1 PATIENT INFORMATION

1 PATIENT DETAILS

NAME
Theo R. Castellanos

DOB
01/07/2012

AGE / SEX
14 yrs / Male

MRN / PATIENT ID
PC-118374

DATE OF SERVICE
08/05/2026

PROVIDER
Yusuf Adekunle, MD

CREDENTIALS
MD, FACC

PARENT / GUARDIAN PRESENT
Both parents — Marisol and Daniel Castellanos

VISIT TYPE
Pediatric Cardiology Consultation — urgent, first visit

CARE SETTING
Outpatient pediatric cardiology clinic

INFORMANT / COLLATERAL SOURCE
Patient and both parents; soccer coach statement; ED record 07/29

REFERRAL SOURCE
Emergency department, 07/29/2026 — syncope during competitive play

PRIMARY CARE PROVIDER
Riverbend Family Medicine — Dr. H. Nakamura

CC CHIEF COMPLAINT

2 PRIMARY CARDIAC CONCERN

"I passed out running in the second half. I don't remember hitting the ground." — patient. Parents add that his father's brother died suddenly at 24 and that this is the second time he has fainted while playing.

S SUBJECTIVE

3 REPORTED CARDIOVASCULAR SYMPTOMS & HISTORY

3a REASON FOR EVALUATION & CARDIAC SYMPTOMS

Reason for Pediatric Cardiology Evaluation

Urgent evaluation of **exertional syncope** in a competitive adolescent athlete with a family history of premature sudden death, referred from the emergency department. Sports participation is currently suspended pending this assessment, and the family is seeking clearance for the club season beginning 08/24.

Syncope / Presyncope

Index event 07/29/2026, approximately 55 minutes into a competitive match on a warm evening (28°C). He was sprinting to close down an opponent when he lost consciousness **without any prodrome** — no lightheadedness, nausea, visual greying, palpitations, or chest pain. The coach and two parents witnessed a sudden collapse face-first with no protective movement; facial abrasion and a chipped incisor resulted. Estimated 25–30 seconds of unresponsiveness with brief generalised stiffening and two or three myoclonic jerks reported by the coach, no tongue biting, no incontinence, and full orientation within a minute of waking with no confusional period. **A first event in 11/2025** was attributed to heat and dehydration: he collapsed at the end of a running drill, also without prodrome, was not brought for assessment, and returned to play the following week. No syncope at rest, on standing, with emotion, on hearing a startling noise, or while swimming. No events during sleep.

Chest Pain Symptoms

Occasional brief left-sided sharp chest pain lasting seconds, reproducible on palpation of the costal margin, unrelated to exertion, with no radiation and no associated dyspnea. Not present during either syncopal event.

Palpitations / Arrhythmia Symptoms

Denies sustained palpitations, racing heart at rest, or fluttering. Reports appropriate exertional awareness of heart rate that settles within minutes of stopping. No documented prior rhythm monitoring.

Dyspnea / Exercise Intolerance

No exertional dyspnea. Until 07/29 he trained five times weekly and was among the fittest in his squad, completing bleep tests in the top quartile. No decline in stamina, no need to stop, and no difference from peers reported by the coach.

Cyanosis / Hypoxemia Symptoms

None ever. No clubbing, no cyanotic episodes in infancy, no prior congenital heart disease diagnosis.

3b CARDIAC HISTORY, MEDICATIONS & CONTEXT

Congenital Heart Disease History

None known. A soft systolic murmur was noted at the 4-year and 6-year well visits and documented as innocent; no echocardiogram was ever performed. Newborn pulse oximetry screening passed.

Medication History and Treatment Response

No cardiac medications. Uses ibuprofen occasionally for sports aches. **Takes a caffeinated pre-workout powder** three to four times weekly, obtained from a teammate, and two energy drinks on match days — total caffeine load estimated at 350–450 mg on training days. No prescription stimulants, no ADHD medication, no anabolic or supplement use beyond a protein shake, no recreational drugs. This was disclosed only on direct questioning with the parents present.

Past Medical History

Term birth, uncomplicated. Mild intermittent asthma in childhood, no treatment since age 9. Tonsillectomy age 7. No Kawasaki disease, rheumatic fever, myocarditis, seizure disorder, or endocrine disease. No genetic syndrome. Sensorineural hearing loss ruled out at school screening — relevant given the differential. No drug allergies.

Family History

Paternal uncle died suddenly at age 24 while swimming; drowning was recorded on the certificate and no autopsy or genetic testing was performed. Paternal grandfather died at 41 of “a heart attack” with no documented coronary disease. Father, 46, asymptomatic and never assessed; he has never had an EKG. Mother’s side unremarkable. No known long QT syndrome, Brugada syndrome, hypertrophic or arrhythmogenic cardiomyopathy, Marfan syndrome, aortic dissection, pacemaker or ICD in the family, and no sudden infant death. **Three of the family history features here — sudden death under 40, an unexplained drowning, and an unassessed first-degree relative — are individually red flags.**

Social / Activity History

Year 9 student, academically strong, no school absence. Competitive club soccer five sessions weekly plus weekend

matches; also plays basketball recreationally. Hydration habits inconsistent, particularly on hot match days. No tobacco, vaping, or alcohol. Lives with both parents and a younger sister aged 9. Both parents are visibly anxious about the family history and have already withdrawn him from training on their own initiative.

Recent Testing / Hospitalizations

Emergency department 07/29/2026: 12-lead EKG reported as "sinus rhythm, no acute change" without interval measurement; troponin normal; electrolytes, magnesium, calcium, glucose, and complete blood count normal; head CT normal after the facial injury; discharged after 4 hours with a diagnosis of vasovagal syncope and advice to hydrate. No echocardiogram, no rhythm monitoring, and no exercise testing performed. Dental review 07/30 for the chipped incisor.

Pertinent Negatives

No chest pain on exertion, no orthopnea, no palpitations at rest, no cyanosis, no severe dyspnea, no oedema, no neurological deficit, no headache, no fever or recent viral illness, no joint symptoms, and no bleeding or bruising. No family history of epilepsy. No aura, no post-event confusion, and no tongue biting to support a primary seizure.

ROS PEDIATRIC CARDIOLOGY REVIEW OF SYSTEMS

4 PERTINENT POSITIVES & NEGATIVES

Cardiac symptoms	**Positive — two episodes of exertional syncope without prodrome. Negative for palpitations, presyncope at rest, exertional chest pain**
Exercise tolerance	**Negative — no dyspnea, fatigue, or reduced stamina; top-quartile fitness until event**
Infant / feeding history	**Not applicable at 14 years; no infantile feeding, sweating, or growth concerns historically**
Congestive symptoms	**Negative for oedema, orthopnea, cough, wheeze, or respiratory distress**
Neurologic	**Equivocal — brief stiffening and myoclonic jerks witnessed, but no aura, tongue bite, incontinence, or post-ictal confusion**
Infectious / inflammatory	**Negative for fever, recent viral illness, Kawasaki-like or rheumatic features**
Medication / substance	**Positive — high pre-workout and energy drink caffeine load. Negative for stimulants, anabolic agents, QT-prolonging drugs**
Activity restriction	**Positive — self-imposed withdrawal from all sport since 07/29; clearance requested for 08/24 season**

O OBJECTIVE

5 OBSERVED FINDINGS

V VITALS

TEMPERATURE	BLOOD PRESSURE
36.8°C	**114/68 mmHg seated right arm; 110/66 standing at 3**

min

HEART RATE	RESPIRATORY RATE
62 bpm, regular	14 / min
OXYGEN SATURATION	HEIGHT
99% room air	172 cm (68th centile)
WEIGHT	BMI
61 kg (57th centile)	20.6 kg/m²
GROWTH PERCENTILES	PAIN SCORE
Tracking consistently; no crossing of centiles	0/10 at rest

4-EXTREMITY BLOOD PRESSURES

Right arm 114/68, left arm 112/68, right leg 120/70, left leg 118/70 — no gradient

5a AGE-APPROPRIATE CARDIAC EXAMINATION

General Appearance

Well-grown, athletic, comfortable at rest. No distress, no cyanosis, no increased work of breathing. Fully engaged in the consultation and able to give his own history. Healing abrasion over the right zygoma and a repaired upper incisor consistent with an unprotected fall.

Head / Eyes / Ears / Nose / Throat

No dysmorphic or syndromic features. No high-arched palate, no myopia, no lens abnormality on gross inspection. Conjunctivae and mucosa normal, no pallor or cyanosis. Dentition intact apart from the repaired incisor.

Neck

No jugular venous distension. No webbing, no goitre, no lymphadenopathy. Carotid upstrokes normal and symmetrical without bruit.

Cardiovascular

Apex non-displaced, normal in character with no thrill or heave. Regular rhythm at 62. **S1 normal; S2 with normal physiological splitting.** Grade 1–2/6 soft mid-systolic murmur at the left sternal border, **diminishing on standing and on Valsalva** and without radiation, click, or late-peaking quality — features of an innocent murmur rather than dynamic outflow obstruction. No gallop, no rub. Peripheral pulses full and symmetrical in all four limbs including femorals, with no radio-femoral delay. Capillary refill under 2 seconds. No oedema.

Pulmonary

Normal effort, no retractions. Clear vesicular breath sounds throughout with no crackles or wheeze. No oxygen requirement.

Abdomen

Soft, non-tender. No hepatomegaly, no splenomegaly, no ascites, no masses. No signs of venous congestion.

Extremities / Vascular

No clubbing, cyanosis, oedema, or arachnodactyly. Wrist and thumb signs negative. Arm span to height ratio 1.01. Extremities warm with equal temperature. No prior vascular access sites.

Skin

Normal colour and perfusion. No café-au-lait macules, lentigines, striae, or surgical scars. Healing facial abrasion as described.

Neurologic

Alert and fully oriented. Normal tone, power 5/5 throughout, reflexes 2+ symmetrical. Coordination and gait normal. Cranial nerves intact. No focal deficit.

DV CARDIAC DEVICE / PROCEDURE SITE EXAMINATION

6 DEVICE & PROCEDURE SITE FINDINGS

PACEMAKER OR ICD SITE

None — no device implanted

STERNOTOMY / THORACOTOMY INCISION

None — no prior cardiac surgery

CATHETERIZATION ACCESS SITE

None — no prior catheterization

SIGNS OF INFECTION OR VASCULAR COMPROMISE

Not applicable

GD GROWTH / DEVELOPMENT / FUNCTIONAL ASSESSMENT

7 FUNCTIONAL CONTEXT RELEVANT TO CARDIAC CARE

Growth chart review and weight gain

Height 68th and weight 57th centile, both tracking consistently since age 8. No failure to thrive, no recent weight change. Tanner stage 4.

Developmental and school status

Age-appropriate development throughout. Academically strong with no absence attributable to cardiac symptoms.

Activity tolerance compared with peers

Above average until 07/29 — among the fittest in his squad by the coach's account, with objective bleep test results in the top quartile. This preserved capacity argues against a cardiomyopathy with impaired function.

Sports participation and restrictions

All competitive and vigorous recreational activity suspended since 07/29 and to remain suspended today. Club season starts 08/24; the family has been told clearance cannot be given before the diagnostic pathway is complete.

Need for accommodations

School informed in writing today: no physical education, no competitive sport, and no unsupervised swimming until reviewed. Emergency action plan issued to the school and the club.

CT CARDIAC TESTING / DIAGNOSTIC RESULTS

8 RESULTS REVIEWED OR ORDERED

EKG — repeated and measured today, 08/05/2026

Sinus rhythm at 62. Axis normal. PR 148 ms, QRS 88 ms with no pre-excitation and no delta wave. **QT 460 ms, QTc 468 ms by Bazett at a heart rate of 62**, measured manually in leads II and V5 with the teach-the-tangent method. T-wave morphology is broad-based with a **notched T wave in V4–V5**. No epsilon waves, no type 1 Brugada pattern, no left

ventricular hypertrophy by voltage criteria, no repolarisation pattern of arrhythmogenic cardiomyopathy, no pathological Q waves. **The 07/29 emergency department EKG, re-measured personally today, shows a QTc of 471 ms — the interval was never calculated at that visit.**

Echocardiogram — 08/05/2026

Structurally normal heart. Situs solitus, normal connections. Left ventricle normal in size with an ejection fraction of 63% and no regional abnormality; **maximal septal wall thickness 8 mm with a normal z-score, excluding hypertrophic cardiomyopathy at this time.** Right ventricle normal in size and function with no aneurysm or dyskinesia. Valves structurally normal; trivial tricuspid regurgitation only, no outflow gradient at rest or with Valsalva (peak LVOT velocity 1.2 m/s). Aortic root 26 mm, z-score +0.4; ascending aorta normal. **Both coronary arteries arise normally from their respective sinuses and follow a normal proximal course** — specifically sought given exertional syncope. No pericardial effusion. No prior study for comparison.

Rhythm Monitoring

14-day ambulatory patch monitor fitted today with a symptom diary. No prior monitoring exists. Objective: quantify ectopy, capture exercise-related arrhythmia, and correlate any symptom with rhythm.

Exercise Testing

Ordered, scheduled 08/11/2026 — graded treadmill protocol with continuous 12-lead monitoring, specifically to assess QTc behaviour in the 4-minute recovery phase and to look for exercise-induced ventricular ectopy or bidirectional couplets. Not performed today.

Cardiac MRI / CT

Cardiac MRI with contrast ordered, scheduled 08/19/2026 — to characterise myocardium and exclude subtle arrhythmogenic cardiomyopathy, myocarditis, or infiltration not resolved by echocardiography, and to define coronary course definitively.

Cardiac Catheterization

Not indicated. No hemodynamic question, no suspected shunt, no interventional target.

Laboratory Studies

From 07/29: troponin, complete blood count, electrolytes, magnesium 2.0 mg/dL, calcium, and glucose all normal — important because a normal potassium, magnesium, and calcium remove secondary causes of QT prolongation. Thyroid function added today, result pending. NT-proBNP 42 pg/mL — normal, arguing against heart failure. No prior lipid panel; deferred.

Genetic / Family Screening

Inherited arrhythmia panel sent today (long QT, catecholaminergic polymorphic ventricular tachycardia, Brugada, and cardiomyopathy genes), with pre-test genetic counselling delivered and consent documented. **Cascade screening initiated: EKGs arranged this week for the father and for the 9-year-old sister**, and for the paternal grandmother. Records of the paternal uncle's death requested from the coroner — an unexplained drowning at 24 in this pedigree is a potential channelopathy event and should be reclassified if evidence supports it.

Prior Records Reviewed

Emergency department note and both EKG tracings from 07/29/2026 (re-measured personally). Primary care record including the innocent murmur documentation at ages 4 and 6. School medical file. Written coach statement describing the collapse. Dental record 07/30. No prior cardiology contact exists.

A ASSESSMENT

9 PEDIATRIC CARDIOLOGY CLINICAL INTERPRETATION

- **Exertional syncope, twice, without prodrome, in an adolescent athlete with a borderline-prolonged QTc of 468–471 ms, a notched T wave in the lateral leads, and a pedigree containing sudden death under 40 and an unexplained drowning. This is presumed arrhythmic syncope until proven otherwise, and long QT syndrome is the leading diagnosis.** Nothing about this presentation is compatible with the vasovagal diagnosis given on 07/29.
- **Why not vasovagal:** vasovagal syncope has a prodrome, occurs on standing or after exertion rather than at peak exertion, and rarely causes unprotected facial injury. Collapse mid-sprint with no warning and a face-first fall is the classic description of an arrhythmic event. The brief stiffening and myoclonic jerks are convulsive syncope from cerebral hypoperfusion, not epilepsy — there was no aura, no tongue bite, no incontinence, and no post-ictal confusion.
- **Structural heart disease is substantially excluded on today's echocardiogram:** normal wall thickness with a normal z-score excludes hypertrophic cardiomyopathy at present; normal biventricular size and function, no outflow gradient at rest or with provocation, a normal aortic root, and normally arising coronary arteries with a normal proximal course. Anomalous coronary origin was specifically sought because it is the structural lesion that most classically causes exertional syncope in this age group. Cardiac MRI will complete the exclusion of arrhythmogenic cardiomyopathy and myocarditis.
- **The differential that remains is electrical:** long QT syndrome first, given the interval and the notched T wave; catecholaminergic polymorphic ventricular tachycardia second, since both events were adrenergically driven and its resting EKG is characteristically normal; and arrhythmogenic cardiomyopathy third, pending MRI. Brugada syndrome is unlikely with no type 1 pattern and no rest or sleep events. Wolff-Parkinson-White is excluded by the absence of pre-excitation.
- **A borderline QTc is not a reassuring QTc in this context.** At 468 ms in a 14-year-old male with two exertional syncopal events and this family history, the pre-test probability is high enough that management should not wait for genetic confirmation. Exercise testing with recovery-phase QTc measurement is the highest-yield next test, because failure of the QT to shorten appropriately in recovery is more discriminating than a single resting interval.
- **The caffeine load is a genuine aggravating factor but not the explanation.** An estimated 350–450 mg of caffeine on training days is proarrhythmic in a susceptible myocardium and must stop, but attributing exertional syncope with this pedigree to energy drinks would be a serious error.
- **Two systemic failures in this case are worth documenting.** First, a QTc was never calculated on 07/29 — the interval was there to be measured and the diagnosis was on the tracing. Second, the paternal uncle's drowning at 24 was never investigated; unexplained drowning in a young adult is a recognised presentation of long QT syndrome type 1 and should have triggered family screening a decade ago.
- **The family, not just the patient, is now the unit of care.** The father has never had an EKG and the 9-year-old sister has never been assessed. Both require screening this week irrespective of the proband's genetic result.
- **Growth, development, and functional capacity are entirely normal** and his above-average fitness argues against a cardiomyopathy with impaired function — a reassuring feature, but not one that changes the restriction.

P PLAN

10 PEDIATRIC CARDIOLOGY MANAGEMENT BY PROBLEM

- **Activity restriction — effective immediately and non-negotiable:** no competitive sport, no vigorous recreational exercise, and **no swimming, even supervised**, until the diagnostic pathway is complete. The 08/24 season start cannot be cleared. School and club notified in writing today; the family accepted this after a detailed discussion of the rationale and both parents were able to repeat it back.
- **Diagnostic sequence:** 14-day patch monitor fitted today with symptom diary. Exercise treadmill test 08/11 with recovery-phase QTc measurement as the primary endpoint. Contrast cardiac MRI 08/19. Serial resting 12-lead EKGs at each contact — the QTc is a moving measurement and a single value is insufficient. Thyroid function

pending.

- **Genetic testing and counselling:** inherited arrhythmia and cardiomyopathy panel sent today with formal pre-test counselling delivered and consented. Expected turnaround 4–6 weeks. Result review appointment booked with genetic counselling present. The family was explicitly told that **a negative panel does not exclude the diagnosis** — roughly a fifth to a quarter of clinically definite long QT syndrome is genotype-negative — and that management is driven by phenotype.
- **Cascade family screening:** resting EKGs booked this week for the father, the 9-year-old sister, and the paternal grandmother, with cardiology review of every tracing by me personally rather than by report. Coroner's and medical records for the paternal uncle requested with family consent to establish whether the 2004 drowning should be reclassified as a probable arrhythmic death.
- **Medication:** beta blockade deferred until after exercise testing on 08/11, at which point **nadolol is the preferred agent if long QT syndrome is confirmed or remains probable**, dosed by weight and titrated against resting and exercise heart rate. No treatment is being started today because the exercise test result will define both the diagnosis and the dose, and activity restriction provides the protection in the interim. If catecholaminergic polymorphic ventricular tachycardia emerges instead, nadolol remains first line with flecainide as an adjunct.
- **Substance and lifestyle plan: complete cessation of the pre-workout powder and all energy drinks**, discussed with the patient directly and with both parents. Written list of QT-prolonging drugs to avoid provided, including common macrolides, ondansetron, and certain antihistamines, with instruction to check every new prescription. Electrolyte and hydration advice; prompt attention to any illness causing vomiting or diarrhoea. Avoid sudden startling noises if long QT type 2 is later confirmed.
- **Emergency preparedness:** written emergency action plan issued to family, school, and club. Both parents and the coach directed to a hands-on CPR course, booked for 08/15. Automated external defibrillator location at the school and the club confirmed today with the club secretary; the club has one, the school's is expired and this was reported to the school administration in writing.
- **Referral and coordination:** pediatric electrophysiology referral sent today for joint review after the exercise test. Genetic counselling engaged. Neurology opinion **not** requested — the event description is convulsive syncope, and a seizure work-up would delay the cardiac pathway. Primary care and school health informed. Consideration of implantable cardioverter-defibrillator candidacy is explicitly deferred to the joint electrophysiology review; it is not appropriate to raise a device decision before the diagnosis is established, and the family were told that this discussion may arise later.
- **Patient and family education:** the diagnosis, the reason the emergency department explanation was wrong, and the reason restriction precedes certainty were all explained in plain terms. Both parents and the patient were told to call emergency services immediately and start CPR for any collapse. Teach-back completed. Written summary and a copy of both EKG tracings given to the family. The psychological impact of removal from sport on a 14-year-old athlete was acknowledged; adolescent psychology support offered and the family will consider it.

F FOLLOW-UP

11 REASSESSMENT PLAN

Follow-up timeframe and purpose

08/11/2026 — exercise treadmill test with recovery-phase QTc; medication decision made the same day. **08/19/2026** — contrast cardiac MRI. **08/24/2026** — cardiology review with patch monitor report, MRI result, and repeat 12-lead EKG; joint pediatric electrophysiology review at the same visit. Family EKGs for father, sister, and paternal grandmother within 7 days, reviewed personally. Genetic panel result appointment at 6 weeks with genetic counselling present. CPR course for parents and coach 08/15. Restriction reviewed at every visit and lifted only on documented joint cardiology and electrophysiology agreement. **Emergency services immediately** for any further syncope, near-syncope, sustained palpitations, or chest pain; call the clinic within 24 hours for any new symptom short of that.

TB TIME DOCUMENTATION & BILLING

TOTAL TIME SPENT
96 minutes

COUNSELING / CAREGIVER EDUCATION TIME
34 minutes — diagnosis, restriction rationale, genetic pre-test counselling, emergency plan

CARE COORDINATION TIME
22 minutes — electrophysiology referral, family screening bookings, school and club notification, coroner records request

RECORDS REVIEW TIME
14 minutes — ED record and both tracings re-measured, primary care record, coach statement

TEST / IMAGING REVIEW TIME
16 minutes — EKG manual interpretation and echocardiogram performed and reported by me

E/M LEVEL
99205 — new patient, high-complexity medical decision making: undiagnosed problem with a threat to life, extensive data review, and independent test interpretation

EKG INTERPRETATION CODE
93000 — 12-lead EKG with interpretation and report (×1 today; 07/29 tracing re-interpreted, not separately billed)

ECHOCARDIOGRAM CODE(S)
93306 — complete transthoracic echocardiogram with spectral and colour Doppler

RHYTHM MONITORING CODE(S)
93241 — external ECG patch, 14-day recording, hook-up and patient education (analysis and report to follow)

DEVICE / PROCEDURE CODE(S)
None — no device or procedure performed

BASIS FOR BILLING
Medical Decision Making — high complexity, with independent test interpretation; time also documented

PRIMARY ICD-10
R55 — Syncope and collapse, with I45.81 long QT syndrome (suspected, under evaluation)

SECONDARY ICD-10
R94.31 abnormal electrocardiogram; Z82.41 family history of sudden cardiac death; Z13.71 encounter for genetic screening; R01.1 cardiac murmur, unspecified; Z71.89 counselling regarding activity restriction

SO PROVIDER SIGN-OFF

PROVIDER NAME	CREDENTIALS	SPECIALTY	DATE	TIME
Yusuf Adekunle, MD	MD, FACC	Pediatric Cardiology	08/05/2026	4:38 PM