



## Syncope (Fainting)

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Syncope, or fainting, is a form of transient loss of consciousness caused by insufficient blood flow to the brain characterized by a rapid onset, short duration, and spontaneous and complete recovery.<sup>1</sup> Neurological (for example, epileptic seizure) and psychogenic causes of transient loss of consciousness are not included in this contemporary definition. About one third of all people will faint in their lifetime. Syncope may result from something as benign as dehydration or, in contrast, can represent a warning sign of an undiagnosed life-threatening condition. Even with expert consultation and diagnostic testing, the cause remains unknown in 10% to 40% of all cases. In this Cardiology Patient Page, we describe the common causes, diagnostic workup, and treatment of syncope.

### What Causes Syncope?

Most causes of syncope can be broadly categorized into 3 groups: reflex-mediated syncope, orthostatic hypotension, and cardiovascular causes of syncope (Table 1).

Reflex-mediated syncope is the most common cause of syncope in the general population. This category encompasses several conditions, including vasovagal, situational, and carotid sinus syncope. Syncope occurs when a normal reflex is overstimulated, associated with marked stimulation of the vagus nerve, which slows the heart rate and, along with dilation of blood vessels, lowers blood pressure and decreases blood flow to the brain. Vasovagal syncope is the most common type of fainting. It can be provoked by emotional or physical stress, for example, intense fear, prolonged standing in a crowded, warm room, or having blood drawn. It is often preceded by warning symptoms such as sweating, nausea, lightheadedness, and visual blurring. Situational syncope occurs in relation to certain specific actions, most commonly urinating or straining with a bowel movement. Carotid sinus syncope can occur with pressure on the carotid artery, often resulting from a tight-fitting shirt or shaving.

Orthostatic hypotension refers to low blood pressure that occurs with standing. This may result from dehydration,

medications, or certain health conditions that lead to dysfunction of the autonomic nervous system, also called dysautonomia. The autonomic nervous system helps control heart rate and blood pressure. Dysautonomia can interfere with the body's ability to prevent blood from pooling in the lower extremities (legs and buttocks) and gut, which can result in low blood pressure with standing. Many diseases such as diabetes mellitus, amyloidosis, and Parkinson disease can cause dysautonomia (Table 1).<sup>2</sup> Many patients, especially young female patients, may never have an identifiable cause of orthostatic hypotension. Common precipitants of syncope resulting from orthostatic hypotension include a prolonged vigorous workout, starting a new medication for high blood pressure, or changing too quickly from a sitting to standing position. Orthostatic hypotension can also activate the vagal reflex, causing reflex-mediated syncope.

Cardiovascular causes of syncope are often the result of abnormalities in the heart rhythm (arrhythmias) causing a heartbeat that is too slow (bradycardia) or too fast (tachycardia).

The information contained in this *Circulation* Cardiology Patient Page is not a substitute for medical advice, and the American Heart Association recommends consultation with your doctor or healthcare professional.

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**Table 1. Causes of Syncope and Common Precipitants**

Cause of Syncope	Common Precipitants
Orthostatic hypotension	Dehydration, bleeding
	Medications: antihypertensives, vasodilators, diuretics, antidepressants
	Dysautonomia: diabetes mellitus, amyloidosis, Parkinson disease
Reflex mediated	Vasovagal: prolonged standing, emotional distress
	Situational: cough or sneeze, micturition, gastrointestinal stimulation, carotid sinus stimulation
Cardiovascular	Arrhythmia (tachycardia or bradycardia): acquired heart disease (coronary artery disease, cardiomyopathies, conduction system disease with aging) or inherited disease (eg, long-QT syndrome, Brugada syndrome, arrhythmogenic right ventricular cardiomyopathy)
	Valvular disease (eg, aortic stenosis)
	Hypertrophic cardiomyopathy
	Pulmonary embolus

Almost any form of heart disease can cause arrhythmias, including inherited (genetic) abnormalities that affect the electric activity of the heart. Syncope may also be attributable to abnormalities in the structure of the heart, including valves, arteries, or the actual muscle itself (cardiomyopathy). For example, a blocked coronary artery may cause heart tissue to become electrically unstable or to form a scar, both of which may result in an arrhythmia. Fainting from these causes may come with no warning signs or may be preceded by palpitations, progressive shortness of breath, or chest pain (Table 2). Cardiovascular causes of syncope are particularly important to diagnose and treat because they can cause sudden death.<sup>3</sup>

## Diagnosing the Cause of Syncope

### History and Physical Examination

A thorough history and physical examination are critical parts of the evaluation of syncope and focus on identifying underlying heart disease. The nature of the onset and symptoms and activities immediately before fainting helps rule

out mimics of syncope (for example, epileptic seizure) and narrow the possible causes. A history of repeated episodes provoked by uncomfortable situations suggests common vasovagal syncope. Use of medications that lower blood pressure or affect that electric system of the heart is an important consideration. A history of sudden death or heart disease in other family members increases concern that an inherited disease may be present. The physical examination includes assessment of blood pressure and heart rate while the patient is lying, sitting, and standing and a thorough cardiovascular and neurological examination.

### Testing

Every patient presenting with syncope should have an electrocardiogram. This simple test may suggest that there is an arrhythmia, an underlying heart disease, or an inherited syndrome with a risk of sudden death. An ultrasound of the heart (echocardiogram) may be needed to look for cardiomyopathy or heart valve abnormalities. If syncope occurred during exertion or there is concern about blockages of the coronary arteries, exercise stress testing and possibly cardiac catheterization

may be necessary. In some cases, continuous electrocardiogram recording over a long period may be warranted to attempt to capture infrequent but important arrhythmias and to attempt to determine the heart rhythm at the time of any recurrent symptoms. A wearable monitor can be used for weeks or months, or a small monitor implanted under the skin of the chest wall may be used to continuously assess the heart rhythm over months to years. If a dangerous arrhythmia is suspected, a type of heart catheterization called an electrophysiological study may be done to test the electric system of the heart and to determine whether any abnormal arrhythmias are provokable. For assessment of some reflex-mediated and orthostatic types of syncope, an upright tilt table test may be performed. After the initial evaluation, the cause of syncope will still be uncertain in up to 40% of people, but only 30% to 40% of all patients will faint again in the next 3 years; many will never have another episode.

## Treatment

Treatment is guided by the cause of syncope. In all patients, stopping medications known to predispose to syncope or arrhythmia can be helpful. Reflex-mediated syncope can often be prevented by avoiding or changing the circumstances of a known trigger, for example, lying flat while having blood drawn. However, many patients will continue to have an occasional episode. Orthostatic hypotension and vasovagal syncope may be improved by increasing

**Table 2. High-Risk Features of Syncope**

Occurs while lying down or during exercise
Simultaneous palpitations
Family history of sudden cardiac death
History of ventricular tachycardia
Presence of structural heart disease
Abnormal baseline electrocardiogram (bifascicular block, pre-excitation, long-QT syndrome, Brugada pattern, arrhythmogenic right ventricular cardiomyopathy)



fluid or salt intake, taking care to change positions slowly, and performing maneuvers such as crossing legs and tensing muscles to limit venous pooling when initial prodromal symptoms occur. Compression stockings may be helpful. When these measures are insufficient, medications such as fludrocortisone, midodrine, droxidopa, and pyridostigmine can be beneficial. Syncope related to some progressive dysautonomias can be difficult to treat, and many symptoms may progress despite treatment. Syncope that is attributable to a slow heart rhythm often warrants placement of a permanent pacemaker. Syncope caused by a dangerous fast heart rhythm such as most types of ventricular tachycardia indicates a risk of sudden death, and placement of an implantable cardioverter-defibrillator is usually needed. For other tachycardias, medications or

a procedure to ablate the tissue causing the arrhythmia (catheter ablation) may be used. Syncope related to structural heart disease may necessitate repair of a blocked coronary artery or an abnormal heart valve.

In summary, syncope is common and often has a benign cause. A careful evaluation is important, however, because it can also be a sign of dangerous heart disease and indicate a risk of sudden death.

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