

ADVANCES IN CARDIAC ARRHYTHMIAS and GREAT INNOVATIONS IN CARDIOLOGY

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Università degli Studi di Torino



Azienda Ospedaliera
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Diagnostic flowchart and management of patients with unexplained syncope

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Definizione

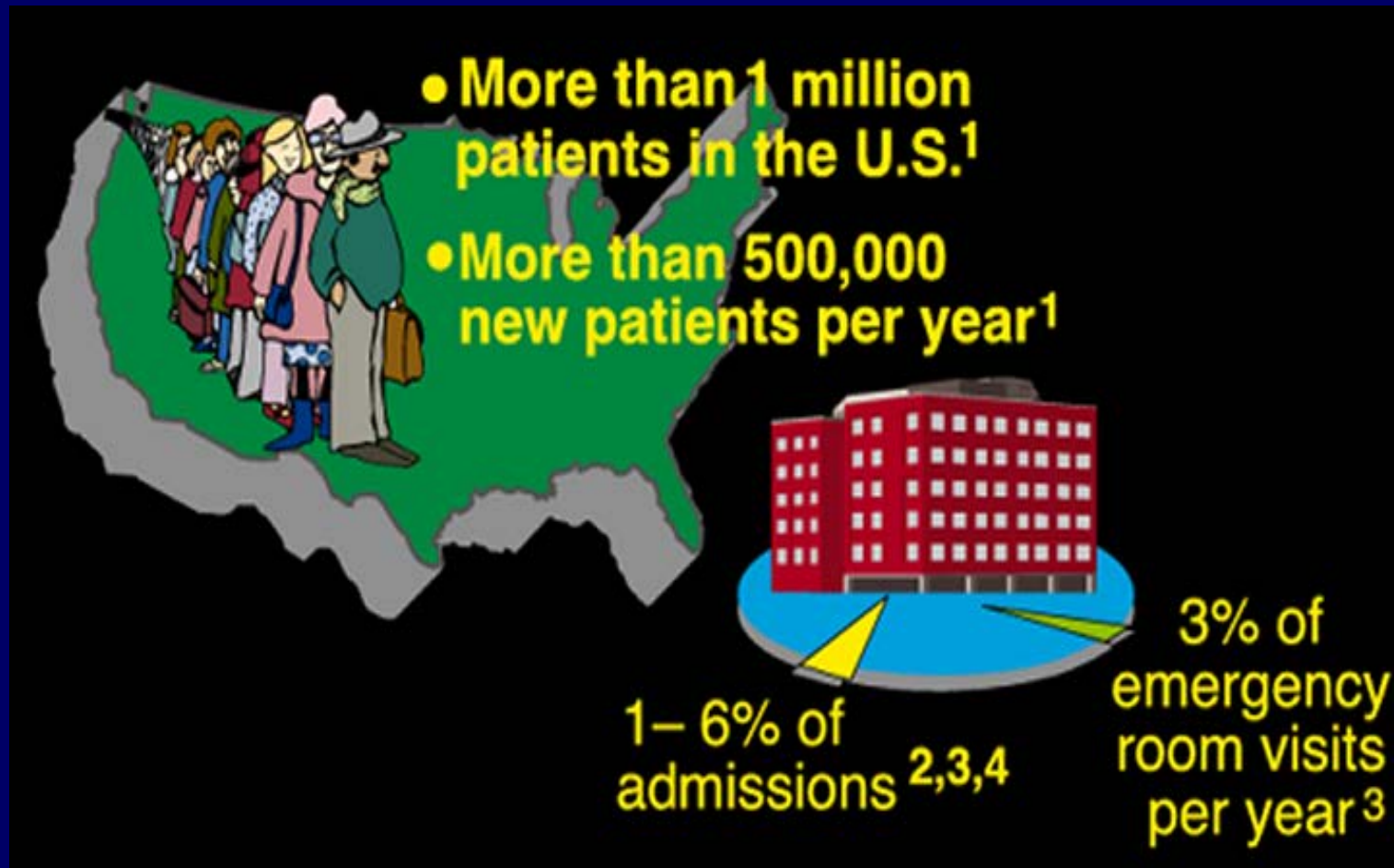
La sincope è un sintomo, le cui caratteristiche cliniche che la definiscono sono:

- transitorio
- fine spontanea
- porta a caduta
- insorgenza relativamente rapida
- recupero spontaneo, completo e generalmente veloce.

Il meccanismo sottostante è una ipoperfusione cerebrale globale transitoria



The Significance of Syncope



¹ National Disease and Therapeutic Index on Syncope and Collapse, ICD-9-CM780.2, IMS America, 1997

² Blanc JJ, L'her C, Touiza A, et al. Eur Heart J, 2002; 23: 815-820.

³ Day SS, et al, AM J of Med 1982

⁴ Kapoor W. Evaluation and outcome of patients with syncope. Medicine 1990;69:160-175

STATE-OF-THE-ART PAPER

New Concepts in the Assessment of Syncope

Michele Brignole, MD,* Mohamed H. Hamdan, MD†

Table 1

Syncope Frequency Depends on the Setting in Which the Measurement Is Made

Setting	Incidence (per 1,000 patient-years)	Ratio
General population	18–40	1
Seeking medical evaluation	9.3–9.5	1:2–1:4
Referred for specialty evaluation	3.6	1:5–1:10
Referred to emergency department	0.7–1.8	1:10–1:50



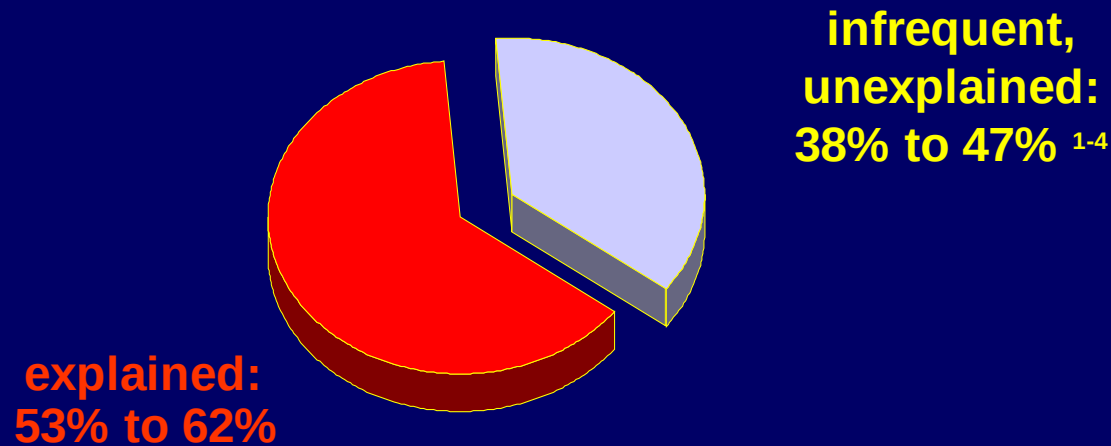
Syncope

Reported Frequency

- Individuals <18 yrs **15%**
- Military Population 17- 46 yrs **20-25%**
- Individuals 40-59 yrs* **16-19%**
- Individuals >70 yrs* **23%**



The Significance of Syncope



- 500,000 new syncope patients each year ⁵
- 170,000 have recurrent syncope ⁶
- 70,000 have recurrent, infrequent, unexplained syncope ¹⁻⁴



¹ Kapoor W, *Med.* 1990;69:160-175.

² Silverstein M, et al. *JAMA.* 1982;248:1185-1189.

³ Meislin G, et al. *Ann Emerg. Med.* 1984;12:499-504.

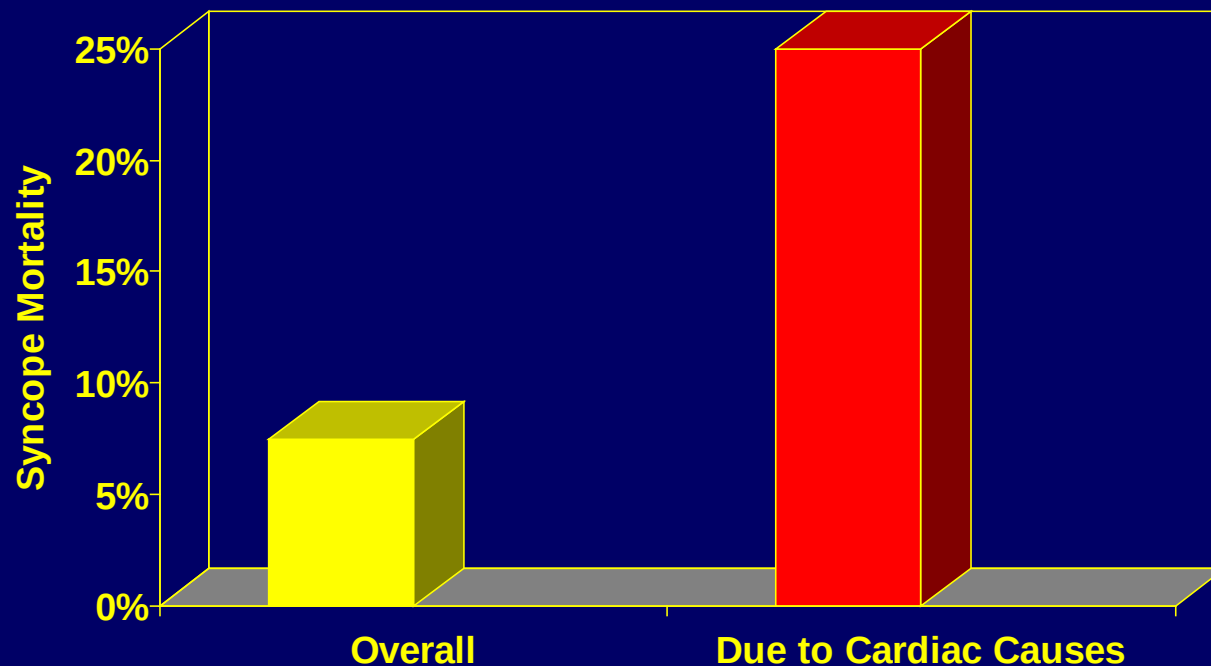
⁴ Kapoor W, et al. *N Eng J Med.* 1983;309:197-204.

⁵ National Disease and Therapeutic Index, IMS America, Syncope and Collapse #780.2; Jan 1997-Dec 1997.

⁶ Kapoor W, et al. *Am J Med.* 1987;83:760-768.

The Significance of Syncope

- Some causes of syncope are potentially fatal
- Cardiac causes of syncope have the highest mortality rates



¹ Day SC, et al. *Am J of Med* 1982;73:15-23.

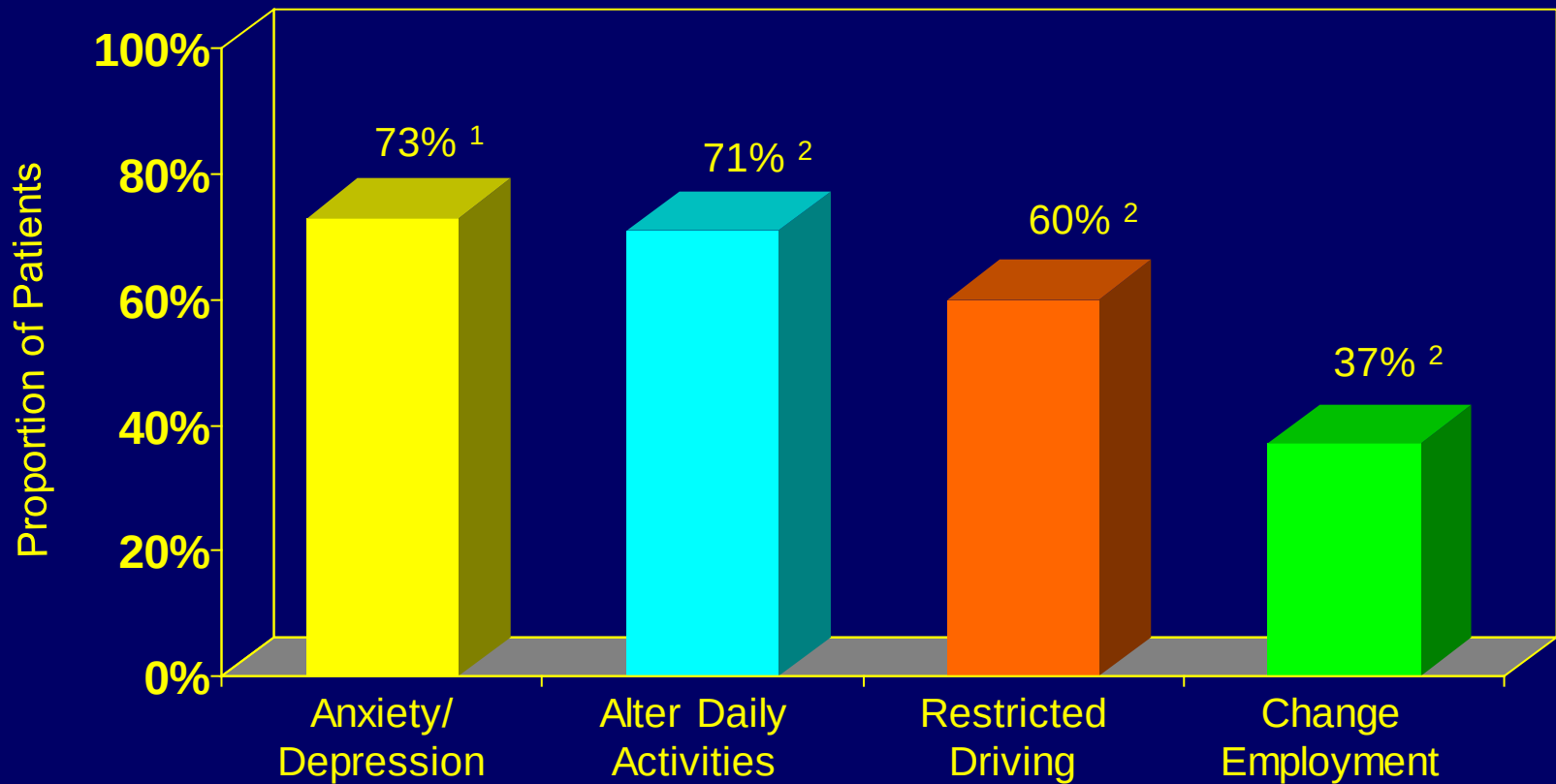
² Kapoor W. *Medicine* 1990;69:160-175.

³ Silverstein M, Sager D, Mulley A. *JAMA*. 1982;248:1185-1189.

⁴ Martin G, Adams S, Martin H. *Ann Emerg Med*. 1984;13:499-504.



Impact of Syncope



¹Linzer, *J Clin Epidemiol*, 1991.

²Linzer, *J Gen Int Med*, 1994.

STATE-OF-THE-ART PAPER

New Concepts in the Assessment of Syncope

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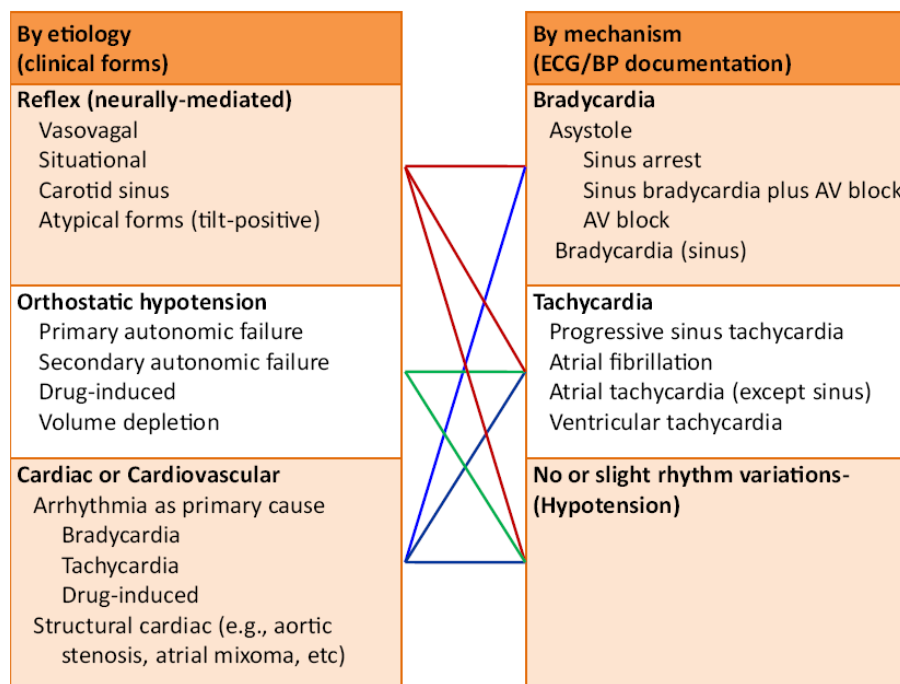


Figure 1

**Classification of Syncope According to Etiology (Modified by ESC Guidelines [1])
Versus Classification According to Mechanism (Modified by ISSUE Classification [7])**

AV = atrioventricular; BP = blood pressure; ECG = electrocardiogram; ESC = European Society of Cardiology; ISSUE = International Study on Syncope of Uncertain Etiology.





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)¹, Heart Failure Association (HFA)², and Heart Rhythm Society (HRS)³

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

Authors/Task Force Members, Angel Moya (Chairperson) (Spain)^{*}, Richard Sutton (Co-Chairperson) (UK)^{*}, Fabrizio Ammirati (Italy), Jean-Jacques Blanc (France), Michele Brignole¹ (Italy), Johannes B. Dahm (Germany), Jean-Claude Deharo (France), Jacek Gajek (Poland), Knut Gjesdal² (Norway), Andrew Krahn³ (Canada), Martial Massin (Belgium), Mauro Pepi (Italy), Thomas Pezawas (Austria), Ricardo Ruiz Granell (Spain), Francois Sarasin⁴ (Switzerland), Andrea Ungar⁶ (Italy), J. Gert van Dijk⁷ (The Netherlands), Edmond P. Walma (The Netherlands), Wouter Wieling (The Netherlands)

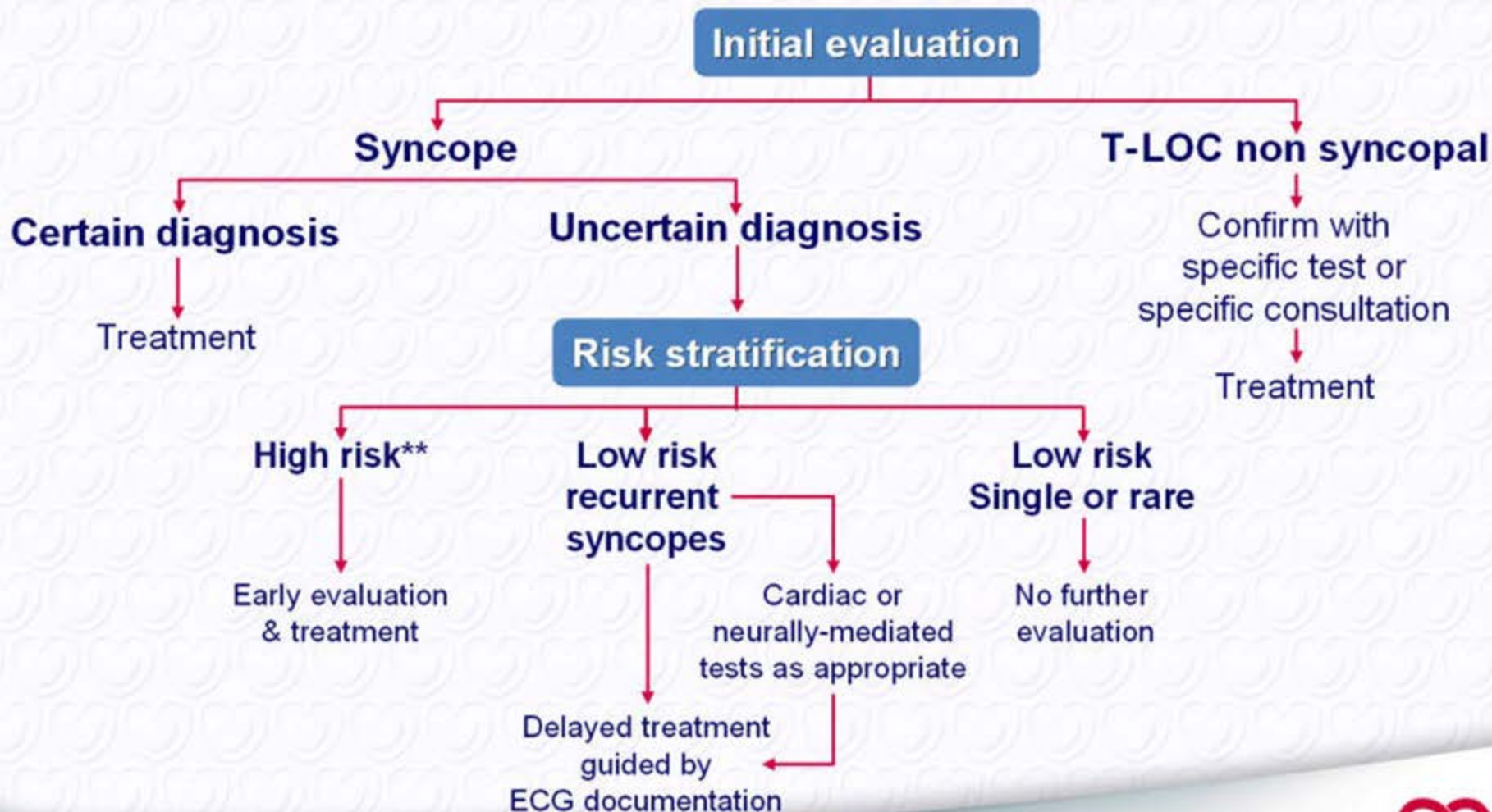
External Contributors, Haruhiko Abe (Japan), David G. Benditt (USA), Wyatt W. Decker (USA), Blair P. Grubb (USA), Horacio Kaufmann⁹ (USA), Carlos Morillo (Canada), Brian Olshansky (USA), Steve W. Parry (UK), Robert Sheldon (Canada), Win K. Shen (USA)

ESC Committee for Practice Guidelines (CPG), Alec Vahanian (Chairperson) (France), Angelo Auricchio (Switzerland), Jeroen Bax (The Netherlands), Claudio Ceconi (Italy), Veronica Dean (France), Gerasimos Filippatos (Greece), Christian Funck-Brentano (France), Richard Hobbs (UK), Peter Kearney (Ireland), Theresa McDonagh (UK), Keith McGregor (France), Bogdan A. Popescu (Romania), Zeljko Reiner (Croatia), Udo Sechtem (Germany), Per Anton Sirnes (Norway), Michal Tendera (Poland), Panos Vardas (Greece), Petr Widimsky (Czech Republic)



Diagnostic flowchart in patients with suspected T-LOC

T-LOC – suspected syncope





Diagnosi

Valutazione Iniziale
Test diagnostici



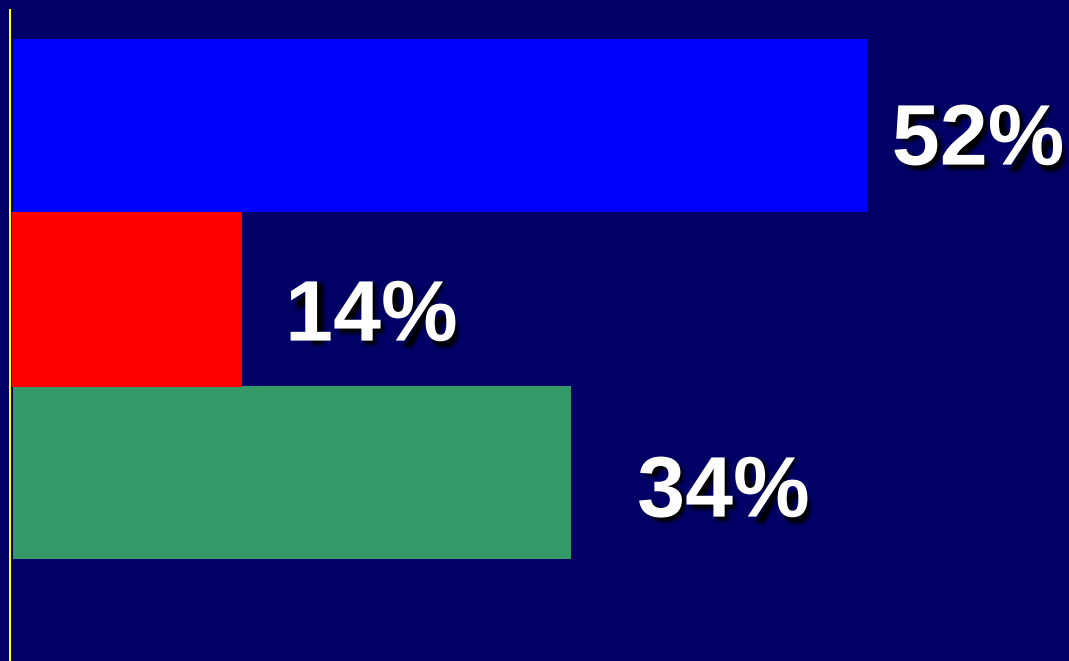


Resa Diagnostica

Valutazione iniziale

Test diagnostici

Non determinata



**Dati raccolti da 7 studi di popolazione negli
anni '80 (N = 1607)**





Resa Diagnostica

Valutazione iniziale

26%

Test diagnostici

56%

Non determinata

18%

Dati raccolti da Syncope Units (N = 342)





Valutazione Iniziale

3 domande chiave:

Domanda #1

- **Sincope o attacco non sincopale ?**

Domanda #2

- **E' presente o assente patologia cardiaca ?**

Domanda #3

- **Com'è l'anamnesi riguardante la sincope ?**





Classificazione della Perdita di Coscienza Transitoria

Perdita di coscienza transitoria apparente o reale

Sincope:

- Sindromi sincopali riflesse neuromediate.
- Ortostatica
- Aritmie cardiache come causa primaria
- Patologie strutturali cardiache e cardiopolmonari
- Cerebrovascolari

Eventi non sincopali:

- Con perdita di coscienza
- Senza perdita di coscienza





Cause di Attacchi non-sincopali (Comunemente diagnosticati come Sincope)

- **Patologie associate ad alterazione o perdita di coscienza**
 - Disordini metabolici, inclusi ipoglicemia, ipossia, iperventilazione con ipocapnia
 - Epilessia
 - Intossicazione
 - Attacco ischemico transitorio vertebro-basilare (TIA)
- **Patologie simil-sincopali senza perdita di coscienza**
 - Catalessia
 - Drop attack
 - ‘Sincopi’ psicogene (patologie da somatizzazione)
 - TIA di origine carotidea





Valutazione Iniziale

3 domande chiave:

Domanda #1

- **Sincope o attacco non sincopale ?**

Domanda #2

- **E' presente o assente patologia cardiaca ?**

Domanda #3

- **Com'è l'anamnesi riguardante la sincope ?**





Stratificazione Prognostica

Una patologia cardiaca strutturale è il più importante fattore predittivo di mortalità totale e morte improvvisa nei pazienti con sincope.





Stratificazione Prognostica

Prognosi scadente:

- **Patologia cardiaca strutturale**
(indipendentemente dalla causa di sincope)

Prognosi eccellente:

- **Giovani sani con ECG normale**
- **Sincope neuromediata**
- **Ipotensione ortostatica**
- **Sincope indeterminata**





Stratificazione Prognostica

Stratificazione del rischio:

- età >45
- anamnesi di scompenso cardiaco
- anamnesi di aritmie ventricolari
- ECG patologico

*Aritmie o morte entro un anno :
dal 4-7% dei pazienti con 0 fattori
al 58-80% in pazienti con ≥ 3 fattori*





Valutazione Iniziale

3 domande chiave:

Domanda #1

- **Sincope o attacco non sincopale ?**

Domanda #2

- **E' presente o assente patologia cardiaca ?**

Domanda #3

- **Com'è l'anamnesi riguardante la sincope ?**





Valutazione Iniziale

Caratteristiche anamnestiche importanti

1 - Domande circa le circostanze appena prima dell'evento

- Posizione (supina, seduta o in piedi)
- Attività (supina, durante o dopo esercizio)
- Situazione (minzione, defecazione, tosse o deglutizione)
- Fattori predisponenti (es.luoghi caldi e affollati, posizione ortostatica prolungata, periodo post-prandiale)
- Eventi precipitanti (paura,dolore intenso,movimenti del collo)

2 – Domande riguardanti l'insorgenza dell'evento

- Nausea, vomito, sensazione di freddo, sudorazione, aura, dolore alla testa o alle spalle

3 – Domande riguardanti l'evento (testimoni)

- Colore della cute (pallore,cianosi)
- Durata della perdita di coscienza
- Movimenti (tonico-clonici, ecc)
- Morsicatura della lingua;





Valutazione Iniziale

Importanti caratteristiche anamnestiche

5 - Domande riguardanti la fine dell'evento

- Nausea, vomito, sudorazione, sensazione di freddo, confusione, dolori muscolari, colore della cute, ferite

6 - Domande riguardanti il background

- Numero e durata delle sincopi
- Storia familiare di patologia aritmica
- Presenza di patologia cardiaca
- Anamnesi neurologica (M. di Parkinson, epilessia, narcolessia)
- Anamnesi internistica (diabete, ecc.)
- Farmaci (farmaci antiipertensivi o antidepressivi)





Valutazione Iniziale

Criteri diagnostici

- Sincope vasovagale: viene diagnosticata se eventi precipitanti come paura, intenso dolore, stress emotivo, ortostatismo prolungato si associano ai tipici sintomi prodromici.
- Sincope situazionale viene diagnosticata se la sincope intercorre durante o immediatamente dopo minzione, defecazione, tosse o deglutizione.
- Sincope ortostatica viene diagnosticata quando c'è documentazione di ipotensione ortostatica associata a sincope e presincope





Valutazione Iniziale

Criteri diagnostici ECG

Sincope dovuta ad aritmie cardiache viene diagnosticata in caso di:

- **Bradicardia sinusale sintomatica <40 bpm o blocchi senoatriali ripetitivi o pause sinusali >3 s**
- **Blocco atrioventricolare 2° Mobitz II o 3° grado**
- **Blocco di branca destro e sinistro alternante**
- **Tachicardia sopraventricolare e ventricolare parossistica rapida**
- **Malfunzionamento del pacemaker con pause**





Valutazione Iniziale

Criteri diagnostici ECG

Sincope dovuta ad ischemia cardiaca

Viene diagnosticata quando i sintomi sono presenti con una evidenza ECG di ischemia miocardica acuta con o senza infarto miocardico, indipendentemente dal suo meccanismo(*)

**** Il meccanismo può essere cardiaco (bassa gittata o aritmia) o riflesso (riflesso di Bezold-Jarish), ma il trattamento è essenzialmente quello dell'ischemia.***



Diagnostic tests





Indagini Diagnostiche

Patologia cardiaca certa o sospetta

si

Valutazione cardiaca

- Ecocardiografia
- Monitoraggio ECG
- Test ergometrico
- Studio elettrofisiologico
- Impianto loop-recorder

no

Valutazione SNA

- Massaggio seni carotidei
- Tilt test
- test ATP
- Impianto loop-recorder





Indagini Diagnostiche

***Utili
(quando indicate)***

Massaggio del seno carotideo
Tilt test
Ecocardiografia
Holter
Studio elettrofisiologico
Test ergometrico
Loop recorder impiantabile

Generalmente non utili

EEG
TAC & RMN
Ecografia TSA
Potenziali tardivi
Coronarografia
Scintigrafia polmonare



Resa Diagnostica

Test	APPROPRIATI	DIAGNOSTICI	NND
Anamnesi/E.obiett/ PA clino-orto	308 (100%)	47 (15%)	7
Ecg	241 (78%)	25 (10%)	10
Ecocardiografia	103 (33%)	3 (3%)	34
Monitoraggio ECG	82 (27%)	13 (16%)	6
Test ergometrico	22 (7%)	1 (5%)	22
MSC	177 (57%)	44 (24%)	4
Tilt test	161 (52%)	94 (58%)	2
Test ATP	47 (15%)	7 (15%)	7
SEF	51 (17%)	14 (27%)	4

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



Carotid sinus massage: “Method of Symptoms”

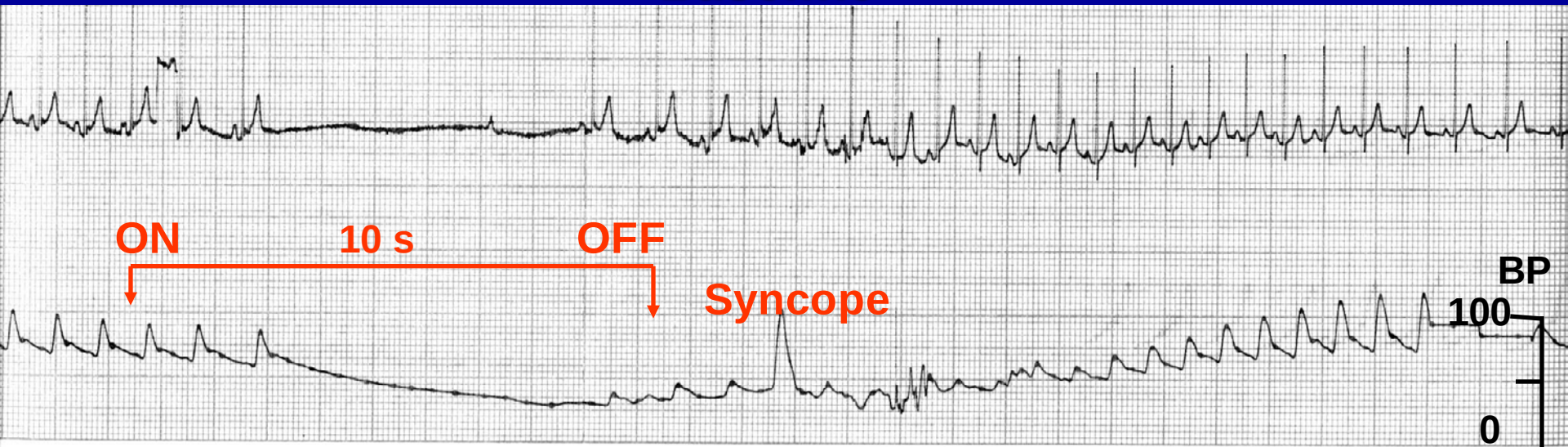
CSM sequence:

- Supine right massage 10 sec
- Supine left massage 10 sec
- Orthostatic blood pressure drop
- Standing right massage 10 sec
- Standing left massage 10 sec
- (in case of asystole) massage repeated after atropine 0.02 mg/Kg i.v.

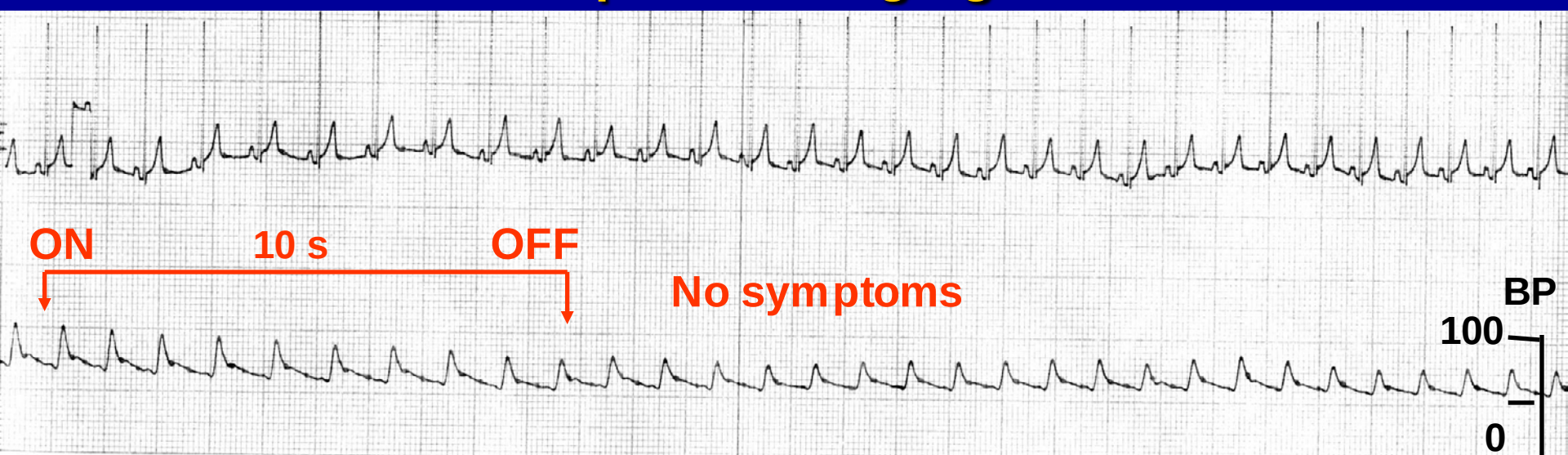


“Method of Symptoms”: CI form

Baseline



Atropine 0.02 mg/Kg i.v.



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

Electrophysiological study (EPS)

• Indications:

- In patients with ischaemic heart disease, EPS is indicated when initial evaluation suggests an arrhythmic cause of syncope unless there is already an established indication for ICD.
- In patients with BBB, EPS should be considered when non invasive tests failed to make the diagnosis.
- In patients with syncope preceded by sudden and brief palpitations non invasive tests failed to make the diagnosis.
- In patients with Brugada syndrome, ARVC and hypertrophic cardiomyopathy (in selected cases).
- In patients with high-risk occupations requiring to exclude a CV cause (in selected cases).
- EPS is not recommended in patients with normal ECG, no heart disease and no palpitations.

Class	Level
I	B
IIa	B
IIb	B
IIb	C
IIb	C
III	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

I B

I C

IIa C

IIb C

IIb C

IIb C

III B

III C



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

www.escardio.org/guidelines

European Heart Journal 2009;30:2631-2671

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Recommendations

Tilt testing

- **Methodology:**

- Supine pre-tilt phase of at least 5 min, when no venous cannulation, and of at least 20 min, when cannulation is undertaken, is recommended.
- Tilt angle between 60° to 70° is recommended.
- Passive phase of a minimum of 20 min and a maximum of 45 min is recommended.
- For nitroglycerine, a fixed dose of 300-400 µg sublingually administered in the upright position is recommended.
- For isoproterenol, an incremental infusion rate from 1 up to 3 µg/min in order to increase average heart rate by about 20-25% over baseline is recommended.

Class	Level
I	C
I	B
I	B
I	B
I	B



Tilt test: The Italian Protocol

- Stabilization phase
5 min, supine
- Passive phase
20 min, 60 degree tilt angle
- Drug phase
15 min after oral NTG 400 mcg spray

Test positive if syncope occurs



Recommendations

Tilt testing

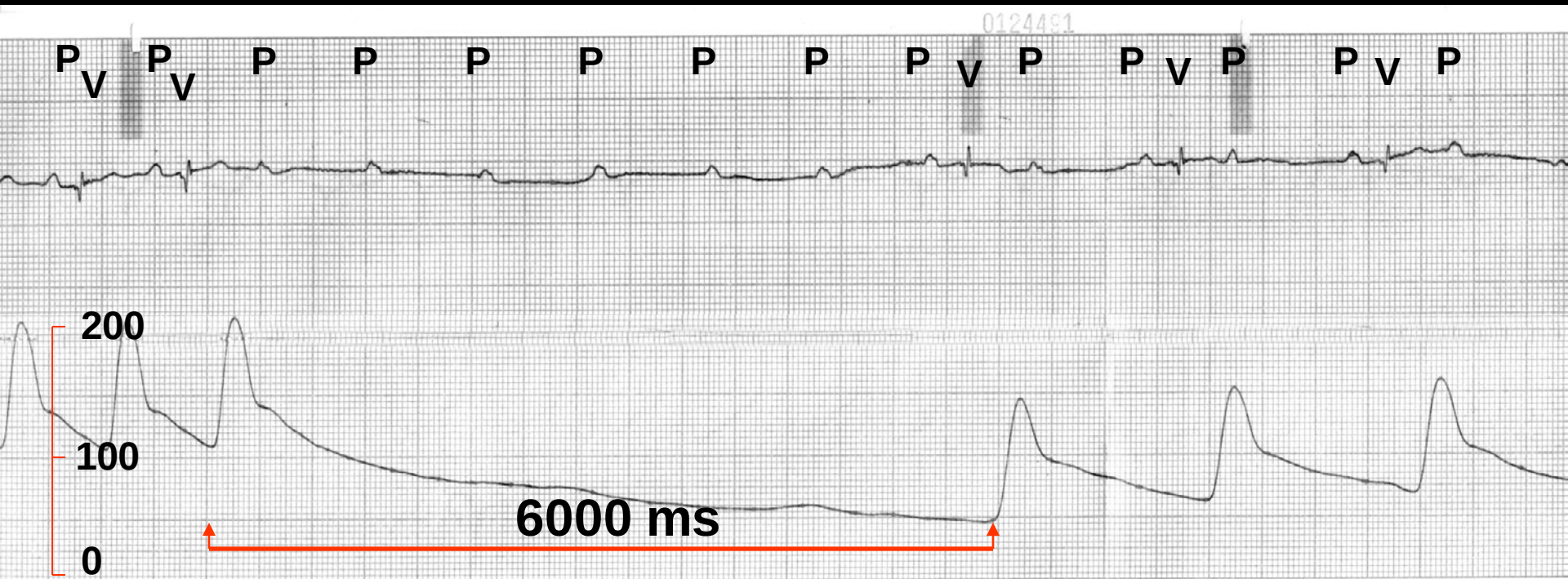
- **Diagnostic criteria:**

- In patients without structural heart disease, the induction of reflex hypotension/bradycardia **with** reproduction of syncope or progressive OH (with or without symptoms) are diagnostic of reflex syncope and OH respectively.
- In patients without structural heart disease, the induction of reflex hypotension/bradycardia **without** reproduction of syncope may be diagnostic of reflex syncope.
- In patients without structural heart disease, arrhythmia or other cardiovascular cause of syncope should be excluded prior to considering positive tilt test results as diagnostic.
- Induction of LOC in absence of hypotension and/or bradycardia should be considered diagnostic of psychogenic pseudo syncope.

Class	Level
I	B
IIa	B
IIa	C
IIa	C



ATP test



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 (≥ 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.
 - 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 ≤ 4 weeks.

Class Level

I	B
I	C
I	B
I	B
I	B
IIa	B
IIa	B

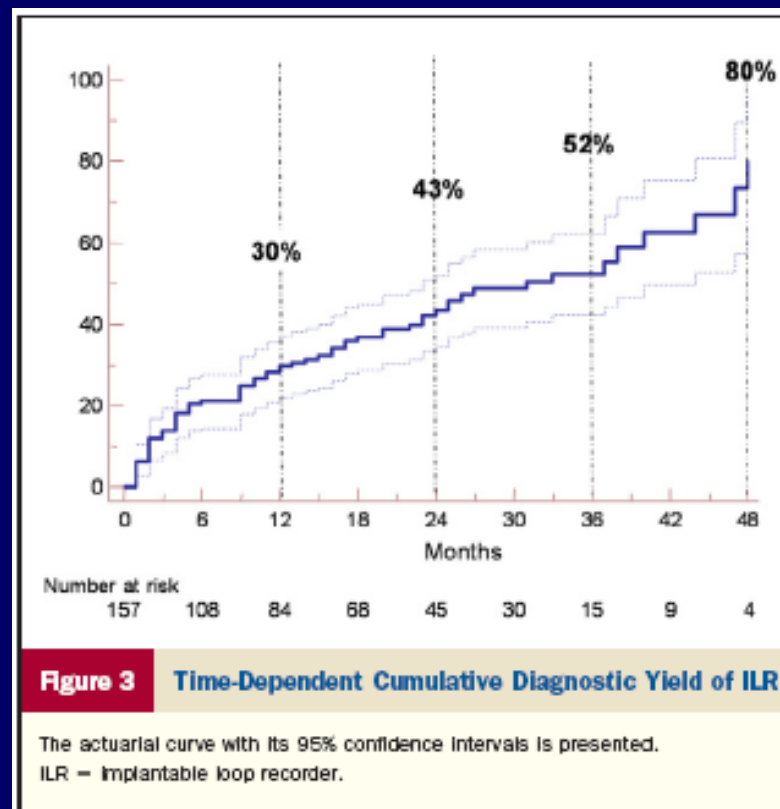


STATE-OF-THE-ART PAPER

New Concepts in the Assessment of Syncope

Michele Brignole, MD,* Mohamed H. Hamdan, MD†

Resa diagnostica del loop recorder impiantabile



RAST Methods

- Prospective randomized trial
 - 60 patients with unexplained syncope referred for cardiac investigation
- Inclusion:
 - Recurrent unexplained syncope
 - Referred to the arrhythmia service for cardiac investigation
 - No clinical diagnosis after history, physical, ECG and at least 24 hours of cardiac monitoring
- Exclusion:
 - LVEF < 35%
 - Unable to give informed consent
 - Major morbidity precluding one year of follow up



RAST Results

Unexplained Syncope
n=60

ILR
n=30

Conventional
n=30

In Follow-up
n=3

Diagnosed
n=14

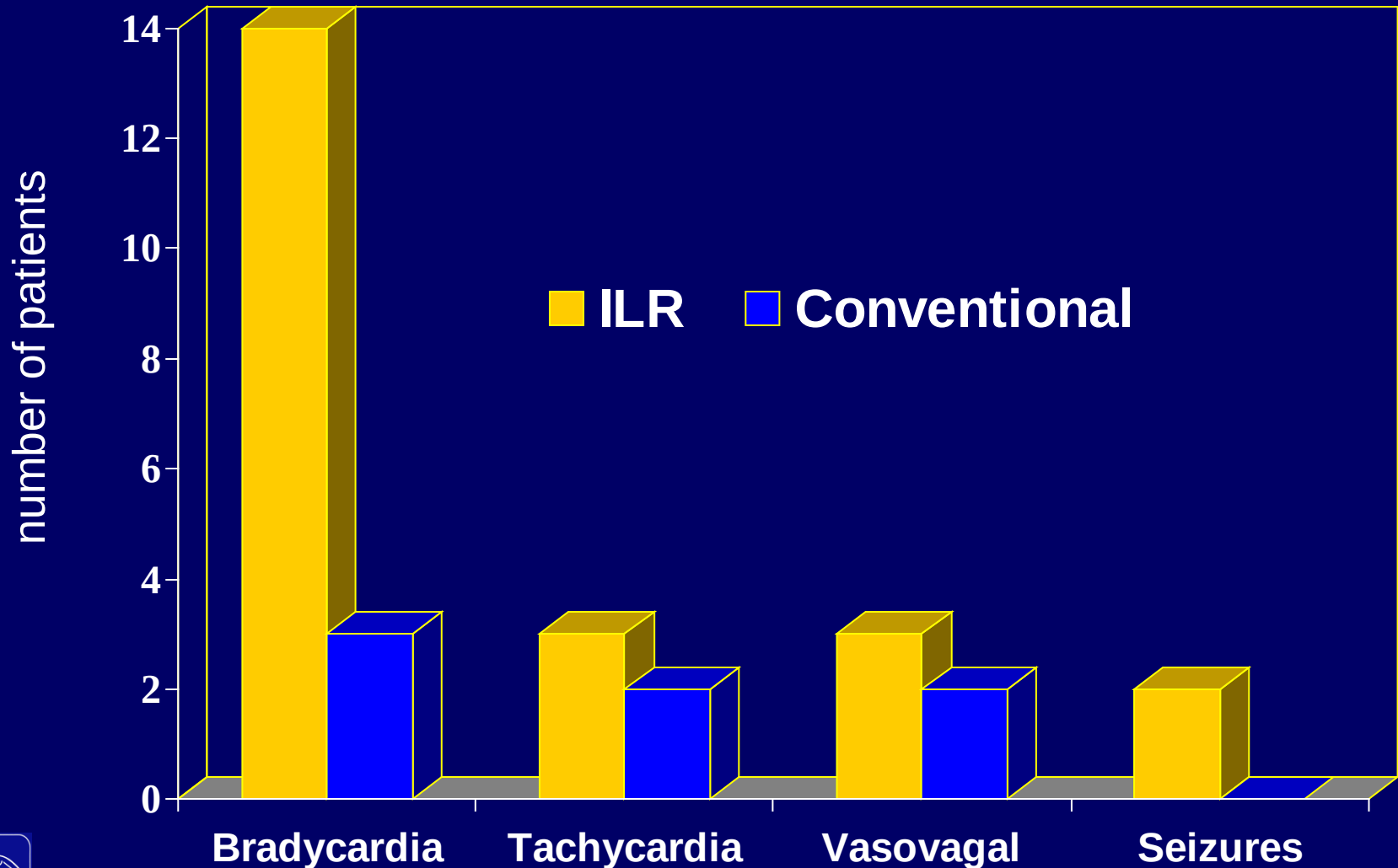
Undiagnosed
n=13

Diagnosed
n=6

Undiagnosed
n=24



RAST - Diagnoses

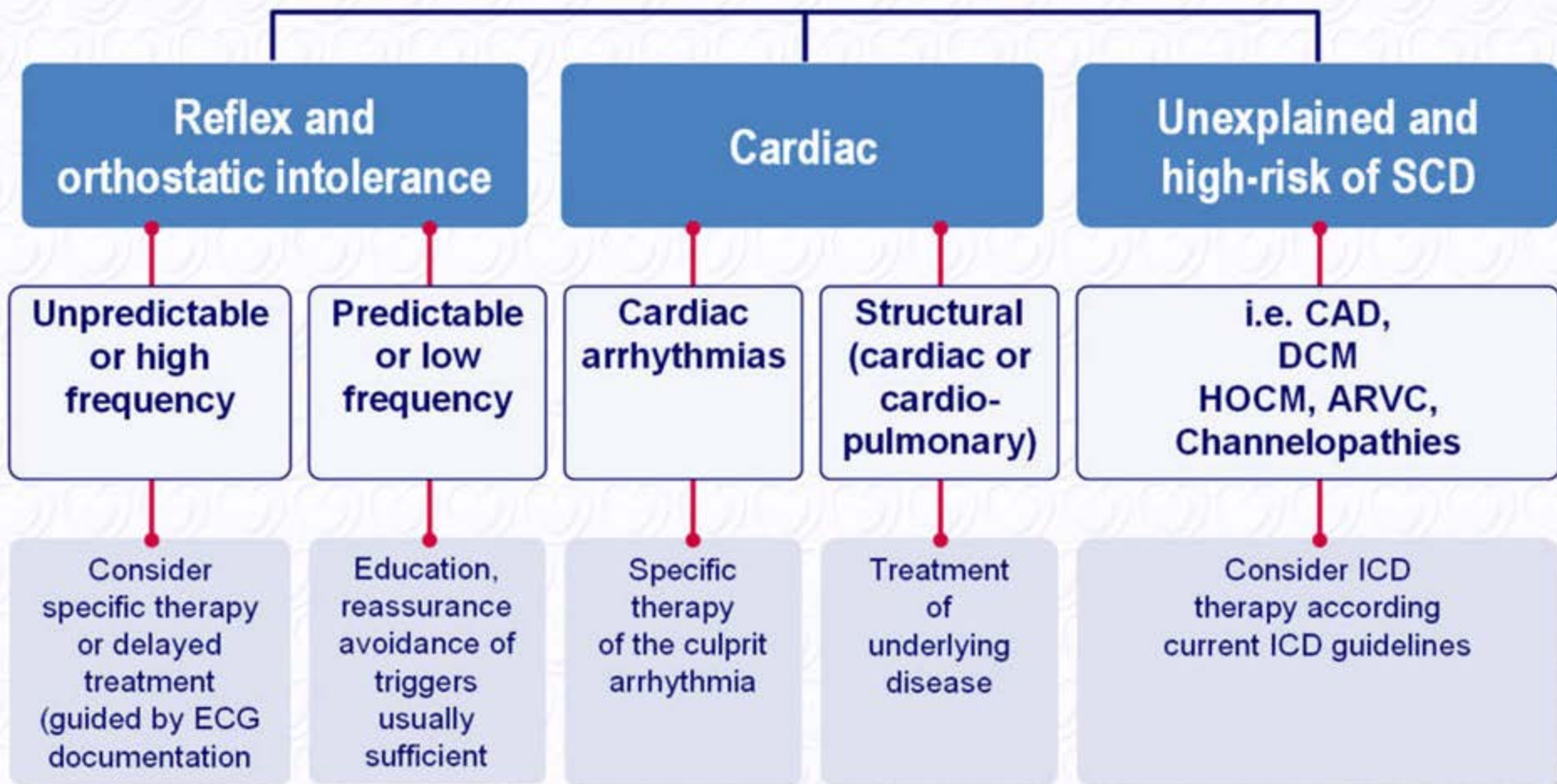


Treatment



Treatment of syncope

Diagnostic evaluation



Treatment of reflex syncope

- Explanation of the diagnosis, provision of reassurance and explanation of risk of recurrence are indicated in all patients.
- Isometric counterpressure manoeuvres are indicated in patients with prodrome.
- Cardiac pacing should be considered in patients with dominant cardioinhibitory CSS.
- Cardiac pacing should be considered in patients with frequent recurrent reflex syncope, age > 40 years and documented spontaneous cardioinhibitory response during monitoring.
- Midodrine may be indicated in patients with VVS refractory to lifestyle measures.
- Tilt training may be useful for education of patients but long-term benefit depends on compliance.
- Cardiac pacing may be indicated in patients with tilt-induced cardioinhibitory response with recurrent frequent unpredictable syncope and age > 40 after alternative therapy has failed.
- Cardiac pacing is not indicated in the absence of a documented cardio-inhibitory reflex.
- Beta-adrenergic blocking drugs are not indicated.

Class	Level
I	C
I	B
IIa	B
IIa	B
IIa	C
IIb	B
IIb	C
III	C
III	A



Instruction sheet for the patient

Istruzioni sulle manovre di contropressione

Usi queste manovre come misura preventiva o quando avverte qualche sintomo di una sincope incipiente. Le esegua regolarmente, anche quando non avverte sintomi.



Hand grip consiste nella contrazione volontaria e massimale di una palla di gomma (approssimativamente del diametro di 5-6 cm) tenuta nella mano dominante per il tempo massimo tollerato o fino alla completa scomparsa dei sintomi.

Leg crossing consiste nell'incrociare le gambe combinando la contrazione dei muscoli delle gambe e dell'addome per il massimo tempo tollerato o fino alla scomparsa dei sintomi.



Arm tensing consiste nella massima contrazione isometrica tollerata delle due braccia ottenuta agganciando una mano all'altra e tirando contemporaneamente verso l'esterno per il massimo tempo tollerato o fino alla completa scomparsa dei sintomi



Treatment of orthostatic hypotension

- Adequate hydration and salt intake must be maintained.
- Midodrine should be administered as adjunctive therapy if needed.
- Fludrocortisone should be administered as adjunctive therapy if needed.
- PCM may be indicated.
- Abdominal binders and/or support stockings to reduce venous pooling may be indicated.
- Head-up tilt sleeping ($> 10^\circ$) to increase fluid volume may be indicated.

Class	Level
I	C
IIa	B
IIa	C
IIb	C
IIb	C
IIb	C



Syncope due to cardiac arrhythmias

Recommendations

Treatment of syncope due to cardiac arrhythmias

- Syncope due to cardiac arrhythmias must receive treatment appropriate to the cause

Class	Level
I	B



Treatment of syncope due to cardiac arrhythmias (1)

Cardiac pacing

- Pacing is indicated in patients with sinus node disease in whom syncope is demonstrated to be due to sinus arrest (symptom-ECG correlation) without a correctable cause.
- Pacing is indicated in sinus node disease patients with syncope and abnormal CSNRT.
- Pacing is indicated in sinus node disease patients with syncope and asymptomatic pauses > 3 s (with possible exceptions of young trained persons, during sleep and in medicated patients).
- Pacing is indicated in patients with syncope and 2nd degree Mobitz II, advanced or complete AV block.
- Pacing is indicated in patients with syncope, BBB and positive EPS.
- Pacing should be considered in patients with unexplained syncope and BBB.
- Pacing may be indicated in patients with unexplained syncope and sinus node disease with persistent sinus bradycardia itself asymptomatic.
- Pacing is not indicated in patients with unexplained syncope without evidence of any conduction disturbance.

Class	Level
I	C
I	C
I	C
I	B
I	B
IIa	C
IIb	C
III	C



Treatment of syncope due to cardiac arrhythmias (2)

Catheter ablation

- Catheter ablation is indicated in patients with symptom/arrhythmia ECG correlation in both SVT and VT in the absence of structural heart disease (with exception of atrial fibrillation)
- Catheter ablation may be indicated in patients with syncope due to the onset of rapid atrial fibrillation

Class	Level
I	C
IIb	C



Treatment of syncope due to cardiac arrhythmias (3)

Antiarrhythmic drug therapy

- Antiarrhythmic drug therapy, including rate control drugs, is indicated in patients with syncope due to onset of rapid atrial fibrillation
- Drug therapy should be considered in patients with symptom/arrhythmia ECG correlation in both SVT and VT when catheter ablation cannot be undertaken or has failed

Class	Level
I	C
IIa	C



Treatment of syncope due to cardiac arrhythmias (4)

Implantable Cardioverter Defibrillator

- ICD is indicated in patients with documented VT and structural heart disease.
- ICD is indicated when sustained monomorphic VT is induced at EPS in patients with previous myocardial infarct.
- ICD should be considered in patients with documented VT and inherited cardiomyopathies or channelopathies.

Class	Level
I	B
I	B
IIa	B



Syncope in paediatric patients (1)

- Diagnostic evaluation in paediatric patients is similar to that in adults.
- Reflex syncope represents the vast majority of the aetiology, but in rare cases, syncope is the manifestation of life-threatening cardiac arrhythmia or structural abnormalities.
- Syncope should also be differentiated from epilepsy and psychogenic pseudosyncope which are rare but important causes of T-LOC in paediatric patients.
- The cornerstone of therapy for young patients with reflex syncope includes education and reassurance.



The Significance of Syncope

The only difference between
syncope and sudden death
is that in one you wake up

George Engel, M.D. (1913–1999)

