chest X-ray
- Shortness of breath at rest, blue lips, or working hard to breathe—a deeper lung problem, not simple bronchitis
- Coughing up blood—needs a workup for pneumonia, tuberculosis, blood clot in the lung, or cancer
- Cough lasting more than three weeks—reconsider whooping cough (pertussis), asthma, acid reflux, or another cause
- Coughing fits that end in a whoop or vomiting, or contact with someone who has whooping cough—suspect pertussis

Nursing priorities

1. Check and document vital signs and oxygen level — Normal vitals and oxygen support bronchitis; abnormal values raise concern for pneumonia.
2. Teach that antibiotics are not needed and explain why — Setting expectations prevents antibiotic overuse and builds trust; the cause is a virus.
3. Give clear return-precautions (when to come back) — The patient must know the red flags — high fever, trouble breathing, or a cough lasting over 3 weeks.
4. Support comfort: fluids, rest, fever control, and smoking cessation — These ease symptoms and speed recovery; smoke keeps the airways irritated.

Sources

- CDC — Antibiotic Prescribing and Use: Acute Bronchitis
- American College of Physicians / CDC — Appropriate Antibiotic Use for Acute Respiratory Tract Infection in Adults (Annals of Internal Medicine 2001)
- Cochrane Review — Antibiotics for acute bronchitis (2017)
- American Academy of Family Physicians (AAFP) — Acute Bronchitis clinical guideline

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