The Ups & Downs of Syncope: When Should I Worry
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Objectives

• Review syncope definitions and background
• Define causes of syncope in children and adolescents
• Define the burden of syncope in pediatrics
• Discuss the evaluation and treatment of pediatric syncope
Akron Children’s Syncope Clinic

- Created in 2014 to provide a standardized approach to patients referred for syncope
- Staffed by 2 nurse practitioners with cardiologist available for consultation
- Purpose of ACH Syncope Clinic:
  - To screen appropriately for patients who may be a risk for sudden death
  - To provide comprehensive treatment for patients with vasovagal / neurocardiogenic syncope
    - Improvement of symptoms
    - Improve perceived quality of life
Case Study #1

- JM: 15 y/o otherwise healthy female
- Passed out in church after kneeling then standing
- Recalls feeling light headed, blurry to black vision, and nausea
- Has had 2 similar episodes after standing quickly
- Frequently skips breakfast and doesn’t drink water
- Minimal exercise
EKG #1
Case Study #2

• KK: 13 y/o male, otherwise healthy
• 2 episodes of syncope, both mid-exercise
• Near drowning event at age 4
• Family history of sudden death in paternal uncle; drowned while swimming in the ocean and 1\textsuperscript{st} cousin died of SIDS at 3 months
EKG #2

QTc 480 msec
CB: 10 y/o male, otherwise healthy
2 episodes of syncope during exercise
Reported chest pain prior to syncope
EKG shows LVH
Case #3
Syncope

- A relatively abrupt, self-limiting loss of consciousness
- Causes reduced blood flow to the brain
- Triggered by a sudden drop in either the heart rate, the blood pressure, or both
Background

- Syncope is relatively common in children and adolescents
- 30% of all people will experience a near syncope or syncope in the first two decades of life
- Accounts for 1% of all pediatric ED visits in United States
- Accounted for 0.05% of all visits to ACH ED in 2018
- 645 visits to ACH Syncope Clinic in 2018
Etiology of Loss of Consciousness

• Circulatory abnormalities
• Neurologic abnormalities
• Psychological/Psychiatric abnormalities
• Cardiac abnormalities
Circulatory Abnormalities

- Vasovagal/neurocardiogenic syncope
- Situational/reflex syncope
  - Hair combing
  - Blood and gore
  - Pain
  - Micturition/defecation
  - Stress/anxiety
Neurologic Abnormalities

• Complex or simple seizures
• Migraine variant
• Vascular events
• Disrupted CSF circulation
Psychological/Psychiatric Abnormalities

• Conversion disorder/ PNES/ pseudoseizures
• Hyperventilation
• Panic Attack
• Munchausen’s Syndrome
Cardiac Abnormalities

- **Congenital** electrical problems
  - Congenital long QT syndrome
  - Brugada syndrome
  - WPW/pre-excitation
  - Congenital complete heart block

- **Structural** heart disease
  - Hypertrophic cardiomyopathy
  - Anomalous coronary artery
  - Pulmonary hypertension

- **Acquired** heart disease
  - Myocarditis
  - Complete heart block (e.g. Lyme disease)

- * Most common cardiac causes of sudden/unexpected death in the young
Burden of Syncope

• Patient/Family burden
  • Concern for serious medical problem
  • Missed school and change in activity level

• System burden of disease
  • Multiple medical visits
    • Primary care, ED, neurology, cardiology
  • Cost of unnecessary medical testing
Patient self-report: Mean PedsQL™ scores by disease

* Syncope patients with lower PedsQL scores (p<0.01)
# Syncope patients with higher PedsQL scores (p<0.01)

Anderson et.al. Evaluation and Management of Pediatric Syncope, Pediatric Neurology
Evaluation of Pediatric Syncope

Goal:
• Make a diagnosis of the etiology of syncope
• Rule out serious causes of syncope
• Not perform unnecessary tests
AHA, ACC, HRS and ESC have created guidelines for the evaluation of syncope that include recommendations for evaluation of pediatric patients.

Essential components of evaluation in children include a comprehensive **medical and family history, physical examination** and an **electrocardiogram**.

Diagnostic yield is low for most tests used in the evaluation of pediatric syncope.

Unnecessary diagnostic testing leads to increased medical costs and potential harm to patients.
Diagnostic Evaluation

- Thorough history
  - Past medical history
  - History of syncopal event
- Family history
  - Sudden death
  - Pacemaker/ICD implantation
  - Cardiomyopathy
  - Channelopathy
Diagnostic Evaluation

• Thorough physical examination
  • Cardiac and neurologic
• Electrocardiogram
• Tilt-table testing

• Tests with low diagnostic yield
  – Head imaging, blood work, radiographs, echocardiograms
Red Flags

- Syncope DURING exercise
- Preceded by chest pain
- Resulting in major injury from a fall
- Near drowning
- Seizure activity with post-ictal state
- Focal neurological finding after event
- Abnormal cardiac/neurologic examination
- Abnormal ECG
- Family history (1st degree)
  - Cardiomyopathy
  - Sudden death <50 year old
  - Channelopathy
  - Pacemaker or Defibrillator
Treatment

- Reassurance, reassurance, reassurance!
- Education
- Hydration and salt intake
- Regular exercise
- Avoid triggers
- Physical counter-maneuvers
- Medications
Non-pharmacologic Management

- Increase fluid and salt intake
- Encourage 80-100 ounces of fluid per day, avoid caffeine
- Recommend salty snacks
- Note for school
Non-pharmacologic Management

Exercise
- Cardiovascular exercise
- Resistance training of the lower extremities
- No physical restrictions
Non-pharmacologic Management

- Lifestyle changes/avoidance of triggers
  - Slow down position changes
  - Avoid heat: vasodilation and dehydration
  - Move during prolonged standing
  - Limit/avoid caffeine
  - Avoid alcohol
  - Other common triggers include physical and emotional stress

- Attention to symptoms
  - Sit or lie down if symptomatic
  - Utilize physical counter maneuvers
Pharmacologic Management

2017 ACC/AHA/HRS guidelines for the evaluation and management of patients with syncope
A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society
Treatment of VVS

• Initial treatment:
  – Start hydration with 80-100 oz/day; daily exercise routine; increase salt intake 3-5 gm/day

• If symptoms continue:
  – Fludrocortisone 0.1 mg daily
  – Midodrine 2.5 – 10 mg TID
  – Consider Betablockers or SSRI’s
Referral

**Cardiology**
- Age < 8 years with syncope
- Recurrent syncope
- Syncope during exercise, preceded by chest pain, or accompanied with a physical injury from sudden fall
- Family history of sudden death, cardiomyopathy, channelopathy, or PM/ICD
- Abnormal exam
- Near drowning

**Neurology**
- Seizure activity with post-ictal state
- Focal neurological finding after the event
Summary

- Syncope is common in healthy adolescents
- The most common etiology is benign vasovagal/neurocardiogenic syncope
- Cardiac and neurologic abnormalities should be considered
- Extensive testing is not usually necessary
- Most patients respond to reassurance and education
- Syncope clinic can be a resource for you