Syncope
(From a Cardiologist’s Perspective)

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Goals

• Formally define syncope, its associated causes and epidemiology
• Review the recommendations on the evaluation and management of syncope
• Discuss the different types of syncope and associated testing
• Review the driving recommendations for syncope

Outline

• Definition, epidemiology and demographics
• Initial evaluation
• Risk assessment and disposition
• Additional testing and recommendations
  – Cardiovascular and neurologic testing
• Non-cardiac syncope recommendations
  – Vasovagal, orthostatic, pseudosyncope, zebras
Not Covered

- Treatments for cardiac syncope
  - SVT, bradycardia, VT/VF, NICM, ARVC, HCM, valvular disease, sarcoid, brugada, LTQS, CPVT, etc. – follow ACC/AHA guidelines

- Adult congenital heart disease patients
- Pediatric syncope
- Geriatric patient
- Athletes (referred to experienced care provider)

Outline

- Definition, epidemiology and demographics
Definition

- **Syncope**: A symptom that presents with an abrupt, transient, complete loss of consciousness, associated with the inability to maintain postural tone, with rapid and spontaneous recovery.
  - Presumed mechanism is cerebral hypoperfusion
  - NOT seizures (difficult if hypoxic), head trauma, pseudosyncope

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**Table 2**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition/Comments and Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syncope</td>
<td>A symptom that presents with an abrupt, transient, complete loss of consciousness, associated with inability to maintain postural tone, with rapid and spontaneous recovery. The presumed mechanism is cerebral hypoperfusion.</td>
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</table>

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- Syncope
- Loss of consciousness
- Transient loss of consciousness
- Presyncope
- Unexplained Syncope

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**Orthostatic hypotension**

- Classification:
  - **Class I**: Direct sympathetic hyperactivity
  - **Class II**: Indirect sympathetic hyperactivity

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**Psychogenic syncope**

- A symptom of apparent but not true loss of consciousness that may occur in the absence of identifiable cardiac, reflex, neurogenic, or metabolic causes.
Epidemiology and Demographics

- Incidence of syncope depends on the population being evaluated
- Interpretation of symptoms varies among patients, observers (talk to family) and providers
- Classifications:
  - Reflex syncope (21%)
  - Cardiac syncope (9%)
  - Orthostatic hypotension (9%)
  - Unknown (37%)


Epidemiology and Demographics

- Syncope represents approximately 0.8-2.4% of all ED visits nationwide
- Up to 6% of hospital admission are for a diagnosis of syncope
- Up to 30% of unexplained falls in elderly patients may be due to syncope
- 1 in 3 people experience syncope in their lifetime
- Up to 10% of cases of Thoracic Aortic Dissection, Acute Coronary Syndrome, Subarachnoid Hemorrhage, or Pulmonary Embolus present with syncope

Epidemiology and Demographics

• 16 year old male is taking hospital tour and sees blood, losing consciousness. He is diagnosed with vasovagal syncope.

How long does it take someone to lose consciousness with cerebral hypoperfusion?
   A) 2-4 seconds
   B) 5-7 seconds
   C) 8-10 seconds
   D) >12 seconds


Red Wing Studies

KRA apparatus in Red Wing, MN

Outline

• Definition, epidemiology and demographics
• Initial evaluation
Initial Evaluation

• **Detailed History and Physical exam**
  – Take a good HPI (talk to family/witnesses)
  – Review past medical history and medications
  – Family History (any early deaths)
  – Physical exam
    • Orthostatic blood pressures/heart rate
    • Heart rate, rhythm, gallops, murmurs, etc.
    • Neurologic exam – focal deficits

• **Resting 12 lead ECG**
  – Endless amounts of information
  – Easily available and inexpensive
  – May not alter subsequent management but can give great direction
Initial Evaluation

Symptoms associated with syncope

- More often cardiac
  - Older age (>60)
  - Male gender
  - Known cardiac disease (structural, congenital, CHF)
  - NO prodrome (or brief with palps)
  - Syncope while supine or with exertion
  - Infrequent episodes

- Noncardiac
  - Younger age (<40)
  - No hx of cardiac disease
  - Syncope while standing or positional changes
  - Prodrome
  - Specific triggers (pain, stress, medical, dehydrated)
  - Frequent recurrence

Outline

- Definition, epidemiology and demographics
- Initial evaluation
- Risk assessment and disposition
Risk Assessment

• Assess short and long term risks of mortality and morbidity
  – NOT primary determinants for admission

• Consider risk stratification scores
  – Limited use because of inconsistent definitions, outcomes, time frames, etc.
  – Does NOT outperform clinical judgment
## Short-Term Risk Factors (<30d)

**History: Outpatient Clinic or ED Evaluation**
- Male sex (74,85,101,102)
- Older age (>60 y) (88)
- No prodrome (68)
- Palpitations preceding loss of consciousness (83)
- Exertional syncope (83)
- Structural heart disease (70,83,88,101,103)
- HF (74,83,85,88)
- Cerebrovascular disease (70)
- Family history of SCD (70)
- Trauma (68,101)

**Physical Examination or Laboratory Investigation**
- Evidence of bleeding (83)
- Persistent abnormal vital signs (70)
- Abnormal ECG (68,72,74,75,105)
- Positive troponin (75)

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## Long-Term Risk Factors (>30d)

**Long-Term Risk Factors (>30 d)**

- Male sex (68,90)
- Older age (67,74,75,90)
- Absence of nausea/vomiting preceding syncopal event (93)
- VA (68,90)
- Cancer (68)
- Structural heart disease (68,103)
- HF (90)
- Cerebrovascular disease (68)
- Diabetes mellitus (104)
- High CHADS-2 score (95)
- Abnormal ECG (84,90,93)
- Lower GFR
Disposition

• Insufficient support for disposition algorithms

• Reasonable to manage presumptive reflex-mediated syncope in the outpatient setting in the absence of serious medical conditions (COR 2A)

Disposition - Hospitalized

- Hospital evaluation and treatment recommended for patients with syncope who have a serious medical condition potentially relevant to the cause of syncope identified on initial evaluation.

Disposition

Cardiac or Vascular Nonarrhythmic Conditions

Noncardiac Conditions

- Severe anemia/gastrointestinal bleeding
- Major traumatic injury due to syncope
- Persistent vital sign abnormalities
- Pulmonary embolism
- Aortic dissection
- Acute HF
- Moderate-to-severe LV dysfunction
Outline

• Definition, epidemiology and demographics
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  – Cardiovascular and neurologic testing
Additional Testing

• This testing is *after* a H&P, ECG and risk stratification
• Need to understand the diagnostic and prognostic value of further testing

• *Broad-based use of additional testing is costly and often ineffective*
Blood Testing

- Targeted blood tests – NO shotgun!
- Diagnostic yield of blood testing is low (when routinely used)
- Testing should be directed from H&P or other comorbidities
- BNP and troponin if cardiac etiology suspected

Cardiovascular Testing

- Important to realize that abnormalities found during cardiovascular testing may not have causal relationship to syncope

- Testing results require clinical judgment and appropriate selection
Cardiovascular Testing

- Echo if structural disease is suspected
  - HCM, LV dysfunction, valvular disease, etc
- CT/MR if inconclusive or inadequate studies/imaging
- **NO routine cardiac imaging**
  - “Screening” echo is low utility
  - <2% made the diagnosis
  - <5% contributed to the diagnosis
Cardiovascular Testing

- Exercise stress testing if syncope or presyncope during exertion
- Cath and radionuclide imaging has little role in syncope evaluation
- Cardiac monitoring devices
  - Depends on frequency, duration and nature
  - Be aware of patient's symptoms and whether he or she can trigger the recording system


Cardiac Monitoring

- Holter monitor (24-72h)
- External loop recorder (2-6wks)
- Patch Recorder
- Mobile cardiac outpatient monitoring (2-14 days)
- Implantable monitor
Other Cardiovascular Testing

• Electrophysiological Study (EPS)
  – After other cardiac testing and high suspicion
  – NOT for normal ECG and echo


Other Cardiovascular Testing

• Tilt-Table Testing
  – Recurrent vasovagal syncope after negative work up (gives a diagnosis)
  – Delayed orthostatic hypotension (s/s >3 mins)
  – Can distinguish convulsive syncope from epilepsy
  – Evaluate pseudosyncope
  – NOT for evaluation of treatments

Neurologic Testing

- MRI and CT of the head are **NOT** recommended in the *routine* evaluation of patients with syncope *in the absence of focal neurologic findings or head injury.* (Class III)

- Referral for autonomic evaluation if syncope and known/suspected neurodegenerative disease.

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Neurologic Testing

- Carotid artery imaging is **NOT** recommended in *routine* evaluation *without focal neurologic findings*

- Routine EEG is NOT recommended in the syncope evaluation without features of seizure
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Treatment of Cardiac Syncope

Follow ACC/AHA guidelines

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease
A Report of the American College of Cardiology/American Heart Association

2011 ACCF/AHA Guideline for the Diagnosis and Treatment of Hypertrophic Cardiomyopathy
A Report of the American Heart Association

2015 ACC/AHA/HRS Guideline for the Management of Adult Patients With Supraventricular Tachycardia
A Report of the American College of Cardiology/American Heart Association
Task Force on Clinical Practice Guidelines and the Heart Rhythm Society
Noncardiac Syncope

- Vasovagal syncope
  - Reflex causing hypotension and bradycardia, triggered by prolonged standing or exposure to emotional stress, pain or medical procedures.
  - Prodrome with diaphoresis, warmth, pallor and fatigue.

Vasovagal Treatment

• Patient education (essential)
  – Explain the diagnosis, awareness and avoidance of triggers with reassurance
• Physical counter-pressure maneuvers
• Medications (less effective)
  – Midodrine (2A), Fludrocortisone (2B), Beta Blockers (2B), SSRI (2B)
  – Adjust current BP medications
• Rare role for pacemakers
  – Also in carotid sinus syndrome

Noncardiac Syncope Treatment

• Orthostatic Hypotension
  – Well documented diagnosis. Treated with medication adjustments and IVF

• Dehydration and drugs
  – Fluids and adjust antihypertensive drugs

• Pseudosyncope
  – Apparent syncope without impaired cerebral perfusion
  – Conversion disorder - not malingering or Munchausen syndrome

Syncope Zebras

I CAN'T SAY I'M ENTIRELY PLEASED WITH MY HIP REPLACEMENT.
Rare Causes of Syncope

- Tamponade
- Constrictive Pericarditis
- LV Noncompaction
- Takotsubo
- Pulmonary emboli
- Pulmonary Hypertension
- Fabry, Amyloid, Hemochromatosis
- Myocarditis, Lyme, Chagas disease
- Neuromuscular disease, Myotonic dystrophy

- Lenegre-Lev Disease
- Cardiac tumors
- Prosthetic valve thrombosis
- Anomalous coronary artery
- Aortic dissection
- Subclavian steal
- Coarctation (BAV)
- Rheumatoid arthritis, neck tumor
- Carcinoid, pheos
- Beta thalassemia
- Seizures and migraines
Driving Recommendations

- Use your local driving laws and rules
- Not previously listed or available as reference with when taking care of syncope (especially recurrent syncope)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Symptom-Free Waiting Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH</td>
<td>1 month</td>
</tr>
<tr>
<td>VVS, no syncope in prior year (698)</td>
<td>No restriction</td>
</tr>
<tr>
<td>VVS, 1-6 syncope per year (694)</td>
<td>1 month</td>
</tr>
<tr>
<td>VVS, &gt;6 syncope per year (694,698)</td>
<td>Not fit to drive until symptoms resolved</td>
</tr>
<tr>
<td>Situational syncope other than cough syncope</td>
<td>1 month</td>
</tr>
<tr>
<td>Cough syncope, untreated</td>
<td>Not fit to drive</td>
</tr>
<tr>
<td>Cough syncope, treated with cough suppression</td>
<td>1 month</td>
</tr>
<tr>
<td>Carotid sinus syncope, untreated (698)</td>
<td>Not fit to drive</td>
</tr>
<tr>
<td>Carotid sinus syncope, treated with permanent pacemaker (698)</td>
<td>1 week</td>
</tr>
<tr>
<td>Syncope due to nonreflex bradycardia, untreated (698)</td>
<td>Not fit to drive</td>
</tr>
<tr>
<td>Syncope due to nonreflex bradycardia, treated with permanent pacemaker (12,698)</td>
<td>1 week</td>
</tr>
<tr>
<td>Syncope due to SVT, untreated (698)</td>
<td>Not fit to drive</td>
</tr>
<tr>
<td>Syncope due to SVT, pharmacologically suppressed (698)</td>
<td>1 month</td>
</tr>
<tr>
<td>Syncope due to SVT, treated with ablation (698)</td>
<td>1 week</td>
</tr>
<tr>
<td>Syncope with LVEF &lt;35% and a presumed arrhythmic etiology without an ICD (699,700)</td>
<td>Not fit to drive</td>
</tr>
<tr>
<td>Syncope with LVEF &lt;35% and presumed arrhythmic etiology with an ICD (701,702)</td>
<td>3 months</td>
</tr>
<tr>
<td>Syncope presumed due to VT/VF, structural heart disease, and LVEF ≥35%, untreated</td>
<td>Not fit to drive</td>
</tr>
<tr>
<td>Syncope presumed due to VT/VF, structural heart disease, and LVEF ≥35%, treated with an ICD and guideline-directed drug therapy (701,702)</td>
<td>3 months</td>
</tr>
<tr>
<td>Syncope presumed due to VT with a genetic cause, untreated</td>
<td>Not fit to drive</td>
</tr>
<tr>
<td>Syncope presumed due to VT with a genetic cause, treated with an ICD or guideline-directed drug therapy</td>
<td>3 months</td>
</tr>
<tr>
<td>Syncope presumed due to a nonstructural heart disease VT, such as RVOT or LVOT, untreated</td>
<td>Not fit to drive</td>
</tr>
<tr>
<td>Syncope presumed due to a nonstructural heart disease VT, such as RVOT or LVOT, treated successfully with ablation or suppressed pharmacologically (698)</td>
<td>3 months</td>
</tr>
<tr>
<td>Syncope of undetermined etiology</td>
<td>1 month</td>
</tr>
</tbody>
</table>
Conclusions

• Syncope is common diagnosis with variable definitions
• H&P and ECG are vital in the assessment
  – Remember the serious medical conditions
  – Use your medical judgment and experience
• Testing should be focused and pertinent
  – No “shotgun” approach to blood work
  – Appropriate echoes (not screening/routine)
  – Avoid head CT and carotid ultrasound without focal neurologic deficit or trauma.
• Acknowledge new driving recommendations

Questions and Discussion

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