

# Joshua Lovelock, MD

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Fellow of American College of Cardiology and Heart Rhythm Society  
No Financial Relationships to disclose

**Board Certified in**

- Internal Medicine
- Cardiovascular Diseases
- Electrophysiology

**Special interests:**

- Irregular Heart Rhythms
- A-fib
- Palpitations
- Fainting spells

**Medical School:**  
University of Pittsburgh

**Fellowship:**  
Emory University

**Residency:**  
University of Chicago





Syncope:

# Diagnostics and Treatment

Josh Lovelock

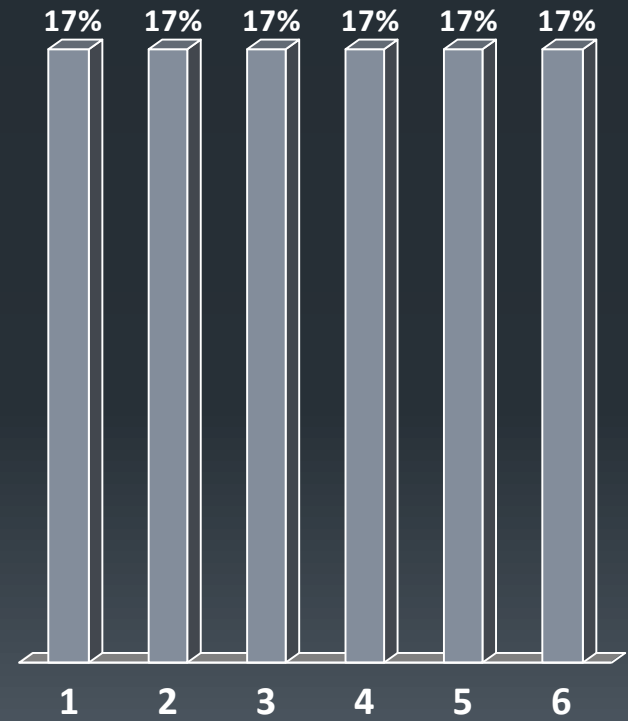
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# Syncope

- Definition: clinic syndrome of transient loss of consciousness caused by loss of cerebral perfusion as a result of abrupt drop in SBP.
  - Brief
  - Self limited
  - Recovery rapid
- Differential
  - Seizures
  - Traumatic brain injury (concussion)
  - Intoxication
  - Metabolic disturbances
  - Conversion disturbance (pseudo-seizure)

# Syncope: Question 1

1. Which of these is not a cause of syncope:
  1. Reflex syncope
  2. Orthostatic syncope
  3. Hyponatremia
  4. Cardiac arrhythmias
  5. Structural cardiopulmonary disease



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# Syncope: Question 1

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# Syncope: Clinical Features

## Neurally mediated syncope:

Absence of heart disease

Long history of recurrent syncope

After sudden unexpected unpleasant sight, sound, smell or pain

Prolonged standing or crowded, hot places

Nausea, vomiting associated with syncope

During a meal or post-prandial

With head rotation or pressure on carotid sinus (as in tumours, shaving, tight collars)

After exertion

## Syncope due to OH:

After standing up

Temporal relationship with start or changes of dosage of vasodepressive drugs leading to hypotension

Prolonged standing especially in crowded, hot places

Presence of autonomic neuropathy or Parkinsonism

Standing after exertion

## Cardiovascular syncope:

Presence of definite structural heart disease

Family history of unexplained sudden death or channelopathy

During exertion, or supine

Abnormal ECG

Sudden onset palpitation immediately followed by syncope

ECG findings suggesting arrhythmic syncope:

- Bifascicular block (defined as either LBBB or RBBB combined with left anterior or left posterior fascicular block)
- Other intraventricular conduction abnormalities (QRS duration  $\geq 0.12$  s)
- Mobitz I second degree AV block
- Asymptomatic inappropriate sinus bradycardia ( $< 50$  bpm), sinoatrial block or sinus pause  $\geq 3$  s in the absence of negatively chronotropic medications
- Non-sustained VT
- Pre-excited QRS complexes
- Long or short QT intervals
- Early repolarization
- RBBB pattern with ST-elevation in leads V1-V3 (Brugada syndrome)
- Negative T waves in right precordial leads, epsilon waves and ventricular late potentials suggestive of ARVC
- Q waves suggesting myocardial infarction

# Syncope: Prodrome

- Presyncope (near-syncope) is the same manifestation without the duration or intensity.
  - Lightheadness
  - A feeling of warmth or cold
  - Sweating
  - Palpitations
  - Nausea or abdominal discomfort
  - Visual disturbance
  - Hearing loss
  - Pallor or paleness

# Syncope: Evaluation

## ■ History

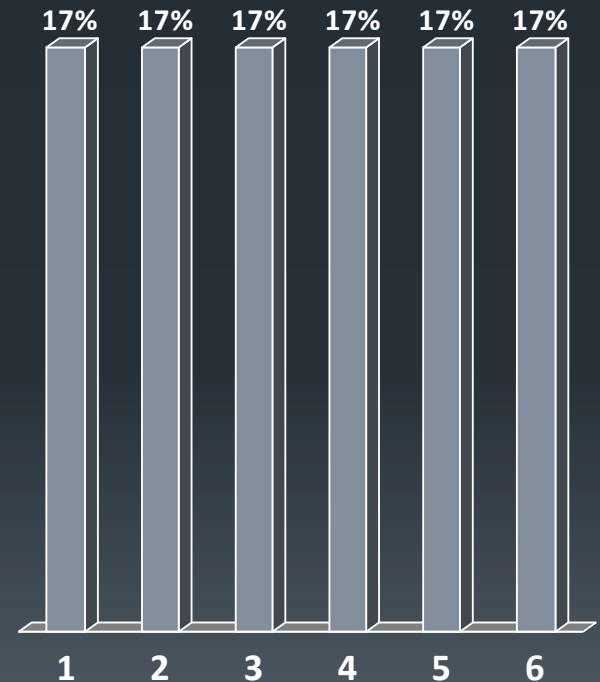
- Number, frequency, and duration of episodes
- Onset of syncope
- Position
- Provocative factors
  - Exercise
  - Urination or defecation
  - Warm or crowded place
  - Prolonged standing
  - Post-prandial
  - Emotional stressor
  - Abrupt neck movement
  - Pre-existing medical conditions
- Pre-existing medical condition
- Medications
- Family history



# Syncope: Question 2

1. A 23 y/o female presented to the ED with a “passing out spell.” Pt studying for finals at the library got up felt weak, dizzy, nauseated, cold and clammy, and syncopized. What workup should be done in the ED.

1. Tilt table
2. Carotid Dopplers
3. Head CT
4. EKG
5. ETT



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  4. EKG
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# Syncope: Evaluation

- Physical Exam
  - Vitals
  - Cardiac exam
  - Neurologic exam
- EKG
  - Bradycardia
  - AV block
  - BBB
  - VT or SVT
  - Cardiac devices
  - Inherited arrhythmias
  - Electrolyte disturbance
- Echocardiogram
  - Structural heart disease

# Syncope: Risk Stratification

- High risk
  - Hospitalization for w/u
- Intermediate risk
  - Typical hx of cardiac dx without active disease
  - Symptoms not typical of vasovagal syncope
- Low risk
  - Structurally normal heart
  - Normal EKG
  - Symptoms consistent with vasovagal syncope

# Syncope: Risk Stratification

## SHORT-TERM HIGH RISK CRITERIA WHICH REQUIRE PROMPT HOSPITALIZATION OR INTENSIVE EVALUATION

**Severe structural or coronary artery disease** (heart failure, low LVEF, or previous myocardial infarction)

### Clinical or ECG features suggesting arrhythmic syncope

- Syncope during exertion or supine
- Palpitations at the time of syncope
- Family history of SCD
- Non-sustained VT
- Bifascicular-block (LBBB or RBBB combined with left anterior or left posterior fascicular block) or other intraventricular conduction abnormalities with QRS duration  $\geq 120$  ms
- Inadequate sinus bradycardia (<50 bpm) or sinoatrial block in absence of negative chronotropic medications or physical training
- Pre-excited QRS complex
- Prolonged or short QT interval
- RBBB pattern with ST-elevation in leads V1-V3 (Brugada pattern)
- Negative T waves in right precordial leads, epsilon waves, and ventricular late potentials suggestive of ARVC

### Important co-morbidities

- Severe anaemia
- Electrolyte disturbance

# Syncope: Additional Testing

- Holter Monitoring
  - 24-48 hrs of continuous monitoring
- Event Monitoring
  - Up to 1 month of event driven monitoring
- Implantable Loop Recorder
  - Up to 3 years of recording
- Holter Monitoring
- Orthostatic blood pressure measurements
- Exercise testing
- Carotid Sinus Massage
- EP Study
- Neurologic Testing
- Tilt Table Testing

# Syncope: Subtypes

<b>Reflex (neurally mediated) syncope</b>
<b>Vasovagal:</b>
Mediated by emotional distress: fear, pain, instrumentation, blood phobia
Mediated by orthostatic stress
<b>Situational:</b>
Cough, sneeze
Gastrointestinal stimulation (swallow, defecation, visceral pain)
Micturition (postmicturition)
Post-exercise
Postprandial
Others (eg, laughter, brass instrument playing, weightlifting)
<b>Carotid sinus syncope</b>
<b>Atypical forms (without apparent triggers and/or atypical presentation)</b>
<b>Syncope due to orthostatic hypotension</b>
<b>Primary autonomic failure:</b>
Pure autonomic failure, multiple system atrophy, Parkinson's disease with autonomic failure, Lewy body dementia
<b>Secondary autonomic failure:</b>
Diabetes, amyloidosis, uraemia, spinal cord injuries
<b>Drug-induced orthostatic hypotension:</b>
Alcohol, vasodilators, diuretics, phenothiazines, antidepressants
<b>Volume depletion:</b>
Hemorrhage, diarrhoea, vomiting, etc
<b>Cardiac syncope (cardiovascular)</b>
<b>Arrhythmia as primary cause:</b>
<b>Bradycardia:</b>
Sinus node dysfunction (including bradycardia/tachycardia syndrome)
Atrioventricular conduction system disease
Implanted device malfunction
<b>Tachycardia:</b>
Supraventricular
Ventricular (idiopathic, secondary to structural heart disease or to channelopathies)
<b>Drug-induced bradycardia and tachyarrhythmias</b>
<b>Structural disease:</b>
Cardiac: cardiac valvular disease, acute myocardial infarction/ischaemia, hypertrophic cardiomyopathy, cardiac masses (atrial myxoma, tumors, etc), pericardial disease/tamponade, congenital anomalies of coronary arteries, prosthetic valves dysfunction
Others: pulmonary embolus, acute aortic dissection, pulmonary hypertension

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# What is Reveal LINQ ?

- Provides up to 3 years of continuous cardiac monitoring
- Smallest available insertable cardiac monitor
- Simple, minimally invasive insertion procedure
- Safe for use in MRI setting same day at 1.5 and 3.0 Tesla



# A Revolutionary System

## The Complete Monitoring Solution

Improved CareLink®  
User Interface



Wireless

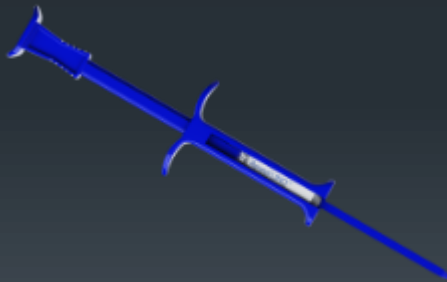
Reveal LINQ™ ICM



MyCareLink™  
Patient Monitor



Cellular



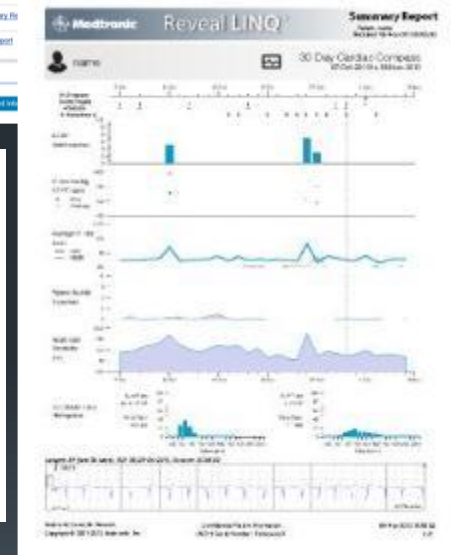
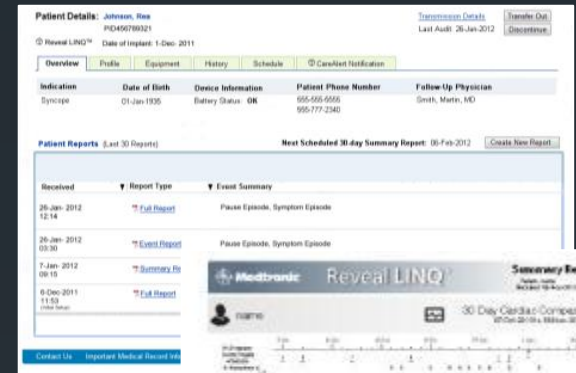
Simplified Insertion  
Procedure



Patient  
Assistant



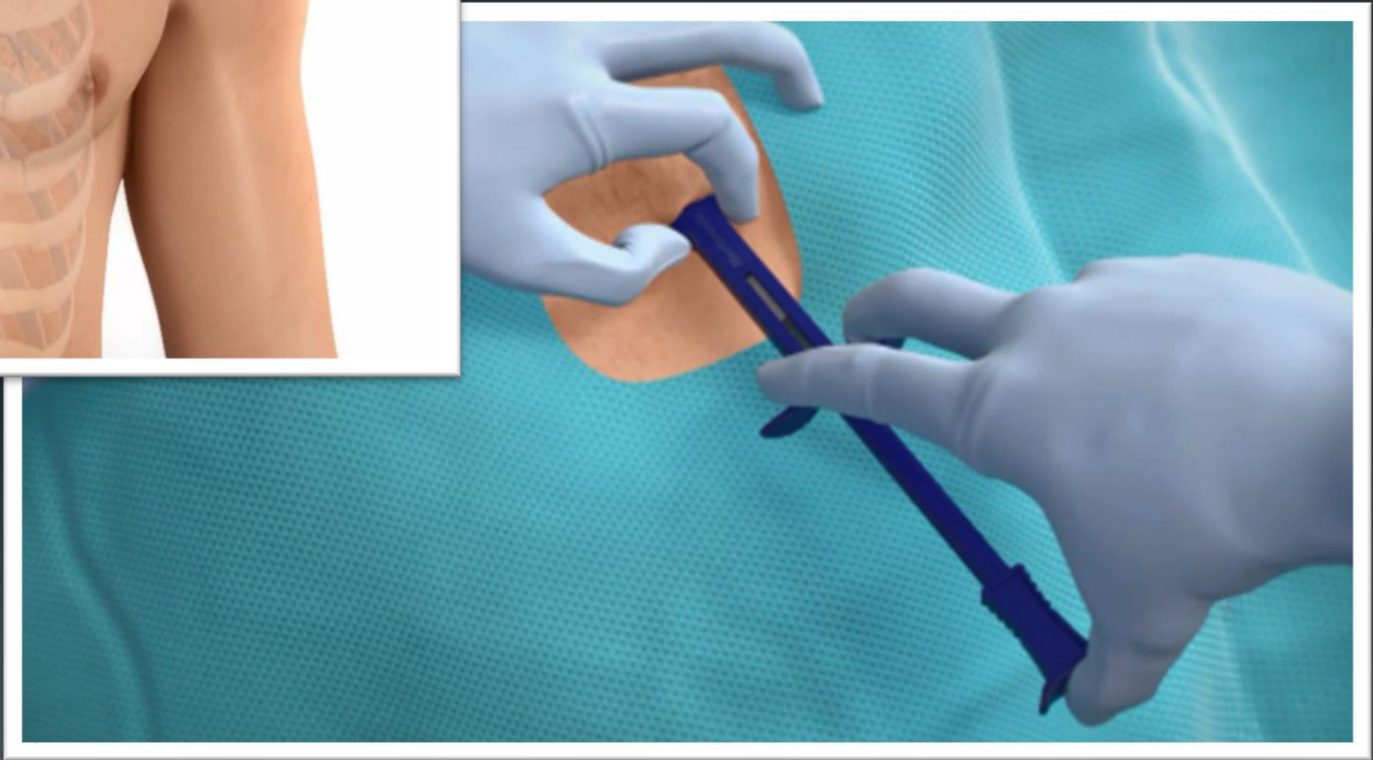
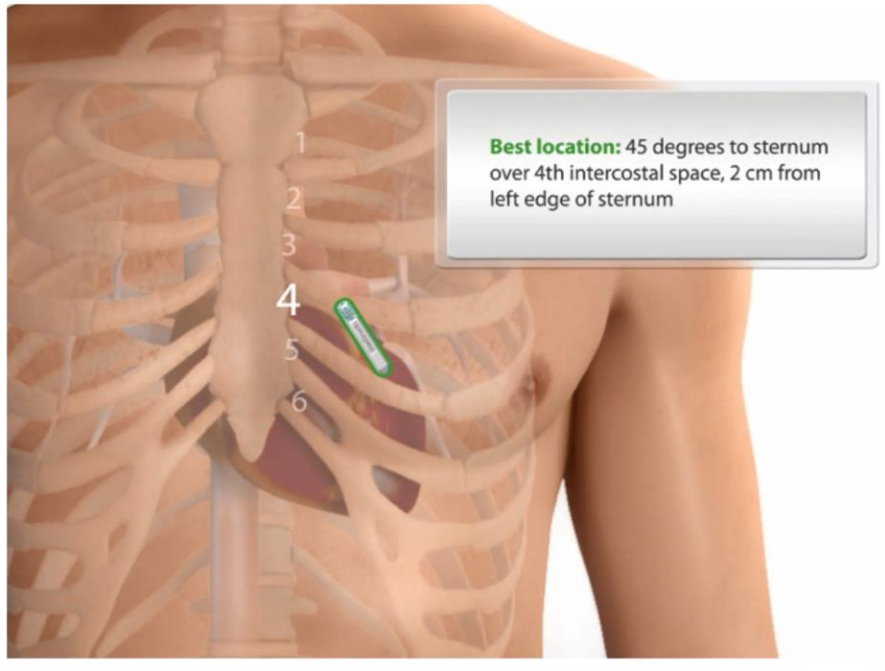
Mobile  
Alerts



Streamlined Reports

All patient and clinical data are fictitious and for demonstration purposes only

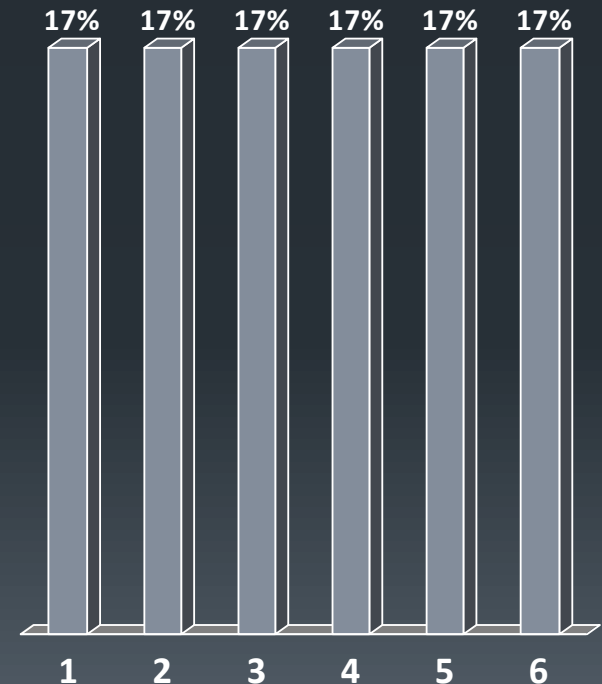
# Reveal LINQ Insertion



# Syncope: Question 3

1. A 23 y/o female is referred to the cardiology clinic for multiple fainting episodes. Symptoms consistent with vasovagal syncope. Patient has a normal EKG, marginal blood pressure, and structurally normal echocardiogram. Which treatment has the best evidence supporting its use?

1. B-blockers
2. Midodrine
3. SSRIs
4. Orthostatic training program
5. Dual Chamber Pacemaker



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  3. SSRIs
  4. Orthostatic training program
  5. Dual Chamber Pacemaker

# Syncope: Treatment

- No therapy proven effective
  - Reassurance
  - Avoid triggers
- Counterpressure Maneuvers
  - Leg crossing, isometric maneuvers
- Volume Support
  - Salt intake
  - Fludrocortisone
  - Ted hose or bike shorts
- Midodrine
  - Uncertain evidence
- B-blockers
  - Not recommended
- SSRI
  - Uncertain
- Disopyramide, theophylline, and methylphenidate
  - No evidence to support use
- Orthostatic Training Program

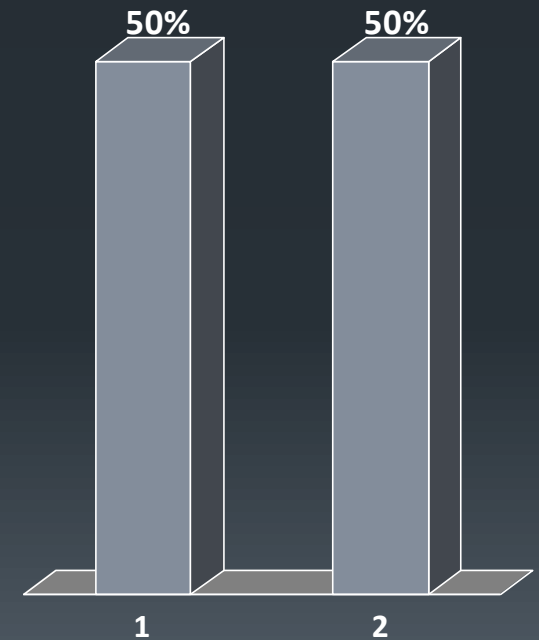
# Syncope: Treatment Pacemakers

- May help in pts with cardioinhibitory vasovagal syncope
  - > 40 yrs old
  - Clear pause or asystolic events documented on tilt table testing or ambulatory monitoring
- Counterpressure Maneuvers
  - Leg crossing, isometric maneuvers
- Volume Support
  - Salt intake
  - Fludrocortisone
  - Ted hose or bike shorts
- Midodrine
  - Uncertain evidence
- B-blockers
  - Not recommended
- SSRI
  - Uncertain
- Disopyramide, theophylline, and methylphenidate
  - No evidence to support use
- Orthostatic Training Program

## Syncope: Question 4

A 23 y/o female is referred to the cardiology clinic for multiple fainting episodes. Symptoms consistent with vasovagal syncope. Patient has a normal EKG, marginal blood pressure, and structurally normal echocardiogram. Conservative therapy has failed to help the pt. Could pacing help?

1. Yes
2. No



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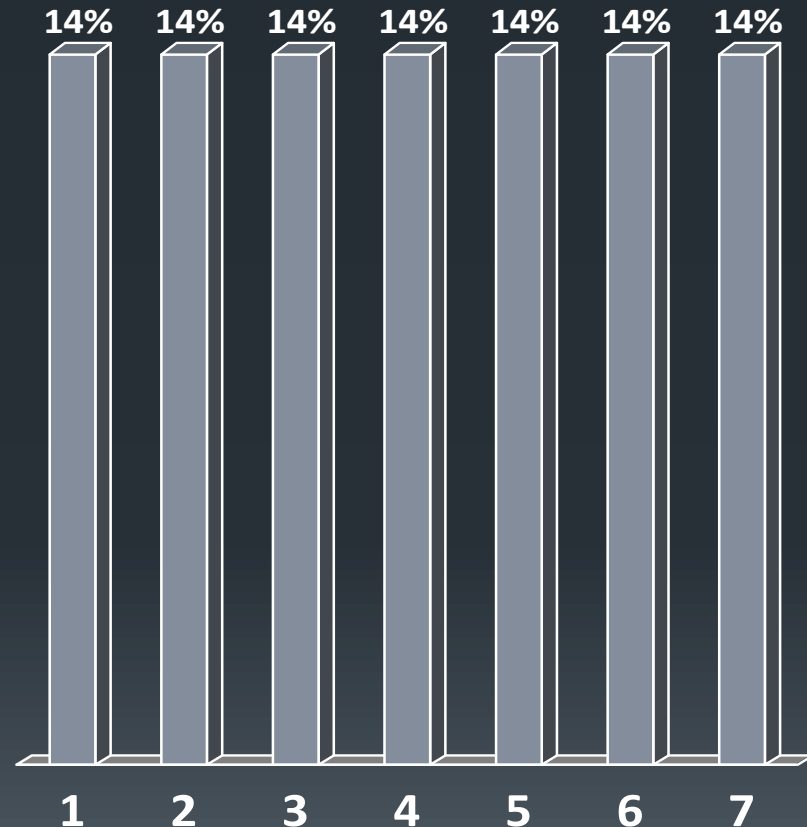
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# Syncope: Question 3

## Which diagnostic test could help support pacing?

1. Echocardiogram
2. ETT
3. Tilt table testing
4. Holter/Event monitoring
5. 1 and 2
6. 3 and 4
7. All of the above



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# Syncope: Treatment of Syncope

Recommendations	Class*	Level <sup>†</sup>
Explanation of the diagnosis, provision of reassurance, and explanation of risk recurrence are indicated in all patients	I	C
Isometric PCMs are indicated in patients with prodrome	I	B
Cardiac pacing should be considered in patients with dominant cardioinhibitory CSS	IIa	B
Cardiac pacing should be considered in patients with frequent recurrent reflex syncope, age >40 years, and documented spontaneous cardioinhibitory response during monitoring	IIa	B
Midodrine may be indicated in patients with VVS refractory to lifestyle measures	IIb	B
Tilt training may be useful for education of patients but long-term benefit depends on compliance	IIb	B
Cardiac pacing may be indicated in patients with tilt-induced cardioinhibitory response with recurrent frequent unpredictable syncope and age >40 after alternative therapy has failed	IIb	C
Cardiac pacing is not indicated in the absence of a documented cardioinhibitory reflex	III	C
$\beta$ -adrenergic blocking drugs are not indicated	III	A

# Syncope: Spain Trial

- 54 pts implanted with dual chamber devices
  - Half programmed DDI and half programmed DDD-CLS and 12 months all pts crossed over
- 72% reduction in syncope in DDD-CLS, but increased after cross over
  - L