Rational Approach to Syncope Work-up in the ER

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Syncope Work-up in the ER: Conflict Disclosures

I have no conflicts to declare other than Alberta Health has paid me when I have assessed patients with syncope.

The following presentation represents the views of the speaker at the time of the presentation. This information is meant for educational purposes, and should not replace other sources of information or your medical judgment.

Syncope Work-up in the ER: Learning Objectives

- Identify the common causes of undifferentiated syncope.
- Know the yield of various tests used in the workup of syncope, if the data exists.
- Know the cost-effectiveness of these tests.

Syncope Work-up in the ER: Case of Lois O'Conner

- Ms LOC (32yo F) presents to ER with her first episode of LOC that occurred at the wake of her grandfather who died suddenly, with no warning, at the age of 92.
- She is previously healthy, exercises regularly, drinks socially (including today), is on no meds.
- She is terrified she is going to die.

Syncope Work-up in the ER: Key questions you need to consider

- Is there a serious underlying cause that can be identified?
- What is the risk of a serious outcome?
- Should the patient be admitted to hospital?

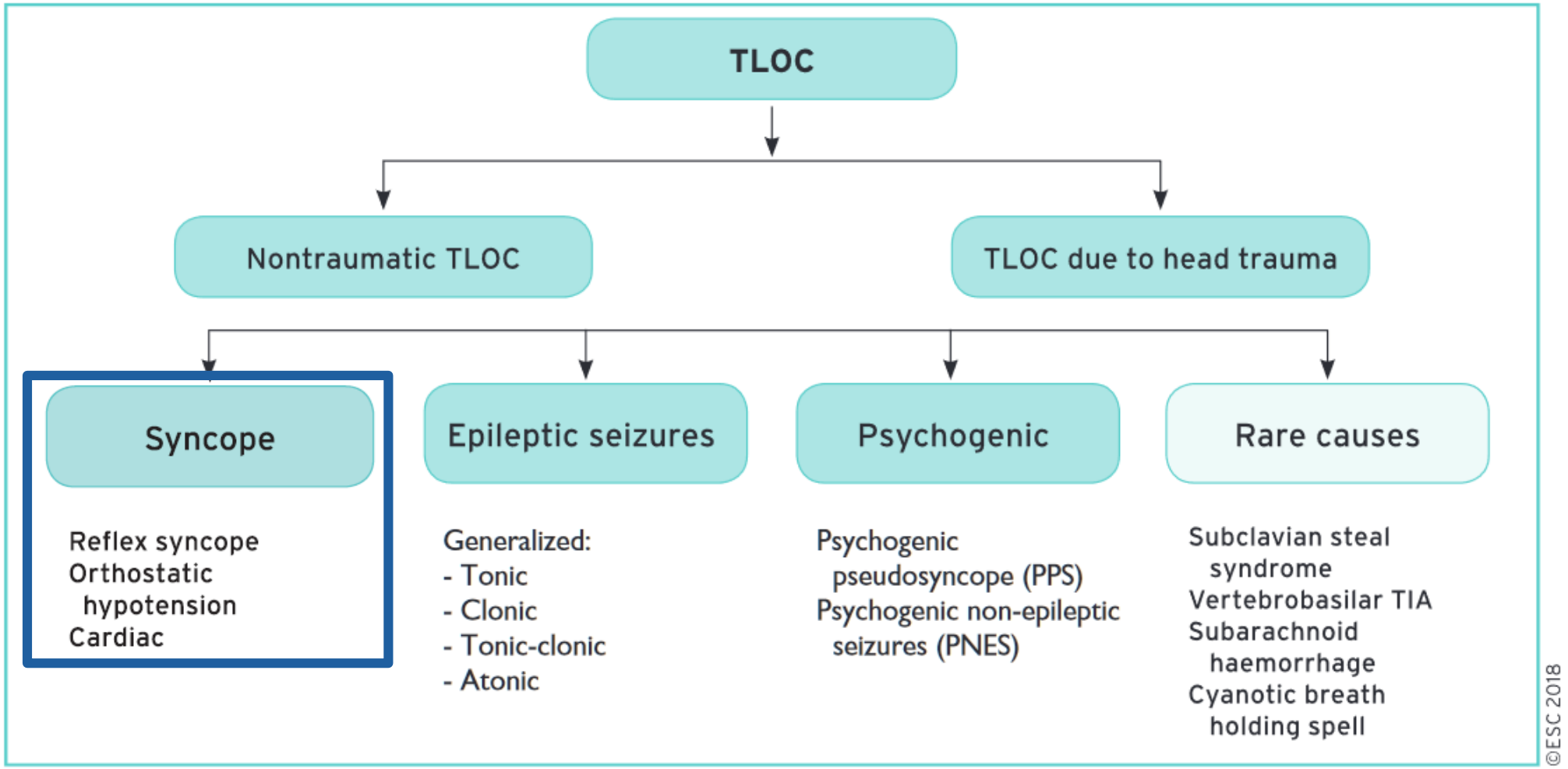
Affects 1/3 of the population at least once during a lifetime

1/3 of those will have repeated episodes

100 000 EMS trips to ER per year in Canada

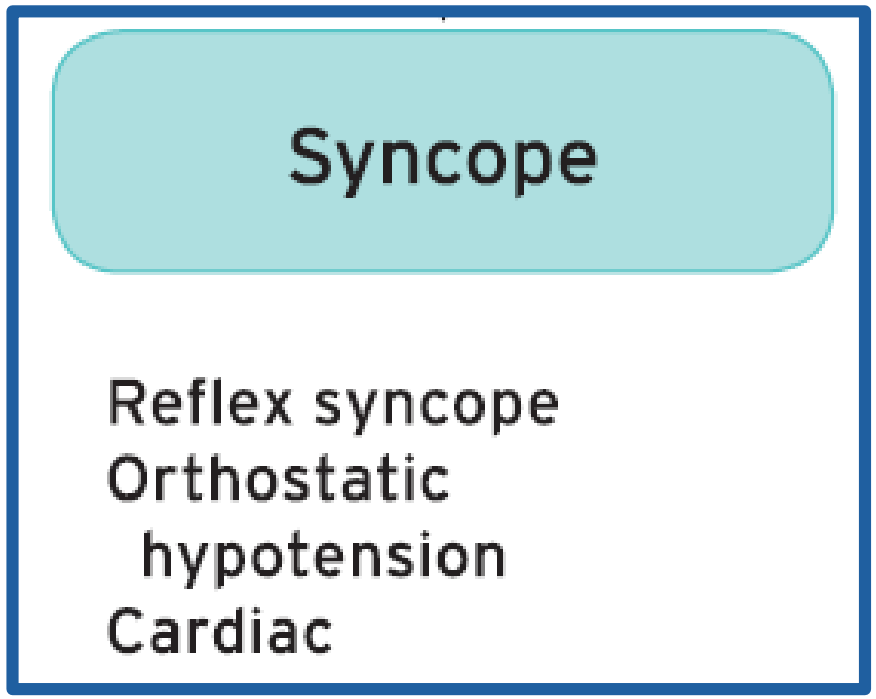
1-3% of all ER visits

DDx for Transient Loss of Consciousness

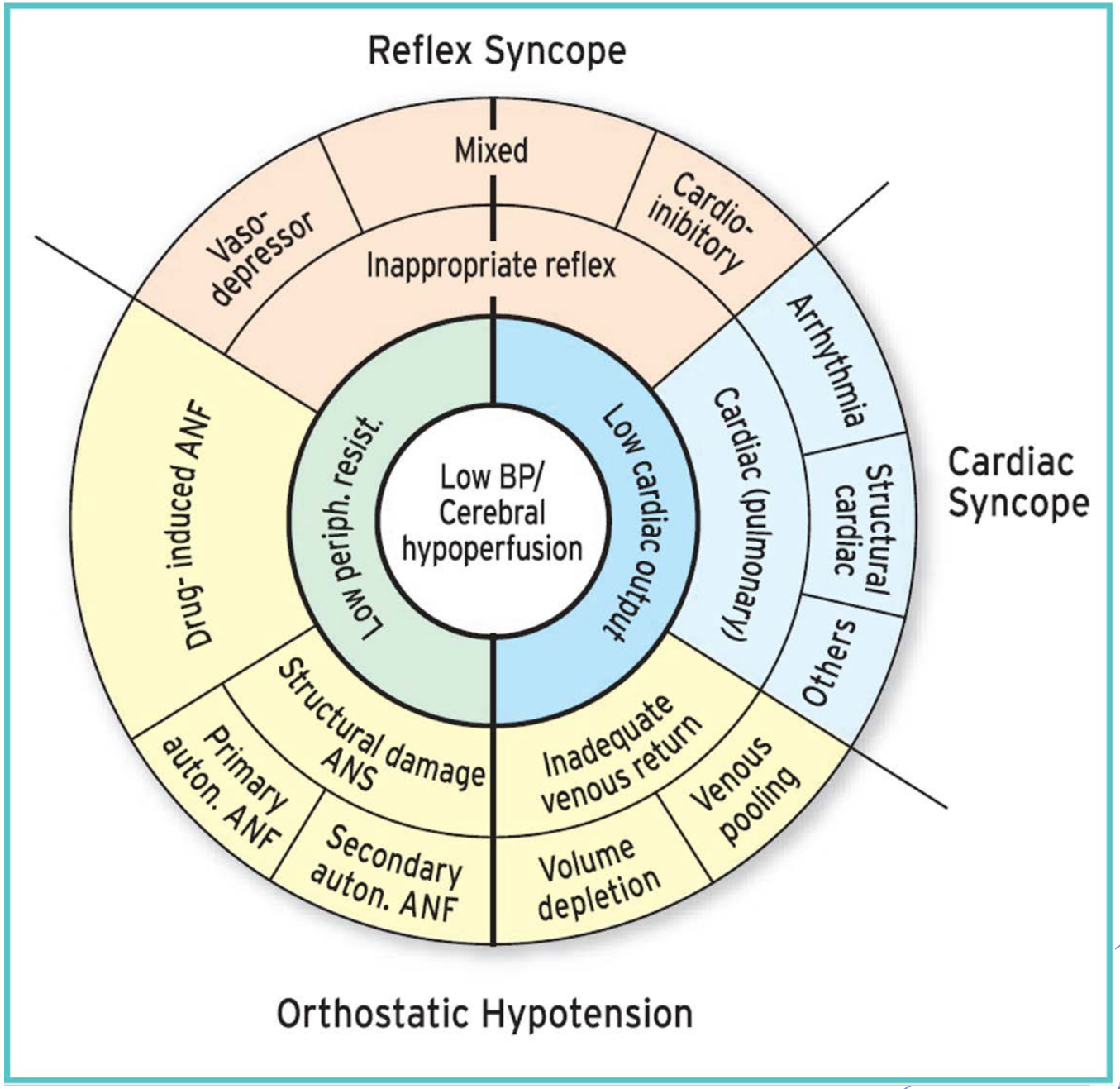


2018 ESC Guidelines for the diagnosis and management of syncope, European Heart Journal 2018;39:1883–1948

What defines syncope?



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



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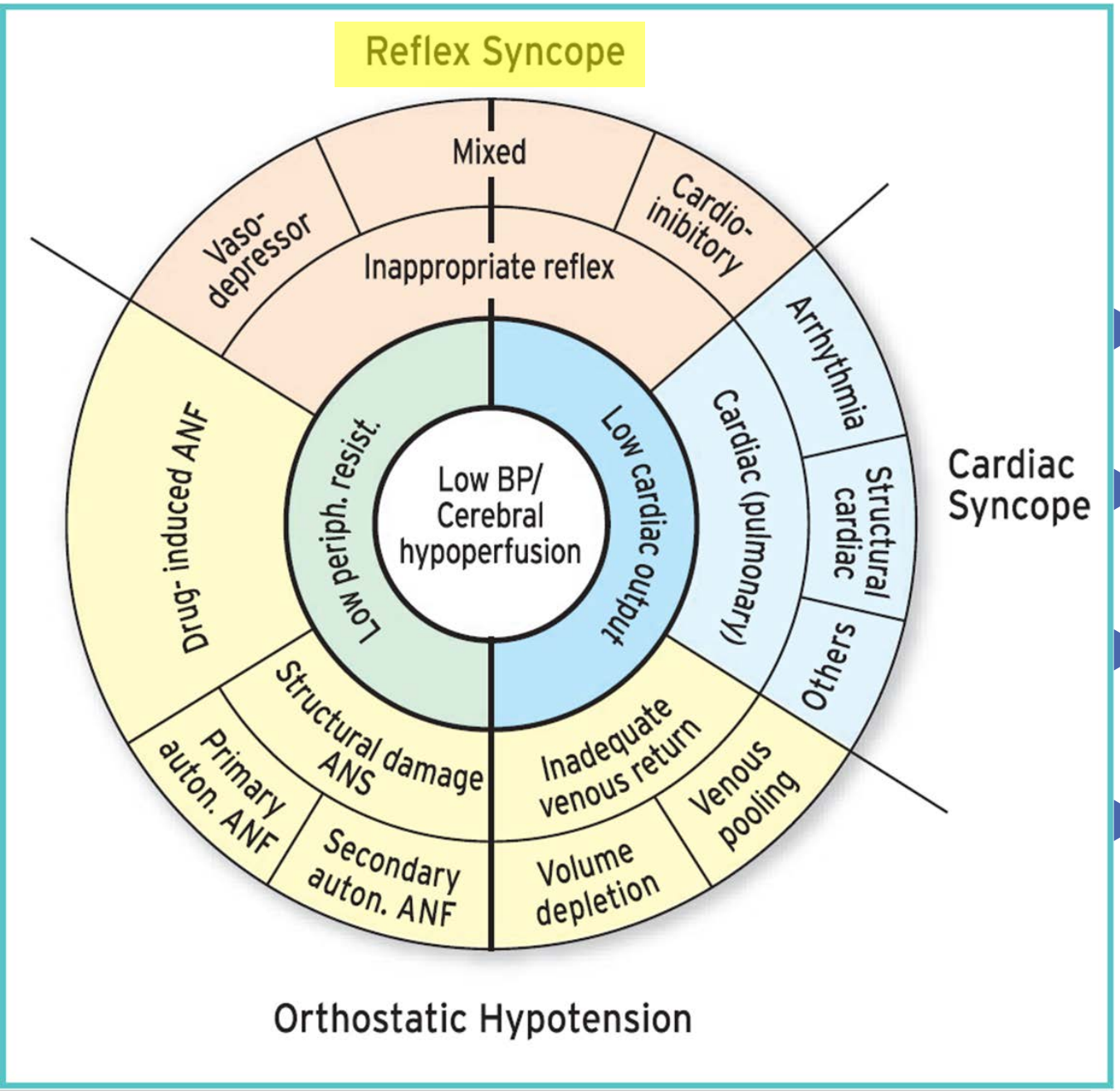

- Vasovagal – Orthostatic or Emotional
- Situational – micturition, GI stimulation, cough, etc
- Carotid Sinus Syndrome
- Non-classical (no prodrome)

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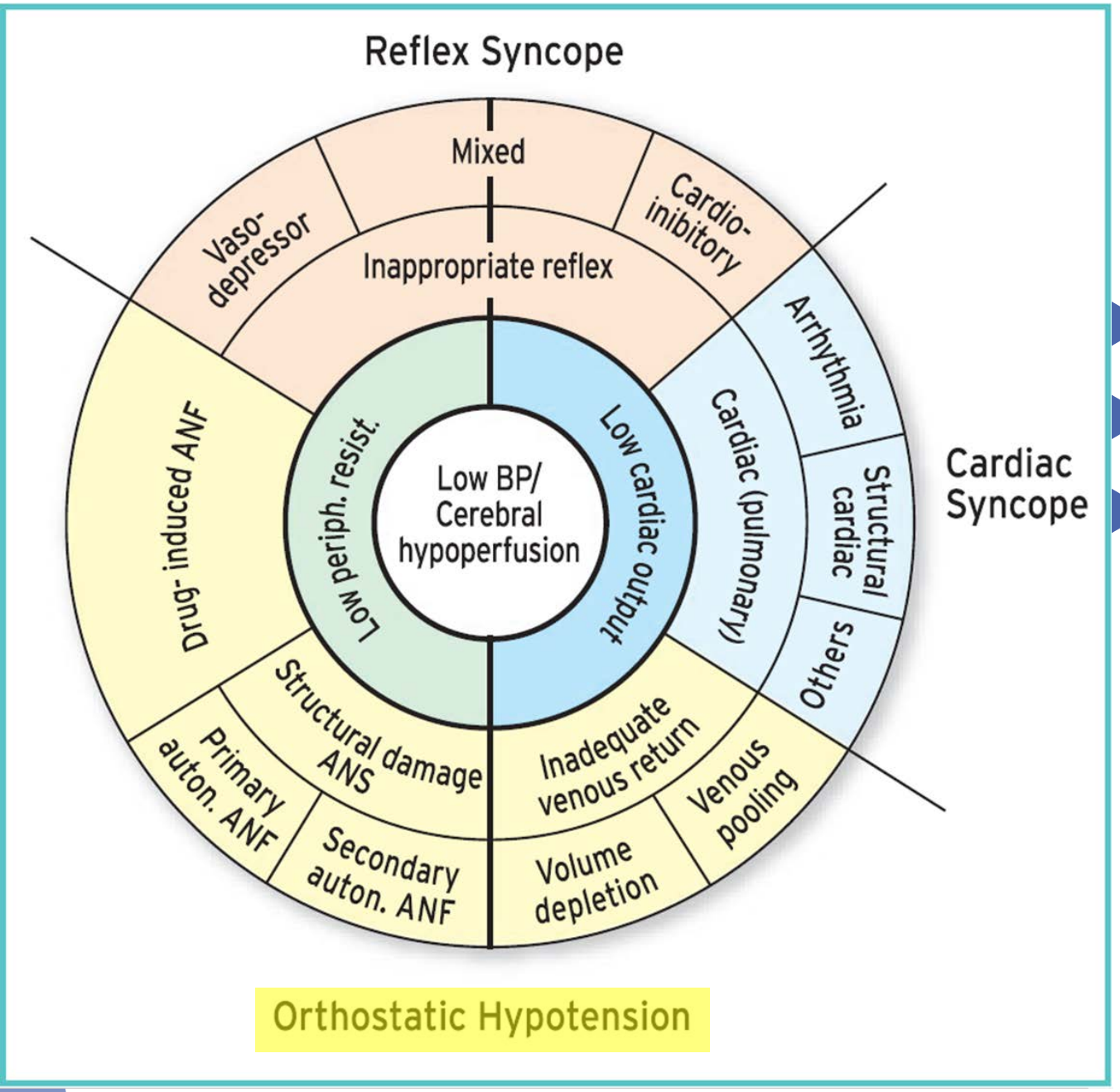

- Drug Induced
- Volume Depletion
- Neurogenic
  - Primary – pure autonomic failure, MSA, Parkinsons, etc.
  - Secondary – DM, Amyloid, Paraneoplastic, etc.

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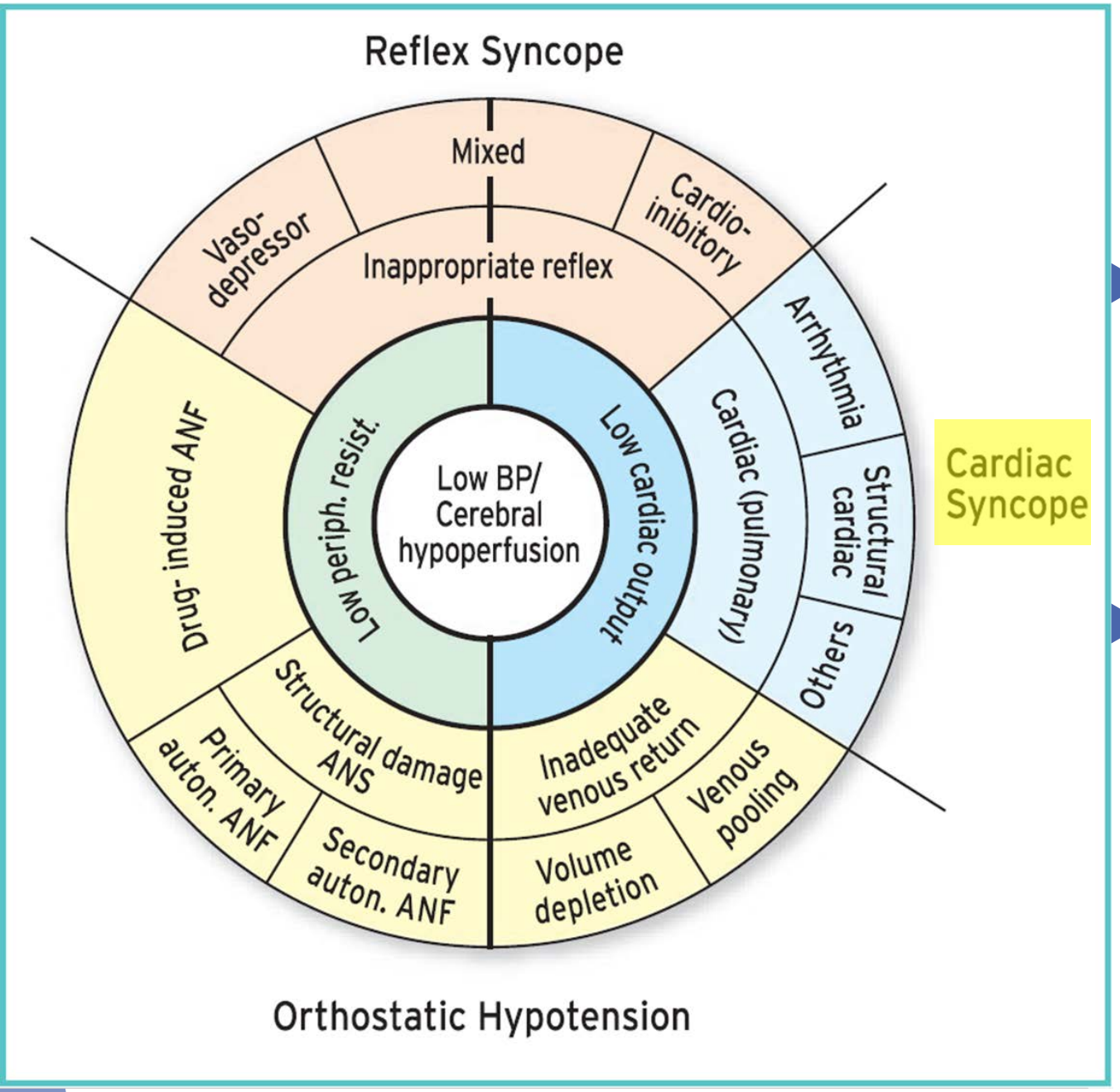

Cardiac Syncope

- Arrhythmic
  - Bradycardia – SN dysfunction or AV conduction system disease
  - Tachycardia – SV or Vent
- Structural – AS, MI/Ischemia, HCM, Cardiac Tumors, Pericardial Dz, PE, Ao Dissection, pHTN, etc.

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Syncope Work-up in the ER: So many tests, so little time…

Laparotomy for hemorrhage

Endoscopy for GI Bleed

Adenosine triphosphate

D-Dimer

Troponin

BNP

Gene sequencing

EEG (regular vs. sleep deprived)

Carotid Dopplers

MRI Head

CT Head

Sleep Study (home vs. observed)

CT for PE

VQ

Angiography (Traditional vs. CTA)

MIBI

Stress Echo

Echocardiography

EST

Valsalva

Tilt Table

Deep Breathing

Active Standing

Carotid Sinus Massage

SmartWatch

Inpatient Telemetry

Formal EP Studies

Implantable Loop Recorder

24hr Holter
48hr Holter
72hr Holter

ECG

Event Loop Recorder

POCUS

Syncope Work-up in the ER: Start with the Basics – History/Exam & ECG

- MOST guidelines emphasize the importance of history in narrowing down the potential etiology.

Reflex syncope

- Long history of recurrent syncope, in particular occurring before the age of 40 years
- After unpleasant sight, sound, smell, or pain
- Prolonged standing
- During meal
- Being in crowded and/or hot places
- Autonomic activation before syncope: pallor, sweating, and/or nausea/vomiting
- With head rotation or pressure on carotid sinus (as in tumours, shaving, tight collars)
- Absence of heart disease

Syncope due to OH

- While or after standing
- Prolonged standing
- Standing after exertion
- Post-prandial hypotension
- Temporal relationship with start or changes of dosage of vasodepressive drugs or diuretics leading to hypotension
- Presence of autonomic neuropathy or parkinsonism

Cardiac syncope

- During exertion or when supine
- Sudden onset palpitation immediately followed by syncope
- Family history of unexplained sudden death at young age
- Presence of structural heart disease or coronary artery disease
- ECG findings suggesting arrhythmic syncope:

2018 ESC Guidelines for the diagnosis and management of syncope, European Heart Journal 2018;39:1883–1948
R. Sutton, et al. Cardiol J 2014;21(6):651-657

Syncope Work-up in the ER: Start with the Basics – History/Exam & ECG

- Physical Exam should focus on:
  - Hemodynamics – Orthostatic BP/HR including during active standing for 3 minutes.
    - SBP drops ≥20mmHg or
    - DBP drops ≥10mmHg or
    - SBP drops to <90mmHg with Sx reproduction
  - Volume status
  - General screen – other cardiac, pulmonary, neurologic findings that might narrow DDx.

Syncope Work-up in the ER: Start with the Basics – History/Exam & ECG

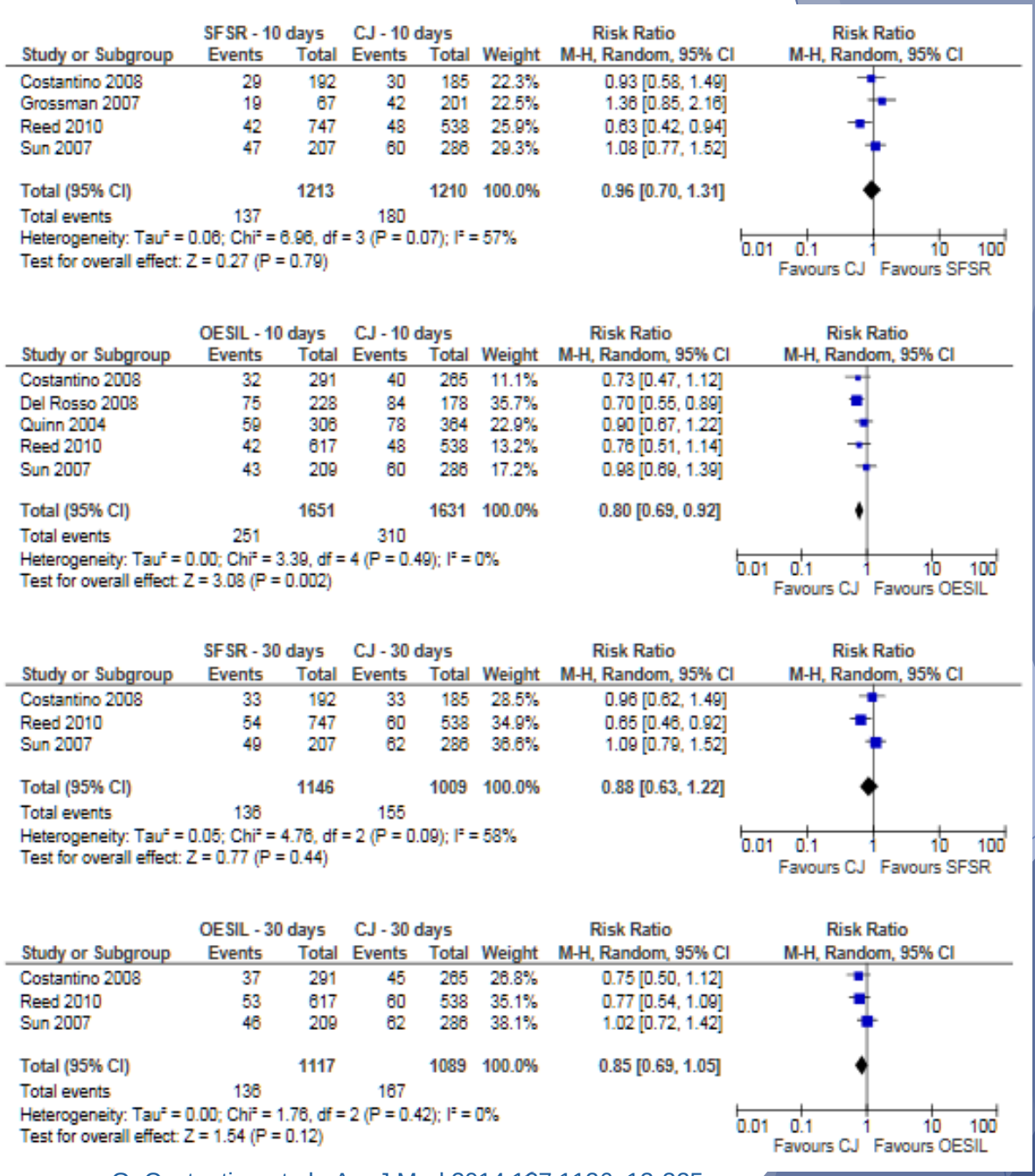
- 12 lead ECG is indicated in all patients with true syncope unless history makes diagnosis.
  - Brady or Tachy arrhythmia
  - Conduction Abnormalities
  - QT Interval
- Troponin – unless clearly not cardiac

That's it!!! That's all!!!
No other "general" screening is required

- Routine testing using other modalities in ALL patients presenting with syncope suffer from:
  - No better sensitivity than clinical questioning
  - Risk of false positives and negatives
  - Complications of the testing
  - Cost

Any Risk Scores??

- Most risk scores performed no better or worse than clinical judgement



Study or Subgroup	SFSR - 10 days Events	Total	CJ - 10 days Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Costantino 2008	29	192	30	185	22.3%	0.93 [0.58, 1.49]
Grossman 2007	19	67	42	201	22.5%	1.36 [0.85, 2.16]
Reed 2010	42	747	48	538	25.9%	0.63 [0.42, 0.94]
Sun 2007	47	207	60	286	29.3%	1.08 [0.77, 1.52]
Total (95% CI)		1213		1210	100.0%	0.96 [0.70, 1.31]
Total events	137		180			

Heterogeneity: Tau² = 0.06; Chi² = 6.96, df = 3 (P = 0.07); I² = 57%
Test for overall effect: Z = 0.27 (P = 0.79)

Risk Ratio M-H, Random, 95% CI
0.01 0.1 1 10 100
Favours CJ Favours SFSR

Study or Subgroup	OESIL - 10 days Events	Total	CJ - 10 days Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Costantino 2008	32	291	40	265	11.1%	0.73 [0.47, 1.12]
Del Rosso 2008	75	228	84	178	35.7%	0.70 [0.55, 0.89]
Quinn 2004	59	308	78	364	22.9%	0.90 [0.67, 1.22]
Reed 2010	42	617	48	538	13.2%	0.76 [0.51, 1.14]
Sun 2007	43	209	60	286	17.2%	0.98 [0.69, 1.39]
Total (95% CI)		1651		1631	100.0%	0.80 [0.69, 0.92]
Total events	251		310			

Heterogeneity: Tau² = 0.00; Chi² = 3.39, df = 4 (P = 0.49); I² = 0%
Test for overall effect: Z = 3.08 (P = 0.002)

Risk Ratio M-H, Random, 95% CI
0.01 0.1 1 10 100
Favours CJ Favours OESIL

Study or Subgroup	SFSR - 30 days Events	Total	CJ - 30 days Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Costantino 2008	33	192	33	185	28.5%	0.96 [0.62, 1.49]
Reed 2010	54	747	80	538	34.9%	0.65 [0.48, 0.92]
Sun 2007	49	207	62	286	36.6%	1.09 [0.79, 1.52]
Total (95% CI)		1146		1009	100.0%	0.88 [0.63, 1.22]
Total events	136		155			

Heterogeneity: Tau² = 0.05; Chi² = 4.76, df = 2 (P = 0.09); I² = 58%
Test for overall effect: Z = 0.77 (P = 0.44)

Risk Ratio M-H, Random, 95% CI
0.01 0.1 1 10 100
Favours CJ Favours SFSR

Study or Subgroup	OESIL - 30 days Events	Total	CJ - 30 days Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Costantino 2008	37	291	45	265	26.8%	0.75 [0.50, 1.12]
Reed 2010	53	617	80	538	35.1%	0.77 [0.54, 1.09]
Sun 2007	46	209	62	286	38.1%	1.02 [0.72, 1.42]
Total (95% CI)		1117		1089	100.0%	0.85 [0.69, 1.05]
Total events	136		187			

Heterogeneity: Tau² = 0.00; Chi² = 1.76, df = 2 (P = 0.42); I² = 0%
Test for overall effect: Z = 1.54 (P = 0.12)

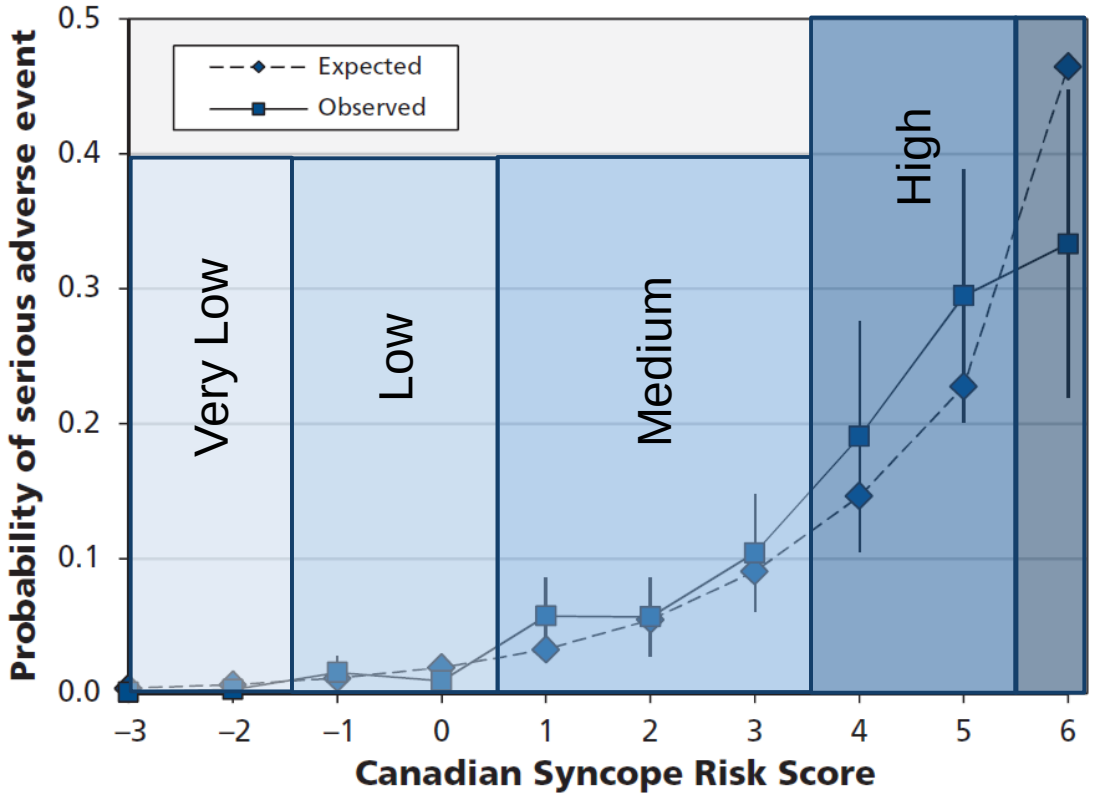
Risk Ratio M-H, Random, 95% CI
0.01 0.1 1 10 100
Favours CJ Favours OESIL

G. Costantino et al., Am J Med 2014;127:1126e13-325

CMAJ RESEARCH

Development of the Canadian Syncope Risk Score to predict serious adverse events after emergency department assessment of syncope

Category	Points
Clinical evaluation	
Predisposition to vasovagal symptoms*	–1
History of heart disease†	1
Any systolic pressure reading < 90 or > 180 mm Hg‡	2
Investigations	
Elevated troponin level (> 99th percentile of normal population)	2
Abnormal QRS axis (< –30° or > 100°)	1
QRS duration > 130 ms	1
Corrected QT interval > 480 ms	2
Diagnosis in emergency department	
Vasovagal syncope	–2
Cardiac syncope	2
Total score (–3 to 11)	___



V Thiruganasambandamoorthy et al., CMAJ 2016;188(12):E289

30 day outcomes

4030 enrolled patients

147 Serious Outcomes (3.6%) (~1/25)

Validation of the CDN Syncope Risk Score

	Development	Validation
Enrolled (gender)	4030 (55.5% F)	2290
Age	53.6y	
Hospitalized	9.5%	
Serious AE in 30d (death, MI, Arrhythmia, structural HD, PE, serious hemorrhage, procedural intervention)	3.6%	3.4% 0.4% death 1.4% arrythmia
AUC ROC	0.87 (0.84-0.89)	0.87 (0.82-0.92)

- Sensitivity of 97.5% and NPV of 99.7% if score ≤ -1 (very low) with 0.3% SAE (0.2% arrhythmia and no death)

- Specificity of 99.4% and PPV of 61.5% if score ≥ 6 (very high) with 61.5% SAE (26.9% arrhythmia and 11.5% death)

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Of patients thought most likely to be vasovagal – NO serious outcomes in development study and 0.2% arrhythmia risk in validation study

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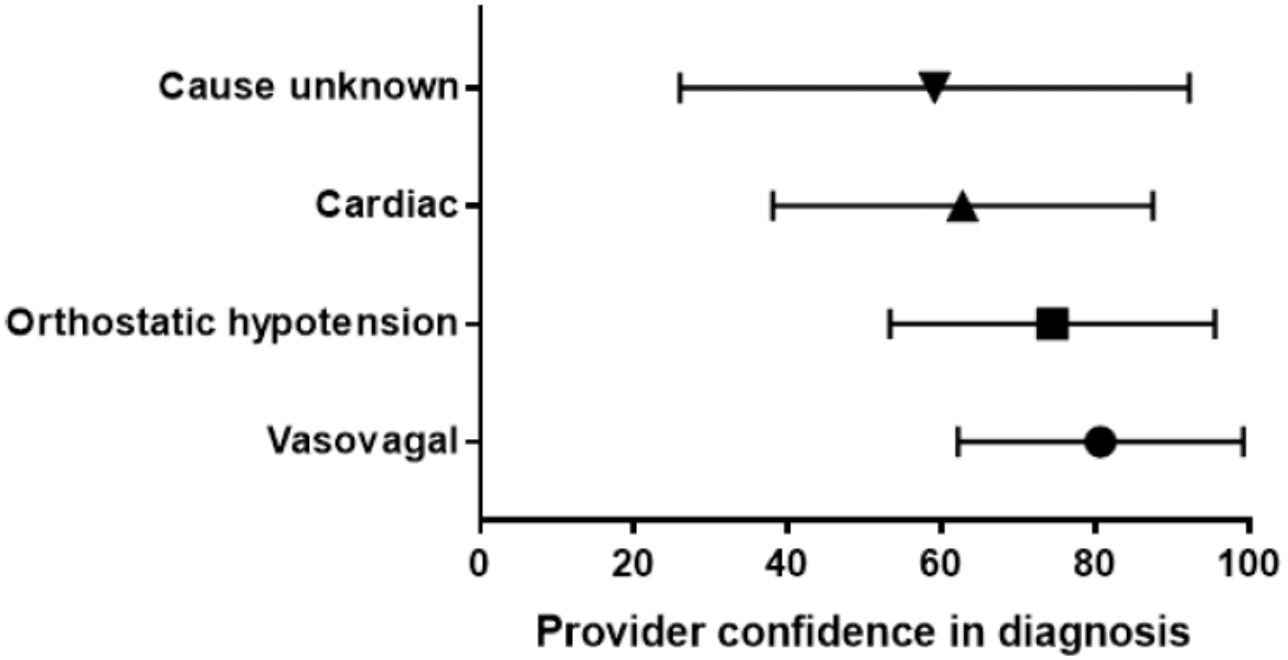
The Value of Clinical Gestalt



- 69.8% Witnessed
- 64.4% Arrived by EMS
- In ER Dx:
  - 53.3% Vasovagal
  - 32.2% Unknown
  - 9.1% Orthostatic
  - 5.4% Cardiac

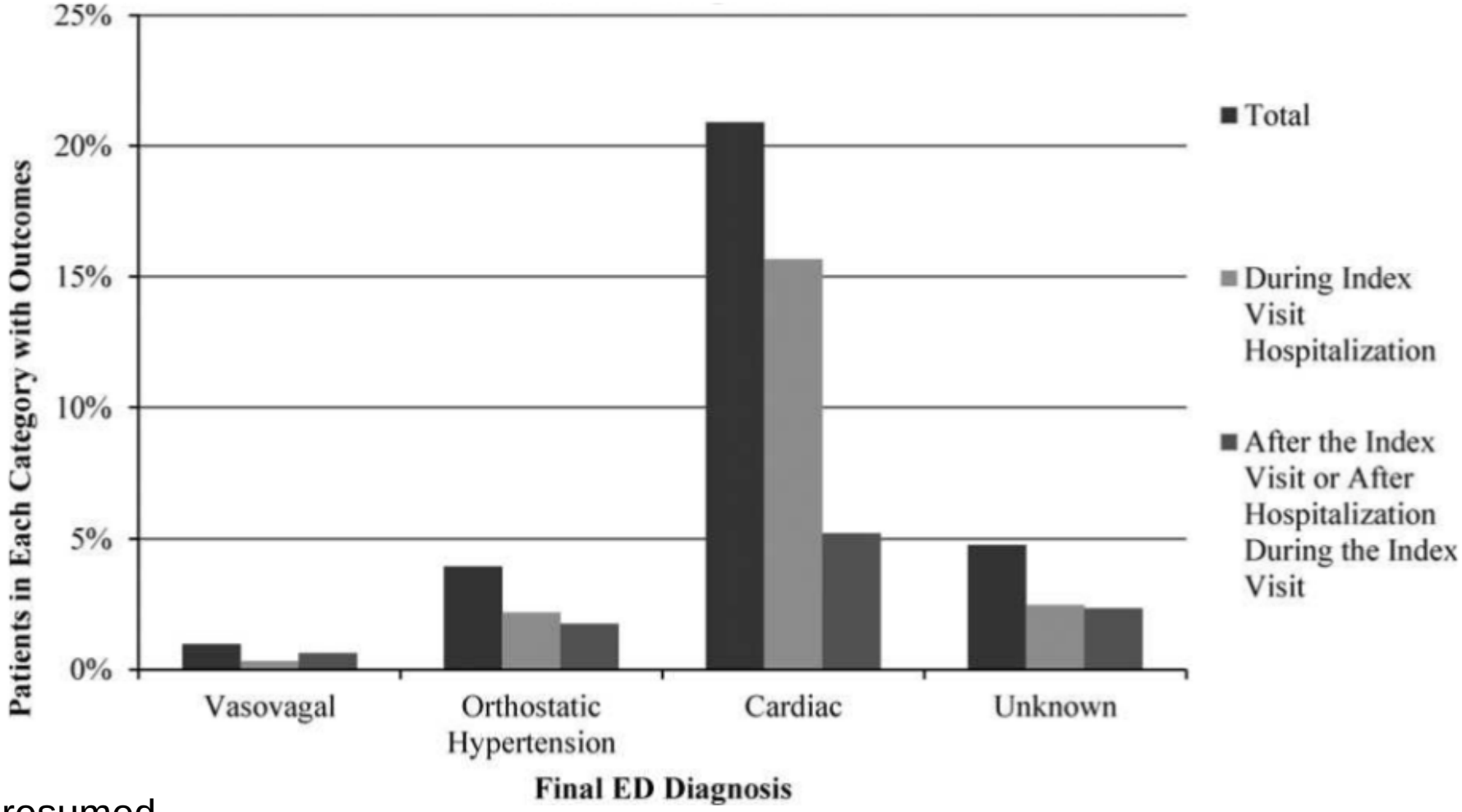
C. Toarta et al., Academ Emerg M 2018; 25(4);388-396

The Value of Clinical Gestalt

There were no reported deaths in the vasovagal syncope group and patients in this group had the least short-term serious outcomes. The favorable prognosis of vasovagal syncope patients observed here has been well documented in several studies including the Framingham Population Cohort, which demonstrated no association between vasovagal syncope and mortality.[14] Despite this, these patients underwent extensive testing in the ED (78% received blood tests, 21% received chest radiographs, and 13% received a computed tomography scan of the head), and they may represent a target for decreasing health care resource utilization in the future.

C. Toarta et al., Academ Emerg M 2018; 25(4);388-396

Time may be your friend



Presumed Dx	53.3%	9.1%	5.4%	32.2%

C. Toarta et al., Academ Emerg M 2018; 25(4);388-396

Syncope Work-up in the ER: Case of Lois O'Conner

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- She is previously healthy, exercises regularly, drinks socially (including today), is on no meds.
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Syncope Work-up in the ER: Case of Lois O'Conner

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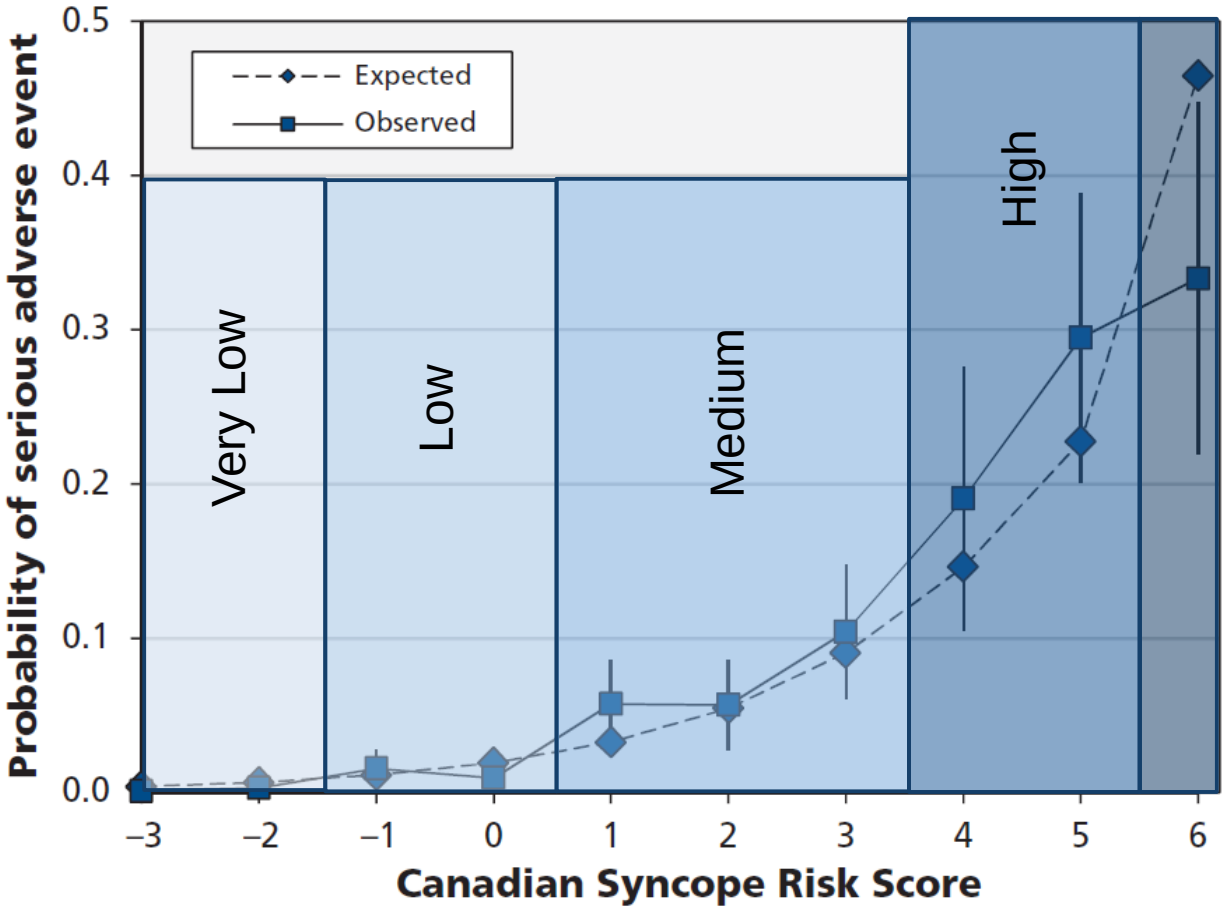
Syncope Work-up in the ER
Case of Lois O'Conner



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- Identify the common causes of undifferentiated syncope.
- Know the yield of various tests used in the workup of syncope, if the data exists.
- Know the cost-effectiveness of these tests.

Check out the ESC Guidelines on Syncope diagnosis and management

European Heart Journal 2018;39:1883–1948