CONDITION

Acute mountain sickness

Learn how to recognize, prevent, and respond to acute mountain sickness, including when headache and other altitude symptoms need urgent care.

WHAT IT IS
Altitude illness after ascending too quickly

BODY SYSTEM
Whole body, especially brain and lungs

MAIN SYMPTOMS
Headache, nausea, dizziness, unusual tiredness

WHAT CAUSES IT
Low oxygen at high altitude

HOW IT IS DIAGNOSED
Symptoms, timing and recent altitude gain

MAIN TREATMENT
Stopping ascent, descent and supplemental oxygen

CAN IT BE CURED?
Yes, often resolves after descent

IS IT AN EMERGENCY?
Sometimes, with confusion, poor coordination or breathlessness at rest

LONG-TERM OUTLOOK
Mild cases often resolve, but severe complications can worsen quickly

Overview

Acute mountain sickness, often called AMS, is an illness that can develop after traveling to a high altitude too quickly. It is caused by the lower amount of available oxygen at altitude. AMS commonly occurs above about 2,500 meters, or 8,200 feet, but some people develop symptoms at lower elevations.

The body can adjust to lower oxygen levels through a process called acclimatization. Breathing becomes faster, and the kidneys help change the body's fluid and chemical balance. These adjustments take time. If the increase in sleeping altitude is faster than the body can manage, symptoms may develop.

AMS usually causes a headache along with symptoms such as nausea, dizziness, or unusual tiredness. Symptoms are often mild and improve when the person stops going higher.

However, continuing to ascend while symptoms are present can make the illness worse.

AMS matters because severe altitude illness can affect the brain or lungs. High-altitude cerebral edema affects the brain and can develop from worsening AMS. High-altitude pulmonary edema affects the lungs and may occur with or without AMS. Both are medical emergencies.

Being physically fit does not prevent altitude illness. Anyone traveling rapidly to a high elevation can be affected, including experienced hikers, skiers, workers, and people arriving by car or plane.

Symptoms

Symptoms usually begin within several hours after arriving at a higher sleeping altitude. They often appear during the first night. Symptoms beginning after several days at the same elevation are less likely to be caused by AMS unless the person has recently gone higher.

Headache is the central symptom of AMS. It occurs along with one or more of the following:

Symptoms can resemble dehydration, a migraine, a viral illness, exhaustion, or a hangover. Poor sleep alone does not establish that someone has AMS because disrupted sleep is common at altitude.

Young children may not be able to describe a headache or dizziness. They may become unusually irritable, inactive, sleepy, or unwilling to eat. These signs are not specific to altitude illness, so a child who appears unwell should be assessed carefully.

A person with mild AMS can usually walk normally, think clearly, and breathe comfortably while resting. Worsening balance, confusion, or extreme drowsiness suggests that the brain may be affected.

Seek emergency help and begin a safe, assisted descent if someone at altitude develops:

A person with these symptoms should not continue upward or be left alone.

- Nausea, vomiting, or loss of appetite
- Dizziness or lightheadedness
- Unusual tiredness, weakness, or reduced activity
- Difficulty sleeping or frequent waking
- Confusion, unusual behavior, or difficulty staying awake
- Trouble walking in a straight line or coordinating movements

- Shortness of breath while resting
- A persistent cough with severe weakness or chest congestion
- Blue or gray lips or skin
- Collapse, loss of consciousness, or a seizure

Causes and risk factors

Air pressure decreases as elevation increases. Although oxygen still makes up about the same percentage of the air, each breath contains fewer oxygen molecules. This reduced oxygen supply is called hypobaric hypoxia.

The strongest risk factors are how high a person goes, how quickly they reach that elevation, and where they sleep. Sleeping altitude matters because the body remains exposed to lower oxygen throughout the night.

Other factors that increase risk include:

A person's past response can help estimate risk, but it is not a guarantee. Someone who felt well on one trip may become ill during another trip with a faster ascent or a higher destination.

Physical fitness does not protect against AMS. Age, sex, and athletic training are not reliable ways to predict who will become ill. People with heart, lung, blood, or neurologic conditions may have additional concerns about low oxygen even if their risk of AMS itself is not higher.

Gradual ascent allows more time for acclimatization. Above 3,000 meters, or about 9,800 feet, expert guidance generally advises limiting increases in sleeping elevation and including rest or acclimatization days. Day trips to a higher point may be better tolerated when the traveler returns to a lower elevation to sleep.

Alcohol and medicines that slow breathing can interfere with sleep-related breathing and make symptoms harder to interpret. Travelers should discuss sedatives, sleep medicines, and prescription pain medicines with a clinician before using them at altitude.

- A previous episode of AMS at a similar altitude and rate of ascent
- Traveling directly from a low elevation to a high sleeping altitude
- Increasing sleeping elevation rapidly over several days
- Strenuous exercise soon after arrival
- Going higher despite current altitude symptoms

Diagnosis

AMS is diagnosed from the symptoms, their timing, and a recent increase in altitude. There is no single blood test or scan that confirms it.

Clinicians often use the Lake Louise criteria to describe AMS in adults. These criteria require a headache after gaining altitude, along with symptoms such as nausea, dizziness, or fatigue. The overall pattern and severity are more important than any one symptom.

A clinician may ask about:

A pulse oximeter measures the percentage of oxygen carried in the blood. Readings normally decrease at high altitude and vary with elevation, breathing, circulation, device quality, and cold fingers. A reading can support an assessment, but it cannot diagnose or rule out AMS by itself.

The examination should check alertness, balance, coordination, breathing, and lung sounds. Difficulty walking heel-to-toe, confusion, or reduced alertness may indicate high-altitude cerebral edema rather than uncomplicated AMS.

Other possible explanations include dehydration, migraine, low blood sugar, infection, medication effects, carbon monoxide exposure, exhaustion, and alcohol-related symptoms. Testing or imaging may be needed when the symptoms are unusual, severe, or do not improve as expected.

- The highest elevation reached and the elevation where the person slept
- How quickly the ascent occurred
- When symptoms began
- Previous altitude illness
- Medicines, alcohol use, and medical conditions
- Whether symptoms improve with rest, oxygen, or descent

Treatment and management

The first step is to stop ascending. A person with symptoms should not sleep at a higher elevation until the symptoms have resolved.

Mild AMS often improves with rest at the same altitude. Fluids should be used to correct normal thirst or dehydration, but drinking excessive water does not treat AMS and can cause harmful changes in blood sodium.

Nonprescription pain relievers may help a headache, and anti-nausea medicine may reduce vomiting. These medicines can improve comfort but do not make it safe to continue ascending

while symptoms remain. A clinician or pharmacist can help determine whether a medicine is appropriate.

Descent is the most reliable treatment. A lower elevation increases the amount of oxygen available with each breath. Descent is particularly important when symptoms are getting worse, are not improving with rest, or interfere with normal activity.

Supplemental oxygen can improve symptoms when it is available. A portable hyperbaric chamber, which temporarily raises pressure around the person, may be used in remote settings when immediate descent is not possible. It is a temporary measure and should not delay evacuation when severe illness is suspected.

Acetazolamide is a prescription medicine that speeds acclimatization by changing how the kidneys manage bicarbonate, which encourages breathing. Clinicians may recommend it to prevent AMS in people with a higher-risk travel plan or to help treat established AMS. It does not replace a gradual ascent or descent when symptoms worsen.

Dexamethasone is a corticosteroid like prednisone or hydrocortisone that reduces brain swelling and may prevent or treat AMS in selected situations. It does not promote acclimatization, and symptoms can return if it is stopped before the person has acclimatized. Its use should be planned with a clinician.

Prevention should begin before the trip. A practical plan may include:

Preventive medicines require an individual assessment. The choice depends on the itinerary, previous altitude response, health conditions, allergies, and other medicines.

- Spending time at an intermediate elevation before sleeping higher
- Increasing sleeping altitude gradually
- Scheduling acclimatization days during a longer ascent
- Keeping activity light during the first hours after a rapid arrival
- Recognizing symptoms early and avoiding further ascent while ill
- Discussing preventive medicine with a clinician when gradual ascent is not possible or there is a history of altitude illness

Complications

High-altitude cerebral edema, or HACE, is severe brain dysfunction caused by altitude. It is usually viewed as the advanced end of the AMS spectrum. Warning signs include confusion, marked drowsiness, unusual behavior, and ataxia, which means loss of balance or coordination.

HACE can worsen quickly. Immediate descent, oxygen, emergency medical care, and rescue treatment are needed. Dexamethasone may be given by trained clinicians or according to a prearranged expedition medical plan.

High-altitude pulmonary edema, or HAPE, is fluid buildup in the lungs. It is not simply severe AMS and may occur without a headache. Early signs can include an unusual drop in exercise ability and breathlessness that is greater than expected. Later signs include breathlessness at rest, cough, chest congestion, and severe weakness.

HAPE also requires urgent descent and oxygen when available. Rescue clinicians may use additional treatments based on the situation. Someone suspected of having HAPE or HACE should not walk down alone if safe assisted evacuation is possible.

Vomiting can contribute to dehydration. Poor judgment or impaired coordination can also increase the risk of falls, exposure, and other injuries in remote areas.

Follow up

Mild symptoms that fully resolve after rest or descent often do not require testing. The person should remain symptom-free before considering any further ascent. Returning upward should be gradual and should not occur after severe altitude illness without medical advice.

Routine follow-up is appropriate after repeated AMS episodes, symptoms at relatively modest elevations, or uncertainty about what caused the illness. A pre-travel visit is also useful for people with heart or lung disease, pregnancy, sleep-related breathing problems, or a previous episode of HACE or HAPE.

Seek prompt medical assessment if symptoms continue after descent, repeatedly return, or include ongoing vomiting, severe headache, fainting, chest symptoms, or unusual shortness of breath. These features may have another cause or may require treatment.

Confusion, inability to walk normally, breathlessness at rest, blue or gray coloring, collapse, or a seizure requires emergency action. Contact local rescue or emergency services, provide oxygen if available and safe to use, and descend as soon as this can be done safely.

Sources

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