

No need to pass out! It's only Syncope

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- **Faculty/Presenter:** Vu Kiet Tran
- **Relationships with commercial interests:**
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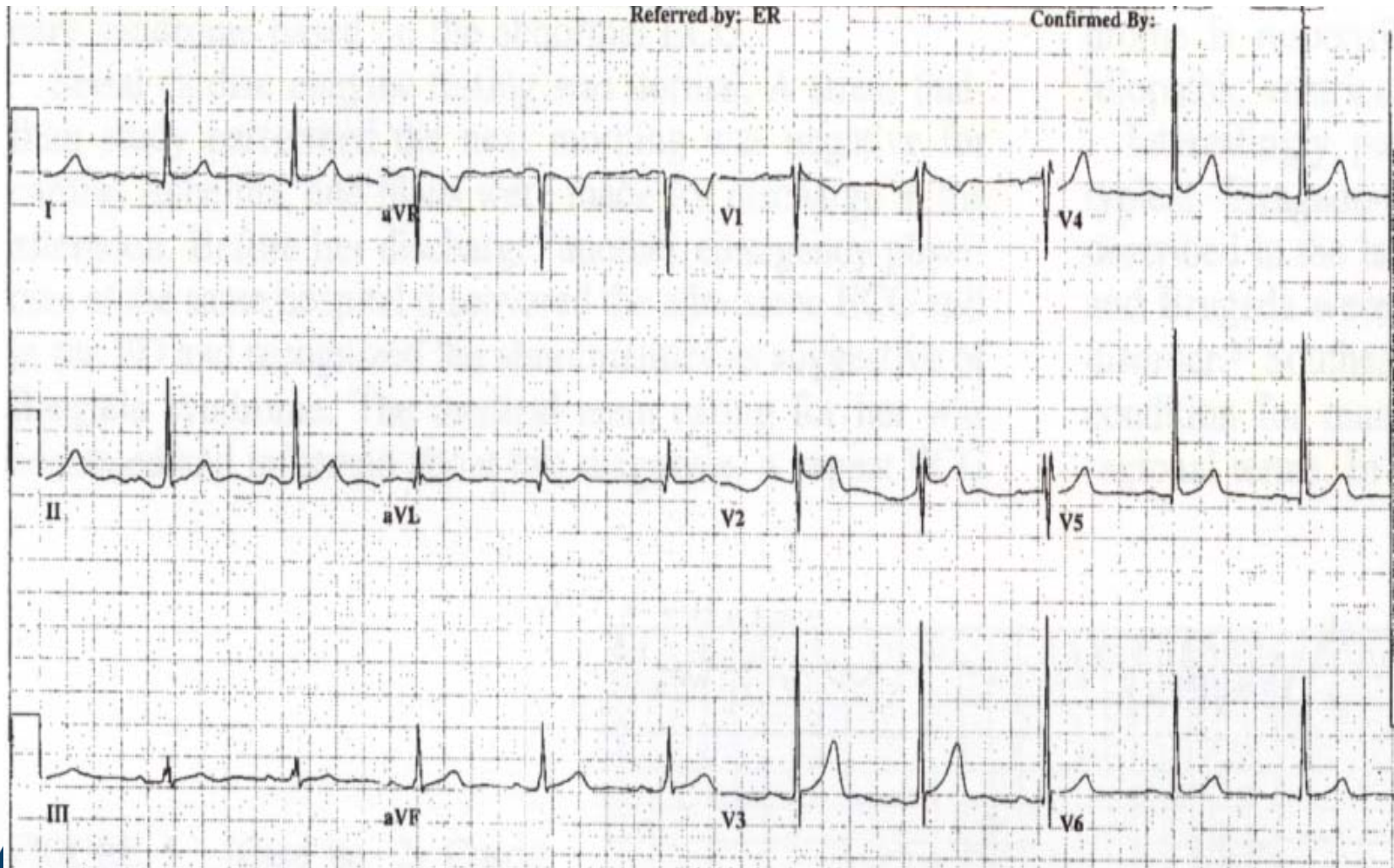
Case 1

- 75 yo female presents with syncope
 - Multiple previous episodes
 - PMH: CAD, CABG, DM
 - Physical exam normal
 - ECG: LBBB
 - She is well in your ED
- What will be management?

Case 2

- 35 yo male was at the Maple Leafs game.
- He suddenly passed out.
- He regained consciousness almost immediately
- No post-syncopal symptoms
- No seizure-like activity noted.
- No PMH, FHx, Meds.
- Denies drugs and alcohol
- Wants to know what happened to him

Case 2



Case 3

- Young female of 28 yo.
- Felt weak in the subway station.
- Then passed out as she tried to get up from her seat
- Now in your RAZ
- What work-up would you like?

Objectives

By the end of this session, you will be able to...

- 1) Understand the importance of clinical assessment in the evaluation of syncope
- 2) Appreciate the importance of cardiac etiologies
- 3) Focus your approach to the diagnosis of syncope
- 4) Make decisions on management (disposition) based on prognosis

Definition

- Greek origin “synkoptein” meaning “to cut short”, pause
- Sudden transient loss of consciousness with concurrent diminution in postural tone followed by spontaneous recovery, and absence of neurological sequelae.

vs pre-syncope (near-syncope)

Syncope mimics

- TIA
- Stroke (ischemic or hemorrhagic)
- Hypoglycemia
- Seizures
- Drop-attacks
- Conversion syndromes
- Psychogenic syncope
- Malingering

Syncope and...

Syncope	Symptom	Conditions
Syncope	Chest pain	Aortic dissection Ruptured AAA STEMI Acute PE
Syncope	Headache	SAH Intra-parenchymal hemorrhage
Syncope	Shortness of breath	Pneumothorax PE
Syncope	Abdo pain	Ruptured AAA Ruptured viscous
Syncope	Bleeding	UGIB LGIB
Syncope	Rash	Anaphylaxis Sepsis

Sudden cardiac death

- **Syncope/Presyncope**
- Chest pain (exertional)
- Dyspnea (exertional)
- Heart murmur
- Family history

Epidemiology

- Diagnosis in **only up to 70-80%**
- No cause on initial evaluation 34%
- Most causes are benign
- Mortality low
 - Cardiac origin: **18-33%**

Europace (2009) 11, 937-943

Incidence

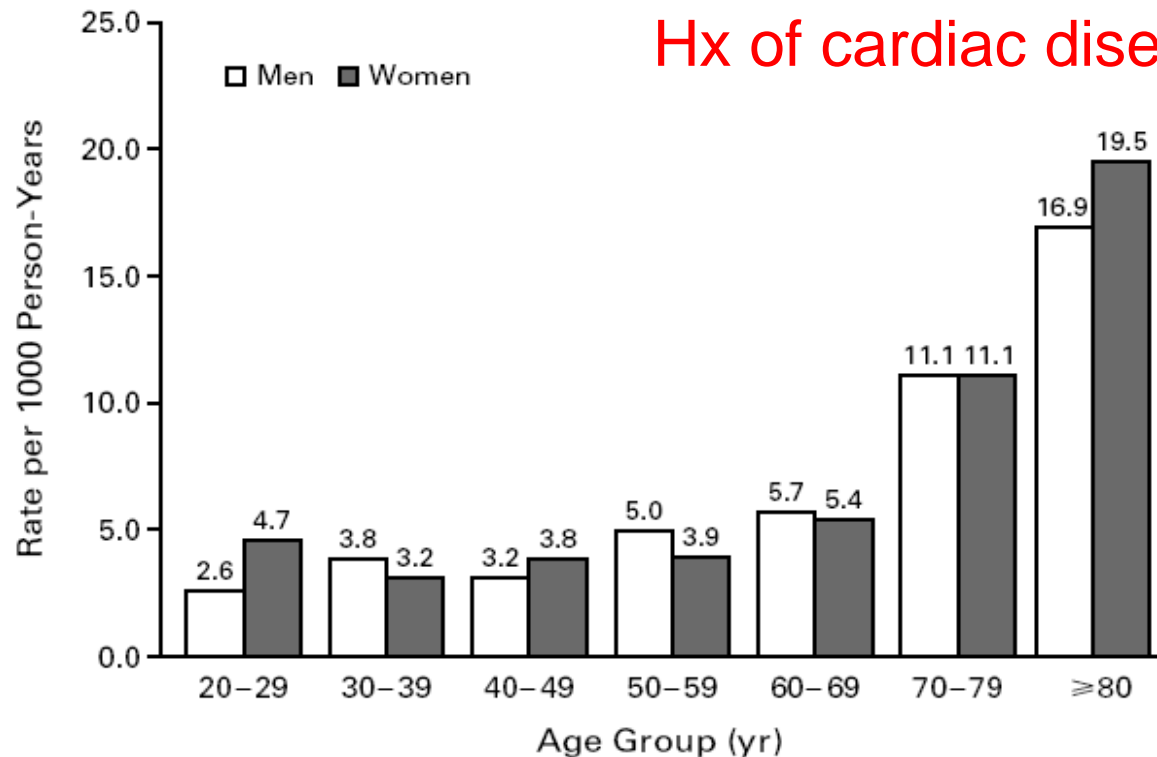
- Bimodal distribution (10-30yo and > 65yo)
- Rates increase with age (sharp rise at 70 yo)
- Lifetime cumulative incidence (subjects > 65yo): 35-39%
- 80% have their first episode before age of 30y

Am J Emerg 2009; 27: 271-279
NEJM 2002; 347: 878-885

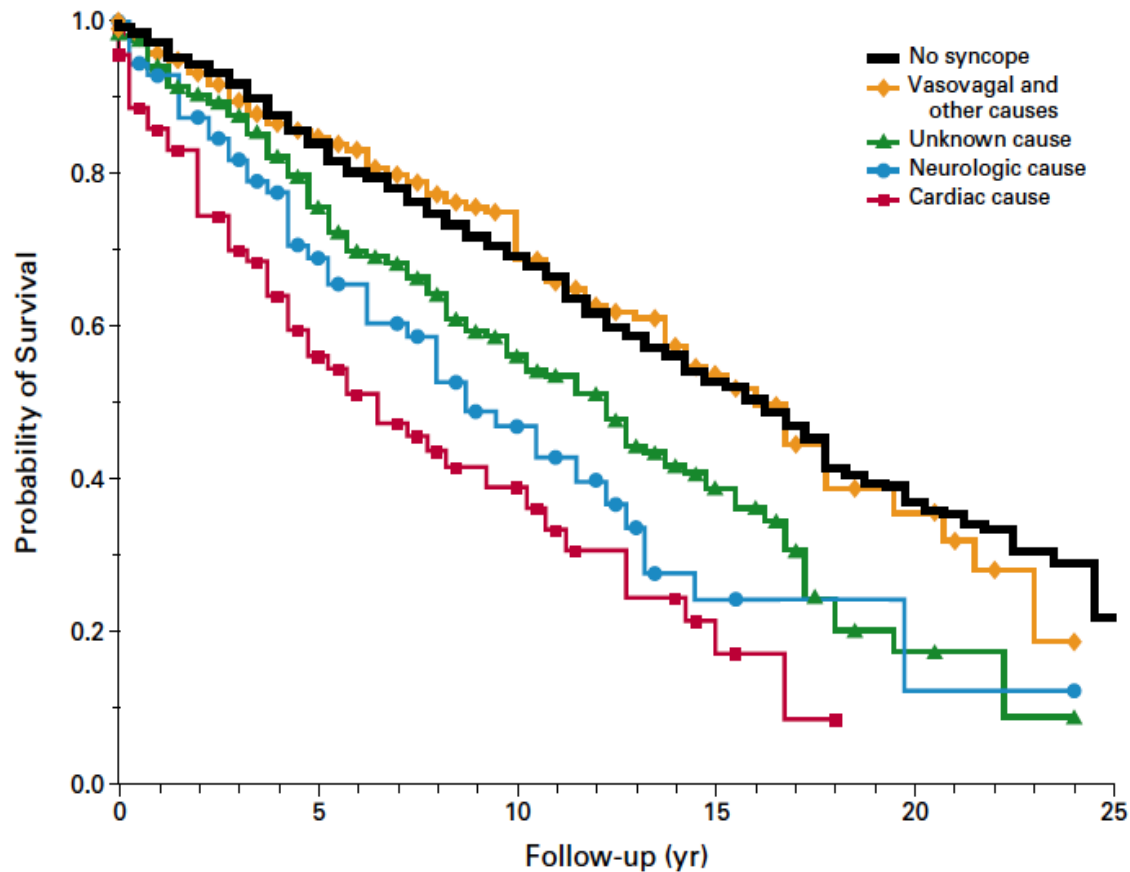


Incidence

Incidence doubles with
Hx of cardiac disease



Mortality according to etiology



Etiologies

• Vasovagal	20%
• Cardiac	13%
• Orthostatic hypotension	9%
• Medications	7%
• Stroke	4%
• TIA	4%
• Other	10%
• Unknown	31%

My classification

Non-fatal	Fatal
Vasovagal	Cardiac arrhythmias (and medications)
Orthostatic hypotension (and medications)	Hemorrhage
Psychogenic	Sepsis/shock

Challenge

Syncope is a symptom, not a disease

- Multiple causes
- Sporadic
- Causes range from benign to lethal
- Occur in the young and old

“Low-risk, high stake”

Who is at high risk of death?

Core work-up

History

Physical exam

ECG

First step

- History, physical exam, and ECG form the cornerstone of initial evaluation
- Diagnostic yield of **45-50%**

History

- Did the patient have syncope?
 - Dizziness/vertigo?
 - Drop attack? (no LOC)
 - Seizure activity
 - Falls
- Sequence of events:
 - Context
 - Prodrome (and duration of prodrome)
 - During the event
 - After the event
- Neurologic symptoms

History

- Plays a key role in the initial evaluation of syncope
 - Prodromal symptoms
 - Family history
 - Triggers and context
 - Medications

Europace (2009) 11, 937-943

History

- 20 symptoms were assessed
- Outcomes: recurrence of syncope or death
- Symptoms alone do not stratify risk in the unexplained syncope
- Factors that risk stratify:
 - Age
 - Previous syncopal episodes
 - Psychiatric history
 - Baseline heart disease
 - Abnormal ECG

Historical independent predictors of an abnormal EPS

- Age
- LVEF < 0.40 (CHF)
- Structural heart disease

Ann Noninvasive Electrocardiol 2009;
14(2): 119-127

Final word on History

Repeated findings of bad outcomes

Age over 65

Congestive heart failure

Existing heart disease

Family history of SCD

Abnormal ECG

High risk features

- History of structural heart disease
- Family history of SCD
- Absence of prodrome
- Palpitations and chest pain
- Exertional syncope
- No recollection of falling

ECG

- Low diagnostic yield: 5%
- A normal ECG is highly predictive of benignity
 - In the absence of an abnormal ECG, further cardiovascular testing has little yield
- ECG are non-invasive, easy to perform, and inexpensive
- Abnormal ECG in 82% of patients who died in follow-up

ECG as an independent predictor

Table 5. Independent Predictors of Abnormal EPS, after Logistic Regression

	OR	CI	P Value
ECG + Holter+	35.94	10.14–127.36	<0.001
ECG + Holter–	17.83	4.82–65.87	<0.001
ECG – Holter+	3.45	0.92–12.88	0.064
ECG – Holter–	0.07	0.02–0.23	<0.001
Age	1.02	1.007–1.033	0.002
LVEF	0.97	0.95–0.99	0.013
OHD	3.13	1.52–6.46	0.002

History and ECG

- ECG in addition to history and physical exam yielded a diagnosis in 76% of cases

Am J Med 2001; 111: 177-184

Basic laboratory testing

- RBW
 - Diagnostic yield: 2-3%
 - usually confirms a clinical suspicion
 - not recommended, should be guided by clinical evaluation
- *Pregnancy test is recommended in all women of child-bearing age*

Cardiac testing

- Diagnostic yield 5-35%
 - Echocardiography
 - Stress testing
 - Holter
 - Loop recorder
 - EPS

Ann Intern Med, June 15 1997; 126 (12): 989-996

Echocardiography

- Low yield 5-7%
- Routine Echo did not establish the cause of the syncope
- Normal Echo for **ALL** patients without a cardiac history and normal ECG
- Important if presence of structural heart disease or abnormal ECG
- No cost-effectiveness studies
 - But cost 7 times more than an ECG

Exercise stress testing

- Low yield: < 1%
- Indicated in:
 - Ischemic heart disease
 - Exertional syncope*

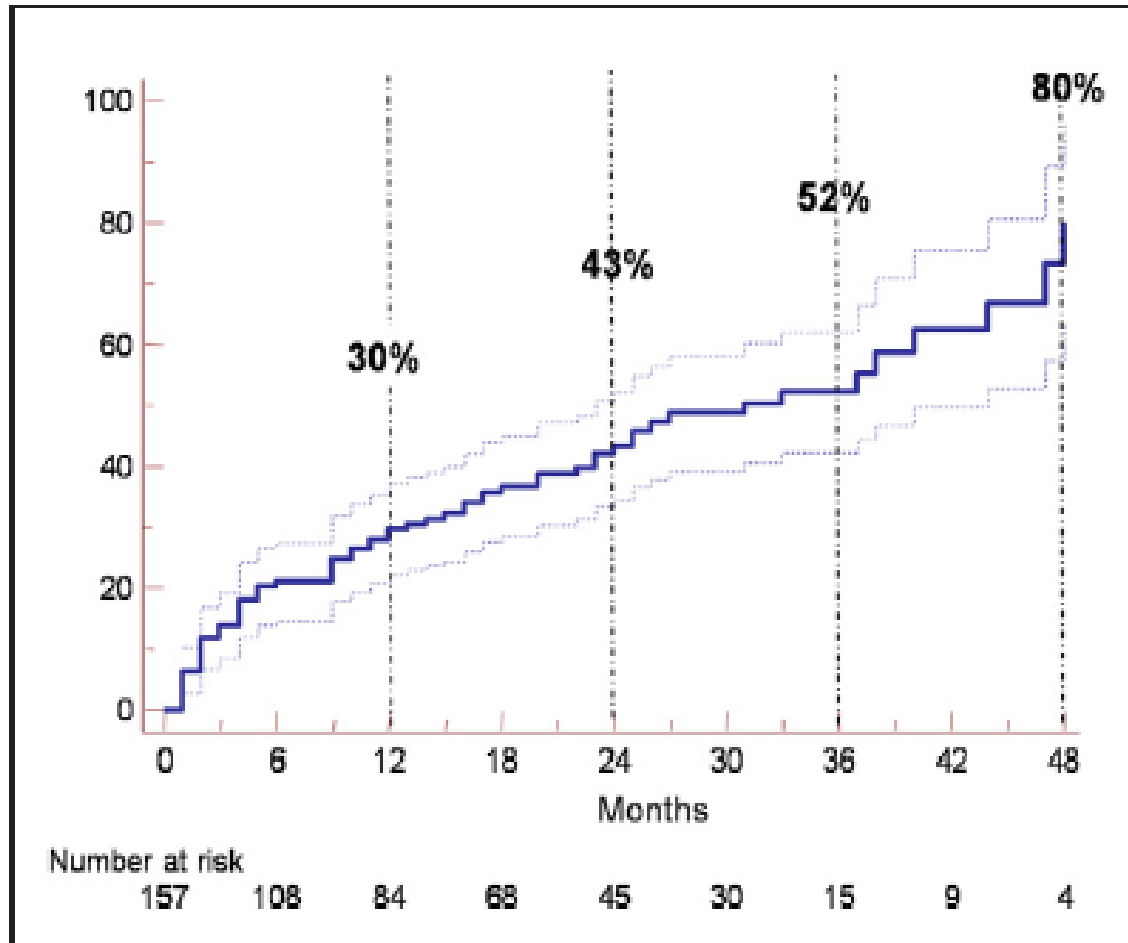
24 Holter

- Yield of 19%
 - 4% correlation of symptoms with arrhythmia
 - 15% have symptoms without arrhythmia
 - 14% have asymptomatic arrhythmia
- Causal relation between most of these arrhythmias and syncope is uncertain
- A negative holter does not r/o arrhythmogenic etiology

External Loop recorder

Yield	24-47% (highest in patients with palpitations)
Indications	<ol style="list-style-type: none">1) Frequent episodes with normal heart2) Recurrent events

Dx yield of ILP



Electrophysiology Study

Goals	VT, VF, SVT
Risks	PE Cardiac perforation MI
Drawbacks	A negative study does not exclude arrhythmogenic cause <i>Insensitive to detect bradyarrhythmias</i>
Overall	Invasive Expensive

Neurological testing

- Low yield 2-6%
- Useful if patients have neurological symptoms/signs or carotid bruits
 - Seizures
 - Focal neurological signs

Neurological testing

EEG	Studies showed little use in the unselected patient with syncope Not recommended as routine workup
CT and MRI	Yield of 4% No use if no neuro symptoms
Carotid doppler	Usefulness is unknown
Transcranial doppler	Usefulness in drop attack is unknown

Coloured-glasses

Speciality	Tests	Conclusive diagnosis
Cardiology	Echo, Holter, EPS, stress test	83%
Internal medicine	Abdo ultrasound, CT/MRI, miscellaneous	69.5%
Neurology	EEG, CT/MRI, Tilt test	54.5%



Risk stratification based on prognostic factors

Risk stratification 1

TABLE 3. Predictors of Cardiac Arrhythmias in Patients with Unexplained Syncope

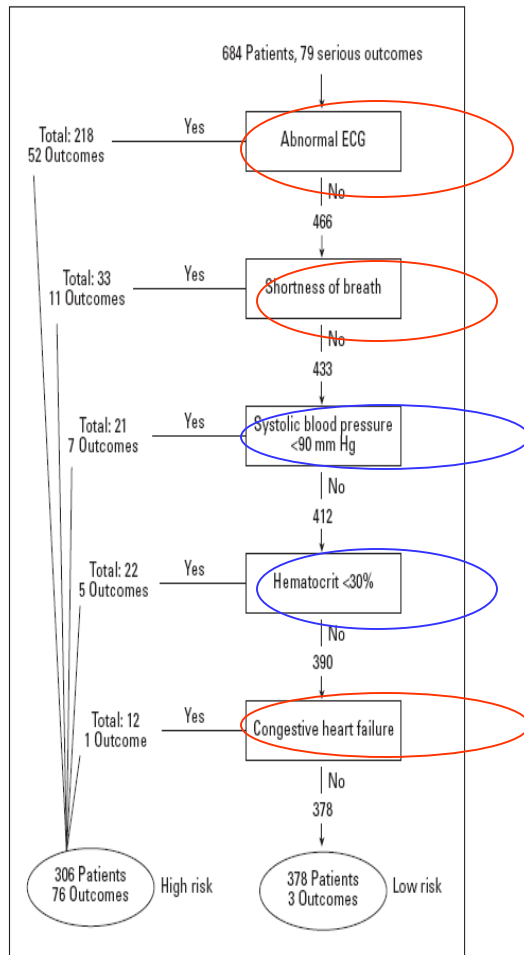
Variables	Univariate Analysis			Multivariate Analysis		
	OR	95% CI	p	OR	95% CI	p
Abnormal ECG	11.6	4.6–29.5	<0.001	8.1	3.0–22.7	<0.001
Age ≥65 years	13.4	3.0–58.5	<0.001	5.4	1.1–26.0	0.03
History of congestive heart failure	8.6	3.5–21.1	<0.001	5.3	1.9–15.0	0.002
History of myocardial infarction	4.3	1.7–10.9	0.003			
History of cardiac disease (any type)	4.3	1.8–10.1	0.001			

Overall arrhythmogenic syncope 17-18%

San Francisco Syncope Rule

Figure.

Decision tree to derive the San Francisco Syncope Rule.



7-days outcome study

- Sensitivity 96.2%
- Specificity 62%
- NPV 99.2%
- PPV 24.8%
- Decrease admission rate by 10%

San Francisco – Validation

Internal

30-days outcome study

- Sensitivity 98%
- Specificity 56%
- Potentially decreasing admission by 7%

External

7-days outcome study

- Sensitivity 89%
- Specificity 69%

“should use as a risk stratification...as opposed to traditional rules used to replace judgment”

San Francisco – Elderly patients

Application of the rule for pts > 65yo
7-days outcome study

- Sensitivity 76.5%
- Specificity 36.8%
- NPV 87%
- PPV 22.1%

San Francisco vs clinical judgment

Clinical judgment

Sensitivity 94%

Specificity 54%

ROC (AUC) 0.83

San Francisco

Sensitivity 96%

Specificity 62%

ROC (AUC) 0.92

Rule out vasovagal – Calgary Syncope Score

Table 5 Diagnostic questions to determine whether syncope is due to vasovagal syncope or to another cause of syncope

Question	Points (if yes)
Is there a history of at least one of bifascicular block, asystole, supraventricular tachycardia, diabetes?	-5
At times have bystanders noted you to be blue during your faint?	-4
Did your syncope start when you were 35 years of age or older?	-3
Do you remember anything about being unconscious?	-2
Do you have lightheaded spells or faint with prolonged sitting or standing?	1
Do you sweat or feel warm before a faint?	2
Do you have lightheaded spells or faint with pain or in medical settings?	3

The patient has vasovagal syncope if the point score is ≥ -2 .

Calgary score

	Sheldon et al EHJ 2006	Romme et al EHJ 2009	Guzman et al Europace 2013
Population	Syncope with no structural disease	Consecutive transient LOC	Referred for tilt testing
Sample	418	380	180
Characteristic			Age 73.4+/- 7.8
Sensitivity	89%	87%	51%
Specificity	91%	32%	73%

OESIL risk score

Independent Predictors	Risk ratio
Age > 65	1.42
CVD on history	1.34
Abnormal ECG	1.29
Syncope without prodrome	1.13

European Heart Journal 2003; 24: 811-819

OESIL risk score

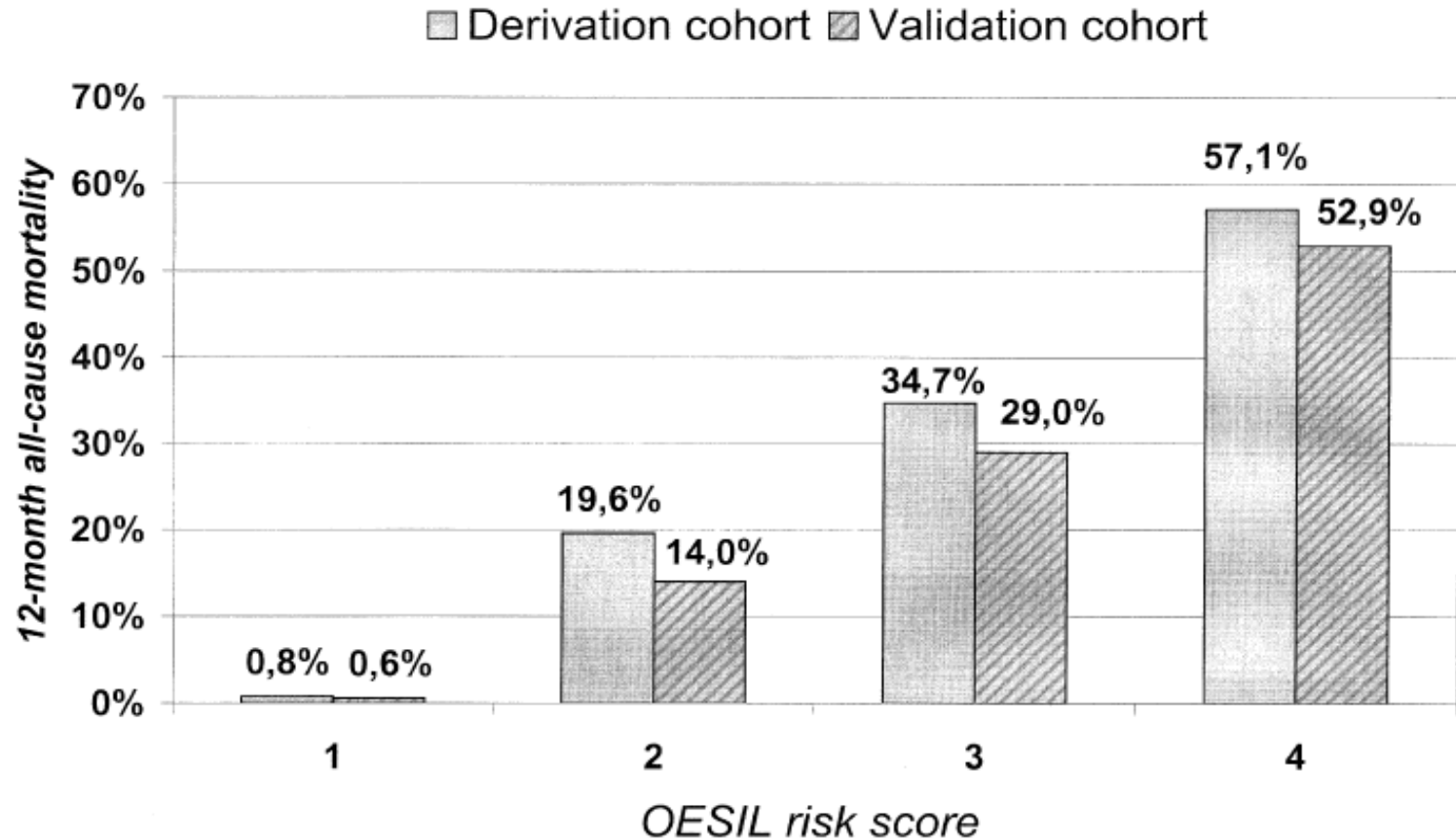


Fig. 2 Rates of 12-month all-cause mortality according to the OESIL score in the derivation and validation cohorts.

OESIL risk Score

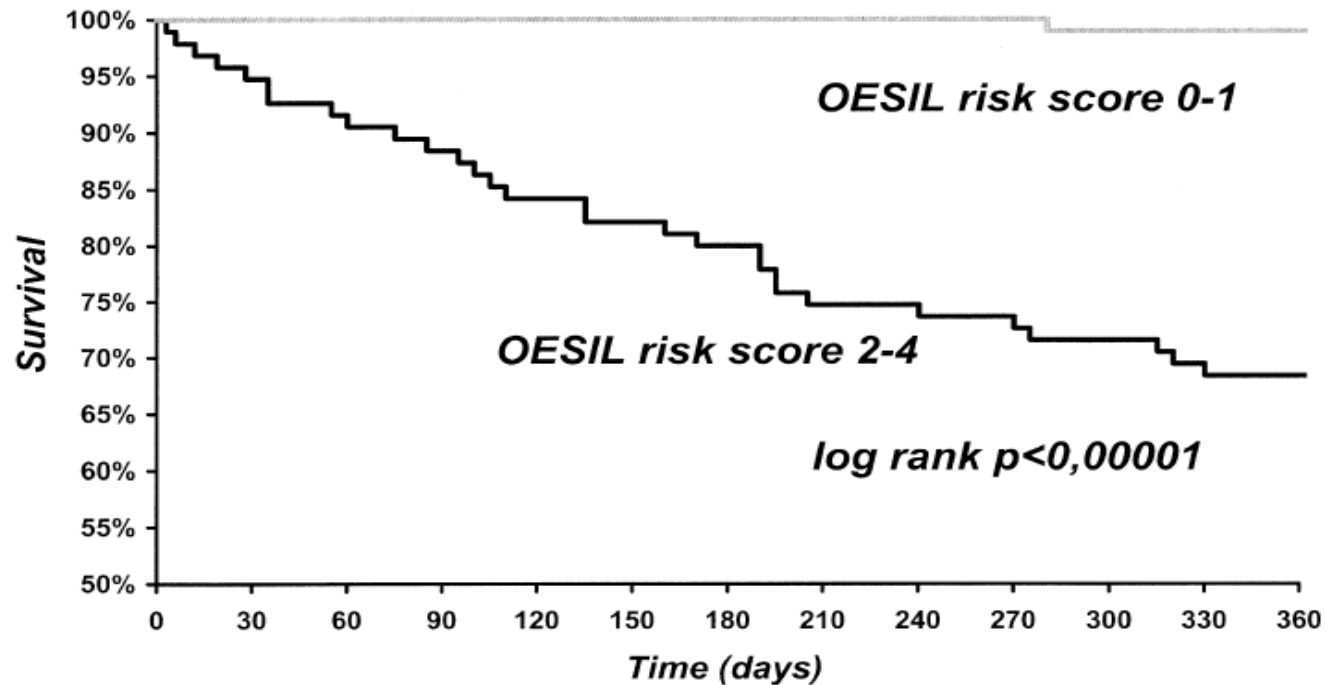


Fig. 4 Kaplan-Meier survival curves according to the score at presentation in patients included in the derivation cohort.

Management should be...

Based on risk and prognosis

and not on diagnosis (if diagnosis is not possible and often difficult to make)

Summary of risk stratification

Sarasin et al.	San Francisco	OESIL	Miscellaneous
<ul style="list-style-type: none"> ❖ Abnormal ECG ❖ Age > 65 ❖ Hx of CHF 	<ul style="list-style-type: none"> ❖ Abnormal ECG ❖ SOB ❖ SBP < 90 ❖ Hct < 30% ❖ CHF 	<ul style="list-style-type: none"> ❖ Abnormal ECG ❖ Age > 65 ❖ Cardiovascular disease on Hx ❖ Syncope without prodrome 	<ul style="list-style-type: none"> ❖ Exertional syncope ❖ Palpitation ❖ Family history of premature sudden death ❖ Drugs that prolong QT

Cases Revisited

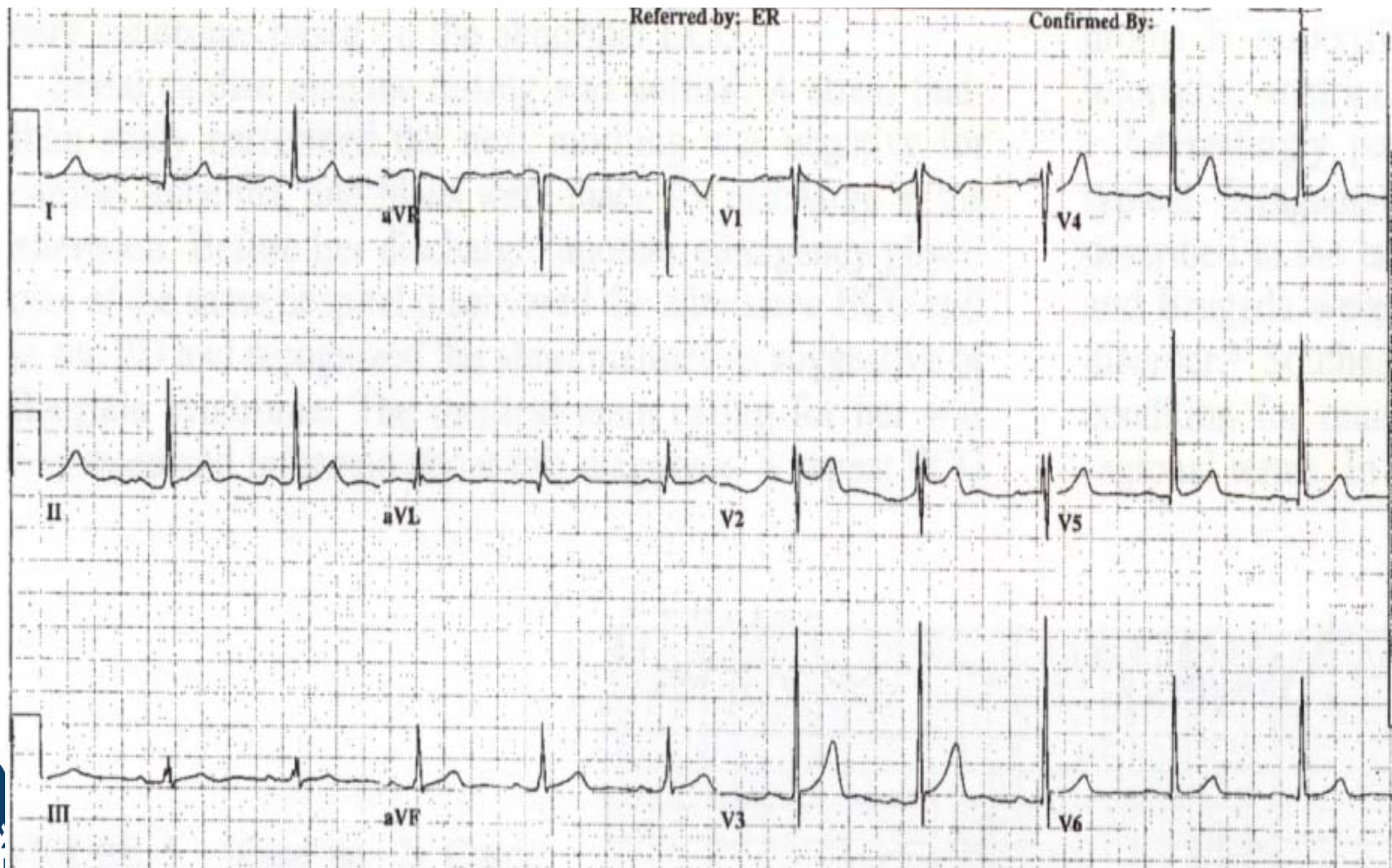
Case 1

- 75 yo female presents with syncope
 - Multiple previous episodes
 - PMH: CAD, CABG, DM
 - Physical exam normal
 - ECG: LBBB
- What will be your management?

Case 1

- Loop recorder placed for 1 month, but was asymptomatic
- Had EPS, normal
- Loop event monitoring again which showed complete AV dissociation
- Pacemaker placement
- No syncope after 2-year f/u

Case 2



Case 3

- Young female of 28 yo.
 - Felt weak in the subway station.
 - Then passed out as she tried to get up from her seat.
-
- What work-up would you like?

Case 3

- B-HCG was positive.
- Pelvic ultrasound showed rupture left ectopic pregnancy with free fluid in the pelvis.
- Transferred care to Gynecology

Summary

- History, physical examination, and ECG form the cornerstone of the syncope work-up
- Patients whom heart disease is known or those with exertional syncope should get cardiac testing

Take Homes

- Careful (and painful) history give you the diagnosis in almost all cases
- Diagnose benign causes
- **IDENTIFY** high risk criteria
- Use clinical decision rules if initial risk is unclear (but know their limitations)
- Do an ECG on all patients
- High risk patients should receive cardiac consultation

Questions?



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