

# Setting the scene - overview Syncope

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MISA and TCD

## Setting the scene - overview Syncope

- Arrhythmia – important / small contribution
- Syncope – QOL
- Related symptoms
- CGA – Physiological adjunct

### Definition (1)



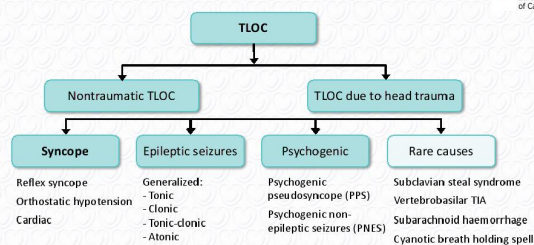
- **Syncope** is a TLOC, due to *transient global cerebral hypoperfusion*, characterized by rapid onset, short duration and spontaneous complete recovery.

### Definition (2)



- **Transient loss of consciousness (TLOC)** is a state of real or apparent loss of consciousness with loss of awareness, characterized by amnesia for the period of unconsciousness, abnormal motor control, loss of responsiveness, and a short duration.
- **TLOC is syncope** when there is:
  - a) presence of features specific for reflex, orthostatic hypotension, or cardiac syncope, *and*;
  - b) absence of features specific for other forms of TLOC.

### Classification



### Classification Reflex (neurally-mediated) syncope



- **Vasovagal:**
  - orthostatic VVS: standing, less common sitting,
  - emotional: fear, pain (somatic or visceral), instrumentation, blood phobia.
- **Situational:**
  - micturition,
  - gastrointestinal stimulation (swallow, defaecation),
  - cough, sneeze,
  - post-exercise,
  - others (e.g. laughing, brass instrument playing).
- **Carotid sinus syndrome.**
- **Non-classical forms** (without prodromes and/or without apparent triggers and/or atypical presentation).

## Classification

### Syncope due to orthostatic hypotension



- **Drug-induced OH (most common cause of OH):**
  - e.g. vasodilators, diuretics, phenothiazine, antidepressants.
- **Volume depletion:**
  - haemorrhage, diarrhoea, vomiting, etc.
- **Primary autonomic failure (neurogenic OH):**
  - pure autonomic failure, multiple system atrophy, Parkinson's disease, dementia with Lewy bodies.
- **Secondary autonomic failure (neurogenic OH):**
  - diabetes, amyloidosis, spinal cord injuries, auto-immune autonomic neuropathy, paraneoplastic autonomic neuropathy, kidney failure.

*Note.* Hypotension may be exacerbated by venous pooling during exercise (exercise-induced), after meals (postprandial hypotension), and after prolonged bed rest (deconditioning).

[www.escardio.org/guidelines](http://www.escardio.org/guidelines)

2018 ESC Guidelines on Syncope – Michele Brignole & Angel Moya  
European Heart Journal 2018;39:1883–1948 – Doi:10.1093/eurheartj/ehy037

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## Classification

### Cardiac syncope



#### Arrhythmia as primary cause

- **Bradycardia:**
  - sinus node dysfunction (including bradycardia/tachycardia syndrome),
  - atrioventricular conduction system disease.
- **Tachycardia:**
  - supraventricular,
  - ventricular.
- **Structural cardiac:** aortic stenosis, acute myocardial infarction/ischaemia, hypertrophic cardiomyopathy, cardiac masses (atrial myxoma, tumours, etc.), pericardial disease/tamponade, congenital anomalies of coronary arteries, prosthetic valves dysfunction.
- **Cardiopulmonary and great vessels:** pulmonary embolus, acute aortic dissection, pulmonary hypertension.

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## Classification

### Conditions (of real or apparent LOC) which may be incorrectly diagnosed as syncope



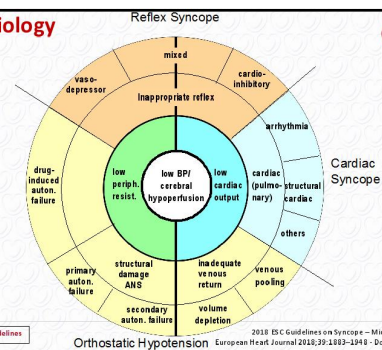
- Generalized seizures, complex partial seizures, absence epilepsy.
- Psychogenic pseudosyncope.
- Falls without TLOC.
- Intracerebral or subarachnoid haemorrhage.
- Vertebrobasilar TIA.
- Carotid TIA.
- Subclavian steal syndrome.
- Cataplexy.
- Metabolic disorders including hypoglycaemia, hypoxia, hyperventilation with hypocapnia.
- Intoxication.
- Coma.
- Cardiac arrest.

[www.escardio.org/guidelines](http://www.escardio.org/guidelines)

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## Pathophysiology



[www.escardio.org/guidelines](http://www.escardio.org/guidelines)

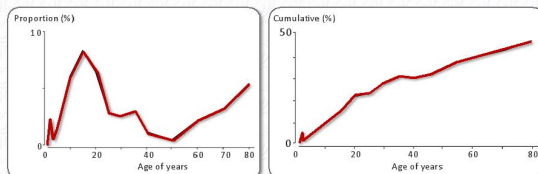
2018 ESC Guidelines on Syncope – Michele Brignole & Angel Moya  
European Heart Journal 2018;39:1883–1948 – Doi:10.1093/eurheartj/ehy037

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## Epidemiology



### Age of first faint

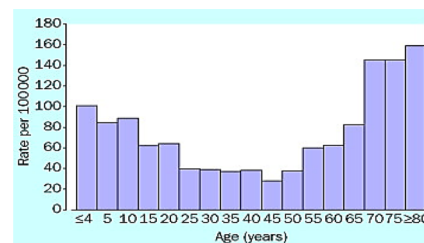


[www.escardio.org/guidelines](http://www.escardio.org/guidelines)

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European Heart Journal 2018;39:1883–1948 – Doi:10.1093/eurheartj/ehy037

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### Incidence of seizures in different age groups



Linda J Stephen, Martin J Brodie. Epilepsy in elderly people Volume 355, Issue 9213, 2000, 1441–1446

## Epidemiology - Frequency of the causes of syncope according to the settings (1)



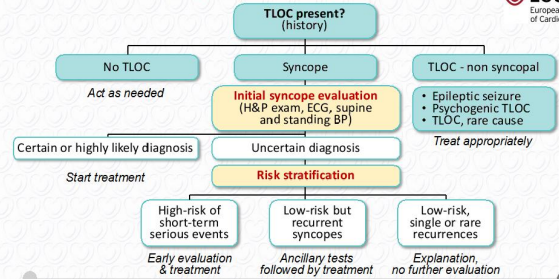
Setting	Source	Reflex (%)	Orthostatic hypotension (%)	Cardiac (%)	Non syncopal T-LOCs (%)	Unexplained (%)
General population	Framingham studies	21	9.4	9.5	9	37
Emergency department	Ammirati	35	6	21	20	17
	Sarasin	38	24	11	8	19
	Blanc	48	4	10	13	24
	Disertori	45	6	11	17	19
	Olde Nordkamp	39	5	5	17	33
	Range	35-48	4-24	5-21	8-20	17-33

[www.escardio.org/guidelines](http://www.escardio.org/guidelines)

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## Presentation of patient with probable TLOC

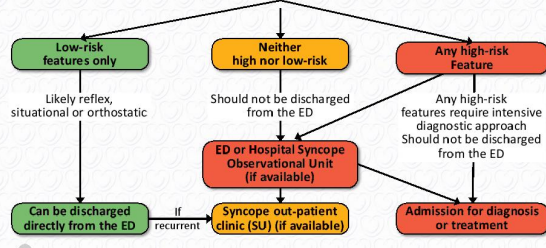


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## Syncope (after initial evaluation in ED)



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## Case 1

- 19 y.o. female
- TLOC in toilet
- Hyperventilating, can't stop it
- RR 35 SO2 98% BP 120/80 HF 120 Temp 37.4 °C
- What would you do?

## Question 1

- Instructions to cope with hyperventilation
- Do a D-dimer or chest CT for PE
- CXR
- Refer to SU as outpatient

## Question 1

- Instructions to cope with hyperventilation
- Analyze for PE**
- Do a CXR
- Refer to SU as outpatient



Europe (2015) 17, 1325–1340  
doi:10.1093/eurheartj/ehv115

#### EHRA POSITION PAPER

### 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)

### Definition of a Syncope Unit

An SU is 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.

The SU should also take the **lead in educating and training** clinicians who encounter syncope.

[www.escardio.org/EHRA](http://www.escardio.org/EHRA)



### Rationale Syncope Unit

- *wide variation in practice* of syncope evaluation
- *wide variation in adoption* of recommendations from published guidelines
- *evidence benefit* systematic approach

[www.escardio.org/EHRA](http://www.escardio.org/EHRA)

### Organizational aspects: Syncope Unit

#### Key components

- The syncope unit should take the **lead in service** delivery for syncope, and in **education and training** of healthcare professionals who encounter syncope.
- The syncope unit should be led by a **clinician** with specific knowledge of TLOC and additional necessary **team members** (i.e. clinical nurse specialist) depending on the local model of service delivery.
- The syncope unit should provide minimum core **treatments** for reflex syncope and OH, and treatments or preferential access for cardiac syncope, falls, psychogenic pseudosyncope, and epilepsy.
- **Referrals** should be directly from family practitioners, EDs, in-hospital and out-hospital services, or self-referral depending on the **risk stratification** of referrals. **Fast-track access**, with a separate waiting list and scheduled follow-up visits, should be recommended.
- Syncope units should employ **quality indicators**, **process indicators**, and desirable **outcome targets**.

[www.escardio.org/guidelines](http://www.escardio.org/guidelines)

2018 ESC Guidelines on Syncope – Michele Brignole & Angel Moya  
EHJ | doi:10.1093/eurheartj/ehy257

### Organizational aspects: Structure of the SU

#### Staffing of an SU is composed of:

1. One or more physicians of any specialty who are **syncope specialists**.
2. A team comprised of professionals who will advance the care of syncope patients.

#### Equipment:

1. Essential Equipment/tests:
  - 12-lead ECG and 3-lead ECG monitoring,
  - non-invasive beat-to-beat blood pressure monitor,
  - tilt-table,
  - Holter monitors,
  - external loop recorders,
  - follow-up of implantable loop recorders (\*),
  - 24-hour blood pressure monitoring,
  - Basic autonomic function tests.
2. Established procedures for:
  - Echocardiography
  - Electrophysiological studies
  - Stress test
  - Neuroimaging tests
3. Specialists' consultancies (cardiology, neurology, internal medicine, geriatric medicine, psychology)

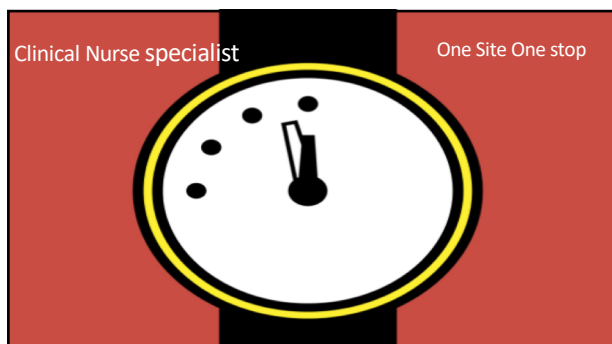
[www.escardio.org/guidelines](http://www.escardio.org/guidelines)

2018 ESC Guidelines on Syncope – Michele Brignole & Angel Moya  
European Heart Journal 2018;39:1303–1348 – doi:10.1093/eurheartj/ehy037

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### Organizational aspects: Role of physician and staff in a SU

Procedure or test	SU Physician	SU Staff	Non-SU personnel
History taking	x		
Structured history taking (e.g., application of software technologies)		x	
12-lead ECG		x	
Blood tests		x	
Echocardiogram and imaging			x
Carotid sinus massage	x		
Active standing test		x	
Tilt table test	(x)	x	
Basic autonomic function test		x	
ECG monitoring (Holter, EHR) administration and interpretation	x	x	
Implantable loop recorder	x	(x)	
Remote monitoring		x	
Others: stress test, electrophysiological study, angiograms			x
Neurological tests (CT, MRI, EEG, video-EEG)			x
Pacemaker and ICD implantation, catheter ablation			x
Patient's education, biofeedback training, and instructions	x	x	
Final report and clinic note	x		
Communication with patients, referring physicians	x	x	
Follow-up	x	x	

#### NEW / REVISED CLINICAL SETTINGS AND TESTS:

- Tilt testing: concepts of *hypotensive* susceptibility
- Increased role of prolonged ECG monitoring
- Video recording in suspected syncope
- "Syncope without prodrome, normal ECG and normal heart" (adenosine sensitive syncope)
- Neurological causes: "ictal asystole"

#### NEW / REVISED INDICATIONS FOR TREATMENT:

- Reflex syncope: algorithms for selection of appropriate therapy based on age, severity of syncope and clinical forms
- Reflex syncope: algorithms for selection of best candidates for pacemaker therapy
- Patients at risk of SCD: definition of unexplained syncope and indication for ICD
- Implantable loop recorder as alternative to ICD, in selected cases

**2018 NEW/REVISED CONCEPTS in management of syncope**

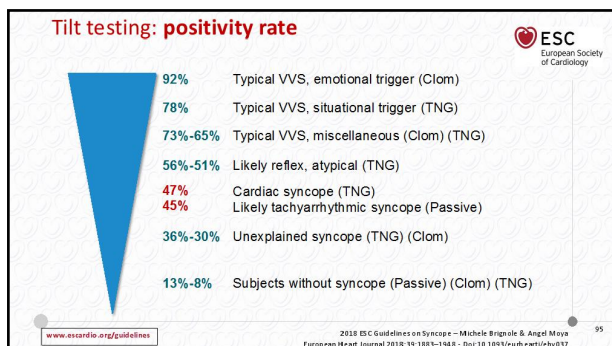
#### (OUT-PATIENT) SYNCOPE MANAGEMENT UNIT:

- Structure: staff, equipment, and procedures
- Tests and assessments
- Access and referrals
- Role of the Clinical Nurse Specialist
- Outcome and quality indicators

#### MANAGEMENT IN EMERGENCY DEPARTMENT:

- List of low-risk and high-risk features
- Risk stratification flowchart
- Management in ED Observation Unit and/or fast-track to Syncope Unit
- Restricted admission criteria
- Limited usefulness of risk stratification scores

[www.escardio.org/guidelines](http://www.escardio.org/guidelines)



### Table 3 cont. Comparison between systematic evaluation and conventional management

Study	Intervention	Comparison	Results
Perry et al. <sup>18</sup> UK	Education through management algorithm for acute medical services effect on patient admitted for falls and syncope	One-month period before (C) vs. 1-month period 1 year later (E)	41 ( 19% reduction of costs per patient 25% reduction in unexplained syncope
Ammirati et al. <sup>19</sup> Italy	Syncope Unit	Unexplained syncope referred to Syncope Unit before patients visited Syncope Unit (C) vs. after visit (E)	96 82% reduction in unexplained syncope – 85% reduction of costs per patient
Fedorowski et al. <sup>20</sup> Sweden	Syncope Unit	Unexplained syncope patients discharged from ED or hospital ward (C) vs. the same patients evaluated by SU (E)	101 87% reduction in unexplained syncope
McCarthy et al. <sup>21</sup> Ireland	Using ESC Guidelines	Utilization of resources in ED (C) vs. re-evaluation of same patients using ESC guidelines 6-month period	214 54% reduction in admissions
Dickerson et al. <sup>22</sup> USA	ESC Guidelines incorporated in 'Faint-Algorithm'	Retrospective assessment of ED admissions	254 52% reduction in admissions
Shin et al. <sup>23</sup> South Korea	Standardized ED protocol for syncope based on ESC guidelines	Period before (C) and after (E) standardization	116 28% reduction in unexplained syncope 39% reduction in admissions 32% reduction of costs per patient
Sun et al. <sup>24</sup> USA	Up to 24 h observation ED	ED syncope presentation with usual care (C) or observation period (E) for intermediate-risk patients	42 ( 84% reduction in admissions 42% reduction of costs per patient
Sanders et al. <sup>25</sup> USA	Standardized care implemented in Faint and Fall Clinic vs. historical control	Standardized care (E) vs. historical control (C)	100 22% reduction in unexplained syncope 80% reduction in admissions
Sun et al. <sup>26</sup> Italy	Observation Unit in five EDs	Rate of admission and costs in patients >50 years, randomized to observation unit (E) vs. standard of care (C)	42 ( 84% reduction in admissions 629 \$ reduction in index hospital costs
Racchi et al. <sup>27</sup> Italy	Standardized care implemented of paediatric guidelines vs. historical control in ED	Two years with protocol (E) vs. previous 2 years in one hospital	470 72% reduction in unexplained syncope 54% reduction in admissions

© experimental group; C, control group; ED, Emergency Department.

Table 3 cont. Comparison between systematic evaluation and conventional management				
Parry et al. <sup>20</sup> UK	Education through management algorithm for acute medical services effect on patient admission for falls and syncope	One-month period before (C) vs. 1-month period a year later (B)	41 (	15% reduction of costs per patient 25% reduction in unexplained syncope
Ammirati et al. <sup>21</sup> Italy				10
Fedorowski et al. <sup>22</sup> Sweden				10
McCarthy et al. <sup>23</sup> Ireland				
Diccianni et al. <sup>24</sup> USA				
Shin et al. <sup>25</sup> South Korea				10
Sun <sup>26</sup> USA	Up to 24 h observation ED	ED syncope presentation with usual care (C) or observation period (B) for intermediate-risk patients	62 (	84% reduction in admissions 42% reduction of costs per patient
Sanders et al. <sup>27</sup> USA	Standardized care implemented in Fair and Fall Clinic vs. historical control	Standardized care (B) vs. historical control (C)	100	22% reduction in unexplained syncope 80% reduction in admissions
Sun et al. <sup>28</sup> USA	Observation Unit in five EDs	Rate of admission and costs in patients >50 years, randomized to observation unit (B) vs. standard of care (C)	62 (	84% reduction in admissions 629 \$ reduction in index hospital costs
Raucci et al. <sup>29</sup> Italy	Standardized care implemented of paediatric guidelines vs. historical control in ED	Two years with protocol (B) vs. previous 2 years in one hospital	470	72% reduction in unexplained syncope 54% reduction in admissions

E: experimental group; C: control group; ED: Emergency Department.

### Case 3

- A 50 y.o. woman
- Collapsed while playing bridge
- back to baseline in ED
- Past medical Hx not significant
- After thorough Hx, physical examination and ECG there is no clear cause
- What is the most appropriate action?

### Question 3

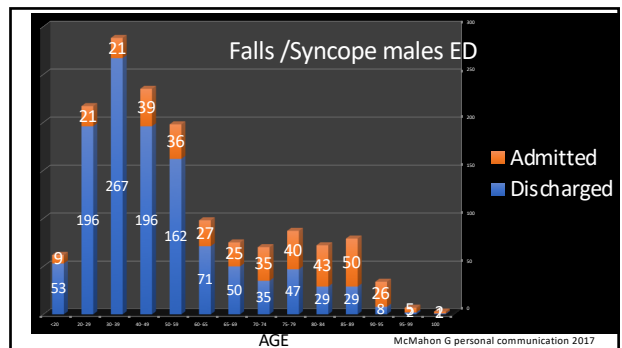
- Admit on telemetry
- Discharge without follow-up
- Discharge with follow-up in SU

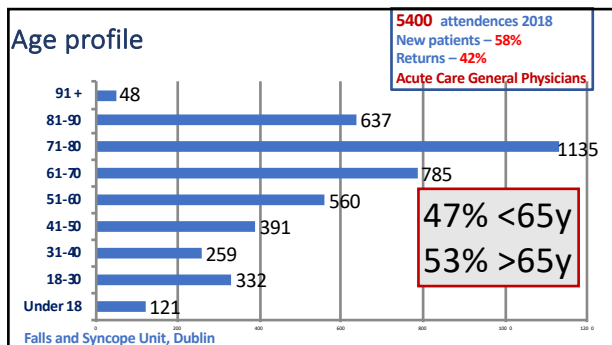
### Question 3

- Admit on telemetry
- Discharge without follow-up
- Discharge with follow-up in SU

F...?

FIT  
FAINT  
FALL  
FUNNY DOS

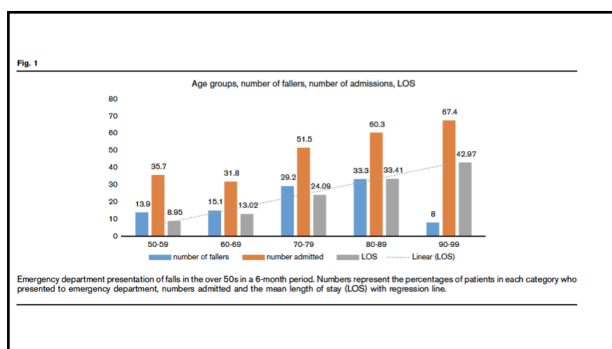




## The prevalence of unexplained falls and syncope in older adults presenting to an Irish urban emergency department

Jaspreet Bhangu<sup>a</sup>, Patricia Hall<sup>a</sup>, Naomi Devaney<sup>a</sup>, Kathleen Bennett<sup>c</sup>, Laura Carroll<sup>b</sup>, Rose-Anne Kenny<sup>a</sup> and C. Geraldine McMahon<sup>b</sup>

Original article 1

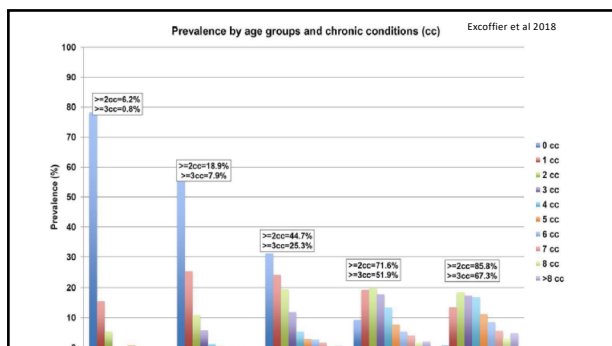


561 patients 50 and over presenting to the ED following a fall or collapse episode over a 6-month period

Patient characteristics	Explained falls n (%)	Unexplained falls n (%)	Syncope n (%)	Medical causes n (%)	Total n (%)
<b>Total</b>	318 (57)	80 (14)	71 (13)	92 (16)	561 (100)
<b>Breakdown by age category (years)</b>					
50-59	45 (14)	10 (13)	14 (20)	9 (9.8)	78 (14)
60-69	55 (17)	8 (10)	12 (17)	9 (9.8)	84 (15)
70-79	92 (29)	23 (28)	23 (32)	26 (28)	164 (29)
80-89	100 (32)	31 (39)	19 (27)	38 (41)	187 (33)
90-100	26 (8)	9 (11)	3 (4)	10 (11)	48 (9)
<b>Sex (female)</b>	215 (68)	34 (43)	39 (55)	55 (60)	343 (61)
<b>Secondary outcomes</b>					
Admissions*	130 (41)	52 (65)	41 (58)	59 (64)	282 (50)
Radiography*	285 (90)	71 (89)	57 (80)	85 (92)	498 (89)
Brain scanning*	104 (33)	46 (58)	45 (63)	52 (57)	246 (44)
Previous ED attendance*	79 (25)	32 (40)	21 (30)	32 (35)	164 (29)
Injury from fall*	141 (44)	34 (43)	22 (30)	28 (30)	225 (40)
Recurrent falls*	51 (16)	40 (50)	27 (38)	31 (34)	149 (27)
<b>Costs*</b>	1,710,673.25	682,168.97	519,126.00	746,144.59	3,658,113.16

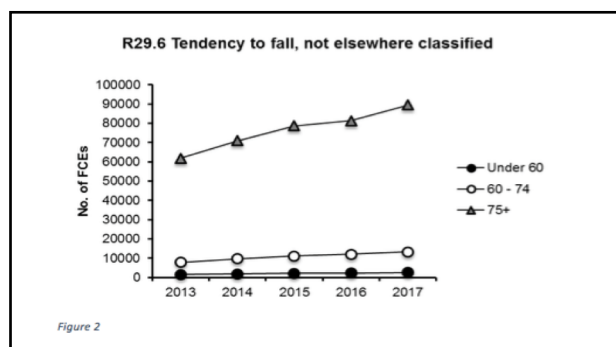
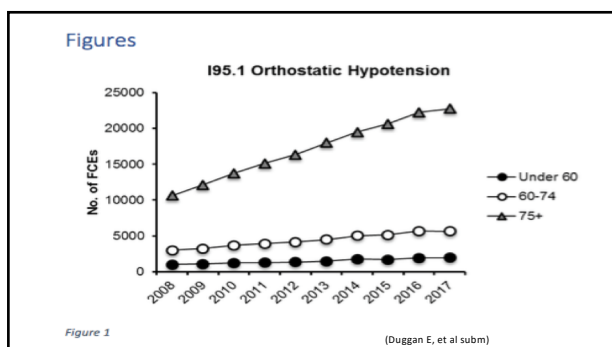
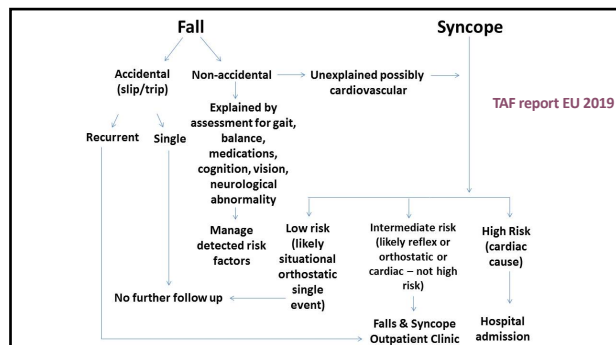
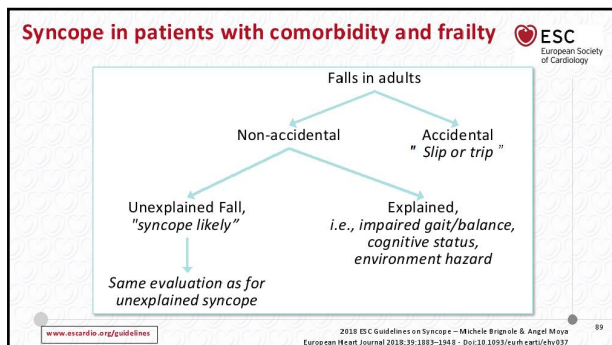
raw costs in euros calculated from admission (LOS), CT scan, radiography costs.

Bhangu, J et al. 2019. *European journal of emergency medicine*, 2020, pp.100-104.



## Syncope in patients with comorbidity and frailty

Recommendations	Class	Level
1. A multifactorial evaluation and intervention is recommended in older patients because more than one possible cause for syncope and unexplained fall may be present.	I	B
2. Cognitive assessment and physical performance tests are indicated in older patients with syncope or unexplained fall.	I	C
3. Modification or discontinuation of possible culprit medications, particularly hypotensive drugs and psychotropic drugs, should be considered in older patients with syncope or unexplained fall.	Ila	B
4. In patients with unexplained fall, the same assessment as for unexplained syncope should be considered.	Ila	C



## Setting the scene - overview Syncope

- Arrhythmia – important / small contribution
- Syncope – QOL
- Related symptoms
- CGA – Physiological adjunct

Congress of the European Federation of Autonomic Societies  
Leiden, 9-10 May 2019

*The Role of a Syncope Unit*  
Rationale  
Requirements – staff/equipment  
EHRA/ESC Guidelines  
TIME  
Clinical Nurse Specialist