POTS in Children

Postural Orthostatic Tachycardia Syndrome

School Nurse Education Conference

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Sources: HRS Consensus 2015 · AAP Pediatrics 2022 · Clinical Autonomic Research 2026 · PMC 2024

Objectives

1. **Recognize common symptoms and triggers** of POTS in children and adolescents
2. **Perform initial assessment and differentiate benign syncope from high-risk causes**
3. **Implement first-line management and identify red flags requiring urgent referral**

What is POTS?

DEFINITION

A disorder of the autonomic nervous system causing **excessive heart rate elevation** upon standing — without a drop in blood pressure.

Blood pools in the legs → ↓ brain perfusion → compensatory ↑ heart rate → symptoms.

📋 PEDIATRIC DIAGNOSTIC CRITERIA

✓ HR increase ≥40 bpm within 10 min of standing
✓ No orthostatic hypotension
✓ Symptoms ≥ 3 months

~1–3%

Estimated prevalence in school-age children

4:1

Female:male ratio (adult studies)

Post-COVID surge

POTS referrals have increased significantly post-COVID-19. Long COVID is now recognized as a common precipitant in adolescents.

How Common Are VVS & POTS in Adolescents?

15–20%

of adolescents experience at least one syncopal episode in their lifetime

73%

of referred adolescents with syncope → VVS (most common cause)

27%

of referred adolescents with syncope → POTS (2nd most common)

Among adolescents referred for syncope/presyncope workup:

General Population

- POTS prevalence: ~1–7% in school-age children
- VVS lifetime risk: ~35% by age 60
- Both peak sharply in adolescent years

Why POTS Gets Missed

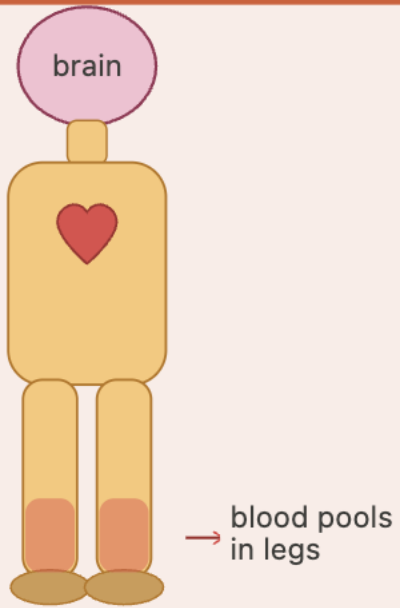
- No full LOC — just "not feeling well"
- Often labeled anxiety or dehydration
- Avg diagnosis delay: 2–3 years from onset

Post-COVID Impact

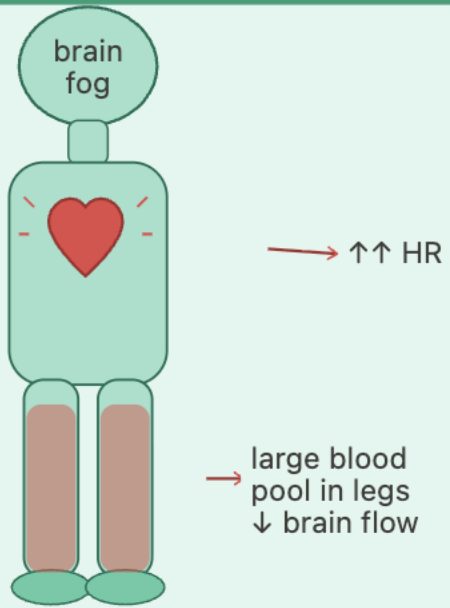
- POTS referrals surged post-2020
- Long COVID is a recognized POTS precipitant
- VVS rates relatively unchanged post-pandemic

Sources: PMC 2025 (10-yr tilt-table cohort, n=137) · Lin et al. (n=600 school-children) · Boris & Moak, Pediatrics 2022 · Clin Auton Res 2026

Vasovagal syncope (VVS)



POTS



VVS vs POTS: Clinical Differentiation

FEATURE	⚡ VASOVAGAL SYNCOPE (VVS)	💓 POTS
Symptom Pattern	Episodic faints — normal in between	Chronic daily symptoms with any upright posture
HR on Standing	Rises then suddenly DROPS (vagal crash)	Sustained rise ≥40 bpm — stays elevated
BP on Standing	Drops significantly during event	Normal — no sustained drop
Prodrome	Classic — nausea, pallor, tunnel vision	Mild or absent
Between Episodes	Completely normal ✓	Daily fatigue, brain fog, palpitations ⚠️
Exercise Tolerance	Usually preserved	Often impaired — exercise intolerance
Key Triggers	Standing, heat, pain, venipuncture, emotion	Any upright posture — minutes of standing
Recovery	Full, rapid after lying down	Improves lying down but recurs immediately on standing

🔑 **KEY CLUE FOR SCHOOL NURSES: A student who feels foggy, exhausted, and "off" every single day — not just when fainting — is describing POTS until proven otherwise.**

The Orthostatic Test & Clinical Overlap

How to Test at School (Informal)

Measure HR + BP lying flat, then repeat at 2, 5 and 10 minutes of standing.

VVS	HR/BP normal for several minutes → then sudden crash of both HR + BP together. Hard to reproduce unless happening in the moment.
POTS	HR climbs ≥40 bpm above supine baseline within 10 min of standing. BP stays stable. Student feels symptomatic the entire time upright.

⚠ Overlap & Co-occurrence

They are not always mutually exclusive:

Some adolescents have BOTH — chronic POTS with superimposed VVS episodes when orthostatic stress becomes severe enough to trigger the vagal reflex.

On tilt-table: sustained tachycardia of POTS → followed by the BP/HR crash of VVS

Practical differentiation tips:

✓ Ask about daily symptoms — not just fainting episodes

✓ VVS: student is fine between events; POTS: not fine

✓ POTS: symptoms start within minutes of standing

✅ School nurses can perform an informal orthostatic HR check in under 5 minutes — it's the single most useful bedside screen to distinguish the two.

How POTS Presents in the School Setting

💫 Dizziness / Lightheadedness

Often upon standing from a desk or floor. May worsen in warm rooms or after long assembly.

😴 Extreme Fatigue

"Brain fog," difficulty concentrating. Student may appear disengaged or falling asleep.

💓 Palpitations

Rapid or pounding heartbeat noticed when rising. May cause anxiety about the sensation.

🤢 Nausea & Abdominal Pain

GI symptoms common — often triggers dismissal from class.

🟦 Blurred / Tunnel Vision

Graying or blurring of vision moments after standing. Clears when seated.

🧠 Headache & Brain Fog

Chronic daily headaches; poor working memory; difficulty with tests.

📌 Presyncope (near-fainting) is more common than full syncope. Rapid symptom relief when lying down is a hallmark clue.

Who Gets POTS? Common Triggers at School

TYPICAL PATIENT PROFILE

Age	12–16 years; adolescence peak
Sex	Predominantly female (4:1 in adults)
Trigger	Recent viral illness, concussion, growth spurt
Academics	High-achiever now struggling to attend
Co-morbidities	Migraine, anxiety, joint hypermobility (EDS)
COVID link	Post-COVID Long Hauler presentation rising

SCHOOL-BASED TRIGGERS

Prolonged Standing
Assembly, choir, cafeteria lines

Heat Exposure
Gym class, outdoor events, warm classrooms

Dehydration
Skipping fluids, early morning classes

Skipping Meals
Low blood sugar amplifies symptoms

Emotional Stress
Exams, presentations, social anxiety

Illness / Recovery
Return to school after infection

Initial Evaluation: School Nurse Assessment

1 Check Vitals (Lying → Standing)

- Measure HR and BP supine
- Repeat HR and BP at 2 min and 5 min standing
- POTS: HR ↑ ≥40 bpm without BP drop
- Document exact numbers — providers will need this

2 Ask the Right Questions

- What was the student doing at onset?
- Did they feel symptoms coming? (prodrome)
- Did lying down improve symptoms?
- Any chest pain? Exertion? No warning?

3 Assess & Observe

- Pallor, sweating, cold/clammy hands
- Signs of dehydration (dry lips, lethargy)
- Note duration and recovery time
- Were there limb jerks? (→ Seizure concern)

✅ Most POTS episodes resolve with lying down + hydration. If symptoms persist or RED FLAGS present → refer urgently.

Differential: POTS vs Cardiac Syncope vs Seizure

Feature	POTS / VV Syncope	Cardiac Syncope ⚠	Seizure ⚠
Trigger	Standing, heat, emotion	Exercise, sudden fright	Often none
Warning (Prodrome)	Yes — dizziness, nausea	Often NONE	None or brief aura
Loss of consciousness	Brief or none (presyncope)	Yes — sudden	Yes — sustained
Limb jerking	Rare, few myoclonics	Rare	Many, rhythmic (>20s)
Recovery	Rapid — seconds to minutes	Variable, may be slow	Slow, postictal confusion
Heart rate	High standing, normal supine	May be very fast or very slow	Variable
ECG finding	Normal or sinus tachycardia	Long QT, Brugada, arrhythmia	Normal (usually)

📌 Rapid full recovery after lying down strongly suggests benign POTS/VV syncope. Exercise-triggered + no warning = CARDIAC until proven otherwise.

Medical Workup: What Providers Do

📋 Step 1: History + Physical + ECG

Most important. Identify triggers, prodrome, family history of sudden cardiac death. ECG rules out Long QT, Brugada, pre-excitation.

🩺 Step 2: Orthostatic Testing (NASA Lean / Active Stand)

HR and BP measured supine, then at 2, 5, 10 min standing. In school: informal version can flag need for referral.

🔬 Step 3: Lab Work to Exclude Mimics

CBC (anemia), thyroid, metabolic panel, iron studies. Autoimmune markers in select cases.

💔 Step 4: Targeted Cardiac Testing (if indicated)

Echo if abnormal exam or family history. Holter / event monitor for arrhythmias. (Tilt-table test for autonomic assessment.)

📌 ECG is the single most important screening tool for dangerous cardiac causes. Every syncopal child should have one.

Treatment: Non-Pharmacologic (First-Line for ALL Children)

💧 Hydration

Cornerstone

2–3 liters of fluid per day. Encourage water bottles in class. Electrolyte drinks (not sugary) can help.

🧂 Increased Salt Intake

Evidence-based

Extra dietary sodium helps retain fluid and expand blood volume. Salt snacks, electrolyte tabs (if prescribed by provider).

🏃 Graded Exercise Program

Key Recovery Tool

Structured recumbent exercise first (swimming, cycling, rowing) → gradual upright exercise. Avoid sudden prolonged standing early on.

🧦 Compression Garments

School-Friendly

Waist-high compression stockings (20–30 mmHg) reduce venous pooling. Abdominal binders also effective.

🪑 Physical Counter-Maneuvers

Teach This!

Teach: leg crossing, squatting, muscle tensing before rising. These can abort presyncope in seconds.

😴 Sleep & Routine

Often Overlooked

Head-of-bed elevation (10–15°), consistent schedule. Avoid prolonged recumbency during the day.

✅ Non-pharmacologic interventions are the cornerstone of POTS treatment in ALL children — start before any medication. (HRS 2015; AAP Pediatrics 2022; Clin Auton Res 2026)

Treatment: Pharmacologic Options (Specialist-Guided)

Beta-Blockers (Metoprolol)

Class: Heart Rate Control

Hyperadrenergic POTS with high resting HR and palpitations.

Watch: Fatigue, exercise intolerance, bradycardia

Ivabradine

Class: Heart Rate Control (Novel)

Reduces heart rate without BP effect. Preferred for symptomatic tachycardia when beta-blockers not tolerated.

Watch: Visual phosphenes, bradycardia

Midodrine

Class: Vasoconstrictor / Peripheral

Increases venous return by constricting blood vessels. Used in hypovolemic subtypes.

Watch: Supine hypertension — check BP

Fludrocortisone

Class: Volume Expansion

Promotes sodium/water retention. Expands plasma volume in hypovolemic POTS.

Watch: Hypokalemia, HTN, fluid overload

Pyridostigmine

Class: Cholinergic Agent

Enhances peripheral vascular tone. Emerging evidence in adolescents.

Watch: GI side effects (cramping, diarrhea)

IV Saline

Class: Acute Volume Rescue

Short-term relief for decompensated POTS, often during illness flares.

Watch: Hospital/clinic setting only

School-Based Interventions & Accommodations

Allow ✅

- Water bottle at all times
- Salt snacks during class (if prescribed)
- Seated rest during long assemblies or choir
- Access to nurse office without penalty
- Elevator access / avoid crowded stairwells

Modify 🔧

- Graded return to PE (start seated / poolside)
- Shorten standing times in line or during labs
- Allow student to move/shift positions in class
- Modified test timing if brain fog is significant
- Flexible attendance during flares

Teach Students 🧠

- Leg crossing before rising from seat
- Squat if feeling faint — never lock knees
- Rise slowly from seated/lying positions
- Drink fluid proactively, not reactively
- Report symptoms early — don't push through

📋 A 504 Plan or IEP accommodation document can formalize these supports. Encourage families to pursue one with their pediatrician's letter.

RED FLAGS: When to Worry About a Cardiac Cause

Syncope during exercise	Classic presentation of hypertrophic cardiomyopathy, Long QT, or other life-threatening arrhythmia.
Syncope without any warning	Suggests sudden arrhythmia onset — no prodrome = no time for compensation = cardiac until proven otherwise.
Family history of sudden cardiac death <50 yrs	Inherited channelopathies (Long QT, Brugada) and cardiomyopathies have familial patterns.
Chest pain at time of syncope	Suggests ischemia, aortic stenosis, or acute arrhythmia — do not dismiss in young athletes.
Abnormal cardiac exam (murmur, irregular rhythm)	May indicate structural heart disease (HCM, aortic stenosis) or arrhythmia substrate.
Recurrent syncope same day / prolonged unconsciousness	Single brief faint can be benign; repeated events or prolonged loss of consciousness is dangerous.
Known cardiac disease or pacemaker/ICD	Any new event in a known cardiac patient demands urgent re-evaluation.

ANY ONE of these flags = Do NOT send home. Call EMS or arrange urgent transport to ED. Call parent.

Cardiac Causes to Rule Out in the School Setting

ECG is the critical screening tool — every child with syncope or exertional presyncope should have one.

	ECG:	Risk:	Management:
Long QT Syndrome	Prolonged QTc on ECG (>440 ms boys, >460 ms girls)	Torsades de pointes → sudden cardiac death	Beta-blocker, ICD in high-risk. Avoid QT-prolonging medications.
Brugada Syndrome	Characteristic ST elevation V1–V3 (may be subtle)	VF triggered by fever, sodium channel blockers	ICD; avoid fever, certain medications.
Hypertrophic Cardiomyopathy (HCM)	LVH pattern, deep Q waves, ST changes	Outflow obstruction → syncope/SCD with exertion	Sports restriction, septal reduction, ICD.
WPW / Pre-excitation	Delta wave, short PR interval on ECG	Rapid conduction via accessory pathway	Ablation; avoid AV-nodal agents.

📌 Cardiac syncope is RARE (<1% of pediatric syncope) but potentially fatal. Clinical suspicion + ECG = the key.

When to Call 911 — Do Not Wait

No pulse or abnormal/absent breathing

Begin CPR immediately while calling EMS

Prolonged or persistent unconsciousness

Does not wake fully within 1–2 minutes of lying flat

Collapsed during or immediately after exercise

High risk for cardiac arrhythmia — treat as cardiac emergency

Severe chest pain with syncope

Rule out aortic emergency, arrhythmia, or ischemia

Multiple syncopal episodes same day

Even if brief — repeated events signal instability

Known cardiac condition with new event

Any child with ICD/pacemaker/heart disease who faints

When in doubt — call. It is always better to over-respond than under-respond to a potentially life-threatening event.

Prognosis & Key Takeaways for School Nurses

📈 Prognosis

- Generally excellent with appropriate treatment
- Many adolescents improve significantly within 1–5 years
- Hydration + exercise conditioning = best outcomes
- Some have persistent symptoms into adulthood
- Post-COVID POTS may follow a longer course

✅ Your Role Matters

- Most fainting in teens is benign — but know the red flags
- POTS is common, manageable, and often missed
- Orthostatic HR check takes <5 minutes — do it
- Hydration + salt + graded activity = front-line care
- You are first-line recognition for these students

School nurses are uniquely positioned to recognize POTS early, prevent unnecessary absences, and connect students to the right care. Trust your clinical instincts — and know your red flags.

Thank You

POTS in Children — School Nurse Education

https://www.youtube.com/watch?v=ucgaUP6Ip4E

YouTube — Dysautonomia International

References: HRS Consensus 2015 · Boris & Moak, Pediatrics 2022 · Schiweck et al., Clin Auton Res 2026 · PMC Clinical Review 2024 · Frontiers Pediatrics 2020

DYSAUTONOMIA INTERNATIONAL

AWARENESS ADVOCACY ADVANCEMENT

What is POTS?