Syncope

Sachin S. Sule, MD, FACP

Associate Professor of Integrated Medical Science

Division of Medicine

Director ,Internal Medicine Residency Program

Charles E. Schmidt College of Medicine, Florida Atlantic University

Disclosures

- I have no financial disclosures relevant to the talk

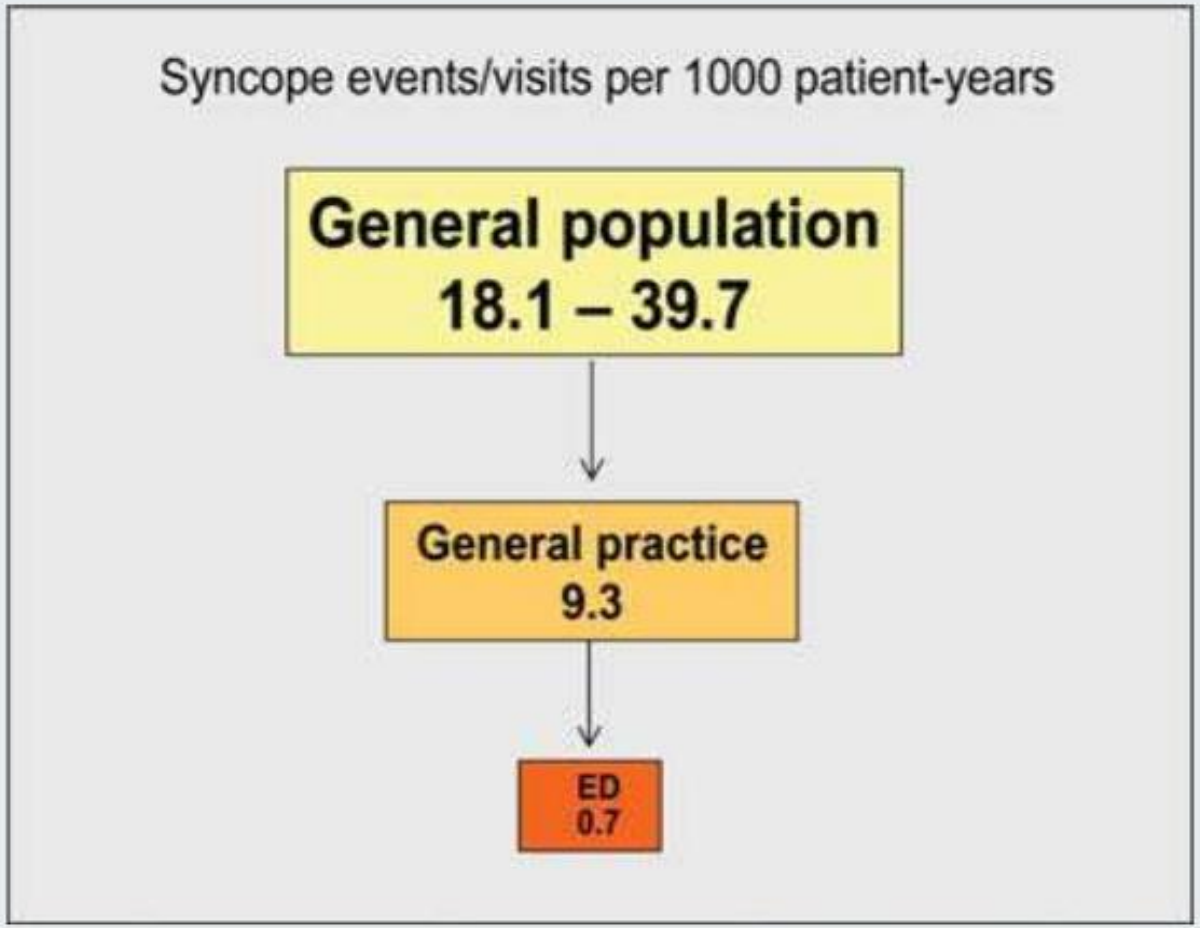
Objectives

- Define Syncope and classify the types of syncope
- Discuss risk assessment and evaluation
- Discuss management of common causes of syncope

Definition

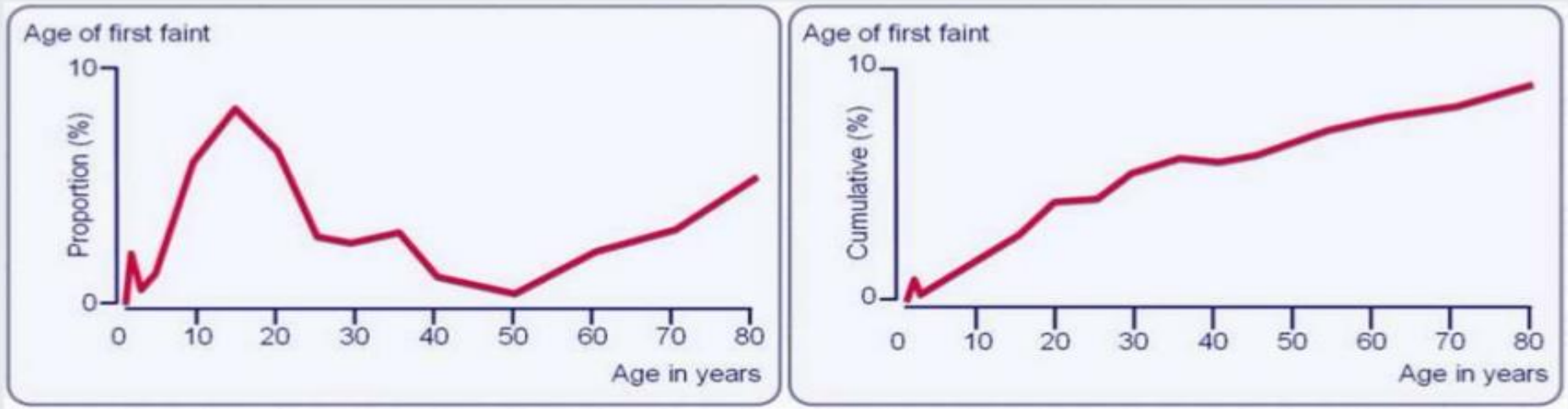
Syncope is defined as a transient loss of consciousness (TLOC) attributable to global cerebral hypo-perfusion, further characterized by rapid onset, brevity, and spontaneous recovery.

Syncope



Strickberger S A et al. Circulation 2006;113:316-327
European Heart Journal (2009) 30, 2631–2671

Syncope



Schematic presentation of the distribution of age and cumulative incidence of first episode of syncope in the general population from subjects up to 80 years is shown.

European Heart Journal (2009) 30, 2631–2671

Background-Syncope

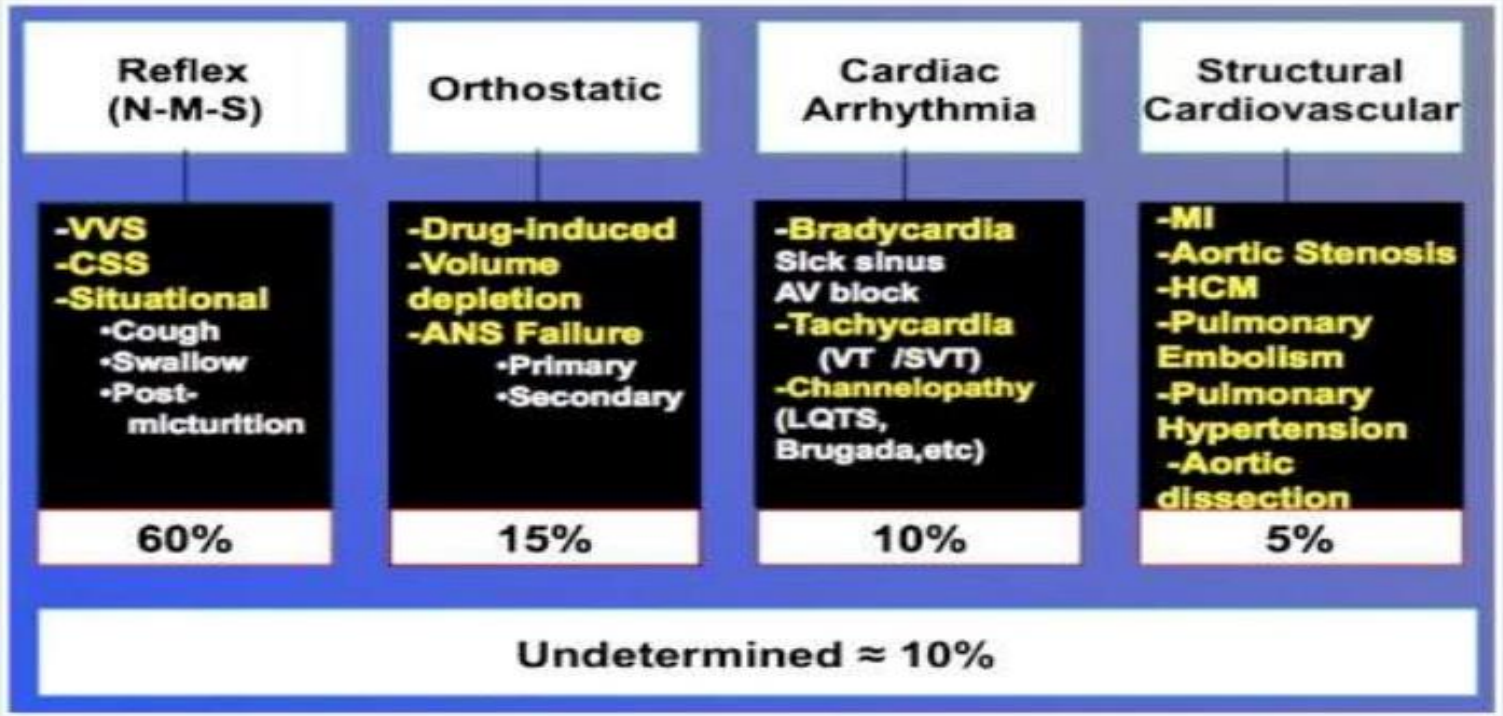
- 1-2 million patients annually, with a similar incidence in women and men
- 1 % of EM encounters resulting in 30% to 40% subsequent admissions, and costs $2.4 billion annually according to the Medicare database
- Recurrent syncope is associated with significant morbidity, negatively impacting QOL by creating anxiety and disruption of normal activities
- Prognosis after syncope ranges from relatively benign for vasovagal to poor for ventricular tachyarrhythmia

Moya A, European Heart J. 2009;30:2631–2671 Soteriades ES, N Engl J Med. 2002;347:878–885.
Blanc JJ. Eur Heart J. 2002;23:815–820. Alshekhlee A. Am J Med. 2009;122:181–188.
Brignole M, Eur Heart J. 2006;27:76–82.

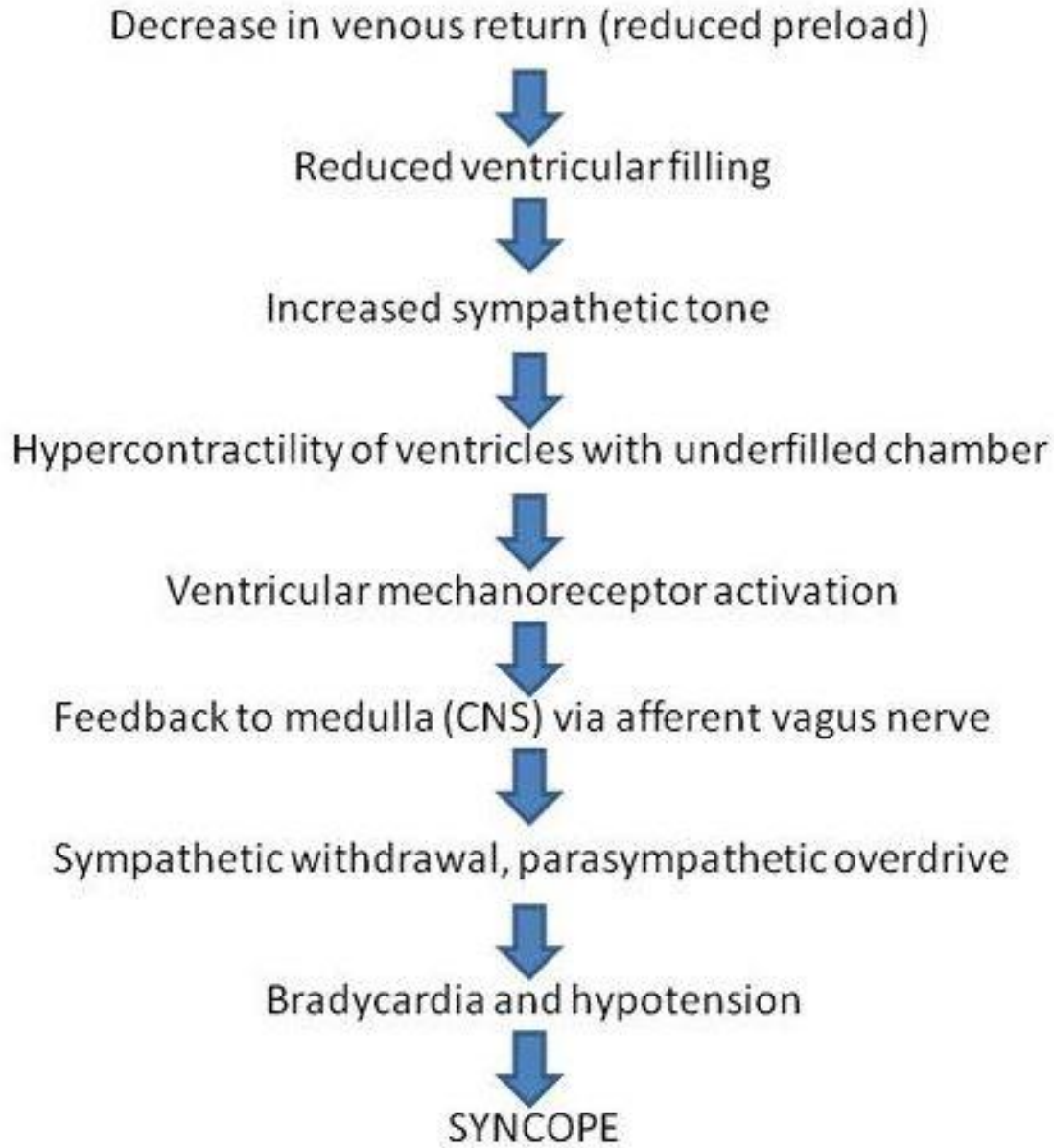
Background

- Among patients >80 years of age, 58% were admitted to hospital .
- Older institutionalized patients: 23 % prevalence with 30% 2-year recurrence rate
- One year fall rate when syncope occurs in older adults: 38%

Classification of Syncope



European Heart Journal (2009) 30, 2631–2671


Decrease in venous return (reduced preload)
Reduced ventricular filling
Increased sympathetic tone
Hypercontractility of ventricles with underfilled chamber
Ventricular mechanoreceptor activation
Feedback to medulla (CNS) via afferent vagus nerve
Sympathetic withdrawal, parasympathetic overdrive
Bradycardia and hypotension
SYNCOPE

Initial Evaluation

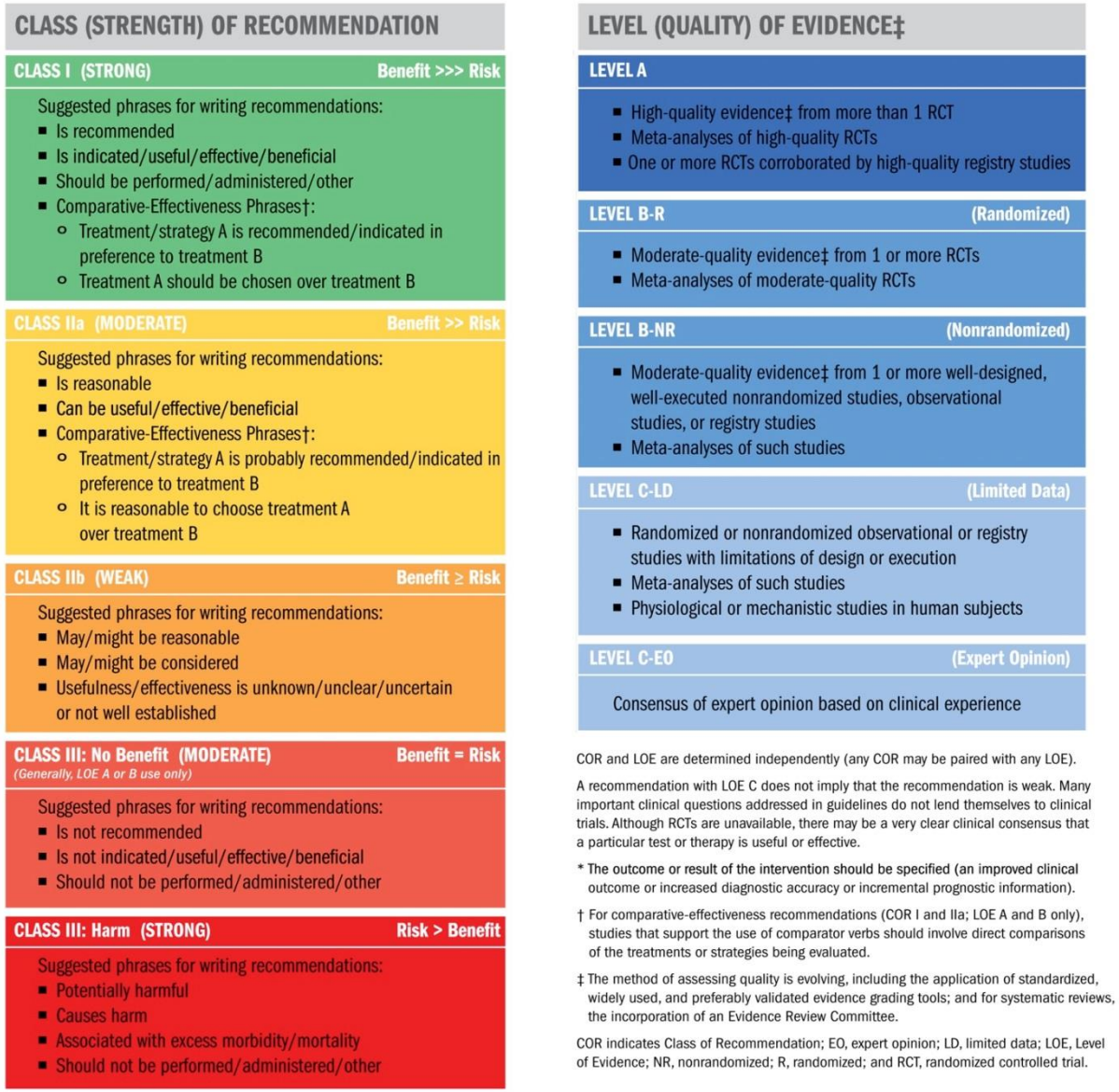
- Initial evaluation should answer 3 questions?
  - **Is it syncope?**
  - **Is there a clear etiology?**
  - **Are there any high risk features?**

Salient features that differentiate syncope and non syncopal events

Vasovagal syncope	Provoked by prolonged standing classically in a hot, or crowded environment or associated with pain or medical procedure.
	Syncope at rest, after exercise.
	Prodrome of nausea, diaphoresis, dyspnea or warmth (often absent in older population)
	Brief LOC (<5min)
	Postdrome of somnolence or fatigue lasting minutes to hours
Cardiac syncope	Syncope at rest or exertion
	Brief or absent prodrome
	Rapid recovery
	Brief LOC (<5min)
	May be preceded by palpitations
Seizures	Prodromal aura (eg, odd smell), preoccupation, déjà vu or jamais vu
	Tongue bitten
	Head turning to one side during LOC
	Unusual posturing during LOC
	Postictal confusion
	Coarse, rhythmic and synchronous limb jerking of ≈1min beginning before or coinciding with LOC.
Pseudo-syncope	Prolonged LOC >15-20min
	Lack of injury in spite of the frequency of episodes
	Resists eye opening during LOC
	Known psychiatric disorder

Table 1. Applying Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care*

(Updated August 2015)



CLASS (STRENGTH) OF RECOMMENDATION

CLASS I (STRONG) — **Benefit >>> Risk**

Suggested phrases for writing recommendations:
- Is recommended
- Is indicated/useful/effective/beneficial
- Should be performed/administered/other
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is recommended/indicated in preference to treatment B
  - Treatment A should be chosen over treatment B

CLASS IIa (MODERATE) — **Benefit >> Risk**

Suggested phrases for writing recommendations:
- Is reasonable
- Can be useful/effective/beneficial
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is probably recommended/indicated in preference to treatment B
  - It is reasonable to choose treatment A over treatment B

CLASS IIb (WEAK) — **Benefit ≥ Risk**

Suggested phrases for writing recommendations:
- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well established

CLASS III: No Benefit (MODERATE) — **Benefit = Risk**

(Generally, LOE A or B use only)

Suggested phrases for writing recommendations:
- Is not recommended
- Is not indicated/useful/effective/beneficial
- Should not be performed/administered/other

CLASS III: Harm (STRONG) — **Risk > Benefit**

Suggested phrases for writing recommendations:
- Potentially harmful
- Causes harm
- Associated with excess morbidity/mortality
- Should not be performed/administered/other

LEVEL (QUALITY) OF EVIDENCE‡

LEVEL A
- High-quality evidence‡ from more than 1 RCT
- Meta-analyses of high-quality RCTs
- One or more RCTs corroborated by high-quality registry studies

LEVEL B-R (Randomized)
- Moderate-quality evidence‡ from 1 or more RCTs
- Meta-analyses of moderate-quality RCTs

LEVEL B-NR (Nonrandomized)
- Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies
- Meta-analyses of such studies

LEVEL C-LD (Limited Data)
- Randomized or nonrandomized observational or registry studies with limitations of design or execution
- Meta-analyses of such studies
- Physiological or mechanistic studies in human subjects

LEVEL C-EO (Expert Opinion)

Consensus of expert opinion based on clinical experience

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

Circulation. 2017;136:e25–e59. DOI: 10.1161/CIR.0000000000000498

History and Physical Examination

COR	LOE	Recommendation
I	B-NR	A detailed history and physical examination should be performed in patients with syncope.

Electrocardiography

COR	LOE	Recommendation
I	B-NR	In the initial evaluation of patients with syncope, a resting 12-lead ECG is useful.

Cardiac vs Noncardiac

Table 4. Historical Characteristics Associated With Increased Probability of Cardiac and Noncardiac Causes of Syncope (60,67-75)

More Often Associated With Cardiac Causes of Syncope
• Older age (>60 y)
• Male sex
• Presence of known ischemic heart disease, structural heart disease, previous arrhythmias, or reduced ventricular function
• Brief prodrome, such as palpitations, or sudden loss of consciousness without prodrome
• Syncope during exertion
• Syncope in the supine position
• Low number of syncope episodes (1 or 2)
• Abnormal cardiac examination
• Family history of inheritable conditions or premature SCD (<50 y of age)
• Presence of known congenital heart disease
More Often Associated With Noncardiac Causes of Syncope
• Younger age
• No known cardiac disease
• Syncope only in the standing position
• Positional change from supine or sitting to standing
• Presence of prodrome: nausea, vomiting, feeling warmth
• Presence of specific triggers: dehydration, pain, distressful stimulus, medical environment
• Situational triggers: cough, laugh, micturition, defecation, deglutition
• Frequent recurrence and prolonged history of syncope with similar characteristics

SCD indicates sudden cardiac death.

DOI: 10.1016/j.jacc.2017.03.003

The physical examination should focus on the following:

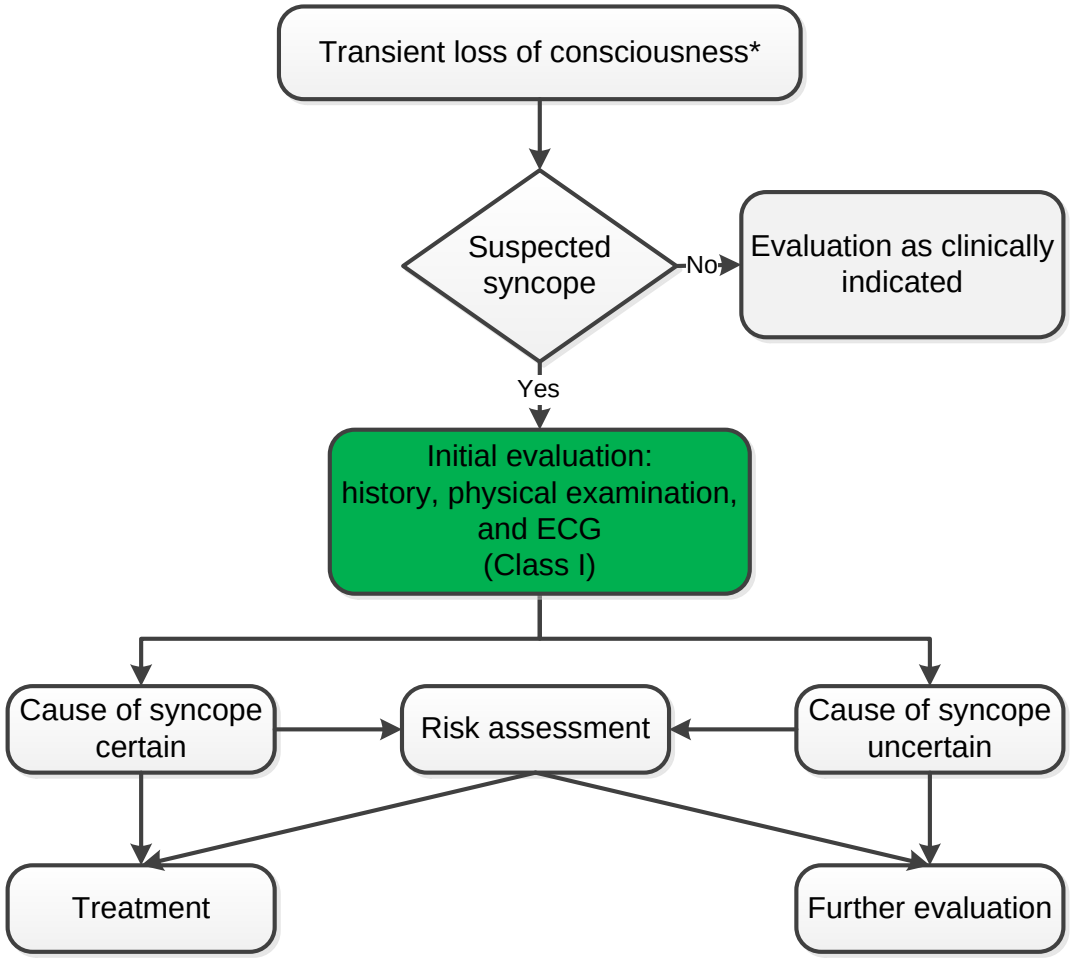
- Heart rate
- Orthostatic hypotension
- Valvular heart disease.
- Focal neurological deficits.

Diagnostic Tools

- Orthostatic Assessment
  - **BP in the supine, sitting, and erect position**
  - **Symptomatic fall from baseline of ≥ 20 mm Hg in SBP, ≥ 10 mm Hg in DBP or a decrease to < 90 mm Hg systolic blood pressure within three minutes of standing when compared with blood pressure from the sitting or supine position.**

General Principles

Syncope Initial Evaluation



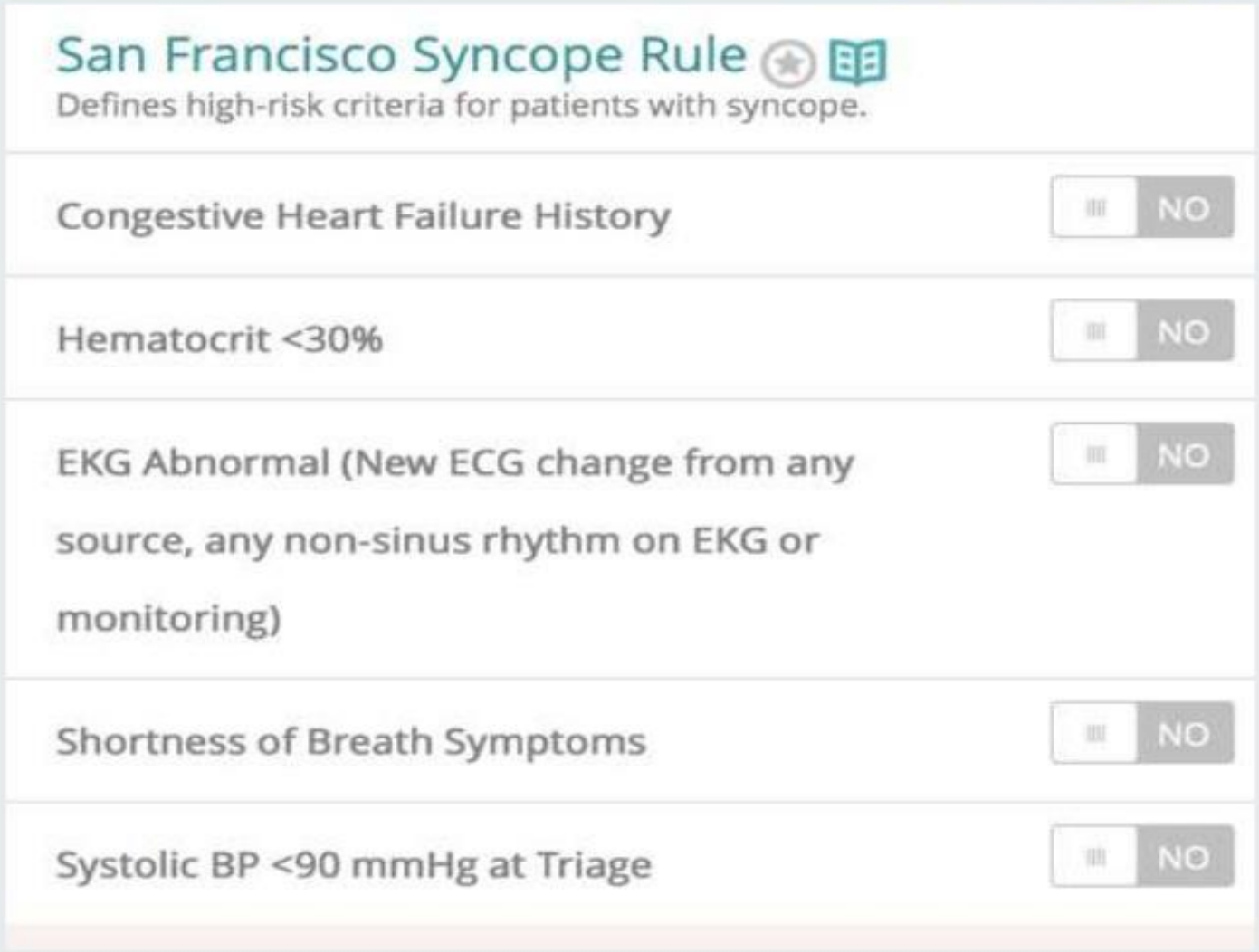
Risk Assessment

COR	LOE	Recommendations
I	B-NR	Evaluation of the cause and assessment for the short- and long-term morbidity and mortality risk of syncope are recommended.
IIb	B-NR	Use of risk stratification scores may be reasonable in the management of patients with syncope.

Syncope Risk Scores

Study	Risk factors	Score	Endpoints	Results (validation cohort)
S. Francisco Syncope Rule[44]	-Abnormal ECG -Congestive heart failure -Shortness of breath -Haematocrit <30% -Systolic blood pressure <90 mmHg	No risk = 0 item Risk = ≥1 item	Serious events at 7 days	98% sensitive and 56% specific
Martin *et al.* [40]	-Abnormal ECG -History of ventricular arrhythmia -History of congestive heart failure -Age >45 years	0 to 4 (1 point each item)	1-year severe arrhythmias or arrhythmic death	0% score 0 5% score 1 16% score 2 27% score 3 or 4
OESIL score[41]	-Abnormal ECG -History of cardiovascular disease -Lack of prodrome -Age >65 years	0 to 4 (1 point each item)	1-year total mortality	0% score 0 0.6% score 1 14% score 2 29% score 3 53% score 4
EGSYS score[42]	-Palpitations before syncope (+4) -Abnormal ECG and/or heart disease (+3) -Syncope during effort (+3) -Syncope while supine (+2) -Autonomic prodrome[a] (−1) -Predisposing and/or precipitating factors[b] (−1)	Sum of + and − points	2-year total mortality ..... Cardiac syncope probability	2% score <3 21% score ≥3 ..... 2% score <3 13% score 3 33% score 4 77% score >4

European Heart Journal (2009) 30, 2631–2671



- This rule has a 96% sensitivity and 62% specificity for serious outcome. Negative predictive value: 99.2%; positive predictive value 24.8%.

High-Risk Group	Intermediate-Risk Group	Low-Risk Group
Chest pain compatible with acute coronary syndrome	Age ≥50 y	Age <50 y
Signs of congestive heart failure	With previous history of:	With no previous history of:
Moderate/severe valvular disease	Coronary artery disease	Cardiovascular disease
History of ventricular arrhythmias	Myocardial infarction	Symptoms consistent with reflex-mediated or vasovagal syncope
ECG/cardiac monitor findings of ischemia	Congestive heart failure	Normal cardiovascular examination
Prolonged QTc (>500 ms)	Cardiomyopathy without active symptoms or signs on cardiac medications	Normal ECG findings
Trifascicular block or pauses between 2 and 3 seconds	Bundle-branch block or Q wave without acute changes on ECG	
Persistent sinus bradycardia between 40 and 60 bpm	Family history of premature (<50 y), unexplained sudden death	
Atrial fibrillation and nonsustained ventricular tachycardia without symptoms	Symptoms not consistent with a reflex-mediated or vasovagal cause	
Cardiac devices (pacemaker or defibrillator) with dysfunction	Cardiac devices without evidence of dysfunction	
	Physician's judgment that suspicion of cardiac syncope is reasonable	

Shen W K et al. *Circulation*. 2004;110:3636-3645

High Risk Features of Syncope

Short-term high risk criteria which require prompt hospitalization or intensive evaluation

Severe structural or coronary artery disease (heart failure, low LVEF, or previous myocardial infarction)

Clinical or ECG features suggesting arrhythmic syncope

- Syncope during exertion or supine
- Palpitations at the time of syncope
- Family history of SCD
- Non-sustained VT
- Bifascicular-block (LBBB or RBBB combined with left anterior or left posterior fascicular block) or other intraventricular conduction abnormalities with QRS duration ≥120 ms
- Inadequate sinus bradycardia (<50 bpm) or sinoatrial block in absence of negative chronotropic medications or physical training
- Pre-excited QRS complex
- Prolonged or short QT interval
- RBBB pattern with ST-elevation in leads V1–V3 (Brugada pattern)
- Negative T waves in right precordial leads, epsilon waves, and ventricular late potentials suggestive of ARVC

Important co-morbidities

- Severe anaemia
- Electrolyte disturbance

Strickberger S A et al. Circulation 2006;113:316-327
European Heart Journal (2009) 30, 2631–2671

From: The ROSE (Risk Stratification of Syncope in the Emergency Department) Study

J Am Coll Cardiol. 2010;55(8):713-721. doi:10.1016/j.jacc.2009.09.049

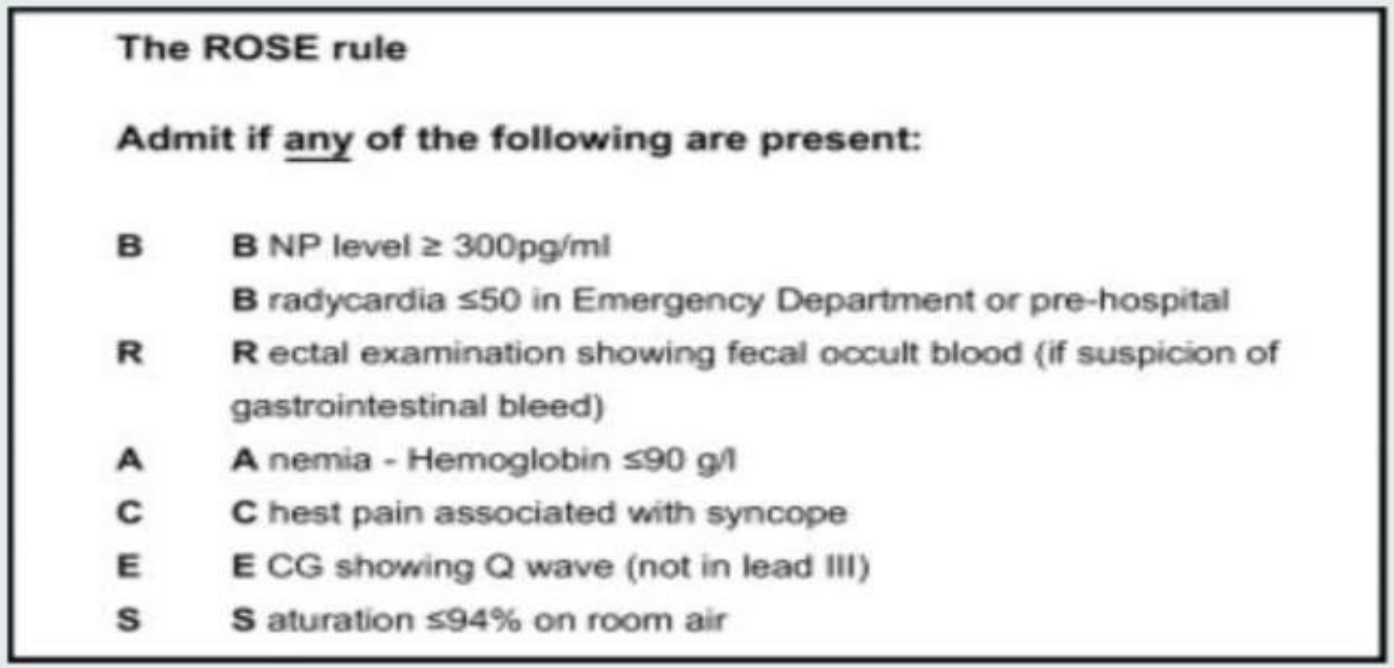


Figure Legend:

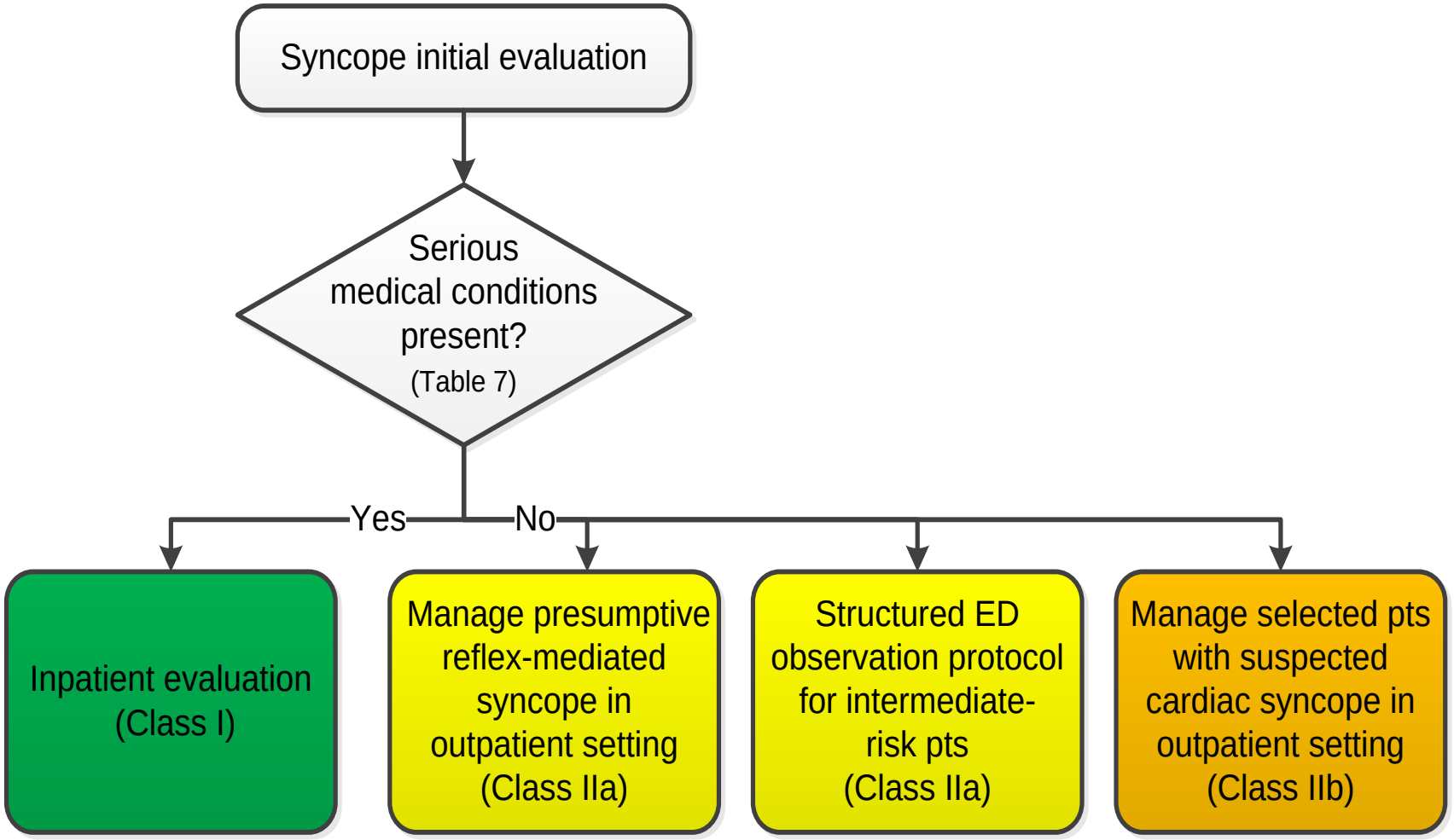
The ROSE Rule With "BRACES" Mnemonic Aide Memoire
A patient should be considered high-risk and admitted if any of the 7 criteria in the ROSE (Risk stratification Of Syncope in the Emergency department) rule are present. BNP = B-type natriuretic peptide; ECG = electrocardiogram.

Etiology of syncope in patients hospitalized with syncope and predictors of mortality and rehospitalization for syncope at 27-month follow-up.

Sule S[1], Palaniswamy C, Aronow WS, Ahn C, Peterson SJ, Adapa S, Mudambi L. Clin Cardiol. 2011 Jan;34(1):35-8. doi: 10.1002/clc.20872.

The authors investigated the etiologies of syncope and risk factors for mortality and rehospitalization for syncope at 27-month follow-up in 325 consecutive patients, mean age 66 years, hospitalized for syncope. The causes of syncope were diagnosed in 241 patients (74%). Of 325 patients, 13 (4%) were rehospitalized for syncope and 38 (12%) died. Stepwise logistic regression analysis showed that significant independent prognostic factors for rehospitalization for syncope were diabetes (odds ratio [OR], 5.7; 95% confidence interval [CI], 1.6-20.4), atrial fibrillation (OR, 4.0; 95% CI, 1.0-15.6), and smoking (OR, 4.6; 95% CI, 1.3-16.8). Stepwise Cox regression analysis showed that significant independent prognostic factors for time to mortality were diabetes (hazard ratio [HR], 2.7; 95% CI, 1.4-5.2), coronary artery bypass graft surgery (HR, 2.9; 95% CI, 1.3-6.5), malignancy history (HR, 2.5; 95% CI, 1.2-5.2), narcotics use (HR, 4.0; 95% CI, 1.7-9.8), smoking (HR, 2.8; 95% CI, 1.4-5.5), atrial fibrillation (HR, 2.4; 95% CI, 1.0-5.4), and volume depletion (HR, 2.8; 95% CI, 1.4-5.8).

Patient Disposition After Initial Evaluation for Syncope

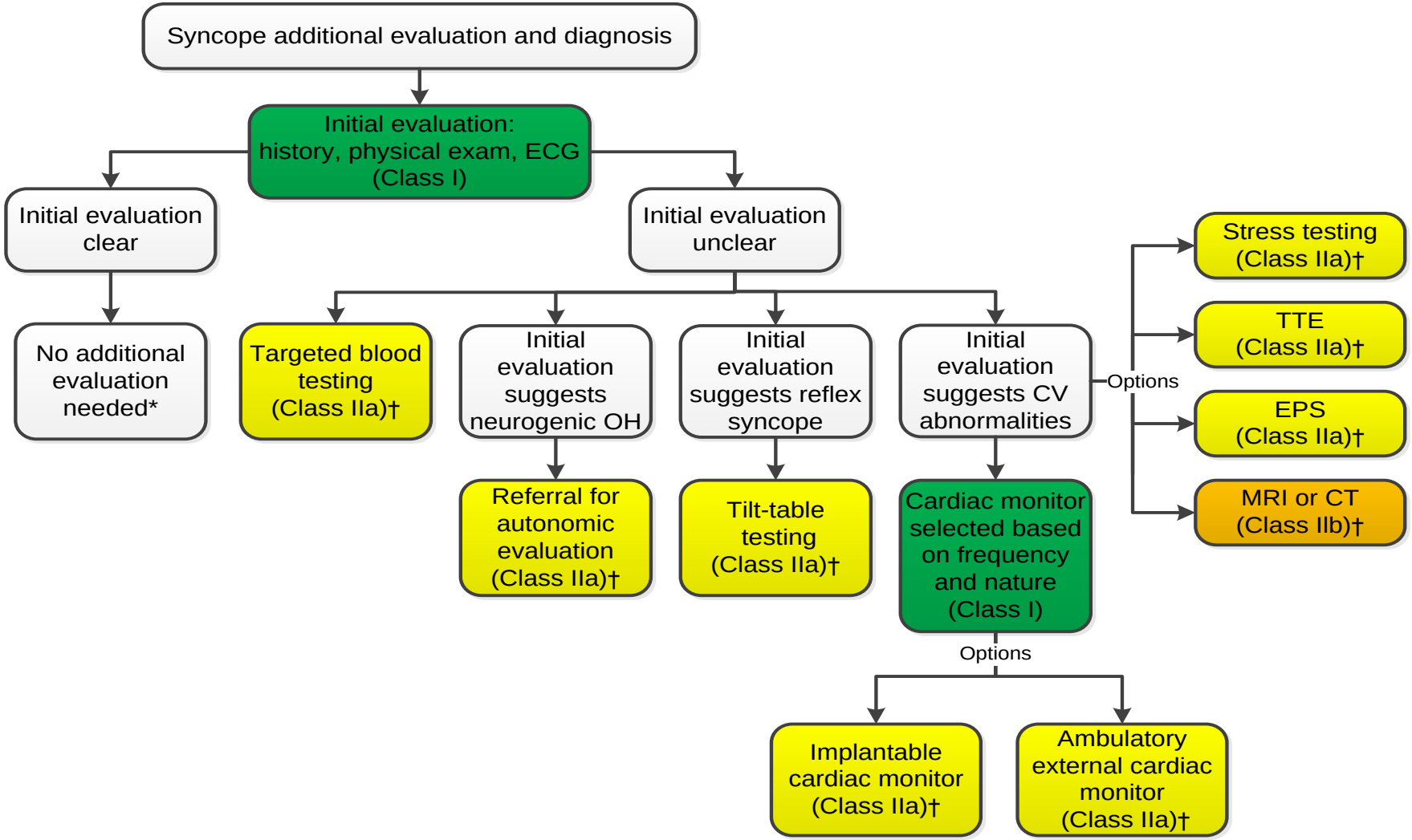


Colors correspond to Class of Recommendation in Table 1.
ED indicates emergency department; pts, patients.

Disposition After Initial Evaluation

COR	LOE	Recommendations
I	B-NR	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.
IIa	C-LD	It is reasonable to manage patients with presumptive reflex-mediated syncope in the outpatient setting in the absence of serious medical conditions.
IIa	B-R	In intermediate-risk patients with an unclear cause of syncope, use of a structured ED observation protocol can be effective in reducing hospital admission.
IIb	C-LD	It may be reasonable to manage selected patients with suspected cardiac syncope in the outpatient setting in the absence of serious medical condition.

Additional Evaluation and Diagnosis



*Applies to patients after a normal initial evaluation without significant injury or cardiovascular morbidities; patients followed up by primary care physician as needed.
†In selected patients (see Section 1.4).
CT indicates computed tomography; CV, cardiovascular; ECG, electrocardiogram; EPS, electrophysiological study; MRI, magnetic resonance imaging; OH, orthostatic hypotension; and TTE, transthoracic echocardiography.

Blood Testing

COR	LOE	Recommendations
IIa	B-NR	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.
IIb	C-LD	Usefulness of brain natriuretic peptide and high-sensitivity troponin measurement is uncertain in patients for whom a cardiac cause of syncope is suspected.
III: No Benefit	B-R	Routine and comprehensive laboratory testing is not useful in the evaluation of patients with syncope.

Cardiac Imaging

COR	LOE	Recommendations
IIa	B-NR	Transthoracic echocardiography can be useful in selected patients presenting with syncope if structural heart disease is suspected.
IIb	B-NR	CT or MRI may be useful in selected patients presenting with syncope of suspected cardiac etiology.
III: No Benefit	B-R	Routine cardiac imaging is not useful in the evaluation of patients with syncope unless cardiac etiology is suspected on the basis of an initial evaluation, including history, physical examination, or ECG.

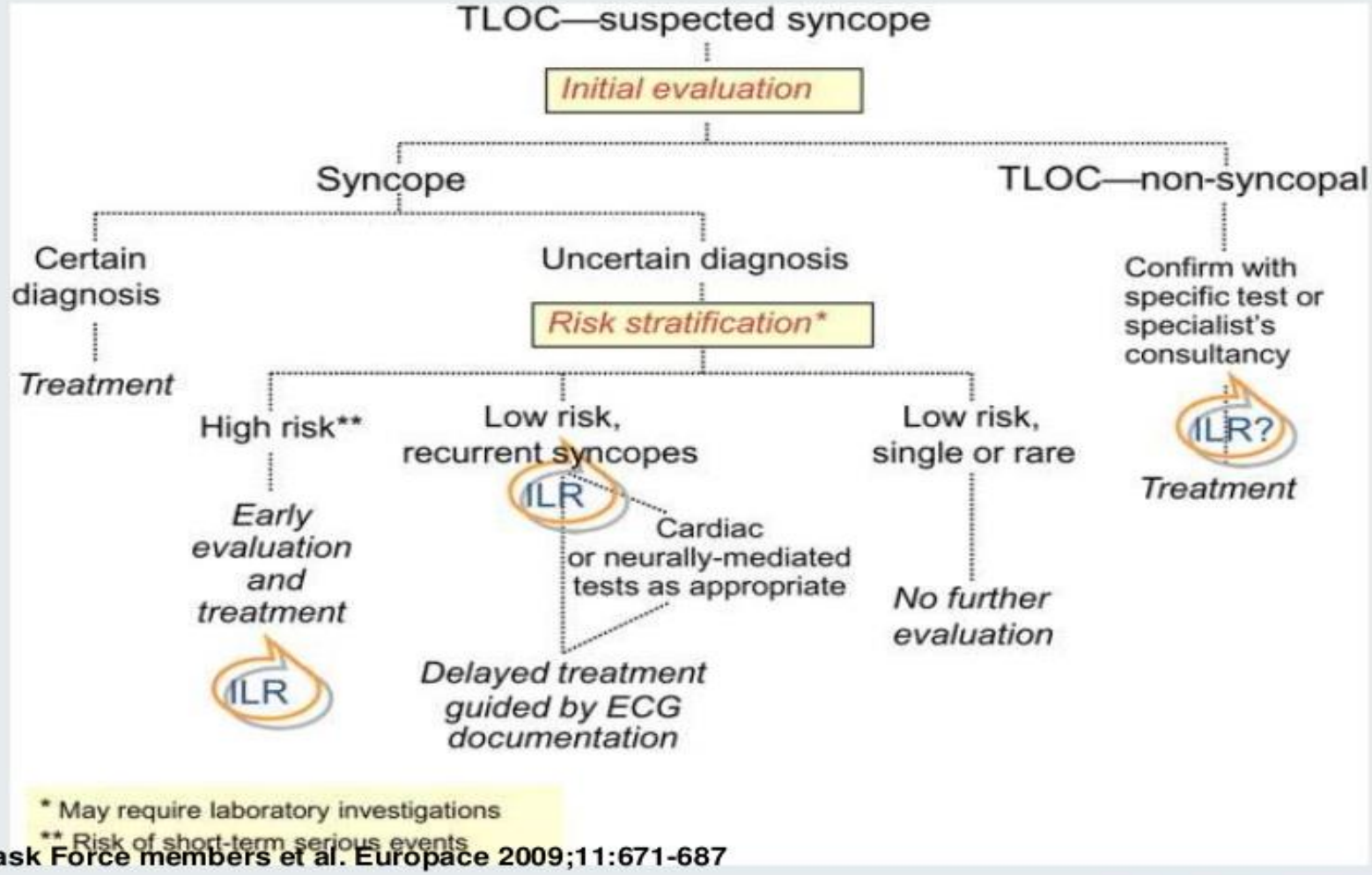
Stress Testing

COR	LOE	Recommendation
IIa	C-LD	Exercise stress testing can be useful to establish the cause of syncope in selected patients who experience syncope or presyncope during exertion.

Cardiac Monitoring

COR	LOE	Recommendations
I	C-EO	The choice of a specific cardiac monitor should be determined on the basis of the frequency and nature of syncope events.
IIa	B-NR	To evaluate selected ambulatory patients with syncope of suspected arrhythmic etiology, the following external cardiac monitoring approaches can be useful: 1. Holter monitor 2. Transtelephonic monitor 3. External loop recorder 4. Patch recorder 5. Mobile cardiac outpatient telemetry.
IIa	B-R	To evaluate selected ambulatory patients with syncope of suspected arrhythmic etiology, an ICM can be useful.

Implantable loop recorder in the work-up of transient loss of consciousness (T-LOC).



Task Force members et al. Europace 2009;11:671-687

Europace

In-Hospital Telemetry

COR	LOE	Recommendation
I	B-NR	Continuous ECG monitoring is useful for hospitalized patients admitted for syncope evaluation with suspected cardiac etiology.

Electrophysiological Study

COR	LOE	Recommendations
IIa	B-NR	EPS can be useful for evaluation of selected patients with syncope of suspected arrhythmic etiology.
III: No Benefit	B-NR	EPS is not recommended for syncope evaluation in patients with a normal ECG and normal cardiac structure and function, unless an arrhythmic etiology is suspected.

Tilt-Table Testing

COR	LOE	Recommendations
IIa	B-R	If the diagnosis is unclear after initial evaluation, tilt-table testing can be useful for patients with suspected VVS.
IIa	B-NR	Tilt-table testing can be useful for patients with syncope and suspected delayed OH when initial evaluation is not diagnostic.
IIa	B-NR	Tilt-table testing is reasonable to distinguish convulsive syncope from epilepsy in selected patients.
IIa	B-NR	Tilt-table testing is reasonable to establish a diagnosis of pseudosyncope.
III: No Benefit	B-R	Tilt-table testing is not recommended to predict a response to medical treatments for VVS.

Tilt Table Relatively Contraindicated

- Syncope with clinically
  - **Severe left ventricular outflow obstruction**
  - **Critical mitral stenosis**
  - **Critical proximal coronary artery stenoses**
  - **Critical cerebrovascular stenoses**

Neurological Testing

Autonomic Evaluation

COR	LOE	Recommendation
IIa	C-LD	Referral for autonomic evaluation can be useful to improve diagnostic and prognostic accuracy in selected patients with syncope and known or suspected neurodegenerative disease.

Neurological and Imaging Diagnostics

COR	LOE	Recommendations
IIa	C-LD	Simultaneous monitoring of an EEG and hemodynamic parameters during tilt-table testing can be useful to distinguish among syncope, pseudosyncope, and epilepsy.
III: No Benefit	B-NR	MRI and CT of the head are not recommended in the routine evaluation of patients with syncope in the absence of focal neurological findings or head injury that support further evaluation.
III: No Benefit	B-NR	Carotid artery imaging is not recommended in the routine evaluation of patients with syncope in the absence of focal neurological findings that support further evaluation.
III: No Benefit	B-NR	Routine recording of an EEG is not recommended in the evaluation of patients with syncope in the absence of specific neurological features suggestive of a seizure.

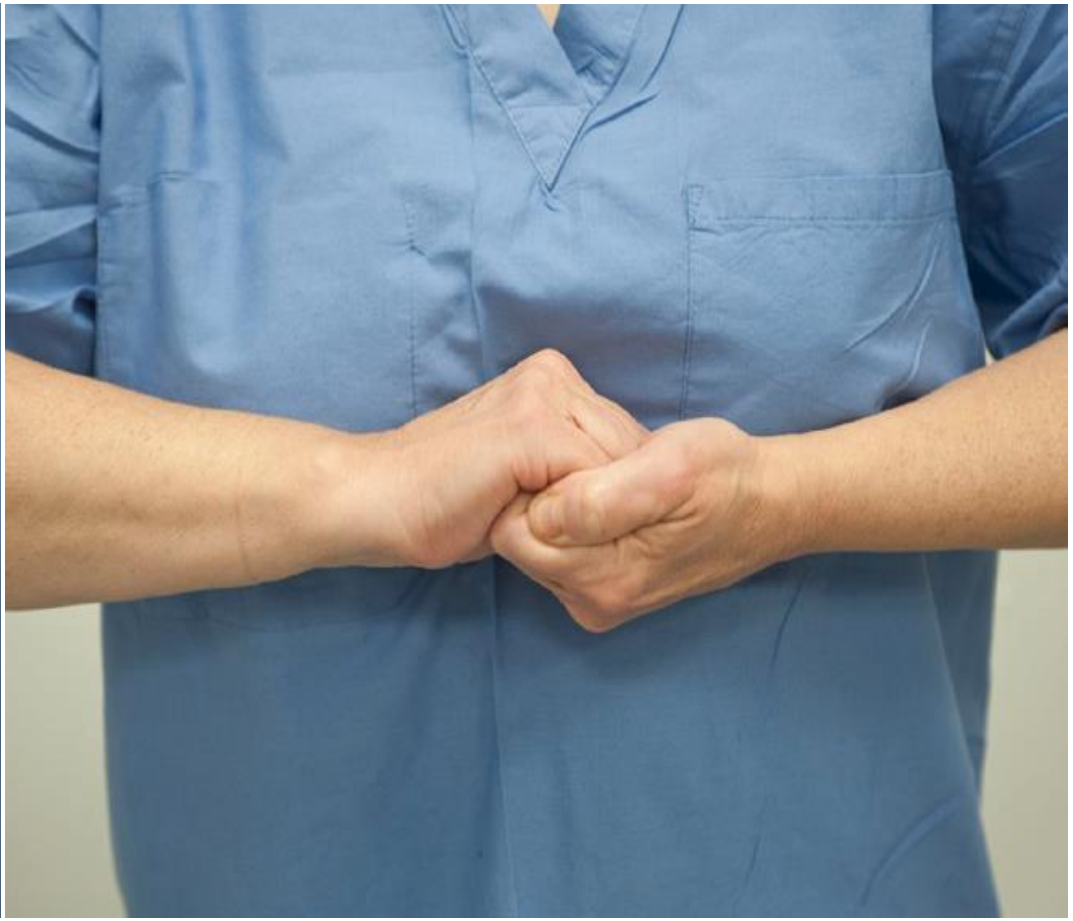
2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope

Reflex Conditions

Reflex Conditions

Vasovagal Syncope

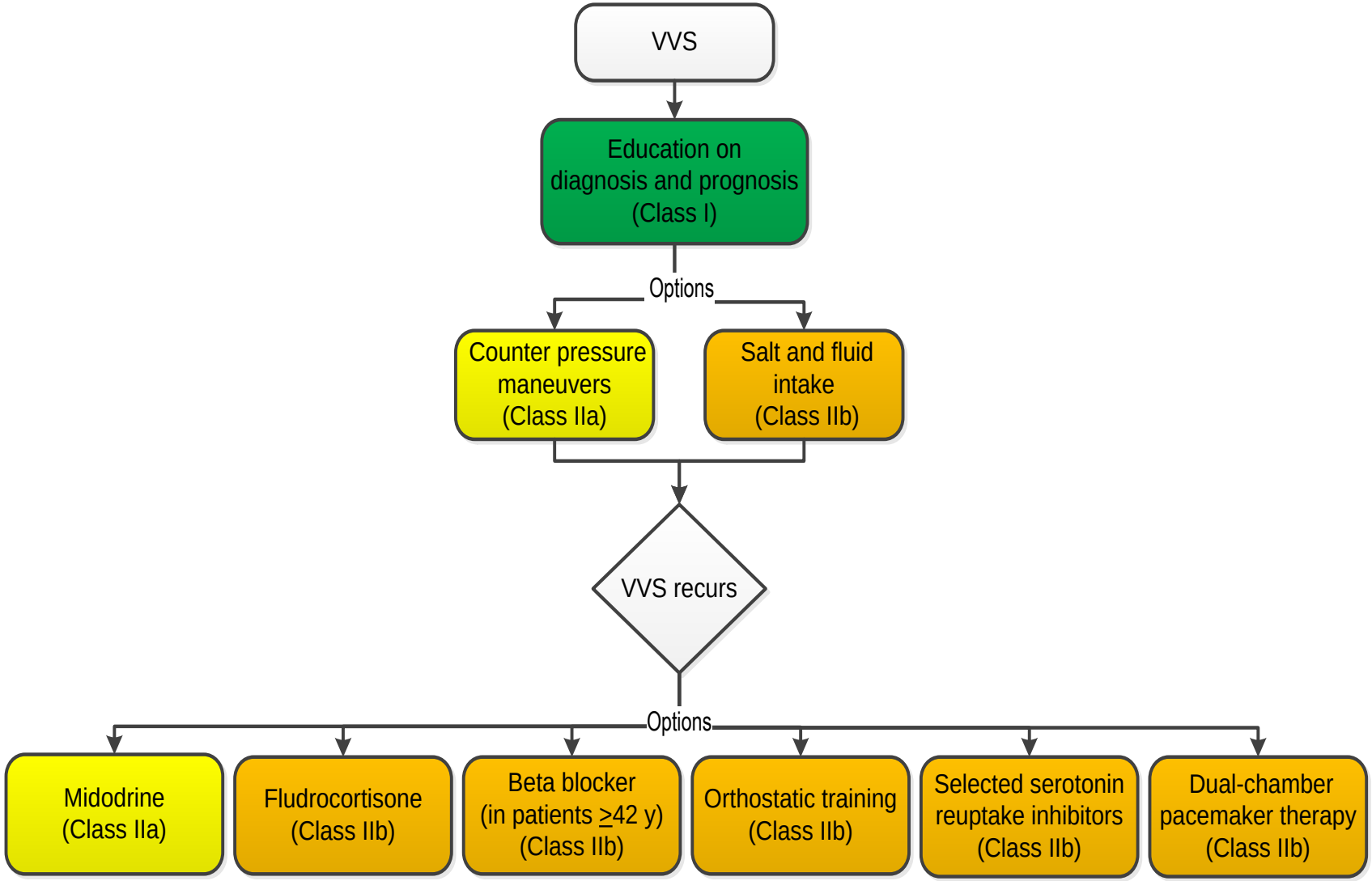
COR	LOE	Recommendations
I	C-EO	Patient education on the diagnosis and prognosis of VVS is recommended.
IIa	B-R	Physical counter-pressure maneuvers can be useful in patients with VVS who have a sufficiently long prodromal period.
IIa	B-R	Midodrine is reasonable in patients with recurrent VVS with no history of hypertension, HF, or urinary retention.
IIb	B-R	The usefulness of orthostatic training is uncertain in patients with frequent VVS.
IIb	B-R	Fludrocortisone might be reasonable for patients with recurrent VVS and inadequate response to salt and fluid intake, unless contraindicated.



Vasovagal Syncope (cont.)

IIb	B-NR	Beta blockers might be reasonable in patients 42 years of age or older with recurrent VVS.
IIb	C-LD	Encouraging increased salt and fluid intake may be reasonable in selected patients with VVS, unless contraindicated.
IIb	C-LD	In selected patients with VVS, it may be reasonable to reduce or withdraw medications that cause hypotension when appropriate.
IIb	C-LD	In patients with recurrent VVS, a selective serotonin reuptake inhibitor might be considered.

Vasovagal Syncope



Colors correspond to Class of Recommendation in Table 1.
VVS indicates vasovagal syncope.

Pacemakers in Vasovagal Syncope

COR	LOE	Recommendation
IIb	B-R [SR]	Dual-chamber pacing might be reasonable in a select population of patients 40 years of age or older with recurrent VVS and prolonged spontaneous pauses.

SR indicated systematic review.

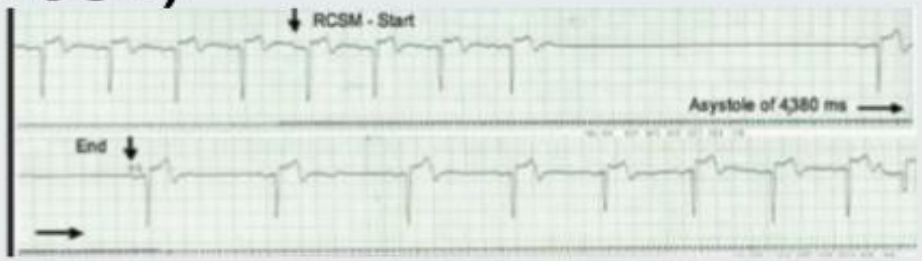
Carotid Sinus Syndrome

COR	LOE	Recommendations
IIa	B-R	Permanent cardiac pacing is reasonable in patients with carotid sinus syndrome that is cardioinhibitory or mixed.
IIb	B-R	It may be reasonable to implant a dual-chamber pacemaker in patients with carotid sinus syndrome who require permanent pacing.

Carotid Sinus

- Carotid Sinus Massage
  - **Massage over the point of maximal carotid impulse for 5-10 seconds on each carotid sinus with a 1-minute interval between massages**
  - **Continuously monitor surface ECG and BP**

- Positive result if any of the following 3 criteria are met:
  - **Asystole exceeding 3 seconds (cardioinhibitory)**
  - **Reduction in SBP exceeding 50 mm Hg independent of heart rate slowing (vasodepressor CSH)**
  - **Combination of the above (mixed CSH)**



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

Orthostatic Hypotension

Orthostatic Hypotension

Neurogenic Orthostatic Hypotension

COR	LOE	Recommendations
I	B-R	Acute water ingestion is recommended in patients with syncope caused by neurogenic OH for occasional, temporary relief.
IIa	C-LD	Physical counter-pressure maneuvers can be beneficial in patients with neurogenic OH with syncope.
IIa	C-LD	Compression garments can be beneficial in patients with syncope and OH.
IIa	B-R	Midodrine can be beneficial in patients with syncope due to neurogenic OH.
IIa	B-R	Droxidopa can be beneficial in patients with syncope due to neurogenic OH.

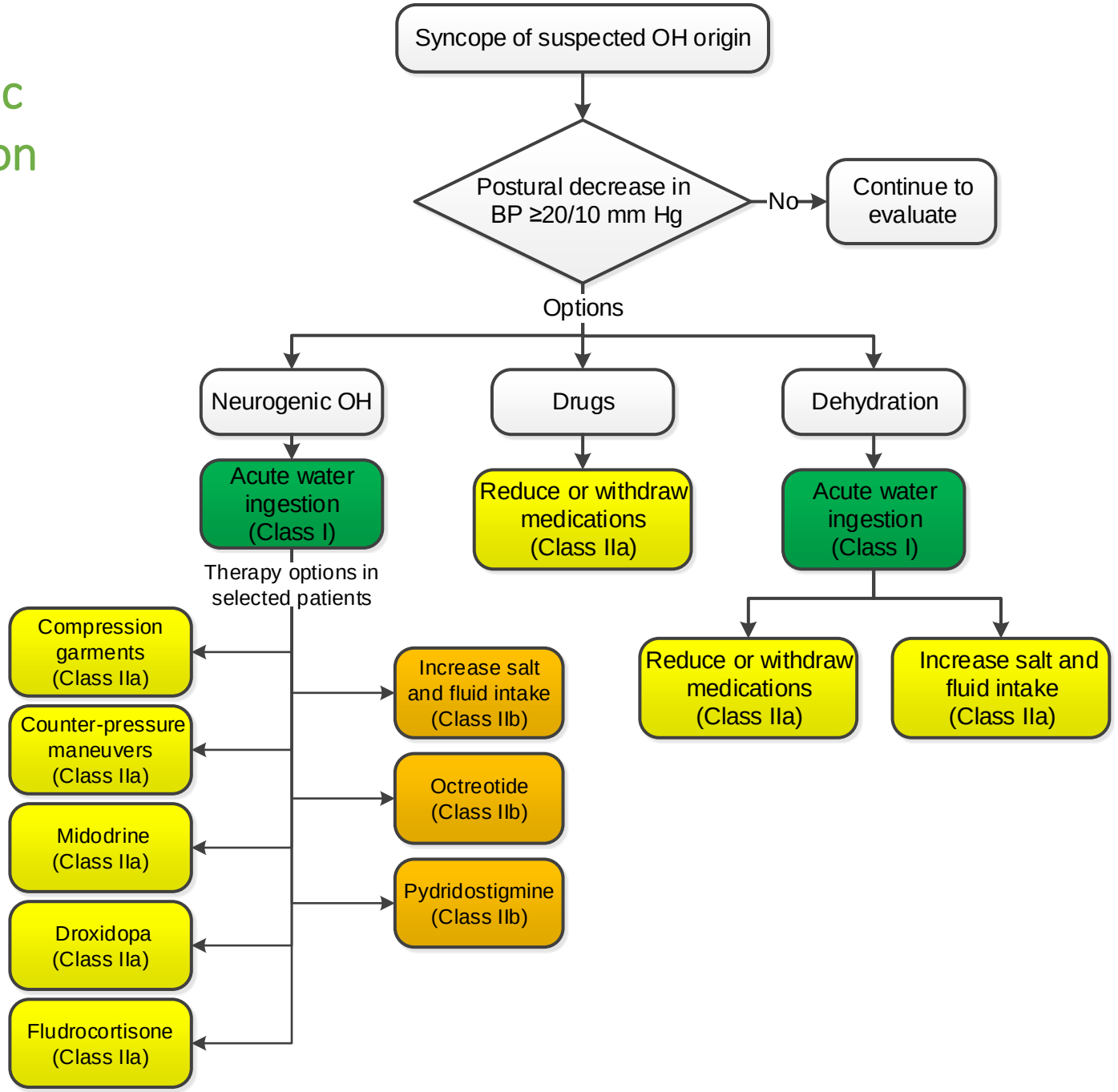
Neurogenic Orthostatic Hypotension (cont.)

IIa	C-LD	Fludrocortisone can be beneficial in patients with syncope due to neurogenic OH.
IIb	C-LD	Encouraging increased salt and fluid intake may be reasonable in selected patients with neurogenic OH.
IIb	C-LD	Pyridostigmine may be beneficial in patients with syncope due to neurogenic OH who are refractory to other treatments.
IIb	C-LD	Octreotide may be beneficial in patients with syncope and refractory recurrent postprandial or neurogenic OH.

Dehydration and Drugs

COR	LOE	Recommendations
I	C-LD	Fluid resuscitation via oral or intravenous bolus is recommended in patients with syncope due to acute dehydration.
IIa	B-NR	Reducing or withdrawing medications that may cause hypotension can be beneficial in selected patients with syncope.
IIa	C-LD	In selected patients with syncope due to dehydration, it is reasonable to encourage increased salt and fluid intake.

Orthostatic Hypotension



Colors correspond to Class of Recommendation in Table 1.
BP indicates blood pressure; OH, orthostatic hypotension.

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Management of Cardiovascular Conditions

Arrhythmic Conditions

COR	LOE	Recommendations
Bradycardia		
I	C-EO	In patients with syncope associated with bradycardia, GDMT is recommended.
Supraventricular Tachycardia		
I	C-EO	In patients with syncope and SVT, GDMT is recommended.
I	C-EO	In patients with AF, GDMT is recommended.
Ventricular Arrhythmia		
I	C-EO	In patients with syncope and VA, GDMT is recommended.

Structural Conditions

COR	LOE	Recommendations
Ischemic and Nonischemic Cardiomyopathy		
I	C-EO	In patients with syncope associated with ischemic and nonischemic cardiomyopathy, GDMT is recommended.
Valvular Heart Disease		
I	C-EO	In patients with syncope associated with valvular heart disease, GDMT is recommended.
Hypertrophic Cardiomyopathy		
I	C-EO	In patients with syncope associated with HCM, GDMT is recommended.

Arrhythmogenic Right Ventricular Cardiomyopathy

COR	LOE	Recommendations
I	B-NR	ICD implantation is recommended in patients with ARVC who present with syncope and have a documented sustained VA.
IIa	B-NR	ICD implantation is reasonable in patients with ARVC who present with syncope of suspected arrhythmic etiology.

Cardiac Sarcoidosis

COR	LOE	Recommendations
I	B-NR	ICD implantation is recommended in patients with cardiac sarcoidosis presenting with syncope and documented spontaneous sustained VA.
I	C-EO	In patients with cardiac sarcoidosis presenting with syncope and conduction abnormalities, GDMT is recommended.
IIa	B-NR	ICD implantation is reasonable in patients with cardiac sarcoidosis and syncope of suspected arrhythmic origin, particularly with LV dysfunction or pacing indication.
IIa	B-NR	EPS is reasonable in patients with cardiac sarcoidosis and syncope of suspected arrhythmic etiology.

Inheritable Arrhythmic Conditions

Brugada Syndrome

COR	LOE	Recommendations
IIa	B-NR	ICD implantation is reasonable in patients with Brugada ECG pattern and syncope of suspected arrhythmic etiology.
IIb	B-NR	Invasive EPS may be considered in patients with Brugada ECG pattern and syncope of suspected arrhythmic etiology.
III: No Benefit	B-NR	ICD implantation is not recommended in patients with Brugada ECG pattern and reflex-mediated syncope in the absence of other risk factors.

Short-QT Syndrome

COR	LOE	Recommendation
IIb	C-EO	ICD implantation may be considered in patients with short-QT pattern and syncope of suspected arrhythmic etiology.

Long-QT Syndrome

COR	LOE	Recommendations
I	B-NR	Beta-blocker therapy, in the absence of contraindications, is indicated as a first-line therapy in patients with LQTS and suspected arrhythmic syncope.
IIa	B-NR	ICD implantation is reasonable in patients with LQTS and suspected arrhythmic syncope who are on beta-blocker therapy or are intolerant to beta-blocker therapy.
IIa	C-LD	Left cardiac sympathetic denervation (LCSD) is reasonable in patients with LQTS and recurrent syncope of suspected arrhythmic mechanism who are intolerant to beta-blocker therapy or for whom beta-blocker therapy has failed.

Catecholaminergic Polymorphic Ventricular Tachycardia

COR	LOE	Recommendations
I	C-LD	Exercise restriction is recommended in patients with CPVT presenting with syncope of suspected arrhythmic etiology.
I	C-LD	Beta blockers lacking intrinsic sympathomimetic activity are recommended in patients with CPVT and stress-induced syncope.
IIa	C-LD	Flecainide is reasonable in patients with CPVT who continue to have syncope of suspected VA despite beta-blocker therapy.
IIa	B-NR	ICD therapy is reasonable in patients with CPVT and a history of exercise- or stress-induced syncope despite use of optimal medical therapy or LCSD.
IIb	C-LD	In patients with CPVT who continue to experience syncope or VA, verapamil with or without beta-blocker therapy may be considered.
IIb	C-LD	LCSD may be reasonable in patients with CPVT, syncope, and symptomatic VA despite optimal medical therapy.

Early Repolarization Pattern

COR	LOE	Recommendations
IIb	C-EO	ICD implantation may be considered in patients with early repolarization pattern and suspected arrhythmic syncope in the presence of a family history of early repolarization pattern with cardiac arrest.
III: Harm	B-NR	EPS should not be performed in patients with early repolarization pattern and history of syncope in the absence of other indications.

Adult Congenital Heart Disease

COR	LOE	Recommendations
IIa	C-EO	For evaluation of patients with ACHD and syncope, referral to a specialist with expertise in ACHD can be beneficial.
IIa	B-NR	EPS is reasonable in patients with moderate or severe ACHD and unexplained syncope.

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Pseudosyncope

Treatment of Pseudosyncope

COR	LOE	Recommendations
IIb	C-LD	In patients with suspected pseudosyncope, a candid discussion with the patient about the diagnosis may be reasonable.
IIb	C-LD	Cognitive behavioral therapy may be beneficial in patients with pseudosyncope.

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Age, Lifestyle, and Special Populations

Geriatric Patients

COR	LOE	Recommendations
IIa	C-EO	For the assessment and management of older adults with syncope, a comprehensive approach in collaboration with an expert in geriatric care can be beneficial.
IIa	B-NR	It is reasonable to consider syncope as a cause of nonaccidental falls in older adults.

Predictors of mortality, rehospitalization for syncope, and cardiac syncope in 352 consecutive elderly patients with syncope.

Khera S[1], Palaniswamy C, Aronow WS, Sule S, Doshi JV, Adapa S, Balasubramaniyam N, Ahn C, Peterson SJ, Nabors C .
J Am Med Dir Assoc. 2013 May;14(5):326-30.

Participants were 352 consecutive patients aged 65 years or older with syncope admitted to hospital from the emergency department.

Significant independent prognostic factors for mortality were diabetes mellitus (OR 2.08; 95% CI 1.09-3.99, P = .0263), history of smoking (OR 2.23; 95% CI 1.10-4.49, P = .0255), and use of statins (OR 0.37; 95% CI 0.19-0.72, P = .0036). Independent risk factors for predicting a cardiac cause of syncope were an abnormal electrocardiogram (OR 2.58; 95% CI 1.46-4.57, P = .0012) and reduced ejection fraction (OR 2.92; 95% CI 1.70-5.02, P < .001). The San Francisco Syncope Rule and Osservatorio Epidemiologico sulla Sincope nel Lazio scores did not predict mortality or rehospitalization in our study population.

Athletes

COR	LOE	Recommendations
I	C-EO	Cardiovascular assessment by a care provider experienced in treating athletes with syncope is recommended prior to resuming competitive sports.
IIa	C-LD	Assessment by a specialist with disease-specific expertise is reasonable for athletes with syncope and high-risk markers.
IIa	C-LD	Extended monitoring can be beneficial for athletes with unexplained exertional syncope after an initial cardiovascular evaluation.
III: Harm	B-NR	Participation in competitive sports is not recommended for athletes with syncope and phenotype-positive HCM, CPVT, LQTS1, or ARVC before evaluation by a specialist.

Driving and Syncope

COR	LOE	Recommendation
IIa	C-EO	It can be beneficial for healthcare providers managing patients with syncope to know the driving laws and restrictions in their regions and discuss implications with the patient.

Syncope and Driving recommendations

Condition	Symptom-Free Waiting Time*
OH	1 month
VVS, no syncope in prior year (698)	No restriction
VVS, 1–6 syncope per year (694)	1 month
VVS, >6 syncope per year (694,698)	**Not fit to drive until symptoms resolved**
Situational syncope other than cough syncope	1 month
Cough syncope, untreated	**Not fit to drive**
Cough syncope, treated with cough suppression	1 month
Carotid sinus syncope, untreated (698)	**Not fit to drive**
Carotid sinus syncope, treated with permanent pacemaker (698)	1 week
Syncope due to nonreflex bradycardia, untreated (698)	**Not fit to drive**
Syncope due to nonreflex bradycardia, treated with permanent pacemaker (12,698)	1 week
Syncope due to SVT, untreated (698)	**Not fit to drive**
Syncope due to SVT, pharmacologically suppressed (698)	1 month
Syncope due to SVT, treated with ablation (698)	1 week
Syncope with LVEF <35% and a presumed arrhythmic etiology without an ICD (699,700)	**Not fit to drive**
Syncope with LVEF <35% and presumed arrhythmic etiology with an ICD (701,702)	3 months
Syncope presumed due to VT/VF, structural heart disease, and LVEF ≥35%, untreated	**Not fit to drive**
Syncope presumed due to VT/VF, structural heart disease, and LVEF ≥35%, treated with an ICD and guideline-directed drug therapy (701,702)	3 months
Syncope presumed due to VT with a genetic cause, untreated	**Not fit to drive**
Syncope presumed due to VT with a genetic cause, treated with an ICD or guideline-directed drug therapy	3 months
Syncope presumed due to a nonstructural heart disease VT, such as RVOT or LVOT, untreated	**Not fit to drive**
Syncope presumed due to a nonstructural heart disease VT, such as RVOT or LVOT, treated successfully with ablation or suppressed pharmacologically (698)	3 months
Syncope of undetermined etiology	1 month

Summary

- Syncope is not an uncommon event.
- It is important to classify syncope and recognize high risk features
- Appropriate diagnostic and therapeutic tools can prevent recurrence.