



Syncope in Children

For 5th–6th Year Medical Students

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1. Definition

Syncope is a **transient loss of consciousness (TLOC)** caused by **temporary global cerebral hypoperfusion**, characterized by:

- Rapid onset
- Brief duration
- Complete spontaneous recovery without neurologic deficit

Most pediatric syncope is **benign (vasovagal)**, but the priority is identifying **cardiac and neurologic causes**, which may be life-threatening.

2. Clinical Presentation

Typical symptoms before syncope (Prodrome)

Suggests **vasovagal syncope**

- Dizziness
 - Lightheadedness
 - Blurred vision
 - Nausea
 - Sweating
 - Pallor
 - Tinnitus
 - Feeling warm
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During syncope

- Sudden collapse
 - Loss of postural tone
 - Usually lasts **<1 minute**
 - Brief myoclonic jerks may occur (do not immediately diagnose epilepsy)
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Recovery

Typical vasovagal syncope:

- Rapid recovery
 - Normal orientation within minutes
 - Mild fatigue afterward
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Red Flag Symptoms

These suggest **cardiac syncope**.

- Syncope during exercise
 - Syncope immediately after exertion
 - Syncope without warning
 - Chest pain
 - Palpitations before collapse
 - Family history of sudden cardiac death (<50 years)
 - Known congenital heart disease
 - Previous arrhythmia
 - Recurrent unexplained episodes
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3. Diagnostic Approach

Step 1 — Confirm true syncope

Differentiate from:

- Seizure
- Breath-holding spell

- Psychogenic pseudosyncope
 - Concussion
 - Hypoglycemia
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Step 2 — Focused History

Circumstances

- Standing?
 - Emotional stress?
 - Pain?
 - Heat?
 - Exercise?
 - Dehydration?
 - Sudden fright?
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Prodrome

Present?

- Yes → vasovagal likely
 - No → consider cardiac cause
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During episode

Ask:

- Duration
 - Convulsions?
 - Cyanosis?
 - Injury?
 - Tongue biting?
 - Urinary incontinence?
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Recovery

Rapid recovery favors syncope.

Postictal confusion favors seizure.

Family history

Must ask about:

- Sudden death
 - Cardiomyopathy
 - Long QT syndrome
 - Channelopathies
 - Unexplained drowning
 - Unexplained motor vehicle accidents
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Medication history

- QT-prolonging drugs
 - Diuretics
 - Antihypertensives
 - Stimulants
 - Antiarrhythmics
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Step 3 — Physical Examination

Vital signs

- Orthostatic BP and HR
 - Fever
 - Oxygen saturation
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Cardiovascular

Look for

- Murmur
- Irregular rhythm
- Signs of heart failure
- Weak femoral pulses

- Blood pressure in all limbs if indicated

Neurologic

- Mental status
- Cranial nerves
- Motor examination
- Focal deficits

General

Look for

- Pallor
- Dehydration
- Trauma
- Anemia

Practical Diagnostic Algorithm

Transient loss of consciousness

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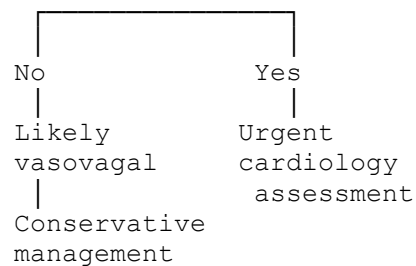
True syncope?

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History + Examination + ECG

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Red flags?



4. Differential Diagnosis

Diagnosis	Key Clues
Vasovagal syncope	Prodrome, standing, heat, emotional trigger
Orthostatic hypotension	Standing after sitting/lying
Dehydration	Vomiting, diarrhea, poor intake
Cardiac arrhythmia	Sudden, no prodrome
Structural heart disease	Murmur, exertional symptoms
Long QT syndrome	Syncope during exercise or emotion
Hypertrophic cardiomyopathy	Exercise-related syncope
Seizure	Postictal confusion, prolonged LOC
Breath-holding spell	Infant/toddler after crying
Psychogenic pseudosyncope	Long duration, eyes closed, normal circulation
Hypoglycemia	Diabetes, prolonged fasting
Migraine-associated syncope	Headache history

5. Investigations

Recommended for ALL patients

 ECG (mandatory)

Evaluate:

- QT interval
 - WPW
 - AV block
 - Ventricular hypertrophy
 - Brugada pattern
 - Arrhythmias
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Based on clinical suspicion

Investigation	Indication
Blood glucose	Altered mental status, diabetes
CBC	Suspected anemia
Electrolytes	Dehydration or metabolic disease
Pregnancy test (adolescents)	Appropriate patients
Echocardiography	Abnormal exam or ECG
Holter monitor	Recurrent unexplained syncope
Exercise stress test	Exercise-related syncope
EEG	Only if seizure suspected
Brain imaging	Focal neurologic signs or trauma

Investigations NOT routinely indicated

- Routine CT brain
 - Routine MRI
 - Routine EEG
 - Extensive laboratory testing
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6. Management Algorithm

Step 1

Assess

- Airway
 - Breathing
 - Circulation
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Step 2

Check:

- Blood glucose
- Vital signs
- ECG

Step 3

Determine likely cause.

A. Vasovagal Syncope

Most common (>70%)

Management

- Reassurance
 - Oral hydration
 - Increase salt intake (if no contraindication)
 - Avoid prolonged standing
 - Avoid dehydration
 - Recognize prodrome
 - Counter-pressure maneuvers (leg crossing, squatting, handgrip) in older children
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B. Orthostatic Hypotension

Treat cause

- Hydration
 - Gradual standing
 - Medication review
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C. Cardiac Syncope

Emergency evaluation

- Continuous cardiac monitoring
 - Cardiology consultation
 - Hospital admission
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D. Hypoglycemia

Treat immediately

- Oral glucose if conscious
- IV dextrose if unconscious

E. Arrhythmia

Treat according to Pediatric Advanced Life Support (PALS) algorithms.

7. Drug Summary Table

Medication	Indication	Dose
Oral rehydration solution	Mild dehydration	Encourage oral fluids
Normal saline	Hypovolemia	20 mL/kg IV bolus, repeat as needed
Dextrose 10% (D10W)	Hypoglycemia (infants/children)	5 mL/kg IV (0.5 g/kg glucose)
Dextrose 25% (D25W)*	Selected older children (institution-specific)	2 mL/kg IV (0.5 g/kg glucose)
Dextrose 50%	Avoid in children due to risk of tissue injury and hyperosmolarity	
Fludrocortisone	Recurrent orthostatic intolerance (specialist)	Specialist guided
Midodrine	Recurrent vasovagal syncope (specialist)	Specialist guided

*Many pediatric centers prefer D10W or D12.5W to reduce the risk of extravasation injury.

Note: Drug therapy is **not indicated** for most children with uncomplicated vasovagal syncope. Lifestyle measures are first-line. Fludrocortisone or midodrine may be considered only in selected patients under specialist supervision.

8. Admission Criteria

Admit if:

- Syncope during exercise
 - Abnormal ECG
 - Known heart disease
 - Persistent abnormal vital signs
 - Significant arrhythmia
 - Chest pain
 - Heart failure
 - Recurrent unexplained syncope
 - Serious injury
 - Persistent neurologic deficit
 - Suspected myocarditis or cardiomyopathy
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9. Referral Criteria

Urgent Cardiology Referral

- Exertional syncope
 - Abnormal ECG
 - Family history of sudden cardiac death
 - Congenital heart disease
 - Palpitations preceding syncope
 - Recurrent unexplained syncope
 - Syncope while supine
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Neurology Referral

- Suspected epilepsy
 - Abnormal neurologic examination
 - Persistent confusion
 - Recurrent unexplained loss of consciousness despite normal cardiac evaluation
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10. Follow-up

Vasovagal syncope

- Review hydration and lifestyle measures
- Reinforce trigger avoidance
- Assess recurrence
- Re-evaluate if symptoms change or red flags develop

Cardiac syncope

- Follow-up with pediatric cardiology
 - Activity recommendations based on diagnosis
 - Ongoing rhythm surveillance if indicated
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11. Clinical Pearls

- **ECG should be performed in every child presenting with true syncope.**
 - Vasovagal syncope is the most common cause in children and adolescents.
 - Syncope **during exertion** is cardiac until proven otherwise.
 - Brief myoclonic movements can occur in syncope and do **not** necessarily indicate epilepsy.
 - Rapid recovery favors syncope; prolonged postictal confusion favors seizure.
 - Most laboratory tests are unnecessary unless suggested by the history or examination.
 - A careful history often establishes the diagnosis.
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12. Common Mistakes in Exams and Practice

- ✗ Assuming all syncope is vasovagal without obtaining an ECG.
- ✗ Missing a family history of sudden cardiac death or inherited arrhythmias.
- ✗ Ordering routine EEG for every syncopal episode.
- ✗ Performing routine brain CT/MRI in uncomplicated syncope.
- ✗ Failing to measure orthostatic vital signs.

- ✗ Missing exertional syncope or syncope occurring in the supine position.
 - ✗ Prescribing medications before implementing hydration and lifestyle modifications.
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13. Key Take-Home Messages

1. Syncope is a transient loss of consciousness due to cerebral hypoperfusion.
 2. Vasovagal syncope is the most common pediatric cause.
 3. A detailed history, physical examination, and **ECG** are the cornerstone of evaluation.
 4. Syncope during exercise, in the supine position, or without a prodrome requires urgent cardiac assessment.
 5. An abnormal ECG or concerning family history should prompt cardiology referral.
 6. Routine EEG, brain imaging, and extensive laboratory testing are **not** indicated in uncomplicated syncope.
 7. Lifestyle measures (adequate hydration, salt intake when appropriate, trigger avoidance, and counter-pressure maneuvers) are the primary treatment for vasovagal syncope.
 8. Admit children with suspected cardiac syncope, significant arrhythmias, abnormal vital signs, or persistent neurologic abnormalities.
 9. Distinguishing syncope from seizure is a key clinical skill.
 10. Identifying the small proportion of children with life-threatening cardiac disease is the primary goal of the initial assessment.
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Guideline-Based References (Recommended)

1. 2024/2025 **American Heart Association (AHA)** Scientific Statements on pediatric syncope and cardiovascular evaluation.
2. **2022 European Society of Cardiology (ESC) Guidelines** for the diagnosis and management of syncope.
3. **ACC/AHA/HRS Guideline** for the evaluation and management of syncope (with pediatric considerations).
4. **American Academy of Pediatrics (AAP)** clinical guidance on syncope and transient loss of consciousness in children.
5. **PALS (American Heart Association), 2025 Update** for management of pediatric arrhythmias and unstable patients.