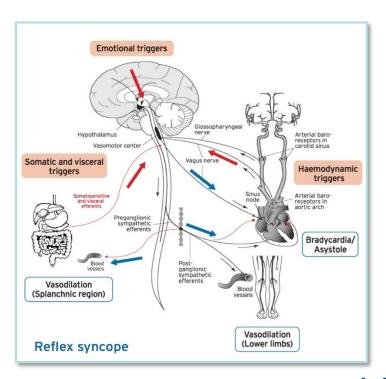
## Heart Rhythm Congress ICC, Birmingham: October 8<sup>th</sup> 2018

STARS Take Fainting to Heart: Syncope and POTs Update



ESC & ACC,AHA,HRS

What are the

Differences and are
they Important?

John Camm
Professor of Clinical Cardiology, St. George's Hospital
Medical School, London



### **Declaration of Competing Interests**

#### Chairman

ESC Guidelines on Atrial Fibrillation, 2010 and Update, 2012; ACC/AHA/ESC Guidelines on VAs and SCD; 2006; NICE Guidelines on ACS and NSTEMI, 2012; NICE Guidelines on Heart Failure, 2008; Member: NICE Guidelines on AF, 2006; ESC VA and SCD Guidelines, 2015; Reviewer: AHA/ACC/HRS Guidelines on AF, 2014; ACC/AHA/HRS SVT Guidelines, 2015; ESC AF Guidelines, 2016

### **Steering Committees**

Multiple trials involving antiarrhythmic agents, heart failure drugs and novel anticoagulants

#### **DSMBs**

Multiple trials of devices and drugs

#### **Events Committees**

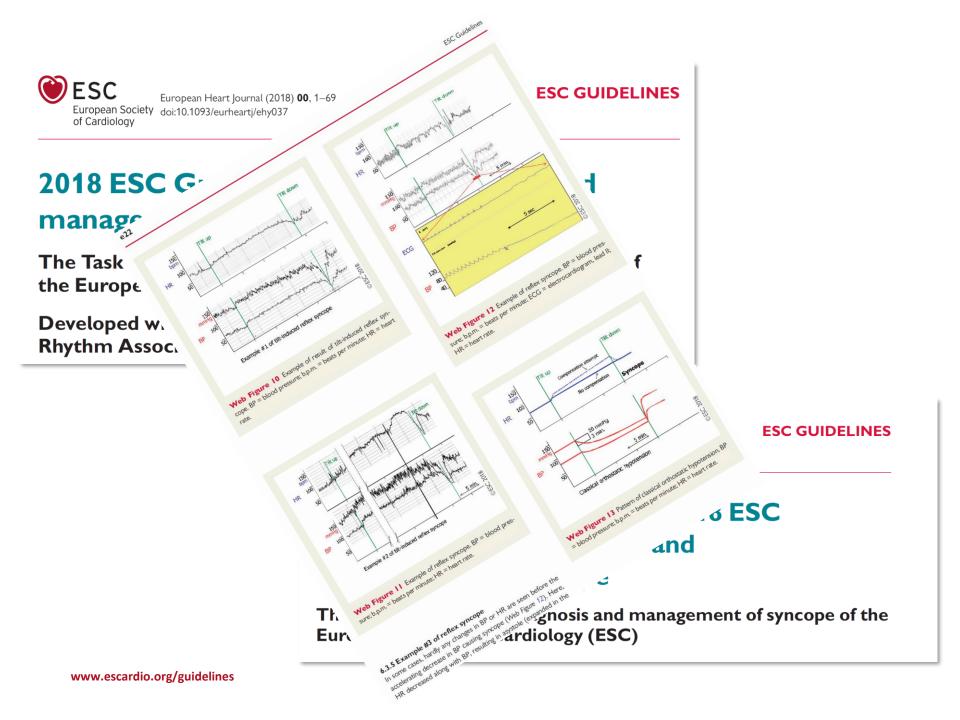
One trial of novel oral anticoagulants and multiple trials of miscellaneous agents with CV adverse effects

#### **Editorial Role**

Editor-in-Chief, European Heart Journal: Case Reports and Clinical Cardiology; Editor, European Textbook of Cardiology, European Heart Journal, Electrophysiology of the Heart, and Evidence Based Cardiology

### **Consultant/Advisor/Speaker**

Incarda, Menarini, Milestone, Sanofi, Servier, **Bayer**, Boehringer Ingelheim, Bristol-Myers Squibb, Daiichi Sankyo, Pfizer, Boston Scientific, Abbott, Biotronik, Medtronic, GlaxoSmithKline, Anidium, Cardiac Insight, Johnson and Johnson, Novartis, Radius, Richmond Pharmacology



### **ESC: Classes of Recommendations**

Classes of recommendations	Definition	Suggested wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended/ is indicated.
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
Class IIa	Weight of evidence/opinion is in favour of usefulness/efficacy.	Should be considered.
Class IIb	Usefulness/efficacy is less well established by evidence/opinion.	May be considered.
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended.

# AHA: Classes of Recommendations

### **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) (Generally, LOE A or B use only)

Benefit = Risk

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.

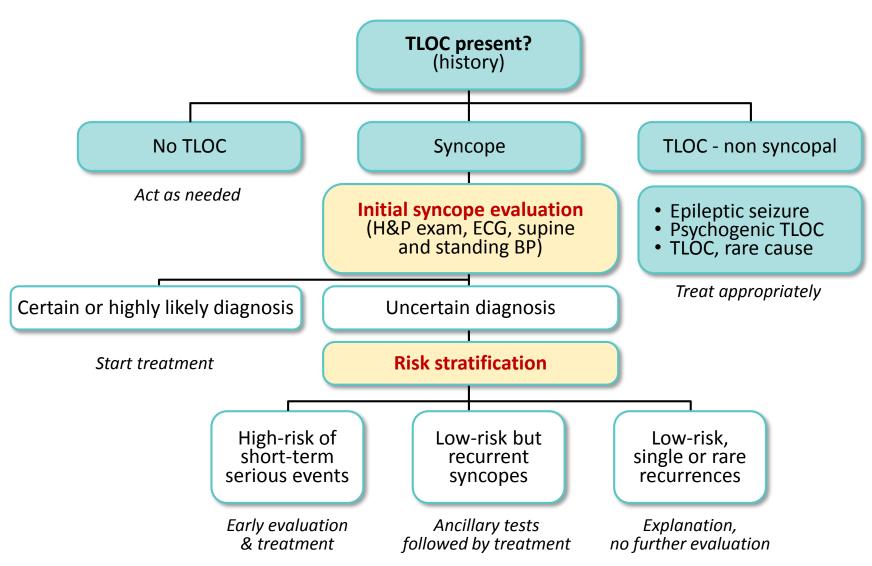
- \* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).
- † For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs 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.

### Definition

- **Syncope** is a TLOC, *due to transient global cerebral hypoperfusion*, characterized by rapid onset, short duration *and* spontaneous complete recovery.
- 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. The presumed mechanism is cerebral hypoperfusion. 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)

### **Presentation of Patient with Probable TLOC**



### Risk Stratification at the Initial Evaluation

Low-risk	High-risk (red flag)
Syncopal event	
<ol> <li>1.Associated with prodrome typical of reflex syncope (e.g. light-headedness, feeling of warmth, sweating, nausea, vomiting)</li> <li>2.After sudden unexpected unpleasant sight, sound, smell, or pain</li> <li>3.After prolonged standing or crowded, hot places</li> <li>4.During a meal or postprandial</li> <li>5.Triggered by cough, defaecation, or micturition</li> <li>6.With head rotation or pressure on carotid sinus (e.g. tumour, shaving, tight collars)</li> <li>7.Standing from supine/sitting position</li> </ol>	<ul> <li>Major</li> <li>1. New onset of chest discomfort, breathlessness, abdominal pain, or headache</li> <li>2. Syncope during exertion or when supine.</li> <li>3. Sudden onset palpitation immediately followed by syncope</li> <li>Minor (high risk only if associated with structural heart disease or abnormal ECG):</li> <li>1. No warning symptoms or short (&lt;10 s) prodrome</li> <li>2. Family history of SCD at young age</li> <li>3. Syncope in the sitting position</li> </ul>

 $\bigcap_{C_{TOSSMa}}$ 

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### CLINICAL PRACTICE

Pacing as a treatment for reflex-mediated (vasovagal, situational, or carotid sinus hypersensitivity) syncope: A systematic review for the 2017 ACC/AHA/HRS guideline for the evaluation and management of patients with syncope Hite evaluation and inaliagement of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society 2017 ACC AHA HRS gui

Evidence Review Committee Members, Paul D. Varosy, MD, FACC, FAHA, FHRS (Chair) Evidence Review Committee Members, Paul D. Varosy, MD, FACC, FAHA, FHRS, \* Amy L. Miller, MD, FACC, FA

Noseworthy, MD \* David J Slotwiner MD FACC, FA

FHRS \* management of patie Lin Y. Chen, Mu, Ms, FACC, FARA, FAKS, Amy L. Miller, Mu, Phu, Mankahach Thiringanacamhandamonthi, MRRC\*

Lin Y. Chen, Mu, Ms, FACC, FARA, FAKS, Amy L. Miller, Mu, Phu, MRRC\*

Mankahach Thiringanacamhandamonthi, MRRC\*

MRRC\*

MRRC\*

MILLER MU, Phu, MRRC\* nanagement of Pac Venkatesh Thiruganasambandamoorthy, MBBS\*

Writing Committee N Glenn N. Levine, MD, FACC, FAHA, Chair

Patrick T. O'Gara, MD, FACC, FAHA, Chair

Longithon I. Holmonin MD, FACC, FAHA, Chair

EACC EAHA, Chair-Elect Jonathan L. Halperin, MD, FACC, FAHA, Win-Kuang Shen, Immediate Past Chair?

Kim L. Al-Kh. Sana M. Al-Khatib, MD, MHS, FACC, FAHA A Ret David G. Bendi Kim K. Bincher, MS, Pharmb, AACC Daniel E. For Biykem Bozkurt, MD, Pharmu, AACC Ralph G. Brindis, MD, MPH, MACC Blair P. Gr Task F Andrew

Andrew Joaquin E. Cigarroa, MD, Pharme Roopinder Kaw. M. Cigarroa, MD, PACC. P. FACC Develope Brian Olsha K

ACC AHA Task Force Me Society for

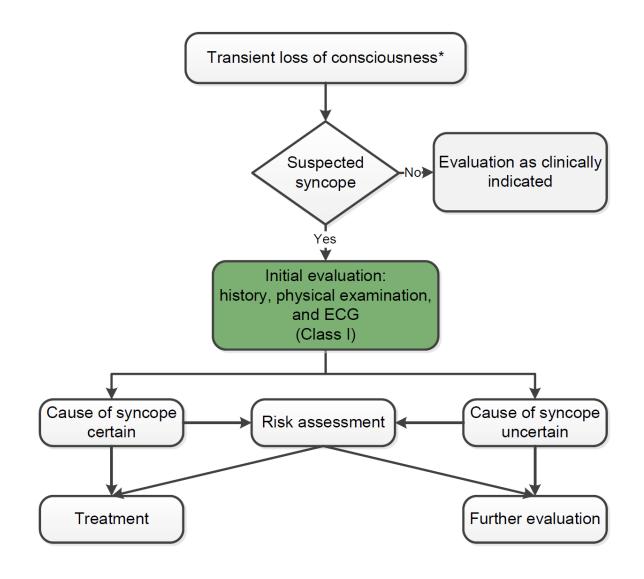
Glenn N. Levine, MD, FACC, F. nenn N. Levine, MD, MACC,
Patrick T. O'Gara, MD, MACC, Jonathan L. Halperin, MD, FACC, 1 nmediate Past Chair, MD, MHS, FACC, FA.
Sana M. Al-Khatib, MD, MHS, FACC, FA. Endorsed by Sana M. Birtcher, MS, PharmD, AACC Run A. Dinener, M.D. PhD, FACC, FAHA
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Brykem Bozkurt, MD, MPH, MD, FACC
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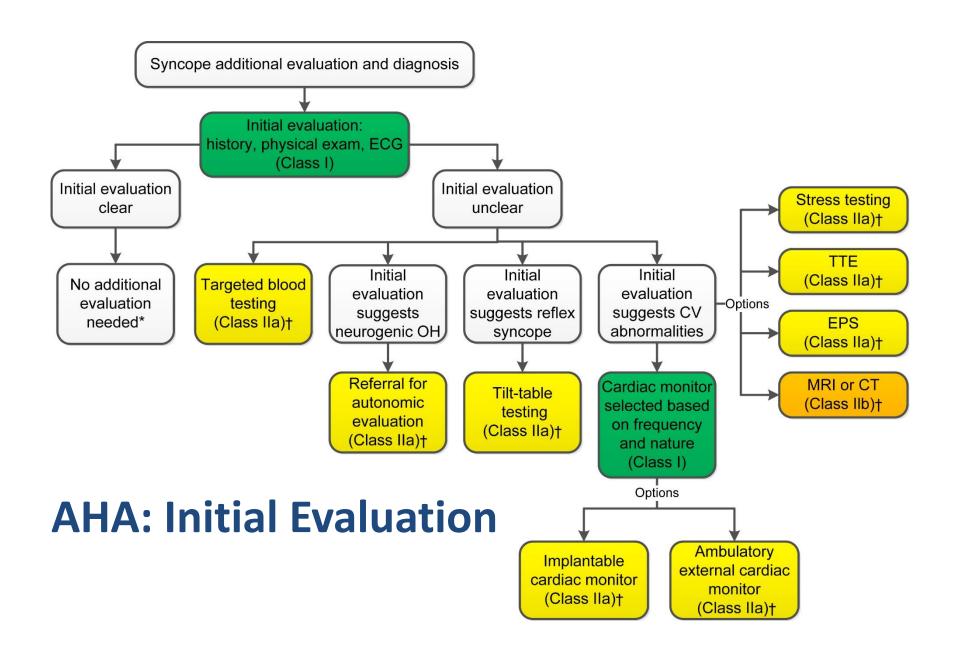


### **AHA: Initial Evaluation**



### Syncope Risk Scores

Study/Reference	Year	Sample N	Events N (%)	Outcome Definition	ED Events*	Predictors	NPV (%)†
Martin (65)	1997	252	104 (41%)	1-y death/arrhythmia	Yes	Abnormal ECG‡; >45 y of age; VA; HF	93
Sarasin (54)	2003	175	30 (17%)	Inpatient arrhythmia	Yes	Abnormal ECG‡; >65 y of age; HF	98
OESIL (47)	2003	270	31 (11%)	1-y death	N/A	Abnormal ECG‡; >65 y of age; no prodrome; cardiac history	100
SFSR (52)	2004	684	79 (12%)	7-d serious events§	Yes	Abnormal ECG‡; dyspnea; hematocrit; systolic BP <90 mm Hg; HF	99
Boston Syncope Rule (50)	2007	293	68 (23%)	30-d serious events	Yes	Symptoms of acute coronary syndrome; worrisome cardiac history; family history of SCD; VHD; signs of conduction disease; volume depletion; persistent abnormal vital signs; primary central nervous event	100
Del Rosso (49)	2008	260	44 (17%)	Cardiac etiology	N/A	Abnormal ECG‡/cardiac history; palpitations; exertional; supine; precipitant (a low-risk factor); autonomic prodrome (low-risk factors)	99
STePS (48)	2008	676	41 (6%)	10-d serious events¶	Yes	Abnormal ECG‡; trauma; no prodrome; male sex	_
Syncope Risk Score (55)	2009	2,584	173 (7%)	30-d serious events#	No	Abnormal ECG‡; >90 y of age; male sex; positive troponin; history of arrhythmia; systolic BP >160 mm Hg; near-syncope (a low-risk factor)	97
ROSE (53)	2010	550	40 (7%)	30-d serious events#	Yes	Abnormal ECG $\ddagger$ ; B-natriuretic peptide; hemoglobin; $O_2$ Sat; fecal occult blood	98

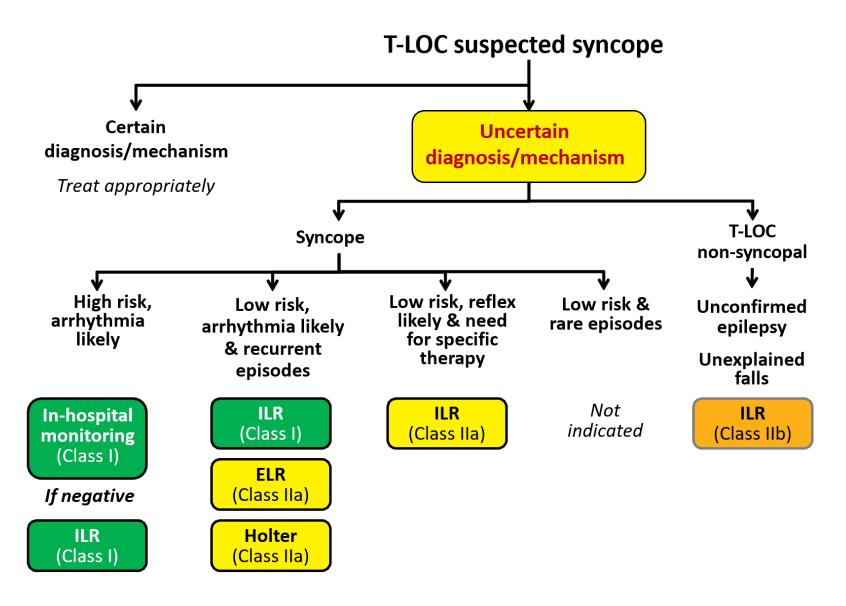


### **AHA: ECG Monitoring**

### **Recommendations for Cardiac Monitoring**

COR	LOE	RECOMMENDATIONS
1	C-EO	The choice of a specific cardiac monitor should be determined on the basis of the frequency and nature of syncope events.
lla	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 (95-99)  2. Transtelephonic monitor (96,100,101)
		3. External loop recorder (96,100-102) 4. Patch recorder (103-105)
		5. Mobile cardiac outpatient telemetry (106,107).
lla	B-R	To evaluate selected ambulatory patients with syncope of suspected arrhythmic etiology, an implantable cardiac monitor can be useful (95,96,99,107-121).

### **ESC: ECG Monitoring**



### **AHA: Class III Recommendations**

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 (134–136).
III: No Benefit	B-NR	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 (89,92).
III: No Benefit	B-R	Tilt-table testing is not recommended to predict a response to medical treatments for VVS (152,153).
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 (205,206).
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 (234).

Beta blockers are not beneficial in pediatric patients with VVS (371,374).

III: No Benefit

B-R

### **Neurological Evaluation and Tests**

5. EEG, ultrasound of neck arteries, and computed tomography or magnetic resonance imaging of the brain are not indicated in patients with syncope.



III: No Benefit B-NR evalu

Magnetic resonance imaging and computed tomography 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 (161,162).

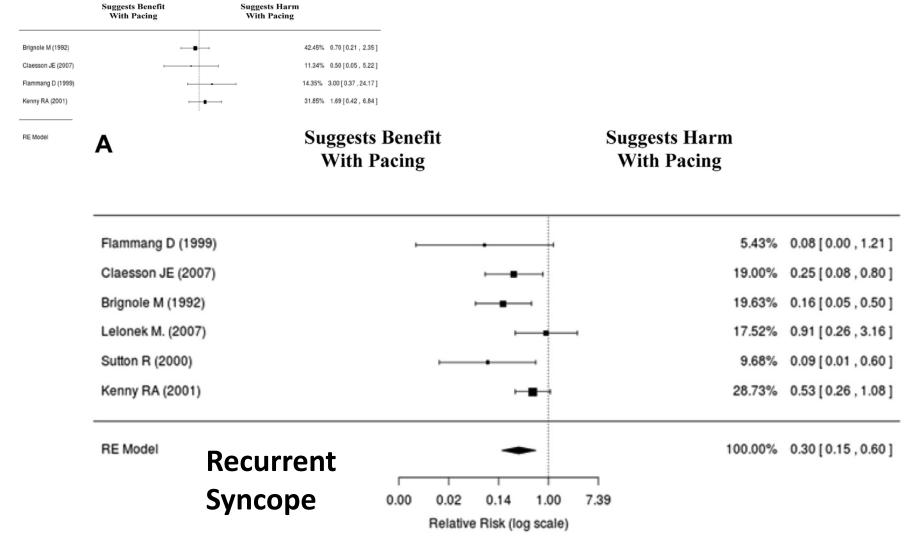
III: No Benefit B-NR

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 (92,161–164).

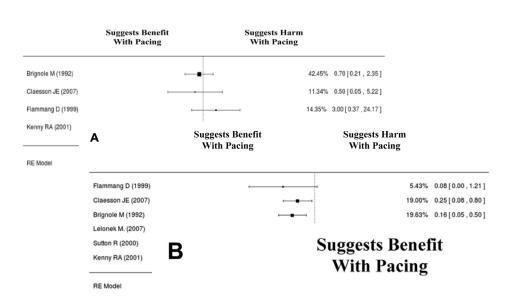
III: No Benefit B-NR

Routine recording of an electroencephalogram is not recommended in the evaluation of patients with syncope in the absence of specific neurological features suggestive of a seizure (18,92,163–167).

### Pacing for Vasovagal/CSH Syncope



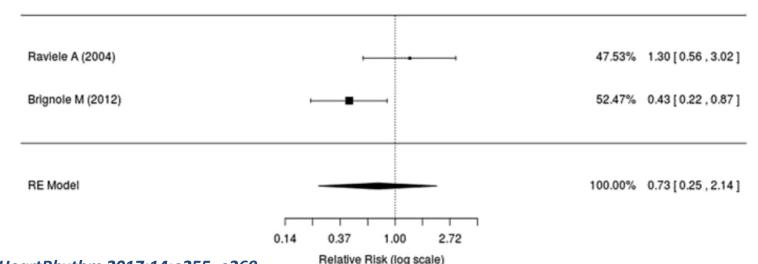
### Pacing for Vasovagal/CSH Syncope



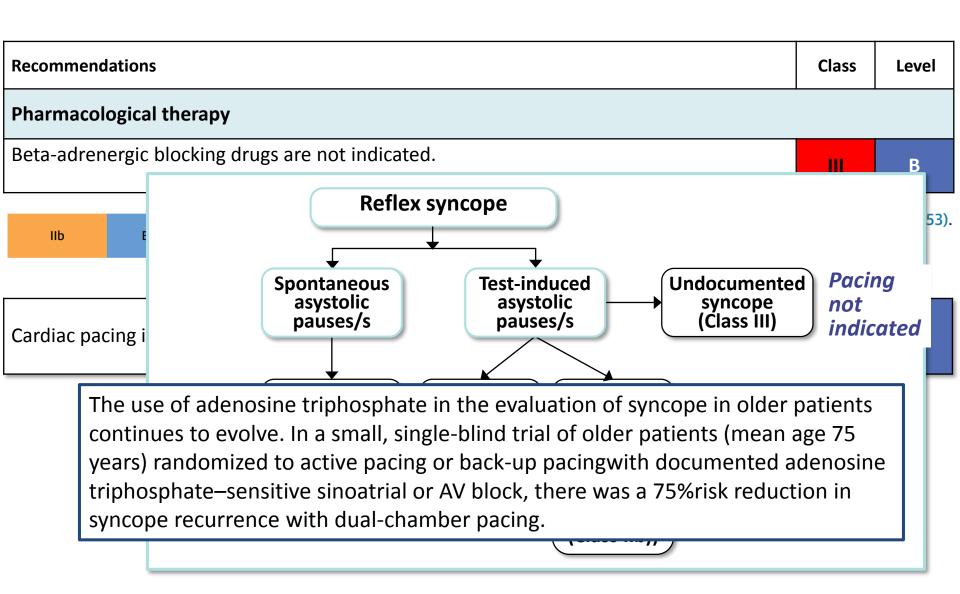
The evidence does not support the routine use of pacing for reflex-mediated syncope beyond patients with recurrent syncope and asystole documented by implantable loop recorder, such as those meeting the entry criteria for the ISSUE-3 trial

Suggests Harm With Pacing

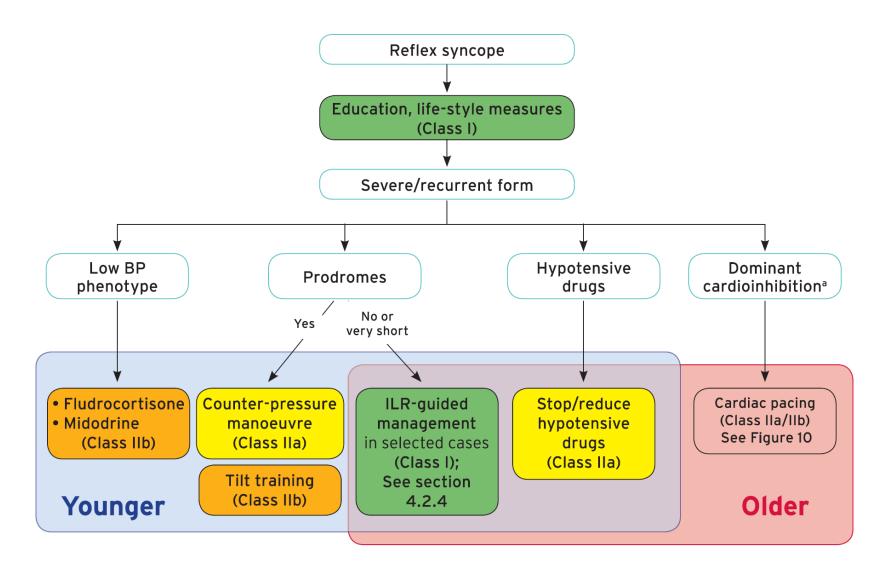




### Treatment of Reflex syncope



### **ESC: Reflex Syncope**

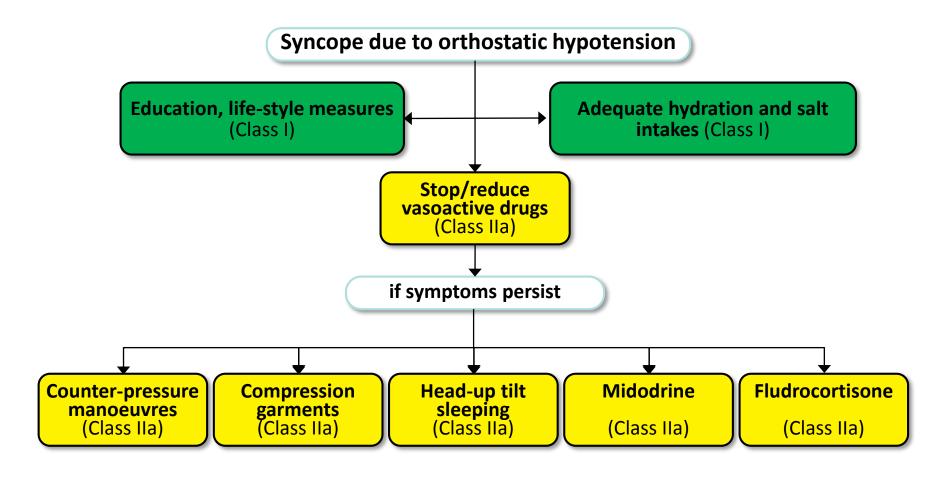


### **Recommendations for Reflex Syncope**

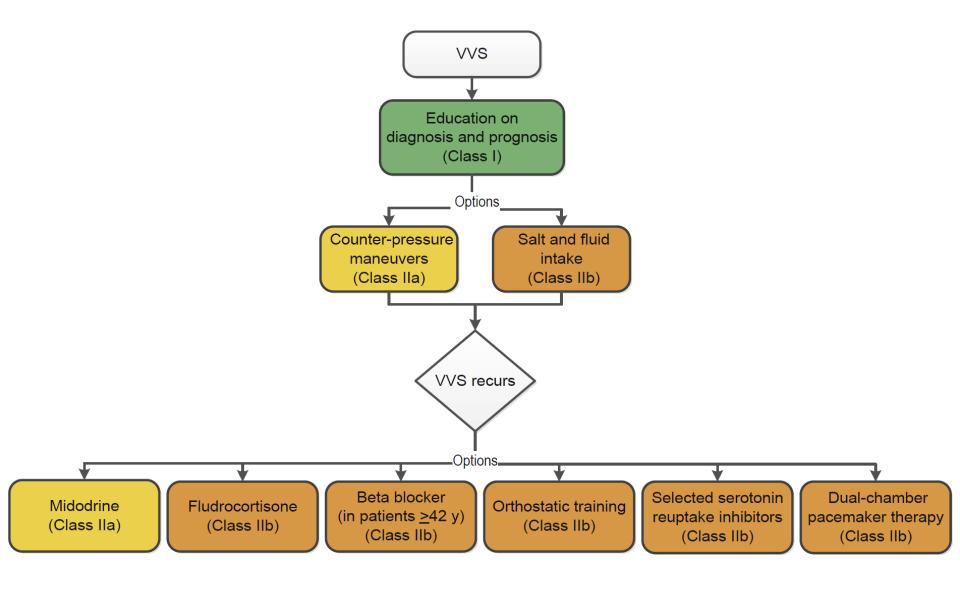
### **Recommendation for Pacemakers in VVS**

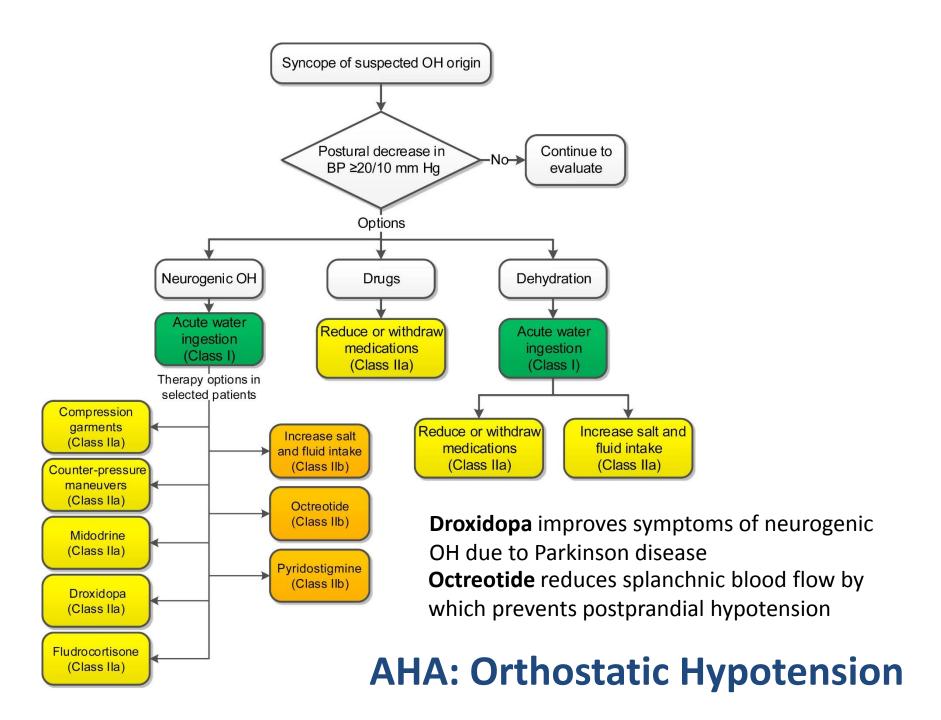
COR	LOE	RECO	MMENDATION	<b>I</b>
IIb	B-R <sup>SR</sup>	Recommend	ations for Ca	rotid Sinus Syndrome
		COR	LOE	RECOMMENDATIONS
		lla	B-R	Permanent cardiac pacing is reasonable in patients with carotid sinus syndrome that is
				cardioinhibitory or mixed (267-275).
		IIb	B-R	It may be reasonable to implant a dual-chamber pacemaker in
				patients with carotid sinus syndrome who require permanent pacing (276-279).

### **ESC: Vasovagal Syncope**



### **AHA: Vasovagal Syncope**





### 4. MANAGEMENT OF CARDIOVASCULAR CONDITIONS

See Online Data Supplements 17 to 24 for data supporting Section 4.

#### 4.1. Arrhythmic Conditions: Recommendations

4.1.1. Bradycardia: Recommendation

#### **Recommendation for Bradycardia**

COR	LOE	RECOMMENDATION
1	C-EO	In patients with syncope associated with bradycardia, GDMT is
		recommended (169).

#### 4.1.2. Supraventricular Tachycardia: Recommendations

#### **Recommendations for Supraventricular Tachycardia**

COR	LOE	RECOMMENDATIONS
1	C-EO	In patients with syncope and supraventricular tachycardia, GDMT is recommended (170).
		In patients with atrial fibrillation, GDMT
	C-EO	is recommended (171).

#### 4.1.3. Ventricular Arrhythmia: Recommendation

#### Recommendation for Ventricular Arrhythmia (VA)

COR	LOE	RECOMMENDATION
1	C-EO	In patients with syncope and VA, GDMT is recommended (169,172-174).

#### 4.2. Structural Conditions: Recommendation

4.2.1. Ischemic and Nonischemic Cardiomyopathy:
Recommendations

### Recommendation for Ischemic and Nonischemic Cardiomyopathy

COR	LOE	RECOMMENDATION
1	C-EO	In patients with syncope associated with ischemic and
		nonischemic cardiomyopathy, GDMT is recommended (169,172).

#### 4.2.2. Valvular Heart Disease: Recommendation

### **Recommendation for Valvular Heart Disease**

COR	LOE	RECOMMENDATION
1	C-EO	In patients with syncope associated with valvular heart
		disease, GDMT is recommended (175).

### **ESC: Ventricular Arrhythmias**

Implantable cardioverter defibrillator indications in patients with unexplained syncope<sup>a</sup> and long QT syndrome

Recommendations	Class <sup>b</sup>	Level <sup>c</sup>
ICD implantation in addition to beta-blockers should be considered in LQTS patients who experience unexplained syncope <sup>a</sup> while receiving an adequate dose of beta-blockers. <sup>46</sup>	lla	В
Left cardiac sympathetic denervation should be considered in patients with symptomatic LQTS when:  (1) beta-blockers are not effective, not tolerated, or are contraindicated;  (2) ICD therapy is contraindicated or refused; or  (3) when patients on beta-blockers with an ICD experience multiple shocks. 46	lla	U
Instead of an ICD, an ILR should be considered in patients with recurrent episodes of unexplained syncope <sup>a</sup> who are at low risk of SCD based on a multiparametric analysis that takes into account the other known risk factors for SCD.	lla	С

Implantable cardioverter defibrillator indications in patients with unexplained syncope<sup>a</sup> and Brugada syndrome

Recommendations	Class <sup>b</sup>	Level <sup>c</sup>
ICD implantation should be considered in patients with a spontaneous diagnostic type 1 ECG pattern and a history of unexplained syncope. <sup>a</sup> , 46,353,355,365,366	lla	n
Instead of an ICD, an ILR should be considered in patients with recurrent episodes of unexplained syncope <sup>a</sup> who are at low risk of SCD, based on a multiparametric analysis that takes into account the other known risk factors for SCD.	lla	v

ECG = electrocardiogram; ICD = implantable cardioverter defibrillator; ILR = implantable loop recorder; SCD = sudden cardiac death.

<sup>a</sup>Unexplained (or uncertain) syncope is defined as any syncope that does not meet the class I diagnostic criteria defined in section 4. In the presence of clinical features described in this section, unexplained syncope is considered a risk factor for ventricular tachyarrhythmias.

<sup>b</sup>Class of recommendation.

<sup>c</sup>Level of evidence.

### **ARVC**

### Recommendations for Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)

COR	LOE	RECOMMENDATIONS
1	B-NR	Implantable cardioverter-defibrillator (ICD) implantation is recommended in patients with ARVC who present with syncope and have a documented sustained VA (177-181).
lla	B-NR	ICD implantation is reasonable in patients with ARVC who present with syncope of suspected arrhythmic etiology (177,178,180-182).

Arrhythmogenic right ventricular cardiomyopathy				
<ol> <li>ICD implantation may be considered in patients with ARVC and a history of unexplained syncope.</li> </ol>	IIb	С		
<ol> <li>Instead of an ICD, an ILR should be considered in patients with recurrent episodes of unexplained syncope with systolic impairment but without a current indication for ICD.</li> </ol>	lla	С		

### Long QT Syndrome

#### Recommendations for Long-QT Syndrome (LQTS)

COR	LOE	RECOMMENDATIONS
1	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 (207–209).
lla	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 (208,210-214).
lla	C-LD	Left cardiac sympathetic denervation 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 (215-217).

### Long QT syndrome

<ol> <li>ICD implantation in addition to beta-blockers should be considered in LQTS patients who experience unexplained syncopea while receiving an adequate dose of beta-blockers.</li> </ol>	lla	В
<ul> <li>2. Left cardiac sympathetic denervation should be considered in patients with symptomatic LQTS when:</li> <li>(a) beta-blockers are not effective, not tolerated, or are contraindicated;</li> <li>(b) ICD therapy is contraindicated or refused; or</li> <li>(c) when patients on beta-blockers with an ICD experience multiple shocks.</li> </ul>	lla	С
3. Instead of an ICD, an ILR may be considered in patients with recurrent episodes of unexplained syncope with systolic impairment but without a current indication for ICD.	lla	С

### Syncope and Driving

### Recommendation for Driving and Syncope

COR LOE RECOMMENDATION

lla 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.

### **Advice for Driving in Patients with Syncope**

Disorder causing syncope		Group 1 (private drivers)		Group 2 (professional drivers)		
Cardiac arrhythmias						
Untreated arrhythmias		Unfit to drive		Unfit to drive		
Cardiac arrhythn life-threatening,	Disorder syncope	causing	Group 1 (private drivers)		Group 2 (profession	onal drivers)
treatment	Reflex sy	ncope				
Cardiac arrhythn threatening (e.g. inheritable disor	Jingie/iiiid		No restrictions unless it occurred during driving.		No restriction unless it occurred during driving or without prodromes.	
Pacemaker impla	e Recurrent and severe		After successful treatment is established.		After successful treatment is established. Particular caution if it occurred during driving or without prodromes.	
Unexplai		ned sync	ope			
			No restrictions ur prodrome, occurr driving, or presen structural heart dafter diagnosis ar therapy is establish	rence during ace of severe lisease. If yes, ad appropriate		gnosis and ate therapy is ed.

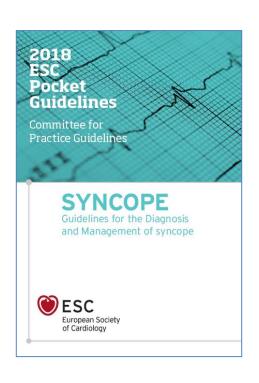
### **ESC: Video Recording**

Recommendations	Class	Level
1. Home video recordings of spontaneous events should be considered. Physicians should encourage patients and their relatives to obtain home video recordings of spontaneous events.	lla	C
2. Adding video recording to tilt testing may be considered in order to increase reliability of clinical observation of induced events.	IIb	C

### Recommendation for History and Physical Examination

COR	LOE	Recommendation
I	B-NR	A detailed history and physical examination should be performed in patients with syncope. 58-66

### Help with the Guidelines







Available on <a href="https://www.escardio.org/">www.escardio.org/</a>
Guidelines