

XV World Congress of Arrhythmias, Beijing, China - 17-20 September, 2015

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# Syncope: The Big Picture

*Antonio Raviele, MD, FESC, FHRS*

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ALFA – Alliance to Fight Atrial fibrillation, Mestre – Venice, Italy

# **Guidelines for the diagnosis and management of syncope (version 2009)**

## **The Task Force for the Diagnosis and Management of Syncope of the European Society of Cardiology (ESC)**

**Developed in collaboration with, European Heart Rhythm Association (EHRA)<sup>1</sup>, Heart Failure Association (HFA)<sup>2</sup>, and Heart Rhythm Society (HRS)<sup>3</sup>**

**Endorsed by the following societies, European Society of Emergency Medicine (EuSEM)<sup>4</sup>, European Federation of Internal Medicine (EFIM)<sup>5</sup>, European Union Geriatric Medicine Society (EUGMS)<sup>6</sup>, American Geriatrics Society (AGS), European Neurological Society (ENS)<sup>7</sup>, European Federation of Autonomic Societies (EFAS)<sup>8</sup>, American Autonomic Society (AAS)<sup>9</sup>**

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# 2015 Heart Rhythm Society Expert Consensus Statement on the Diagnosis and Treatment of Postural Tachycardia Syndrome, Inappropriate Sinus Tachycardia, and Vasovagal Syncope

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# **Syncope Unit: rationale and requirement – the European Heart Rhythm Association position statement endorsed by the Heart Rhythm Society**

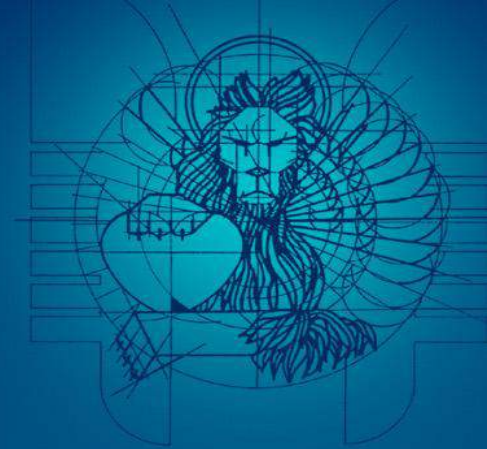
**Rose Anne Kenny** (Chairperson, Ireland), Michele Brignole (Co-chairperson, Italy), Gheorghe-Andrei Dan (Romania), Jean Claude Deharo (France), J. Gert van Dijk (The Netherlands), Colin Doherty (Ireland), Mohamed Hamdan (USA), Angel Moya (Spain), Steve W. Parry (UK), Richard Sutton (UK), Andrea Ungar (Italy), and Wouter Wieling (The Netherlands)

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Document reviewers: Review coordinators, Bulent Gorenek (Turkey), Gregory Y. H. Lip (UK), Michael Glikson (Israel), Philippe Ritter (France), Jodie Hurwitz (USA), Robert Macfadyen (Australia), Andrew Rankin (UK), Luis Mont (Spain), Jesper Svendsen (Denmark), Fred Kusumoto (USA), Mitchell Cohen (USA), and Irene Savelieva (on behalf of EP-Europace, UK)

# Syncope / Definition

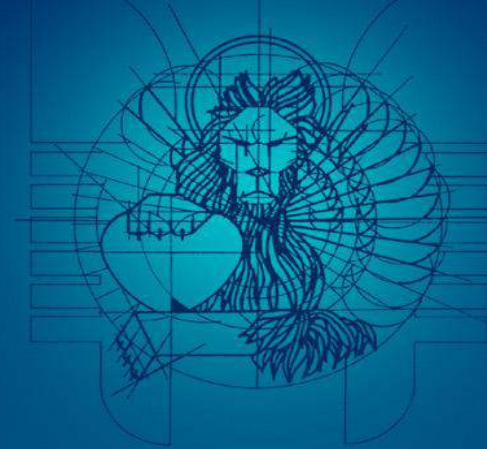
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- ✓ Transient loss of consciousness of
  - rapid onset,
  - short duration,
  - spontaneous complete recovery

# Syncope

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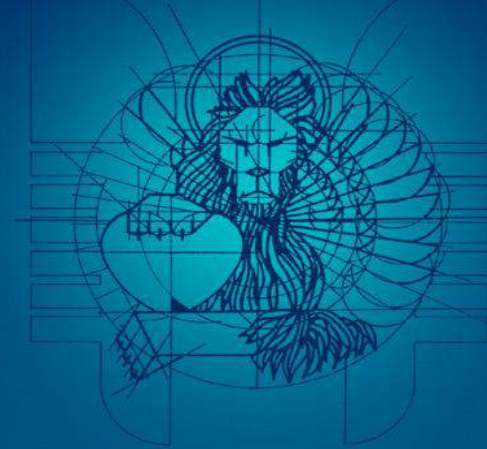


## Underlying mechanism

Transient global cerebral hypoperfusion



# Transient Loss of Consciousness



Syncope

Non-syncopal  
Attacks

# Conditions incorrectly diagnosed as syncope

- **Disorders with partial or complete (LOC) but without cerebral hypoperfusion:**
  - Epilepsy,
  - Metabolic disorders including hypoglycemia, hypoxia, hyperventilation with hypocapnia,
  - Intoxication,
  - Vertebrobasilar TIA (Transient Ischemic Attack).
- **Disorders without impairment of consciousness:**
  - Cataplexy,
  - Drop attacks,
  - Falls,
  - Functional (psychogenic pseudosyncope),
  - TIA of carotid origin.



# Classification of syncope

## Reflex (neurally-mediated) syncope

### Vasovagal:

- Mediated by emotional distress: fear, pain, instrumentation, blood phobia.
- Mediated by orthostatic stress.

### Situational:

- Cough, sneeze.
- Gastrointestinal stimulation (swallow, defaecation, visceral pain).
- Micturition (post-micturition).
- Post-exercise.
- Post-prandial.
- Others (e.g., laught, brass instrument playing, weightlifting).

### Carotid sinus syncope

**Atypical forms** (without apparent triggers and/or atypical presentation).

## Syncope due to orthostatic hypotension

### Primary autonomic failure:

- Pure autonomic failure, multiple system atrophy, Parkinson's disease with autonomic failure, Lewy body dementia.

### Secondary autonomic failure:

- Diabetes, amyloidosis, uraemia, spinal cord injuries.

### Drug-induced orthostatic hypotension:

- Alcohol, vasodilators, diuretics, phenotiazines, antidepressants.

### Volume depletion:

- Haemorrhage, diarrhoea, vomiting, etc.

## Cardiac syncope (cardiovascular)

### Arrhythmia as primary cause:

#### **Bradycardia:**

- Sinus node dysfunction (including brady-cardia/tachycardia syndrome).
- Atrioventricular conduction system disease.
- Implanted device malfunction.

#### **Tachycardia:**

- Supraventricular.
- Ventricular (idiopathic, secondary to structural heart disease or to channelopathies).

### Drug induced bradycardia and tachyarrhythmias

### Structural disease:

Cardiac: *cardiac valvular disease, acute myocardial infarction/ischaemia, hypertrophic cardiomyopathy, cardiac masses (atrial myxoma, tumors, etc), pericardial disease/tamponade, congenital anomalies of coronary arteries, prosthetic valves dysfunction.*

Others: *pulmonary embolus, acute aortic dissection, pulmonary hypertension.*

# Transient LOC / Initial Evaluation

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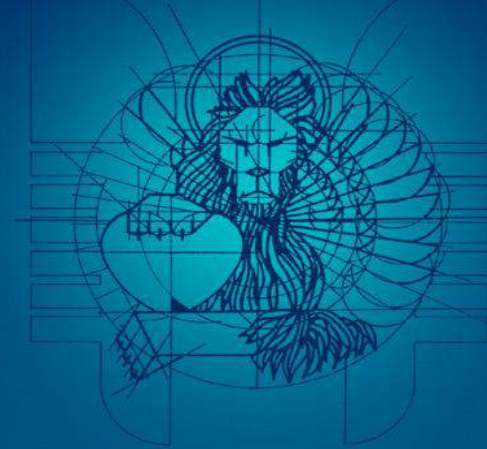


- ✓ **Careful history**
- ✓ **Physical examination**
- ✓ **Orthostatic BP measurements**
- ✓ **Electrocardiogram**



# Initial Evaluation

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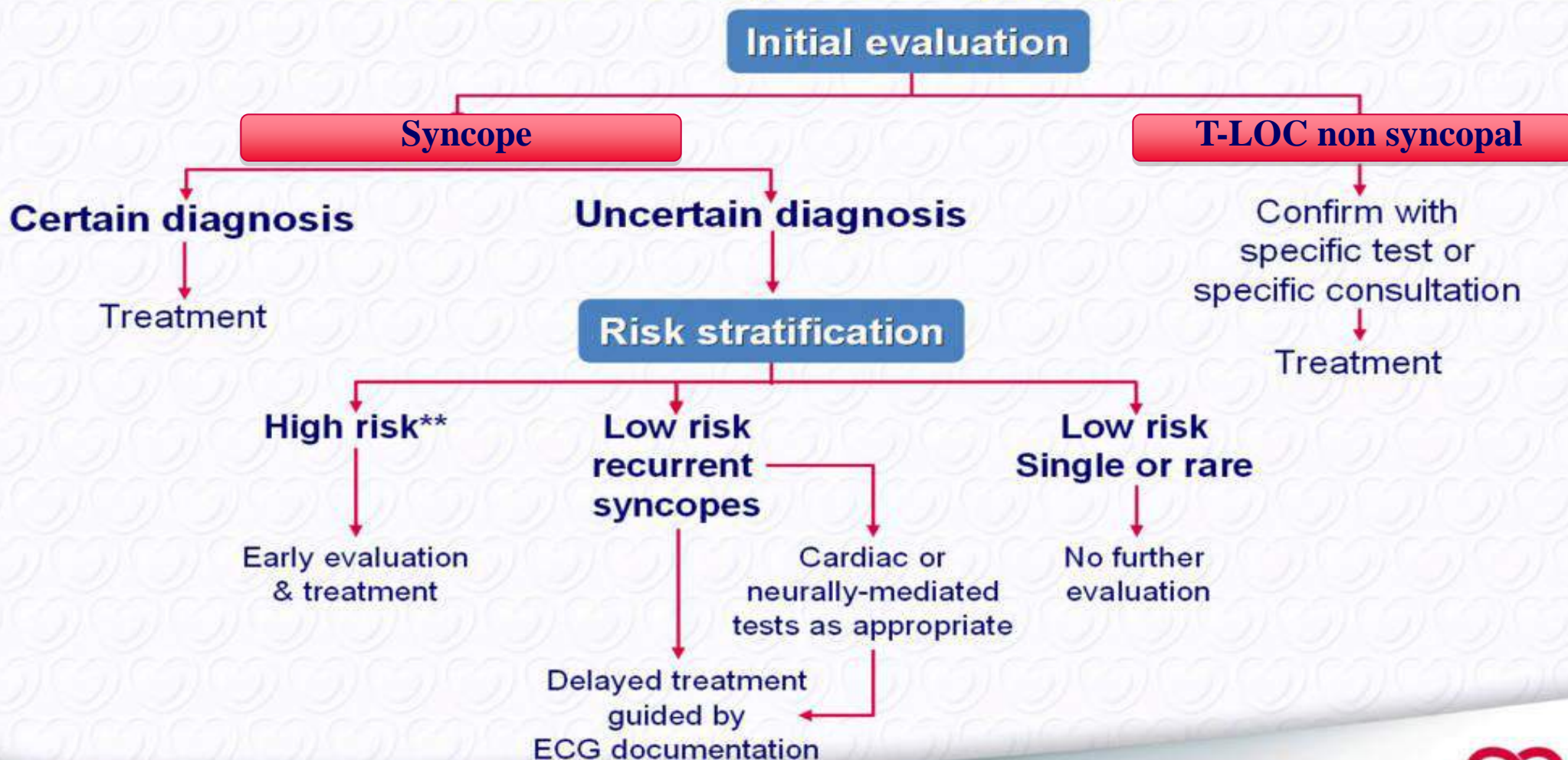


## Question #1

✓ **Syncope or non syncopal attack ?**

# Diagnostic flowchart in patients with suspected T-LOC

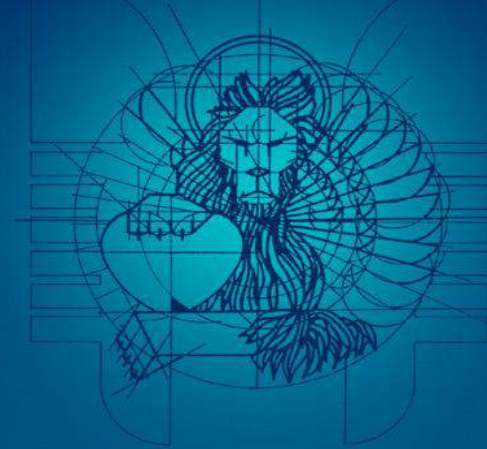
## T-LOC – suspected syncope





# Initial Evaluation

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## Question #2

✓ **What is the cause of syncope ?**

# Classification of syncope

## Reflex (neurally-mediated) syncope

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- Mediated by emotional distress: fear, pain, instrumentation, blood phobia.
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### Structural disease:

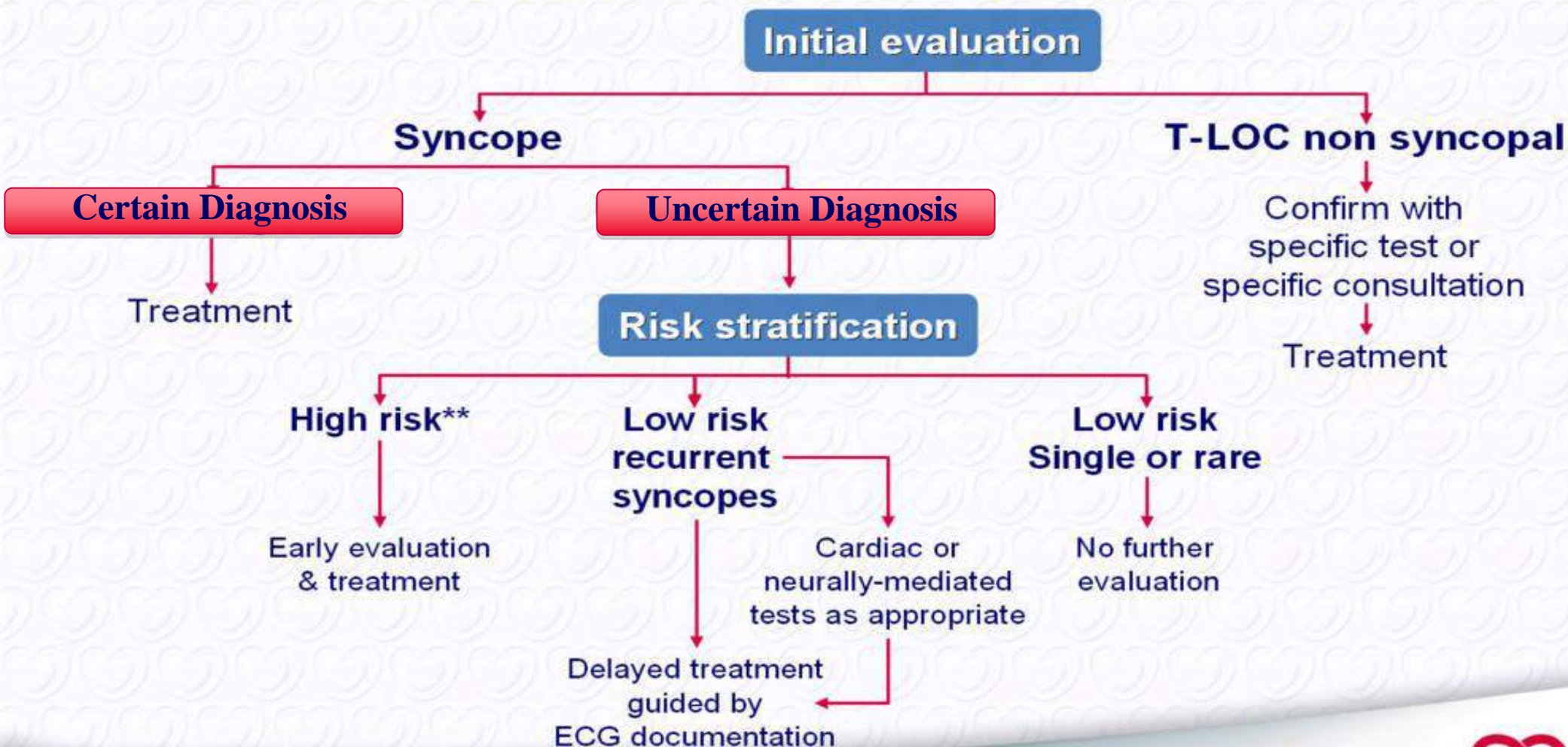
Cardiac: *cardiac valvular disease, acute myocardial infarction/ischaemia, hypertrophic cardiomyopathy, cardiac masses (atrial myxoma, tumors, etc), pericardial disease/tamponade, congenital anomalies of coronary arteries, prosthetic valves dysfunction.*

Others: *pulmonary embolus, acute aortic dissection, pulmonary hypertension.*



# Diagnostic flowchart in patients with suspected T-LOC

## T-LOC – suspected syncope





# Risk stratification

## Criteria suggestive of high risk of cardiovascular events or death

- Severe structural or coronary artery disease (HF, low EF or prior MI).
- Clinical or ECG features suggesting arrhythmic syncope:
  - Syncope during exercise or supine.
  - Palpitations at the time of syncope.
  - Family history of Sudden cardiac death (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  $\geq 120$  ms).
  - Inadequate sinus bradycardia ( $< 50$  bpm) or sino-atrial 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.
  - Family history of SCD.
- Important co-morbidities (severe anemia, electrolyte disturbance).



# Laboratory investigations



Cardiac cause likely or suspected

yes

## Cardiac evaluation

- Echocardiogram
- Exercise test
- ECG monitoring / ILR
- EP study
- Coro Angiography

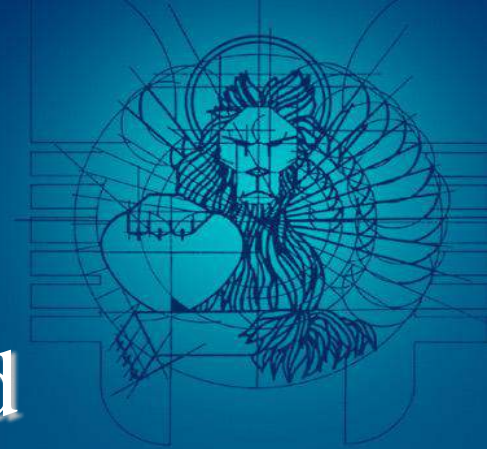
no

## NM evaluation

- Carotid sinus massage
- Tilt testing
- ATP test
- ILR

# Laboratory investigations

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Reflex Cause likely or suspected

yes

## Cardiac evaluation

- Echocardiogram
- Exercise test
- ECG monitoring / ILR
- EP study
- Coro Angiography

no

## NM evaluation

- Carotid sinus massage
- Tilt testing
- ATP test



# Recommendations

## Echocardiography

- **Indications:**

- Echocardiography is indicated for diagnosis and risk stratification in patients who are suspected of having structural heart disease.

- **Diagnostic criteria:**

- Echocardiography alone is diagnostic of the cause of syncope in severe aortic stenosis, obstructive cardiac tumours or thrombi, pericardial tamponade, aortic dissection and congenital anomalies of coronary arteries.

Class	Level
I	B
I	B

# Recommendations

## Exercise testing

- **Indications:**

- Exercise testing is indicated in patients who experience syncope during or shortly after exertion.

- **Diagnostic criteria:**

- Exercise testing is diagnostic when syncope is reproduced during or immediately after exercise in the presence of ECG abnormalities or severe hypotension.
- Exercise testing is diagnostic if Mobitz II 2nd degree or 3rd degree AV block develop during exercise even without syncope.

Class	Level
I	C
I	C
I	C



# Recommendations

## ECG monitoring

### ● Indications:

- ECG monitoring is indicated in patients with clinical or ECG features suggesting arrhythmic syncope.
- Immediate in-hospital monitoring (in bed or telemetric) is indicated in high risk patients.
- Holter monitoring is indicated in patients with frequent syncope or presyncope ( $\geq 1$  per week).
- ILR is indicated in:
  - An early phase of evaluation in patients with recurrent syncope of uncertain origin, absence of high-risk criteria and high likelihood of recurrence within battery longevity of the device. *→ especially older patients*
  - High-risk patients in whom a comprehensive evaluation did not demonstrate a cause of syncope or lead to a specific treatment.
- ILR should be considered to assess the contribution of bradycardia before to consider cardiac pacing in patients with suspected or certain reflex syncope presenting with frequent or traumatic syncopal episodes.
- External loop recorders should be considered in patients who have inter-symptom intervals  $\leq 4$  weeks.

Class Level

I	B
I	C
I	B
I	B
I	B
Ila	B
Ila	B

# Recommendations

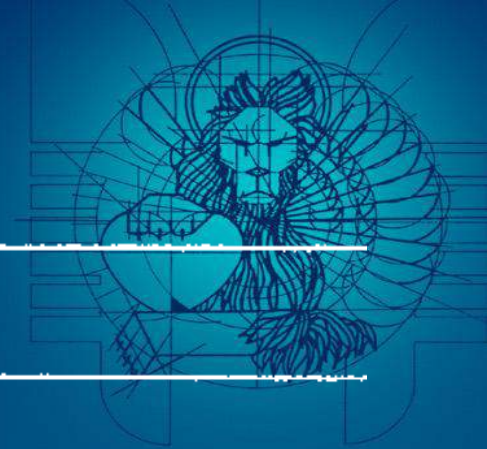
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## Indications

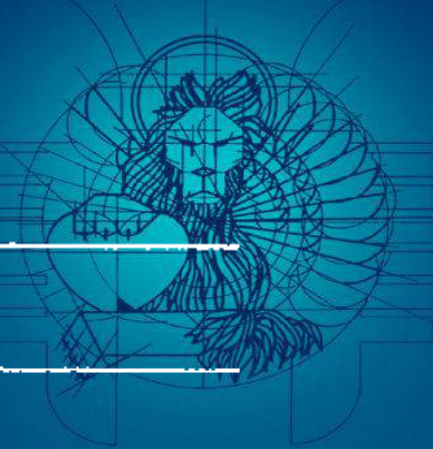
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### Class I

- An **invasive electrophysiological procedure** is indicated when the initial evaluation suggests an arrhythmic cause of syncope such as those listed in Tables 2.2 and 2.3 (in patients with abnormal electrocardiography and/or structural heart disease or syncope associated with palpitations or family history of sudden death).







## *Recommendations*

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### Indications

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#### **Class I**

In patients with syncope suspected to be due, directly or indirectly, to myocardial ischaemia, coronary angiography is recommended in order to confirm the diagnosis and to establish optimal therapy.

#### **Class III**

Angiography alone is rarely diagnostic of the cause of syncope.

# Recommendations

## Carotid sinus massage (CSM)

- **Indications:**

- CSM is indicated in patients > 40 years with syncope of unknown aetiology after initial evaluation.
- CSM should be avoided in patients with previous TIA or stroke within the past 3 months and in patients with carotid murmurs (except if carotid Doppler studies exclude significant stenosis).

- **Diagnostic criteria:**

- CSM is diagnostic if syncope is reproduced in presence of asystole longer than 3 s and/or fall in SBP > 50 mmHg.

Class Level

I

B

III

C

I

B



# Recommendations

## Tilt testing

### ● Indications:

- Tilt testing is indicated in case of unexplained single syncopal episode in high-risk settings\* or recurrent episodes in the absence of organic heart disease, after cardiac causes of syncope have been excluded.
- Tilt testing is indicated when it is needed to demonstrate susceptibility to reflex syncope to the patient.
- Tilt testing should be considered to discriminate between reflex and OH syncope.
- Tilt testing may be considered for differentiating syncope with jerking movements from epilepsy.
- Tilt testing may be indicated for evaluating patients with recurrent unexplained falls.
- Tilt testing may be indicated for evaluating patients with frequent syncope and psychiatric disease.
- Tilt testing is not recommended for assessment of treatment.
- Isoproterenol tilt testing is contraindicated in patients with ischaemic heart disease

Class	Level
<b>I</b>	<b>B</b>
<b>I</b>	<b>C</b>
<b>IIa</b>	<b>C</b>
<b>IIb</b>	<b>C</b>
<b>IIb</b>	<b>C</b>
<b>IIb</b>	<b>C</b>
<b>III</b>	<b>B</b>
<b>III</b>	<b>C</b>

\*occurrence of, or potential risk for, physical injury or with occupational implications.





## Recommendations—Investigation of Vasovagal Syncope

	Class	Level
Tilt-table testing can be useful for assessing patients with suspected vasovagal syncope who lack a confident diagnosis after the initial assessment.	IIa	B-NR
Tilt-table testing is a reasonable option for differentiating between convulsive syncope and epilepsy, for establishing a diagnosis of pseudosyncope, and for testing patients with suspected vasovagal syncope but without clear diagnostic features.	IIa	B-NR
Implantable loop recorders (ILRs) can be useful for assessing older patients with recurrent and troublesome syncope who lack a clear diagnosis and are at low risk of a fatal outcome.	IIa	B-R
Tilt testing is not recommended for predicting the response to specific medical treatments for vasovagal syncope.	III	B-R



# Recommendations

## Adenosine triphosphate test (ATP)

- **Indications:**

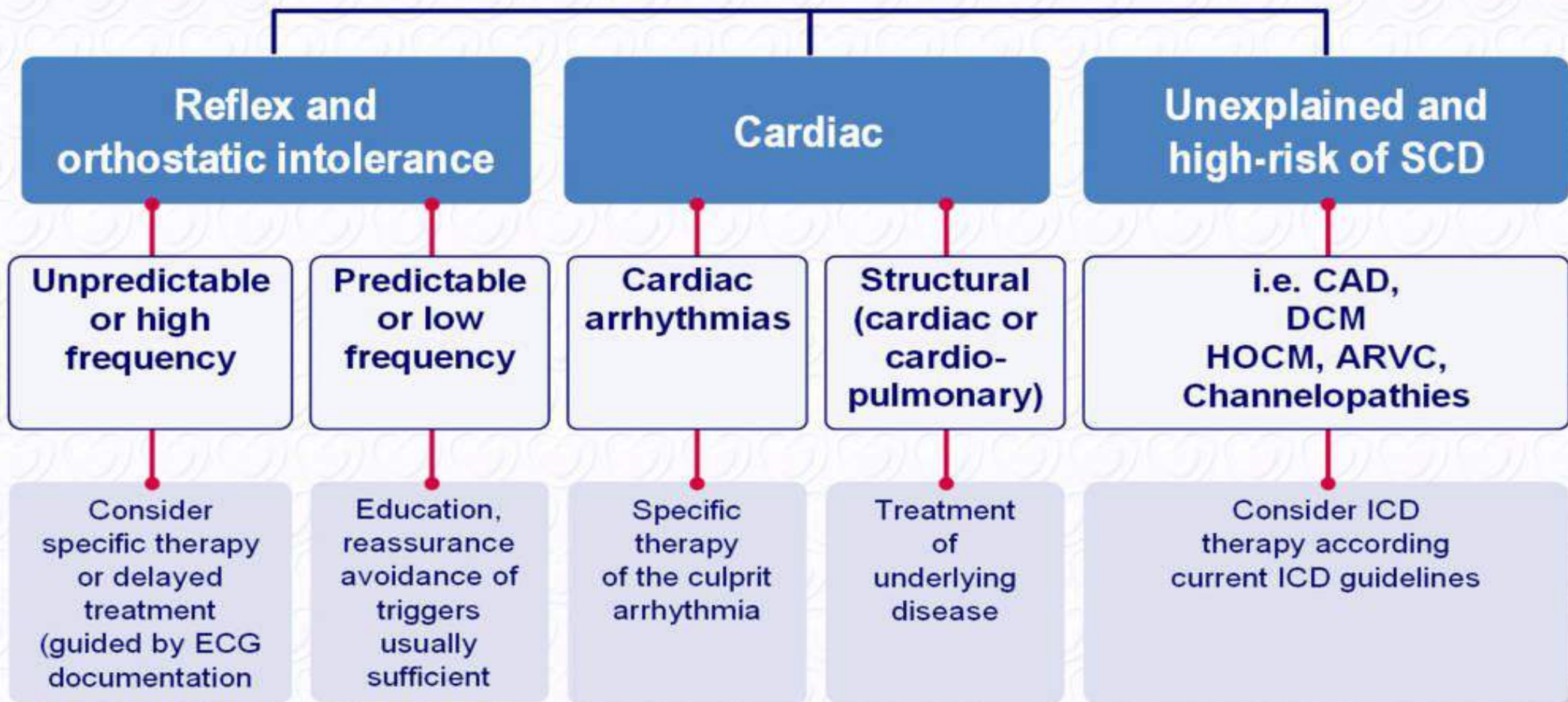
- Owing to lack of correlation with spontaneous syncope, ATP test cannot be used as a diagnostic test to select patients for cardiac pacing.

Class Level

III	B
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# Treatment of syncope

## Diagnostic evaluation





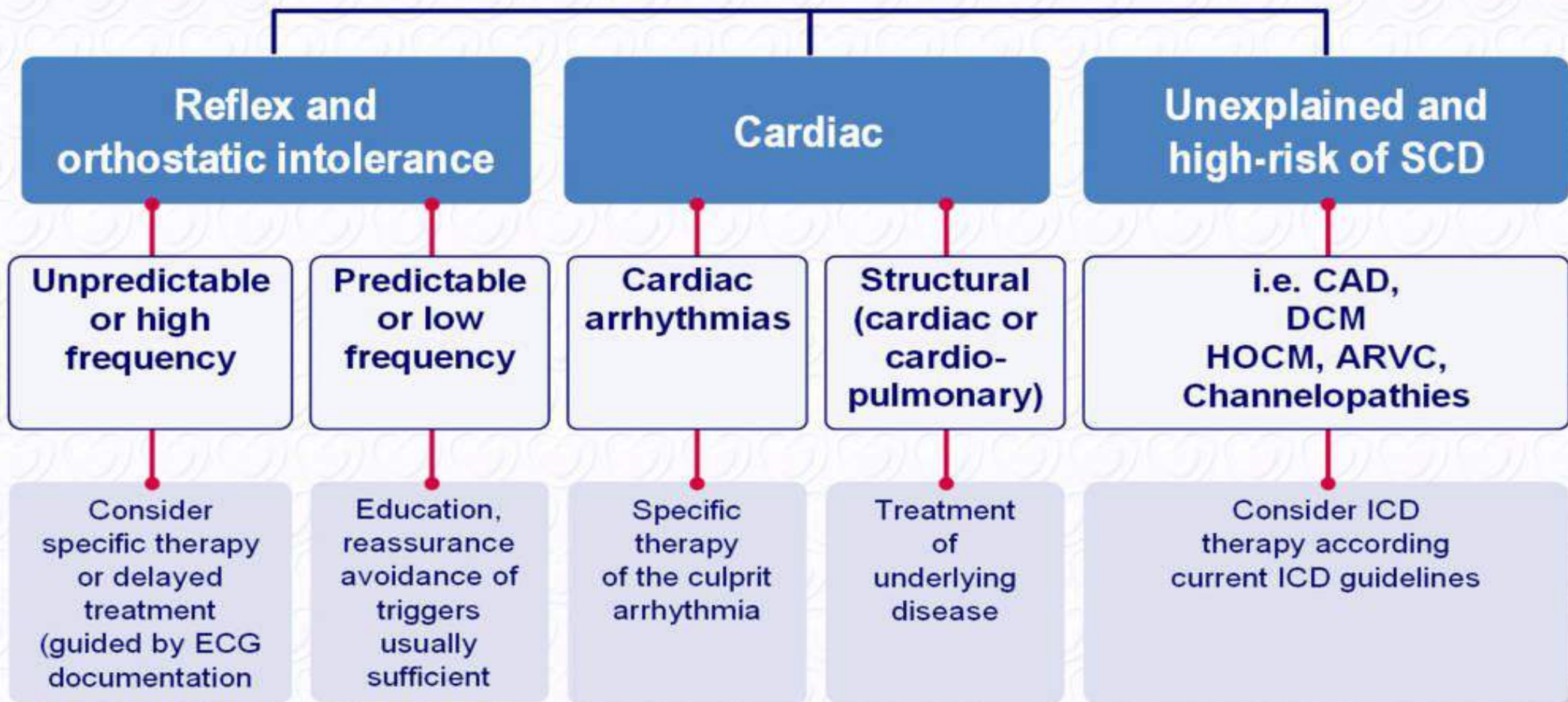


## Recommendations—Lifestyle and Medical Treatment for Vasovagal Syncope

	Class	Level
Education, reassurance, and promoting salt and fluid intake are indicated for patients with vasovagal syncope, unless contraindicated.	I	E
Reducing or withdrawing medications that can cause hypotension can be beneficial for patients with vasovagal syncope.	IIa	E
Physical counterpressure maneuvers can be useful for patients with vasovagal syncope who have a sufficiently long prodromal period.	IIa	B-R
The use of fludrocortisone seems reasonable for patients with frequent vasovagal syncope who lack contraindications for its use.	IIb	E
Beta-blockers may be considered for patients older than 40 years with frequent vasovagal syncope.	IIb	B-R
The use of midodrine seems reasonable for patients with frequent vasovagal syncope and no hypertension or urinary retention.	IIb	B-R

# Treatment of syncope

## Diagnostic evaluation





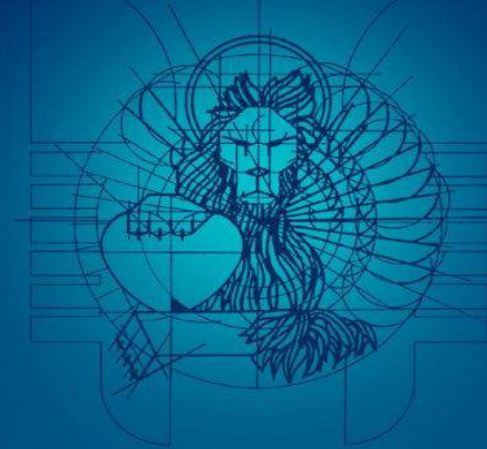
# **Syncope Unit: rationale and requirement – the European Heart Rhythm Association position statement endorsed by the Heart Rhythm Society**

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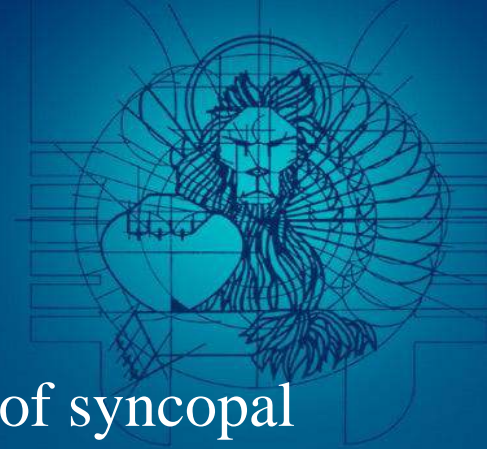
# Syncope Unit / Definition



- ✓ A facility featuring a standardized approach to the diagnosis and management of T-LoC and related symptoms, with dedicated staff and access to appropriate diagnostics and therapies.

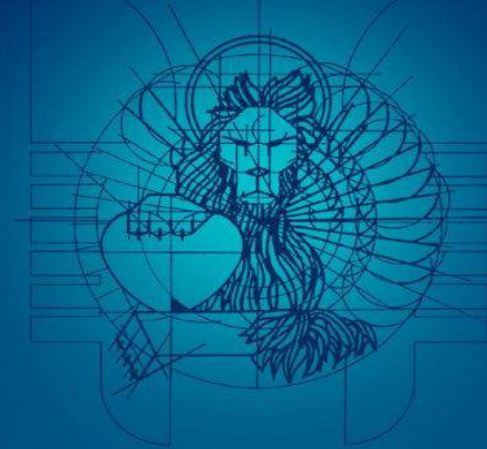


# Syncope Unit / Objectives



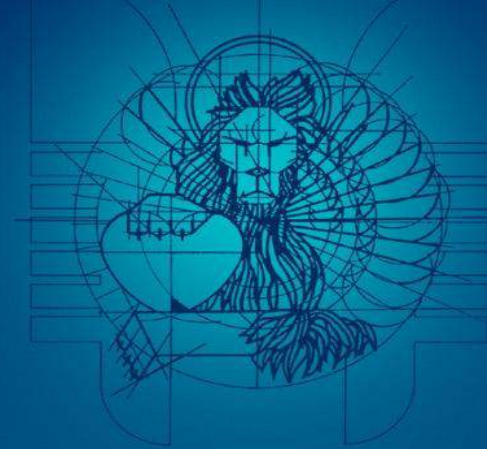
- ✓ Provide state-of-the-art guideline-based assessment of syncopal patients in order to risk-stratify them, obtain an aetiological diagnosis, assess prognosis, and initiate adequate therapy.
- ✓ Perform directly the core laboratory tests and have preferential access to hospitalization, diagnostic tests, and therapeutic procedures.
- ✓ Reduce hospitalizations and costs related to syncope management.

# Syncope Unit / Conclusions



- ✓ The Introduction of Syncope Units has led to a more appropriate use of diagnostic tests, a reduction of undiagnosed cases, a decrease of hospitalization and a considerable improvement in diagnostic yield and cost-effectiveness (that is cost per reliable diagnosis), with resultant more efficient management of patients with syncope.





## Section 3: Vasovagal Syncope

### Definition

Syncope is defined as a transient loss of consciousness, associated with an inability to maintain postural tone, rapid and spontaneous recovery, and the absence of clinical features specific to another form of transient loss of consciousness such as epileptic seizure. “Clinical features” indicates all the information obtained from the history, physical signs, and feasible, reasonable, limited investigations such as an ECG.



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## Recommendations—Investigation of Vasovagal Syncope

	Class	Level
Tilt-table testing can be useful for assessing patients with suspected vasovagal syncope who lack a confident diagnosis after the initial assessment.	IIa	B-NR
Tilt-table testing is a reasonable option for differentiating between convulsive syncope and epilepsy, for establishing a diagnosis of pseudosyncope, and for testing patients with suspected vasovagal syncope but without clear diagnostic features.	IIa	B-NR
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## Recommendations—Lifestyle and Medical Treatment for Vasovagal Syncope

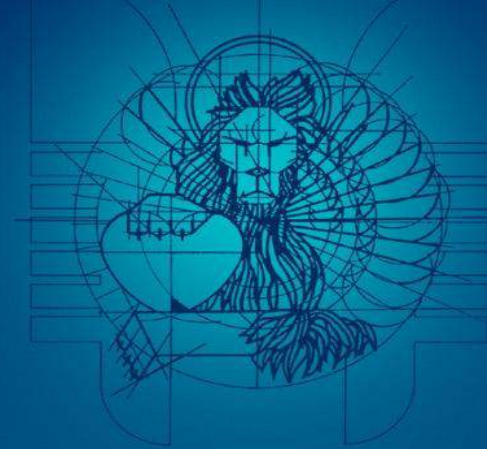
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## Recommendations—Pacemakers for Syncope

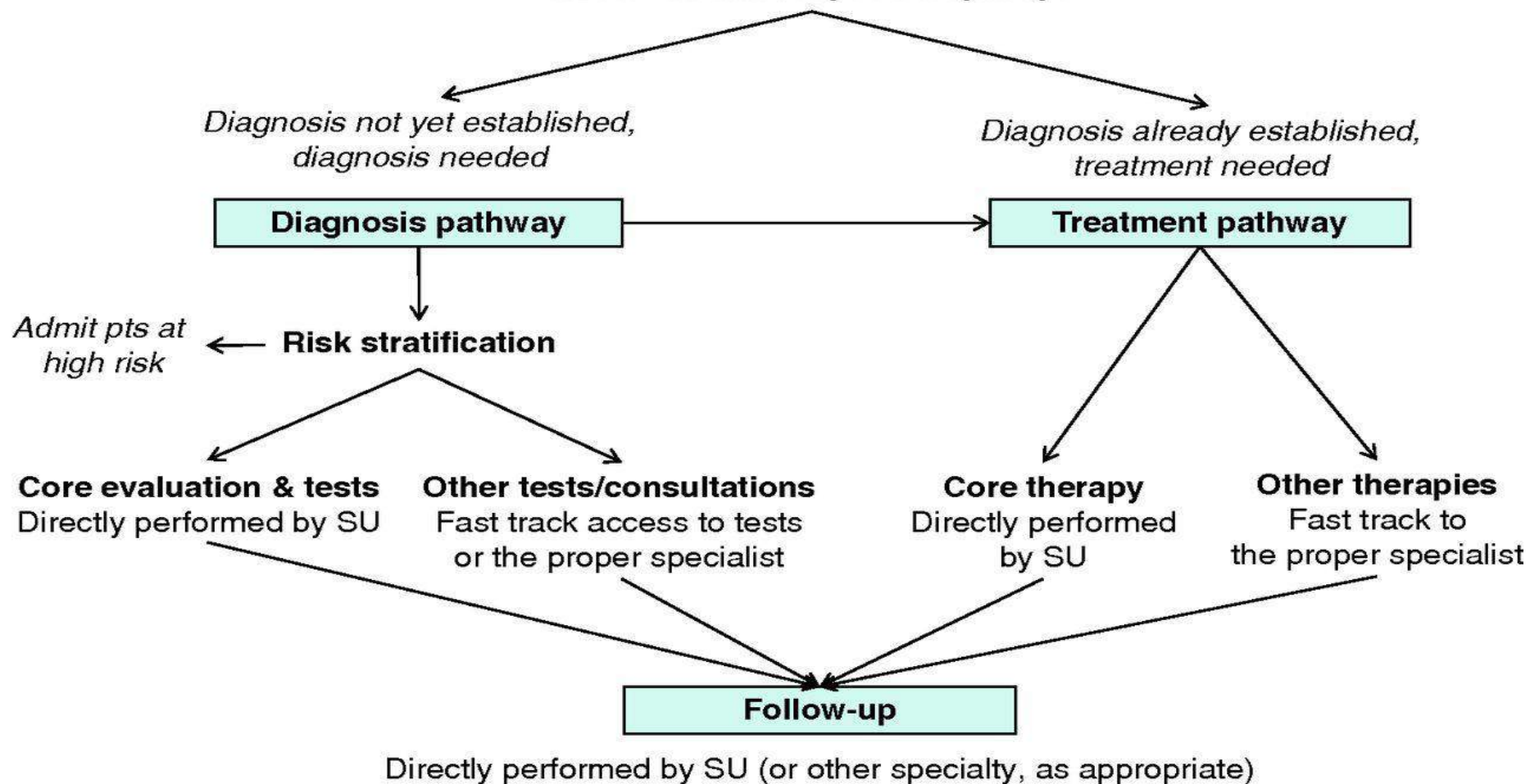
	Class	Level
Dual-chamber pacing can be effective for patients 40 years of age or older with recurrent and unpredictable syncope who have a documented pause $\geq 3$ seconds during clinical syncope or an asymptomatic pause $\geq 6$ seconds.	IIa	B-R
Tilt-table testing may be considered to identify patients with a hypotensive response who would be less likely to respond to permanent cardiac pacing.	IIb	B-NR
Pacing may be considered for pediatric patients with recurrent syncope with documented symptomatic asystole who are refractory to medical therapy.	IIb	B-R
Dual-chamber pacing may be considered in adenosine-susceptible older patients who have unexplained syncope without a prodrome, a normal ECG, and no structural heart disease.	IIb	C





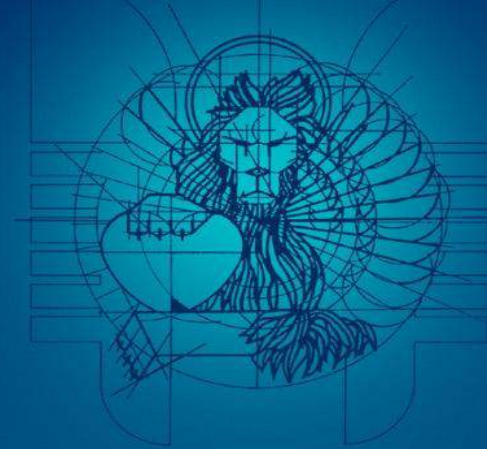
**Framework for a comprehensive management of patients with T-LOC of certain/suspected syncopal nature referred to the SU. Core evaluation and therapy depend on each model of care delivery, with a minimum acceptable set described in Consensus Statement 1.**

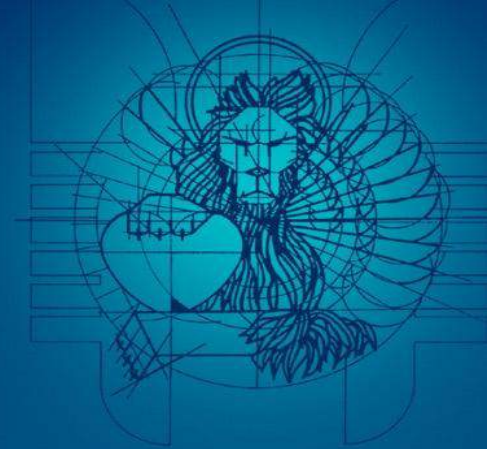
**TLOC–certain/suspected syncope**



Rose Anne Kenny et al. *Europace* 2015;europaev115











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	Class	Level
Tilt-table testing can be useful for assessing patients with suspected vasovagal syncope who lack a confident diagnosis after the initial assessment.	IIa	B-NR
Tilt-table testing is a reasonable option for differentiating between convulsive syncope and epilepsy, for establishing a diagnosis of pseudosyncope, and for testing patients with suspected vasovagal syncope but without clear diagnostic features.	IIa	B-NR
Implantable loop recorders (ILRs) can be useful for assessing older patients with recurrent and troublesome syncope who lack a clear diagnosis and are at low risk of a fatal outcome.	IIa	B-R
Tilt testing is not recommended for predicting the response to specific medical treatments for vasovagal syncope.	III	B-R