Implementing a New Standard for Diagnosing Syncope
Emerging Trends in a Nurse Led Syncope Service

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James Cook University Hospital
South Tees NHS Foundation Trust
Disclosures

Honoraria for lectures or scientific boards:

Medtronic, Bayer, Boehringer Ingelheim, Pfizer, Daiichi Sankyo.
Nurse Delivered Syncope Service

• Commenced 2010, nurse delivered, with clinical support from syncope lead

• Multidisciplinary, multi-speciality model

• Model reflects recommendations made by European Society of Cardiology 2018¹

Structured Care Pathway

- To maximize implementation of the guidelines, a structured care pathway is recommended

Syncope Unit/Service

- Pathway delivered within a multi-faceted service is optimal for quality service delivery
- Led by clinician with specific knowledge of TLOC & necessary team members (i.e. clinical nurse specialist)

A Multidisciplinary Approach

- Experience and training in key components of cardiology, neurology, emergency and geriatric medicine are pertinent
- Nurses may be expected to take very important roles

TLOC, transient loss of consciousness.

Audit Findings

- Audit to examine existing pathways/process map
- Costly and inappropriate investigations and omission of important investigations
- High rates of hospitalisation (often unnecessary) with prolonged stay in hospital
- Multiple attendances to A&E
- Multiple referrals to multiple specialities
- Evidence of misdiagnosis

A&E, accident and emergency;
Pre blackout service – 46 year old gentleman presents to A&E with blackout

- 2001 – A&E (ECG, NAD – discharged, with no further follow up)
- 2005 – Re presents to GP with further episodes of blackout
- 2005 – GP refers to Consultant Physician (CT head and chest, ECG, bloods, CXR – NAD) advises GP to refer to Neurologist
- 2005 – GP refers to Neurology
- 2005 – Consultant Neurologist (EEG, ECG, Bloods, Tilt-test) cardiac cause suspected and referral advised. No evidence of this happening in notes
- 2009 – Re presents to A&E following RTA after having blackout - Re referred to Neurology
- 2009 – Neurologist again advises referral to cardiology
- 2010 – GP refers to cardiology
- 2010/2011 – Seen by cardiologist who suspects cardiac cause. ECG, 7-day ambulatory ECG NAD. Implantable cardiac monitor (ICM) implanted
- 2011 – Ventricular pauses evident on interrogation of ICM
- 2011 – Permanent pacemaker implanted

ECG, electrocardiogram; NAD, no attributable diagnosis; GP, general practitioner; CT, computed tomography; CXR, chest X-ray; RTA, road traffic accident; ICM, implantable cardiac monitor.
AAU, acute assessment unit.

Image shown is author’s own.
South Tees Blackout Multi Disciplinary Team

- Consultant Cardiologist
- Cardiac Physiologists
- Consultant Neurophysiologist
- Secretaries
- Health Care Assistants
- Epilepsy Specialist Nurse
- CRM Specialist Nurses/Nurse Consultant
- Elderly Care
- Falls team
- A&E
- MAU
- Commissioners
- Clinical Psychologist

MAU, medical assessment unit. Image shown is author’s own.
Nurse Led Blackout Service

- Cardiology/neurology experience
- All nurses qualified to at least masters level
- Non-medical prescribing
- Clinical assessment
- Masters level arrhythmia and syncope module
- In-house competency based training
- Regular educational sessions via MDT meetings

MDT, multidisciplinary team.
Streamlined Pathway

- **GP/A&E/AAU – sign-posting**
- **Blackout Service – Triage Nurses**
- **Blackout – Specialist Nurse Management**
- **Cardiology**
- **Neurology**

Image shown is author’s own.
The Blackout Service

- Referral triaged by nurses and signposted appropriately
- Patients assessed by nurses in clinic
- Same day access to consultants if required
- One stop shop offering:
  - History taking / witness accounts
  - Clinical examination
  - Active stands
  - ECG
  - CSM
  - Echocardiogram
  - Holter monitoring
  - Tilt-test (not same day)
  - EEG/MRI/CT (not same day)

CSM, carotid sinus massage.
Source of referrals

- Accident and Emergency 52%
- Primary Care 44%
- Other 4%
Results

• Average reduction of 41 admissions per month
• Reduction of approximately 800 bed days
• Reduction in waiting times for first assessment
• Prompt diagnosis
Reduced waiting times

Days

Department

Neurology
Cardiology
First Fit
Blackout

Internal data courtesy of The Blackout clinic at James Cook University.
Diagnosis at first appointment 72%

- Vasovagal Syncope 38%
- Unclear further tests needed 28%
- Seizures and epilepsy 14%
- Orthostatic hypotension 10%
- Situational Syncope 6%
- Other 4%

Internal data courtesy of The Blackout clinic at James Cook University.
Case Study: From Referral to Follow-up
Case study: 78 year old female

Referral source:
- GP
- 78 year old female

Past medical history:
- Epilepsy
- Breast cancer

Medications:
- Lamotrigine 300mg twice daily
Presenting complaint:

• 2 x episodes of no warning LOC whilst seated within a 1-month period
  — Sustained a facial injury on one occasion
• 1 x episode was witnessed by friend
  — Pale colour
  — Normal breathing
  — Limp body tone
  — No abnormal limb movements or other seizure markers
  — Eyes open
• Unconscious for 1-minute
• Quick recovery
  — No residual symptoms post event

LOC – loss of consciousness
Clinical Examination

• Height, weight and BMI
• Blood pressure: 154/96 to 132/84 - recovered over a 2-minute period
• Cardiovascular and respiratory examination normal
• ECG: normal sinus rhythm
Differential Diagnosis

- Postprandial (as both episodes occurred during or following breakfast)
- Postural hypotension (drop in BP as documented in clinic)
- Cardiac syncope
• 7-day ambulatory ECG monitor

  — Sinus rhythm – max. HR 112bpm, mean HR 87bpm, min. HR 70bpm

  — Discussed with cardiologist and listed for ICM

HR, heart rate.
Implant ICM

- Patient admitted to cardiology day unit
- Seen by specialist nurse
  - Procedure explained
  - Clerked and consented
- Nurse led ICM implant
- Procedure carried out in procedure room by the nurse using ‘sterile’ techniques
- Programming of ICM by nurse
ICM Follow-up

- CareLink™ system checked daily by specialist nurse
- Telephone follow-up at 3, 6 and 12-months with the option of face to face follow-up at 12-months if patient wishes
- Pause alert – transmission demonstrated…
Internal data courtesy of The Blackout clinic at James Cook University.
ICM Follow-up

- Patient contacted
  - Further episode of TLOC at 08:25am
  - Sat eating breakfast
  - No warning TLOC with quick recovery
Diagnosis

- Symptomatic sinus node disease with sinus pauses
- Discussed with cardiologist same day
- Added to list for permanent pacemaker
- Patient agreeable to procedure
- Dual chamber pacemaker implanted
Timeline

- Referral to blackout clinic appointment – 10 days
- Blackout clinic to ICM implant – 6 days
- ICM implant to diagnosis – 38 days
- Diagnosis to pacemaker – 14 days
- Referral to pacemaker – 68 days
Summary

• Nurse delivered models of care as recommended by ESC 2018 proven to be safe and effective
• There is a need for more research specific to nurse led syncope services
• Support from an identified clinical lead is essential
• Education is of paramount importance and more formalised education programmes need to be developed
Monitoring high-risk syncope patients: Putting guidelines into practice?

JC Deharo, MD, FESC
Marseille, France
Disclosures

Honoraria for lectures or scientific boards and grants for research activities:

Medtronic, Boston Scientific, Abbott, Microport, Biotronik, Spectranetics, Bayer, Boehringer Ingelheim, MSD-Pfizer, Novartis.
2018 ESC guidelines for the diagnosis and management of syncope
Key components of the Syncope Unit (SU)

- The SU should take the lead in service delivery for syncope, and in education and training of healthcare professionals who encounter syncope.
- The SU should be led by a clinician with specific knowledge of TLOC and additional necessary team members (i.e. clinical nurse specialist) depending on the local model of service delivery.
- The SU should provide minimum core treatments for reflex syncope and OH, and treatments or preferential access for cardiac syncope, falls, psychogenic pseudosyncope, and epilepsy.
- Referrals should be directly from family practitioners, EDs, in-hospital and out-hospital services, or self-referral depending on the risk stratification of referrals. Fast-track access, with a separate waiting list and scheduled follow-up visits, should be recommended.
- SU should employ quality indicators, process indicators, and desirable outcome targets.

SU, syncope unit; T-LOC, transient loss of consciousness; OH, orthostatic hypotension; ED, emergency department.

Case (1)

• Female, 31 y.o.
• History:
  — Transient ischaemic attack 2 years ago
  — Mitral valve prolapse diagnosed at that time
  — Oral anticoagulants since the TIA
• Attending the syncope unit after 3 syncope during the last 2 years:
  — 1 episode going up stairs, 2 episodes in a prolonged standing position
  — always preceded by palpitations
  — no prodromes
  — mild trauma

TIA, transient ischaemic attack.
Case (2)

Image shown is authors own
Case (3)

- Physical examination: mitral click sound, no systolic murmur
- No other abnormality
- No orthostatic hypotension
- Echocardiogram:

[Image of echocardiogram]
Case (4)

Treadmill test

12-lead Holter monitoring

Image shown is authors own
Case (5)

Cardiac MRI evaluation

Mitral annular disjunction

Late gadolinium enhancement

Images shown is authors own
The initial evaluation of T-LOC

4 key questions

Question #1
Does the event concern T-LOC?

If yes

Question #2
Is T-LOC of syncopal origin?

If yes

Question #3
Which is the risk?

Question #4
Is there a diagnosis?

## Risk stratification at the initial evaluation (I)

<table>
<thead>
<tr>
<th>Syncopal event</th>
<th>Low-risk</th>
<th>High-risk (red flag)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Associated with prodrome typical of reflex</td>
<td>1. Associated with prodrome typical of reflex syncope (e.g. light-headedness, feeling of warmth, sweating, nausea, vomiting).</td>
<td>1. New onset of chest discomfort, breathlessness, abdominal pain, or headache.</td>
</tr>
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<td>syncope (e.g. light-headedness, feeling of</td>
<td>2. After sudden unexpected unpleasant sight, sound, smell, or pain.</td>
<td>2. Syncope during exertion or when supine.</td>
</tr>
<tr>
<td>warmth, sweating, nausea, vomiting).</td>
<td>3. After prolonged standing or crowded, hot places.</td>
<td>3. Sudden onset palpitation immediately followed by syncope.</td>
</tr>
<tr>
<td>2. After sudden unexpected unpleasant sight,</td>
<td>4. During a meal or postprandial.</td>
<td><strong>Minor</strong> (high risk only if associated with structural heart disease or abnormal ECG):</td>
</tr>
<tr>
<td>sound, smell, or pain.</td>
<td>5. Triggered by cough, defecation, or micturition.</td>
<td>1. No warning symptoms or short (&lt;10 s) prodrome,</td>
</tr>
<tr>
<td>3. After prolonged standing or crowded, hot</td>
<td>6. With head rotation or pressure on carotid sinus (e.g. tumour, shaving, tight collars).</td>
<td>2. Family history of SCD at young,</td>
</tr>
<tr>
<td>places.</td>
<td>7. Standing from supine/sitting position.</td>
<td>3. Syncope in the sitting position.</td>
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<td>4. During a meal or postprandial.</td>
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ECG, electrocardiogram.
SCD, sudden cardiac death.
## Cardiac syncope

1. Arrhythmic syncope is highly probable when the ECG shows:
   - Persistent sinus bradycardia <40 b.p.m. or sinus pauses >3 seconds in awake state and in absence of physical training,
   - Mobitz II second- and third-degree AV block,
   - Alternating left and right BBB,
   - VT or rapid paroxysmal SVT,
   - Non-sustained episodes of polymorphic VT and long or short QT interval,
   - Pacemaker or ICD malfunction with cardiac pauses.

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b.p.m, beats per minute; AV block, atrioventricular block; BBB, bundle branch block; VT, ventricular tachycardia; SVT, supraventricular tachycardia; ICD, implantable cardioverter defibrillator.

Clinical & ECG features that suggest a cardiac syncope

- During exertion or when supine.
- Presence of structural heart disease or coronary artery disease.
- Family history of unexplained sudden death at a young age.
- Sudden onset palpitations immediately followed by syncope.
- ECG findings suggesting arrhythmic syncope:
  - Bifascicular block?
  - Other intraventricular conduction abnormalities (QRS duration ≥0.12 s),
  - Mobitz I second-degree AV block,
  - 1° degree AV block with markedly prolonged PR interval,
  - Asymptomatic mild inappropriate sinus bradycardia (40–50 b.p.m.) or slow atrial fibrillation (40–50 b.p.m.),
  - Non-sustained VT,
  - Pre-excited QRS complexes,
  - Long or short QT intervals,
  - Early repolarization,
  - Type 1 Brugada pattern,
  - Negative T waves in right precordial leads, epsilon waves suggestive of ARVC,
  - Left ventricular hypertrophy suggesting hypertrophic cardiomyopathy.

ARVC, arrhythmogenic right ventricular cardiomyopathy.
ECG monitoring: indications

T-LOC suspected syncope

- Certain diagnosis/ mechanism
  
  Treat appropriately

- Syncope
  
  - High risk, arrhythmia likely
    
    In-hospital monitoring (Class I)
    
    If negative
    
    ILR (Class I)
  
  - Low risk, arrhythmia likely & recurrent episodes
    
    ILR (Class I)
    
    ELR (Class IIa)
    
    Holter (Class IIa)
  
  - Low risk, reflex likely & need for specific therapy
    
    ILR (Class IIa)
  
  - Low risk & rare episodes
    
    Not indicated

  - Low risk & non-syncopal
    
    Unconfirmed epilepsy
    
    Unexplained falls
    
    ILR (Class IIb)

Adapted from Brignole et al., 2018 European Heart Journal;39(21):1883-1948.
ECG monitoring: indications

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<tr>
<td><strong>Indications</strong></td>
<td></td>
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</tr>
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<td>Immediate in-hospital monitoring (in bed or by telemetry) is indicated in high-risk patients (defined in Table 6).</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Holter monitoring should be considered in patients who have frequent syncope or presyncope (≥1 episode per week).</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>External loop recorders should be considered, early after the index event, in patients who have an inter-symptom interval ≤4 weeks.</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>ILR is indicated in an early phase of evaluation in patients with recurrent syncope of uncertain origin, absence of high-risk criteria (listed in Table 6), and a high likelihood of recurrence within the battery life of the device.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Supplementary Data Table 5</td>
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<td>ILR is indicated in patients with high-risk criteria (listed in Table 6) in whom a comprehensive evaluation did not demonstrate a cause of syncope or lead to a specific treatment, and who do not have conventional indications for primary prevention ICD or pacemaker indication.</td>
<td>I</td>
<td>A</td>
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<td>Supplementary Data Tables 5 and 6</td>
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<td>ILR should be considered in patients with suspected or certain reflex syncope presenting with frequent or severe syncopal episodes.</td>
<td>Ila</td>
<td>B</td>
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<td>Supplementary Data Table 7</td>
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<td>ILR may be considered in patients in whom epilepsy was suspected but the treatment has proven ineffective.</td>
<td>IIb</td>
<td>B</td>
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<td>ILR may be considered in patients with unexplained falls.</td>
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## Left ventricular systolic dysfunction

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<td>2. An ICD should be considered in patients with unexplained syncope with systolic impairment but without a current indication for ICD to reduce the risk of sudden death</td>
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<td>3. Instead of an ICD, an ILR may be considered in patients with recurrent episodes of unexplained syncope with systolic impairment but without a current indication for ICD</td>
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Unexplained syncope is defined as syncope that does not meet a Class I diagnostic criterion defined in the tables of recommendations. In the presence of clinical features described in this section, unexplained syncope is considered a risk factor for ventricular tachyarrhythmias.

### Left ventricular systolic dysfunction

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### Hypertrophic cardiomyopathy

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### Arrhythmogenic right ventricular cardiomyopathy

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<td>3. ICD implantation may be considered in patients with ARVC and a history of unexplained syncope.</td>
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<td>C</td>
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<td>4. Instead of an ICD, an ILR may be considered in patients with recurrent episodes of unexplained syncope with systolic impairment but without a current indication for ICD.</td>
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HCM, hypertrophic cardiomyopathy.

### Left ventricular systolic dysfunction

1. **ICD therapy** is recommended to reduce SCD in patients with symptomatic heart failure (NYHA class II – III) and LVEF ≤35% after ≥3 months of optimal medical therapy who are expected to survive for at least 1 year with good functional status. 

2. An ICD should be considered in patients with unexplained syncope with systolic impairment but without a current indication for ICD to reduce the risk of sudden death.

3. Instead of an ICD, an ILR may be considered in patients with recurrent episodes of unexplained syncope with systolic impairment but without a current indication for ICD.

### Hypertrophic cardiomyopathy

1. It is recommended that the decision for ICD implantation in patients with unexplained syncope is made according to the ESC HCM Risk-SCD score.

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### Arrhythmogenic right ventricular cardiomyopathy

3. ICD implantation may be considered in patients with ARVC and a history of unexplained syncope.

4. Instead of an ICD, an ILR may be considered in patients with recurrent episodes of unexplained syncope with systolic impairment but without a current indication for ICD.

### Long QT syndrome

1. ICD implantation in addition to beta-blockers should be considered in LQTS patients who experience unexplained syncope while receiving an adequate dose of beta-blockers.

2. Left cardiac sympathetic denervation should be considered in patients with symptomatic LQTS when:
   - (a) beta-blockers are not effective, not tolerated, or are contraindicated;
   - (b) ICD therapy is contraindicated or refused; or
   - (c) when patients on beta-blockers with an ICD experience multiple shocks.

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Unexplained syncope is defined as syncope that does not meet a class I diagnostic criterion defined in the tables of recommendations. In the presence of clinical features described in this section, unexplained syncope is considered a risk factor for ventricular tachyarrhythmias.
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<td>C</td>
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<td>2. An ICD should be considered in patients with unexplained syncope and systolic impairment but without a current indication for ICD to reduce the risk of sudden death.</td>
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<td>3. Instead of an ICD, an ILR may be considered in patients with recurrent episodes of unexplained syncope with systolic impairment but without a current indication for ICD.</td>
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**Hypertrophic cardiomyopathy**

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<td>B</td>
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**Arrhythmogenic right ventricular cardiomyopathy**

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**Brugada syndrome**

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<tr>
<td>1. ICD implantation should be considered in patients with a spontaneous diagnostic type I ECG pattern and a history of unexplained syncope.</td>
<td>IIB</td>
<td>B</td>
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<td>4. Instead of an ICD, an ILR may be considered in patients with recurrent episodes of unexplained syncope with systolic impairment but without a current indication for ICD.</td>
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Case (6)

ILR recordings

Palpitations

Palpitations + dizziness

Figures shown are authors own
Conclusion

Management of syncope in the ED

It is recommended that patients with high-risk features receive an early intensive prompt evaluation in a syncope unit or in an ED observation unit (if available), or are hospitalized.\textsuperscript{26,27,35,36,44–46,50,55–57,59,60,70–76}

ECG monitoring

ILR is indicated in high-risk (criteria listed in Table 6) patients in whom a comprehensive evaluation did not demonstrate a cause of syncope or lead to a specific treatment, and who do not have conventional indications for primary prevention ICD or pacemaker indication.\textsuperscript{174,180,187,188,195} Supplementary Data Tables 5 and 6

Circulation

Common Phenotype in Patients With Mitral Valve Prolapse Who Experienced Sudden Cardiac Death