

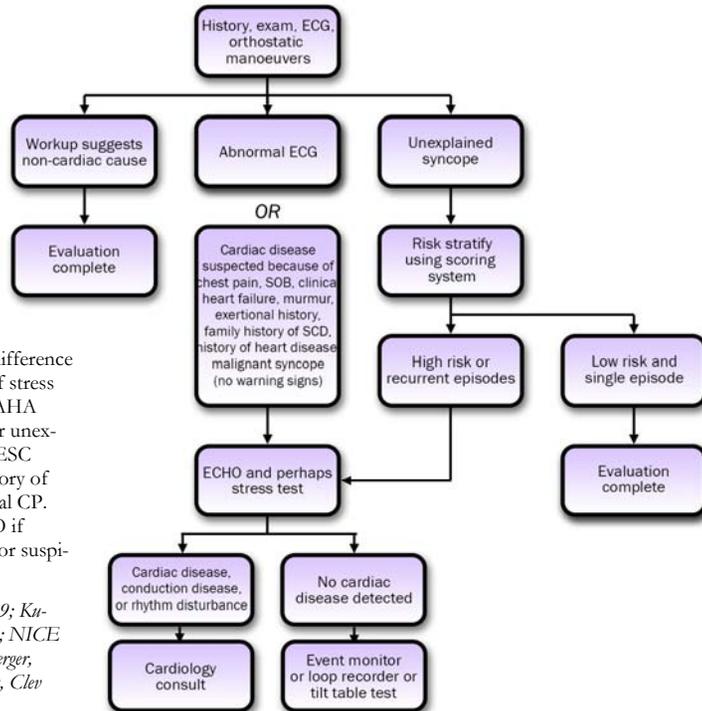
Diagnostic Tests

- Studies suggest application of the **SFSR** can help identify patients where cardiac assessment and tests are indicated and have the best yield — *Mendu, Archives, 2009*
- One meta-analysis showed that H&P and EKG made diagnosis in 45% of cases presenting with syncope — *Linzer, Annals, 1997*
- Studies indicate that **carotid dopplers, EEGs, and head imaging are overused** and should be reserved for patients with appropriate history
- The diagnostic yield of **Holter** is around 1%; sensitivity is better with 30 day **event monitor** or implantable loop recorder — *Europace 2004; Krahn, 2003*
- If initial workup is unrevealing — meaning a cause is not clearly evident from history, exam, and ECG — an **ECHO** may be appropriate (AHA/ACCF Scientific Statement on the Evaluation of Syncope, 2006). An **ECHO** is also indicated if there is a family history of sudden cardiac death < 40y, previous MI, murmur, or suspected cardiomyopathy (European Soc Cardiology, 2009)

Treatment Strategies

- **Neurally-mediated (reflex or vasogenic) syncope**
 - Modification or discontinuation of offending drugs
 - Avoidance of triggering situations
- **Orthostatic hypotension**
 - Elimination of offending medications
 - Encouraging an increased salt or fluid intake
 - Fludrocortisone in low dose (0.1—0.2 mg per day)
 - Support stockings
- **Cardiac arrhythmias**
 - Cardiac pacing, implantable cardioverter-defibrillators, and catheter ablation are all considerations depending upon the mechanism of syncope

Suggested algorithm for approaching the diagnostic evaluation of syncope. Steps derived from several published algorithms including the American Heart Association, the European Society of Cardiology, and the National Institute for Health and Care Excellence



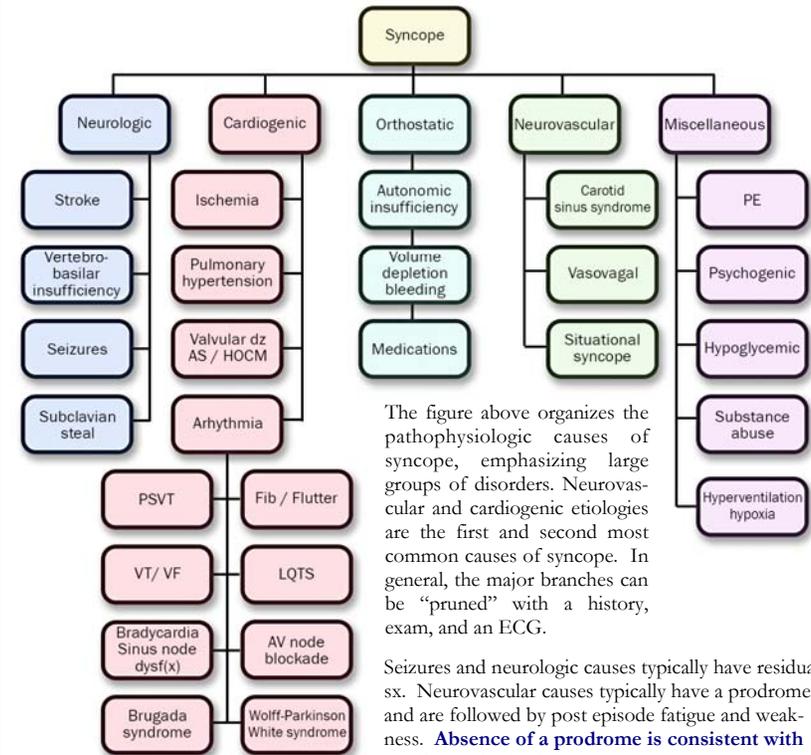
In general, significant difference surrounds the timing of stress test and ECHO. The AHA favors earlier testing for unexplained syncope. The ESC favors ETT only if history of ischemic sx or exertional CP. The ESC favors ECHO if recurrent sx, high risk, or suspicion of cardiac disease.

— *Moya et al, EHJ, 2009; Kulakowski, Kard Pol, 2013; NICE Guidelines, 2010; Strickberger, Circulation, 2006; Hanna, Clev Clin J Med, 2014*

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Syncope in the Hospital

Diagnostic Framework

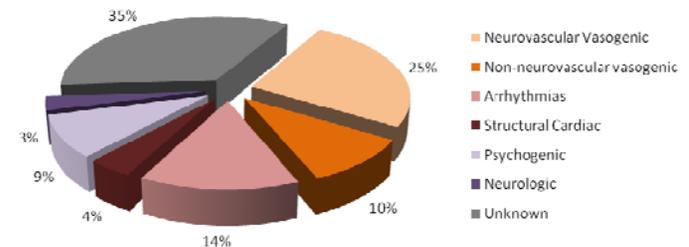


The figure above organizes the pathophysiologic causes of syncope, emphasizing large groups of disorders. Neurovascular and cardiogenic etiologies are the first and second most common causes of syncope. In general, the major branches can be “pruned” with a history, exam, and an ECG.

Seizures and neurologic causes typically have residual sx. Neurovascular causes typically have a prodrome and are followed by post episode fatigue and weakness. **Absence of a prodrome is consistent with cardiac arrhythmia** — *Strickberger, Circulation, 2006*

Common nonsyncopal syndromes not listed above that typically do not involve impairment of consciousness include falls, cataplexy, drop attacks, pseudoseizures, psychogenic conditions including panic attacks, and carotid transient ischemic attacks.

Frequency of Etiologies



Statistics vary by study with the greatest variation in the proportion of unknown causes—some studies have shown a substantial reduction in undiagnosed cases when using a structured algorithm

Diagnostic Approach—History, Exam, and ECG

- Goal is to identify high-morbidity etiologies and to optimize quality of life
- With this in mind, **approach should focus on four questions:**

? Is the loss of consciousness attributable to syncope?

- **Accurate history** taking alone is a key stage and is the **most effective** for establishing a diagnosis — **focus aggressively on ruling out presence of structural heart disease**

? Are there features in the history, exam, or ECG that strongly suggest a diagnosis?

- **Important questions** should focus upon **1) circumstances prior to the attack** (position, activity, context); **2) onset of the attack** (visual changes, nausea, palpitations, temperature changes); **3) questions about the attack from eyewitnesses**; **4) questions about the end of the attack** (confusion, muscle aches, incontinence); **5) questions about personal background** (family history of sudden cardiac death, previous cardiac disease, previous neurologic disease, new changes in setting or meds).

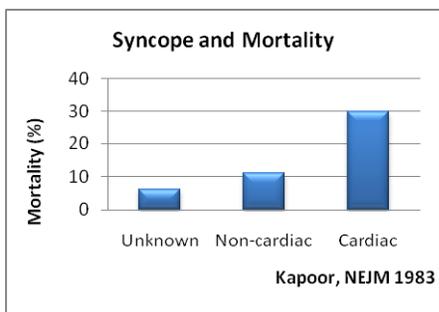
? What is the patient's risk of an adverse outcome (using validated scoring systems)?

? Is heart disease or structural heart disease present or absent?

- **The exam** should include a **neck exam** (for bruits), a **cardiac exam** (for murmurs), **orthostatic vitals**, **orthostatic stress**, and **carotid sinus massage**
- **Orthostatic stress (3 minutes of standing) is positive** when there is a symptomatic fall in SBP > 20mm Hg or DBP > 10 mm Hg or a decrease in SBP < 90 mm Hg
- **Carotid sinus hypersensitivity** is assessed by massaging both carotid sinuses, beginning with the right, for 5-10s each. The test is positive if syncope is reproduced or there is a fall in SBP > 50 mm Hg, or a pause of longer than 3 s. The test should not be done in patients with TIA or stroke in last 3 months or evidence of carotid bruit. — *Moya, Eur Heart J, 2009; Kulakowski, Kard Pol, 2013*
- An **abnormal ECG** suggests a cardiac cause of syncope. Important findings include conduction block or increased QRS duration, prolonged PR interval, prolonged or short QT, pre-excitation, ST changes, TW inversions in R precordial leads, voltage criteria for LVH, or axis deviation
- Absence of suspected signs or symptoms of heart disease virtually excludes a cardiac cause

Etiologies

- The most common causes of syncope is **reflex** or vasovagal syncope; in elderly populations, the most common causes are **vasovagal** (22-62%), **orthostatic** (13-50%), and **arrhythmias** (13-26%); neurologic disease is almost never a cause — *Mendu, Archives, 2009; Ungar, JAGS, 2006*
- **Neurovascular causes** are varied; **vasovagal** is mediated by emotional or orthostatic stress and is characterized by strong myocardial contractions in an “empty” heart; **carotid hypersensitivity** is related to manipulation of carotid sinus; **situational** is neurally-mediated and associated with coughing, micturition, defecation, or eating; **autonomic failure** reflects incapacitation of baroreceptor response
- **Cardiac syncope accounts for 10-20% of cases and predicts and increased risk of death and may herald sudden cardiac death.** It often occurs suddenly without warning signs; the postrecovery period is not usually marked by lingering malaise.
- In these patients, targeted cardiologic testing and prolonged ECG monitoring is recommended. Patients with advanced HF, an EF 20%, and syncope have **45% risk of sudden death** at 1 year; patients with VT have similarly poor prognosis.



Hint: a quick way to focus history and detect uncomplicated faint is to probe for the “**3 P’s**”: **Posture** — prolonged standing or recent movement; **Provoking factors** — such as pain, stooping, medical procedures; **Prodromal symptoms** — think about sweating, nausea, or vision changes

Risk Assessment

- The **OESIL** and **EGSYS** scores serve to assess the risk of death and syncope recurrence. They can be used in an ER, hospital ward, or clinic.
- The **San Francisco Syncope Rule (SFSR)** and the **Risk Stratification of Syncope in the Emergency Department (ROSE)** score have been developed for ED use

- **The SFSR** has been independently validated to predict risk in syncopal patients. If patients have any of the following criteria at evaluation, there is a high risk for serious outcomes:
 - Congestive heart failure history
 - Hematocrit < 30%
 - ECG with abnormal findings
 - Shortness of breath
 - Systolic blood pressure < 90 mmHg at triage
- The **SFSR** rule has a **Sn** 96% and **Sp** 62% for predicting serious outcome; **NPV** is 99.2% and **PPV** is 24.8%

- The **Osservatorio Epidemiologico sulla Sincope nel Lazio (OESIL)** score has been validated in three studies; the rule has a **Sn** 88-97% and a **Sp** 11-73% for predicting serious outcomes
 - Abnormal ECG +1 points
 - History of cardiovascular disease +1 points
 - Syncope without prodrome +1 points
 - Age > 65 years +1 points
- One year mortality estimated at: 0 points = 0%; 1 point = 0.6%; 2 points = 14%; 3 points = 29%; 4 points = 53% — low risk is < 2 points and high risk is ≥ 2 points

- The **Evaluation of Guidelines in Syncope Study (EGSYS)** consists of 6 items found to be most predictive of a cardiac cause of syncope:
 - Palpitations before syncope +4 points
 - Abnormal ECG or cardiac disease +3 points
 - Syncope during exercise +3 points
 - Syncope in supine position +2 points
 - Autonomic symptoms preceding syncope -1 points
 - Typical triggering factors -1 points
- 2 year mortality: < 3 points = 2% mortality; ≥ 3 points = 21% mortality

Test	Test ordered (%)	Result affected management (%)	Cost per test that affected management (\$)
EKG	99	7	1020
Telemetry	95	12	710
Cardiac enzymes	95	1	22,397
Head CT	63	2	24,881
ECHO	39	4	6272
Orthostatics	38	25	17
Carotid US	13	2	19,580
EEG	8	1	32,973
Stress test	6	9	8415