



# **Syncope Management**

**(with a focus on Neurological Syncope)**

**based on**  
**2017 ACC/AHA/HRS Guideline for the Evaluation and**  
**Management of Patients With Syncope**

# Definition:

**Transient loss of consciousness:** Self-limited loss of consciousness can be divided into syncope and nonsyncope conditions. Nonsyncope conditions include seizures, hypoglycemia, metabolic conditions, drug or alcohol intoxication, and concussion due to head trauma. The underlying mechanism of syncope is presumed to be cerebral hypoperfusion, whereas nonsyncope conditions are attributed to different mechanisms.

**Syncope:** A symptom that presents with an abrupt, transient, complete loss of consciousness, associated with inability to maintain postural tone, with rapid and spontaneous recovery. There should not be clinical features of other nonsyncope causes of loss of consciousness, such as seizure, antecedent head trauma, or apparent loss of consciousness (i.e., pseudosyncope).

# Definition:

## Vasovagal Syncope:

- VVS is the most common cause of syncope and a frequent reason for ED visits.
- The underlying pathophysiology of VVS results from a reflex causing hypotension and bradycardia, triggered by prolonged standing or exposure to emotional stress, pain, or medical procedures.
- An episode of VVS is typically associated with a prodrome of diaphoresis, warmth, and pallor, with fatigue after the event.

# Epidemiology and Demographics:

- Estimates of isolated or recurrent syncope may be inaccurate and underestimated because epidemiological data have not been collected in a consistent fashion or because a consistent definition has not been used and interpretation of the symptoms varies among the patients. The evaluation is further obscured by inaccuracy of data collection and by improper diagnosis.
- Studies of syncope report prevalence rates as high as 41%, with recurrent syncope occurring in 13.5%.
- In a cross section of 1925 randomly selected residents in Minnesota, females reported a higher prevalence of syncope (22% versus 15%).

# Epidemiology and Demographics:

- The incidence followed a trimodal distribution in both sexes, with the first episode common around 20, 60, or 80 years of age and the third peak occurring 5 to 7 years earlier in males.
- Reflex syncope was most common (21%), followed by cardiac syncope (9%) and orthostatic hypotension (OH) (9%), with the cause of syncope unknown in 37%.
- In older adults, there is a greater risk of hospitalization and death related to syncope.
- Among patients >80 years old, 58% of syncope cases were admitted to hospital.
- Older institutionalized patients have a 7% annual incidence of syncope, a 23% overall prevalence, and a 30% 2-year recurrence rate.

# Initial Evaluation of Patients With Syncope

- The time interval between the syncopal event and the initial evaluation can vary according to the medical necessity for evaluation and the patient's effort in seeking evaluation.
- The first stages of evaluation are intended for consideration under the general principles, regardless of the clinical setting.
- Additional evaluation might be necessitated according to the outcomes of the initial evaluation or in the presence of specific disease conditions.

# 1. History and Physical Examination:

- The history should aim to identify the prognosis, diagnosis, reversible factors, comorbidities, medication use, and patient and family needs.
- Cardiac syncope carries a significantly worse prognosis than does neurally mediated syncope.
- The diagnostic history should focus on the situations in which syncope occurs:
  - prodromal symptoms
  - patient's self-report
  - bystander observations of the event
  - vital signs
  - post-event symptoms
  - Time relationship to meals and physical activities and duration of the prodrome.



# 1. History and Physical Examination:

- Comorbidities and medication use especially in older patients, particularly with regard to the existence of preexisting cardiovascular disease.
- Family history with particular emphasis on histories of syncope or sudden unexplained death (or drowning)

## **physical examination:**

- Measurement of orthostatic blood pressure and heart rate changes in
  - lying and sitting positions
  - on immediate standing and after 3 minutes of upright posture



# 1. History and Physical Examination:

## physical examination:

- Measurement of orthostatic blood pressure and heart rate changes in
  - lying and sitting positions
  - on immediate standing
  - and after 3 minutes of upright posture
- Heart auscultation must be done to look for murmurs.
- A basic neurological examination should be performed, in search of
  - focal defects
  - other abnormalities that would suggest need for further neurological evaluation or referral.

## 2. Electrocardiography:

- In the initial evaluation of patients with syncope, a resting 12-lead electrocardiogram (ECG) is useful. ECG is widely available and inexpensive and can provide information about the potential and specific cause of the syncope episode.
- Despite the benefit of identifying a likely cause or potential clue about the cause of syncope from the ECG, prospective studies did not conclude that ECG findings significantly affected subsequent management. However, a multicenter, prospective, observational study concluded that the presence of AF, intraventricular conduction disturbances, (LV) hypertrophy, and ventricular pacing were associated with increased risk of death from all causes at 1 year.

# 3. Risk Assessment:

- Syncope is a symptom that can be due to various causes, ranging from benign to life-threatening conditions.
- Evaluation of the cause and assessment for the short- and long-term morbidity and mortality risk of syncope are recommended.
- Short-term adverse events and deaths are determined largely by the cause of syncope and the effectiveness of the treatment. In patients without a presumptive cause of syncope, risk stratification for potential short-term outcomes is necessary for immediate decision making in the acute setting.
- Long-term adverse events and deaths are more likely determined by the underlying medical comorbidities, many of which are cardiac.

## 4. Disposition After Initial Evaluation:

- The evaluating provider must decide whether further workup can continue in an outpatient setting or whether hospital-based evaluation is required.
- The disposition decision depends on the resources available for immediate testing, varying availability and expertise of outpatient diagnostic clinics.
- In patients with a presumptive cause of reflex-mediated syncope and no other dangerous medical conditions identified, hospital-based evaluation is unlikely to provide benefit.
- In patients with perceived higher risk, the healthcare provider may recommend a hospital-based evaluation.
- Specialized syncope evaluation units may lead to reduced health service use and increased diagnostic rates even in benign forms of syncope.

## 4. Disposition After Initial Evaluation:

- Hospital evaluation and treatment **are recommended** for patients presenting with syncope who have a serious medical condition potentially relevant to the cause of syncope identified during initial evaluation.
- Arrhythmic causes may require consideration of pacemaker placement and/or medication modification.
- Cardiac causes require treatment of the underlying condition (e.g., medication management and consideration of surgical intervention for critical aortic stenosis).
- A large spectrum of non-cardiac serious conditions may be associated with syncope and require management of the underlying problem (e.g., severe anemia from a gastrointestinal bleed).

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## 4. Disposition After Initial Evaluation:

- **It is reasonable** to manage patients with presumptive reflex-mediated syncope in the outpatient setting in the absence of serious medical conditions.
- Hospital-based evaluation for presumptive VVS is unlikely to improve long-term outcomes. Possible exceptions that might require hospital-based evaluation include:
  - frequent recurrent syncope with risk of injury or,
  - identified injury related to syncope.
- Presence of >1 serious medical condition, summarized in the next Table, is the key determinant for further in-hospital management of patients after syncope.

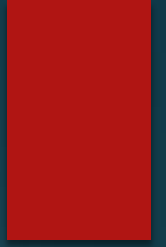




<b>Cardiac Arrhythmic Conditions</b>	<b>Cardiac or Vascular Nonarrhythmic Conditions</b>	<b>Noncardiac Conditions</b>
<ul style="list-style-type: none"><li>■ Sustained or symptomatic VT</li><li>■ Symptomatic conduction system disease or Mobitz II or third-degree heart block</li><li>■ Symptomatic bradycardia or sinus pauses not related to neurally mediated syncope</li><li>■ Symptomatic SVT</li><li>■ Pacemaker/ICD malfunction</li><li>■ Inheritable cardiovascular conditions predisposing to arrhythmias</li></ul>	<ul style="list-style-type: none"><li>■ Cardiac ischemia</li><li>■ Severe aortic stenosis</li><li>■ Cardiac tamponade</li><li>■ HCM</li><li>■ Severe prosthetic valve dysfunction</li><li>■ Pulmonary embolism</li><li>■ Aortic dissection</li><li>■ Acute HF</li><li>■ Moderate-to-severe LV dysfunction</li></ul>	<ul style="list-style-type: none"><li>■ Severe anemia/gastrointestinal bleeding</li><li>■ Major traumatic injury due to syncope</li><li>■ Persistent vital sign abnormalities</li></ul>

HCM indicates hypertrophic cardiomyopathy; HF, heart failure; ICD, implantable cardioverter-defibrillator; LV, left ventricular; SVT, supraventricular tachycardia; and VT, ventricular tachycardia.

# 5. Additional Evaluation And Diagnosis:



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## 1. Blood Testing:

- The availability of simple and accurate biomarkers might help in the diagnosis of the cause of syncope. Evaluation of biomarkers, used as markers of either hypotension or underlying disease processes, is not supported by strong evidences.
- Although broad-panel testing is common in clinical practice at the point of triage, there are no data on the utility of this approach. However, targeted blood tests **are reasonable** in the evaluation of selected patients with syncope identified on the basis of clinical assessment from history, physical examination, and ECG.

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- BNP (brain natriuretic peptide) testing
- Routine and comprehensive laboratory testing: Not useful

## 5.2. Tilt-Table Testing:

- If the diagnosis is unclear after initial evaluation, tilt-table testing can be useful for patients with suspected VVS.
- It is an orthostatic stress test to assess the susceptibility of a vasovagal response to a postural change from a supine to an upright position. A positive response is defined as inducible pre-syncope or syncope associated with hypotension, with or without bradycardia.
- The hemodynamic response to the tilt maneuver determines whether there is a cardioinhibitory, vasodepressor, or mixed response.
- There is general consensus that a tilt-table angle of 70 degrees for 30 to 40 minutes would provide optimal yield.

## 5.2. Tilt-Table Testing:

- Adjunctive agents, such as a low dose of isoproterenol infusion or sublingual nitrates, may improve sensitivity but decrease specificity.
- A positive tilt-table test suggests a tendency or predisposition to VVS induced in the laboratory. This observation during tilt-table testing cannot necessarily define a causal etiology or be entirely conclusive of a reflex mechanism for syncope in the clinical setting.
- Correlation of tilt-table-induced findings to patient's clinical presentation is critically important to prevent consequences of false-positive results from tilt-table testing.
- The utility of tilt-table testing is highest in patients with a suspected VVS when syncope is recurrent.



## 5.2. Tilt-Table Testing:

- Several factors have reduced the role of tilt-table testing in the evaluation of syncope:
  - The overall moderate sensitivity, specificity
  - And reproducibility of tilt-table testing
  - The presence of false-positive response in controls
  - And the increasing recognition of VVS from a structured history taking.
- Tilt-table testing can be useful for patients with syncope and suspected delayed OH when initial evaluation is not diagnostic.
- Tilt-table testing **is reasonable** to distinguish convulsive syncope from epilepsy in selected patients.
- Tilt-table testing **is reasonable** to establish a diagnosis of pseudosyncope



## 5.3. Neurological Testing:

### 1. Autonomic Evaluation:

- Syncope due to neurogenic OH is common in patients with central or peripheral autonomic nervous system damage or dysfunction. Its causes should be sought so as to provide effective management.
- Referral for autonomic evaluation can be useful to improve diagnostic and prognostic accuracy in selected patients with syncope and known or suspected neurodegenerative disease.

## 5.3.1 Autonomic Evaluation:

- Some symptoms of neurogenic OH may differ from those due to dehydration, drugs, and cardiac and reflex syncope. They include:
  - persistent and progressive generalized weakness and fatigue
  - visual blurring
  - cognitive slowing
  - leg buckling
  - and the “coat hanger” headache (a triangular headache at the base of the neck due to trapezius ischemia).
- These symptoms may be provoked or exacerbated by exertion, prolonged standing, meals, or increased ambient temperature.

## 5.3.2 Neurological and Imaging Diagnostics:

- A systematic review found that EEG, CT, MRI, and carotid ultrasound were ordered in 11% to 58% of patients with a presentation of syncope.
- The evidence suggests that routine neurological testing is of very limited value in the context of syncope evaluation and management; the diagnostic yield is low, with very high cost per diagnosis.
- The recommendations pertain to the use of these investigations in patients with syncope and not in patients in the wider category of transient loss of consciousness.
- Simultaneous monitoring of an EEG and hemodynamic parameters during tilt-table testing **can be useful** to distinguish among syncope, pseudosyncope, and epilepsy.

# 6. Treatment: Reflex Conditions

## 1. Vasovagal Syncope:

- Given the benign nature of VVS and its frequent remissions, medical treatment is usually not required unless conservative measures are unsatisfactory.
- In some patients, effective treatment is needed, as syncopal events may result in injury and an impaired quality of life.
- Despite the need and substantial efforts by investigators, there are limited evidence-based therapeutic options.

# 6.1. Treatment: Vasovagal Syncope:

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- In some patients, effective treatment is needed, as syncopal events may result in injury and an impaired quality of life.
- Despite the need and substantial efforts by investigators, there are limited evidence-based therapeutic options.
- Patient education on the diagnosis and prognosis of VVS is recommended.
- Physical counter-pressure maneuvers can be useful in patients with VVS who have a sufficiently long prodromal period.
- Midodrine is reasonable in patients with recurrent VVS with no history of hypertension, HF, or urinary retention.

## 6.1. Treatment: Carotid Sinus Syndrome:

- Carotid sinus syndrome is associated with mechanical manipulation of the carotid sinus, either spontaneously or with carotid sinus massage.
- It is diagnosed by the reproduction of clinical syncope during carotid sinus massage, with a cardioinhibitory response if asystole is  $>3$  seconds or if there is AV block, or a significant vasodepressor response if there is  $>50$  mm Hg drop in SBP.
- It occurs more commonly in men  $>40$  years of age and is due to an abnormal reflex attributed to baroreceptor and possibly medulla dysfunction.

# 6.1. Treatment: Carotid Sinus Syndrome:

- Carotid sinus massage should be performed sequentially over the right and left carotid artery sinus in both the supine and upright positions for 5 seconds each, with continuous beat-to-beat heart rate monitoring and blood pressure measurement.
- Contraindications to performing carotid sinus massage include:
  - Auscultation of carotid bruit
  - Transient ischemic attack
  - Stroke
  - Or myocardial infarction within the prior 3 months.