

Respiratory acidosis

A plain-English guide for you and your family

WHAT IS HAPPENING

Your lungs have one main job: breathe in oxygen and breathe out carbon dioxide (CO₂), a waste gas your cells make all day. Normally, the tiny air sacs in your lungs (alveoli) swap gases perfectly—CO₂ leaves your blood and you exhale it. Respiratory acidosis (acid building up from trapped carbon dioxide) happens when that system breaks down and CO₂ piles up in your blood, making it too acidic. Common causes include blocked airways (asthma or COPD flare-ups), weak breathing muscles (from a stroke, injury, or disease), medicines that slow your breathing drive (like opioids or sleeping pills), or lung damage that makes gas exchange hard. When CO₂ rises fast (acute), you feel sleepy, confused, or short of breath, and your brain can swell—this is an emergency. When it builds slowly over months or years (chronic), your kidneys quietly add bicarbonate (a base) to your blood to balance the acid, so you tolerate higher CO₂ without feeling as sick. Treatment focuses on helping you breathe—oxygen, a breathing mask with pressure, or a tube if your lungs cannot keep up—and fixing the root cause, whether that is opening your airways, stopping a harmful medicine, or strengthening your breathing muscles. The key is to catch it early and support your body while it heals.

What you might feel

- Shortness of breath or feeling like you can't catch your breath
- Confusion, trouble thinking clearly, or feeling sleepy when you shouldn't be
- Headache
- Feeling anxious or restless
- Blue or gray tint to lips, fingernails, or skin (cyanosis)
- Fast heart rate (tachycardia)
- Muscle twitches or hand tremor (asterixis)
- An arterial blood gas (ABG) test shows high CO₂ (PaCO₂ above 45 mmHg) with low pH (below 7.35) in sudden respiratory acidosis (acid building up from trapped carbon dioxide), or near-normal pH (7.35–7.40) in long-standing cases where the kidneys have had time to hold onto bicarbonate to buffer the acid

Call the doctor right away if...

- Severe confusion, hard to wake up, or unconscious (CO₂ narcosis — the brain is so slowed by acid that breathing drive shuts down)
- Gasping for air, unable to speak full sentences, or breathing has become very shallow and slow (respiratory failure is imminent)
- Blue lips, tongue, or fingertips that don't improve with extra oxygen (sign of critically low oxygen)
- New chest pain or very fast or irregular heartbeat (the heart may be struggling under low oxygen and high acid)

What the care team will do

- Place patient on continuous pulse oximetry and capnography (CO₂ monitor) and assess mental status every 15 minutes
- Position patient upright at 45 degrees or higher and encourage deep breathing every hour if awake
- Administer prescribed bronchodilators (albuterol nebulizer) immediately if patient has wheezing or known COPD or asthma
- Prepare and assist with BiPAP setup if patient is alert and cooperative, or gather intubation equipment if patient is abnormally sleepy (somnolent) or has myoclonus
- Hold or reduce any sedating medications and notify provider immediately; prepare naloxone 0.4 mg IV if opioid overdose is suspected
- Start IV access and draw arterial blood gas (ABG) as ordered to confirm pH and PCO₂ levels
- Suction oral secretions and encourage coughing every 2 hours if patient has weak cough or thick mucus
- Monitor for signs of respiratory muscle fatigue: use of neck muscles to breathe, paradoxical abdominal breathing, or respiratory rate above 30 or below 8

Medicines you may be given — and why

Naloxone (Narcan)

Kicks opioid drugs off the receptors in the brain's breathing center, so the brain wakes up and starts telling the lungs to breathe again. Works in 1-2 minutes.

Albuterol (ProAir, Ventolin)

Relaxes the tight muscle bands wrapped around airways in the lungs, opening the tubes so air (and CO₂) can move in and out more easily. Works in 5–15 minutes.

Ipratropium (Atrovent)

Blocks the nerve signal (acetylcholine) that tells airways to squeeze, so the tubes stay open. Often combined with albuterol for a stronger effect. Works in 15–30 minutes.

Prednisone (oral) or Methylprednisolone (IV)

Shuts down the inflammatory cascade inside airways, shrinking swelling and mucus production so air can move and CO₂ can escape. Takes 4–6 hours to start working; full effect by 24–48 hours.

Supplemental oxygen (O₂)

Raises the oxygen level in blood to keep tissues fed while the team works to fix the CO₂ problem. In COPD, use the lowest flow that keeps O₂ saturation 88–92 % to avoid blunting the drive to breathe.

Non-invasive positive-pressure ventilation: BiPAP (bilevel positive airway pressure)

A tight-fitting face mask pushes air into the lungs at two pressures—higher when you breathe in (to inflate lungs and overcome airway resistance) and lower when you breathe out (to help CO₂ escape). Buys time for medications to work and avoids the need for a breathing tube.

Endotracheal intubation and mechanical ventilation

A breathing tube is placed through the mouth into the trachea, and a ventilator machine takes over breathing. The machine controls how much air goes in, how fast, and at what pressure, clearing CO₂ and resting exhausted breathing muscles.

Acetazolamide (Diamox)

Makes the kidneys dump bicarbonate (the blood's buffer) into urine, creating a mild metabolic acidosis (acid building up in the blood) that nudges the brain's breathing center to breathe faster and blow off CO₂. Used mainly in chronic stable hypercapnia (e.g. obesity hypoventilation, high-altitude periodic breathing), NOT in acute respiratory acidosis (acid building up from trapped carbon dioxide).

Where this information comes from

- American Thoracic Society (ATS)

- GOLD COPD 2024 guideline
- UpToDate clinical reference
- American Association for Respiratory Care (AARC)

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