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

TLOC

Nontraumatic TLOC

TLOC due to head trauma

Syncope
- Reflex syncope
- Orthostatic hypotension
- Cardiac

Epileptic seizures
- Generalized:
  - Tonic
  - Clonic
  - Tonic-clonic
  - Atonic

Psychogenic
- Psychogenic pseudosyncope (PPS)
- Psychogenic non-epileptic seizures (PNES)

Rare causes
- Subclavian steal syndrome
- Vertebrobasilar TIA
- Subarachnoid haemorrhage
- Cyanotic breath holding spell

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

Volume Depletion

Neurogenic

- Primary – pure autonomic failure, MSA, Parkinsons, etc.
- Secondary – DM, Amyloid, Paraneoplastic, etc.
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.
Syncope Work-up in the ER: So many tests, so little time…
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
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

G. Costantino et al., Am J Med 2014;127:1126e13-325
Development of the Canadian Syncope Risk Score to predict serious adverse events after emergency department assessment of syncope

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

30 day outcomes

4030 enrolled patients

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

V Thiruganasambandamoorthy et al., CMAJ 2016;188(12):E289
## Validation of the CDN Syncope Risk Score

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

- 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)
Of patients thought most likely to be vasovagal – NO serious outcomes in development study and 0.2% arrhythmia risk in validation study
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
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.\textsuperscript{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.
Time may be your friend

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<tr>
<th>Final ED Diagnosis</th>
<th>Presumed Dx</th>
<th>Vasovagal</th>
<th>Orthostatic Hypertension</th>
<th>Cardiac</th>
<th>Unknown</th>
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<tr>
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<td>53.3%</td>
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C. Toarta et al., Academ Emerg M 2018; 25(4):388-396
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Syncope Work-up in the ER: Case of Lois O’Conner

- ECG
- 24hr Holter
- 48hr Holter
- 72hr Holter
- Event Loop Recorder
- Implantable Loop Recorder
- Formal EP Studies
- Inpatient Telemetry
- SmartWatch
- Carotid Sinus Massage
- Active Standing
- Tilt Table
- Deep Breathing
- Valsalva
- Tilt Table
- Echocardiography
- Stress Echo
- EST
- POCUS
- Laparotomy for hemorrhage
- Endoscopy for GI Bleed
- Adenosine triphosphate
- Troponin
- BNP
- D-Dimer
- EEG (regular vs. sleep deprived)
- Carotid Dopplers
- MRI Head
- CT Head
- Sleep Study (home vs. observed)
- CT for PE
- VQ
- MIBI
- Angiography (Traditional vs. CTA)
Syncope Work-up in the ER
Case of Lois O’Conner

- You get more history which included prodrome symptoms of clammy hands, tunnel vision, her aunt preventing her from lying down and instead tried to give her another Guinness.

- Her Exam was entirely normal.

- Her ECG was entirely normal.

*Triggered by being in a warm crowded place, prolonged standing, fear, emotion or pain.

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**Graph:**
- Canadian Syncope Risk Score
- Probability of serious adverse event

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Check out the ESC Guidelines on Syncope diagnosis and management

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