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Declaration of Conflicting

Interests: The author has accepted fees for speaking, organising education and research from Medtronic Inc.

Understanding Blackouts: a model for rapid diagnosis

Up to a half of all people will experience a blackout – or ‘transient loss of consciousness’ (T-LoC) – during their lifetime,^{1,2} subsequently accounting for 3% of casualty attendances.³ This can be a frightening and distressing experience for the patient and his/her family, and a diagnostic challenge for health professionals, faced with a number of potential reasons for the incident(s).

Likely causes for T-LoC are generally grouped into: cardiovascular (i.e syncope), neurological (i.e epilepsy) and psychological, each requiring different specialist assessment, treatment and monitoring. Syncope (whereby there is a sudden transient decrease of blood flow to the brain, either because of a decrease in blood pressure, heart rate or both) accounts for the majority of cases. Convulsive syncope is commonly misdiagnosed as generalised epilepsy (a sudden unco-ordinated excessive electrical discharge of the brain). This is because the decrease in blood supply to the brain in syncope, causes anoxic irritation, and can be associated with twitching or jerking of the limbs and even incontinence, signs which are often mistaken for epilepsy. A number of patients that I have treated have been diag-

nosed and treated for epilepsy for decades. Some have complete abrupt collapse with abnormal limb movements and double-incontinence. Many have been shown to have prolonged asystole, and benefit from stopping anti-convulsants and receiving a permanent pacemaker.

The All-Party Parliamentary Group on Epilepsy concluded that at least 74,000 patients with epilepsy have been misdiagnosed, and wrongly treated with anti-convulsants, in England alone and other studies estimate that this could cost the NHS nearly £200m a year.⁴ More importantly, life-threatening arrhythmias which may present with T-LoC may be missed if patients are incorrectly referred to neurology services and do not receive routine electrocardiograms (ECG). High-profile cases have highlighted this, where conditions such as the LongQT syndrome have been diagnosed post-mortem on incorrectly interpreted or overlooked ECG recordings, where epilepsy had been diagnosed and treated. In the UK, as few as 4% of patients having neurological investigation for blackouts have a routine 12-lead ECG.

Up to 50% of patients presenting with T-LoC leave hospital without a diagnosis,⁵ many of whom will experience recurrences thereafter.^{6,7} Rapid and accurate diagnosis is vital for ensuring the patient follows the appropriate care pathway and receives the medical attention he/she requires and deserves. Equally important is the identification of factors that confer a high-risk, or ‘Red Flags’. These are:-

Cardiology:

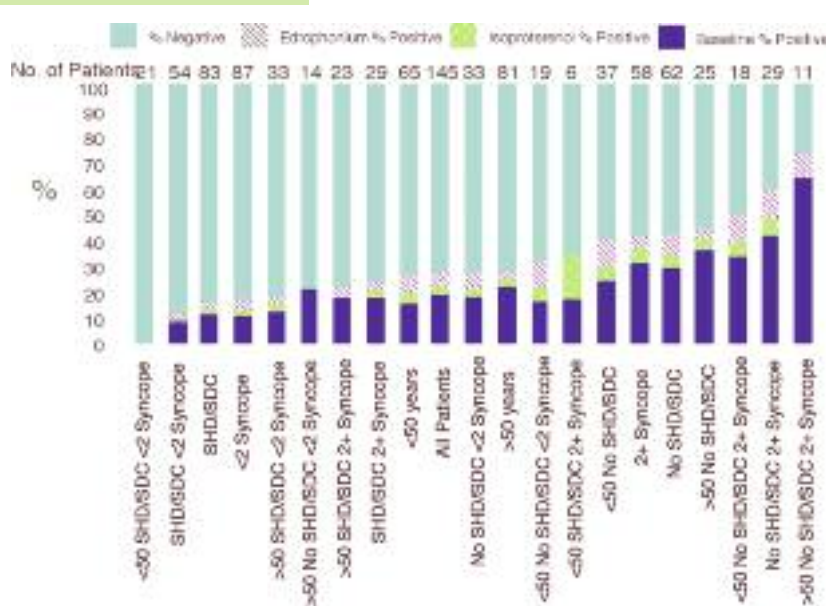
- The presence of structural heart disease.
- A history of sudden cardiac death in the family under 40 years.
- A blackout(s) during exercise.
- An abnormal ECG.

Neurology:

- A new or evolving neurological deficit.
- A history of brain injury.

Diagnosing the cause of unexplained blackouts is possible through a detailed evaluation by a specialist (or number of different specialists), although this can be a complicated and protracted process with patients often being referred from one department to another. Delays must be avoided if a Red Flag is detected. In addition to an in-depth interview with the patient to explore what was happening immediately before the T-LoC (were they exercising, standing for a long period of time or experiencing palpitations?) and

Figure 1: The effect of clinical features in T-LoC on yield of tilt-testing at baseline 45-minute tilt, and subsequent randomised provocation with isoproterenol or edrophonium injection. Young patients with few T-LoC episodes and structural heart disease (far left) had no positive tests. Old patients with multiple T-LoC and no structural heart disease had a high yield of 70%. After baseline tilt, I/V drug provocation added a small addition yield to baseline tilt, which would have included some inevitable false positive results.



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the observation of witnesses during the episode, all patients who have had a blackout should undergo an ECG. Thirty percent of young people with sudden cardiac death (SADS) have had premonitory symptoms, usually a prior blackout. Other clinical cardiology assessments, which have been found to be useful in arriving at a diagnosis, are an echocardiogram, a supine and upright blood pressure estimation, implantation of an ECG loop recorder (a device which can record ongoing heart rhythm data) and a 'tilt test', in which patients are tilted at an angle of 60-70 degrees with their head up in order to pool the blood in the lower legs and induce syncope, during which ECG and blood pressure observations are made. Evidence is now accumulating rapidly that tilt-testing has an overall yield of only about 20% in 'all-comers' with blackouts, and the implantable ECG recorder has a far higher yield and is much more cost-effective than conventional ambulatory monitoring. Tilt-table testing does not effectively discriminate between cases of blackout / T-LOC. It may have value in patients who have clinical Reflex Syncope, in order to reproduce their symptoms. False positive rates as high as 50% are documented for drug-supplemented tilt-table testing, and it should not be used as a test for discriminating between causes of undiagnosed blackouts. Neurological investigations may involve an electroencephalogram (EEG or a recording of the brain waves) and magnetic resonance imaging (MRI) or a computed tomography scan (CT) of the brain. Whilst a small number of patients in published studies have a diagnosis made by complex 'high-tech' investigations, there is no doubt that the majority are diagnosed by careful clinical assessment and a 12-lead ECG. Too often, investigations are rushed into before the careful clinical assessment has been made. Resources are wasted and patients may be misdiagnosed.

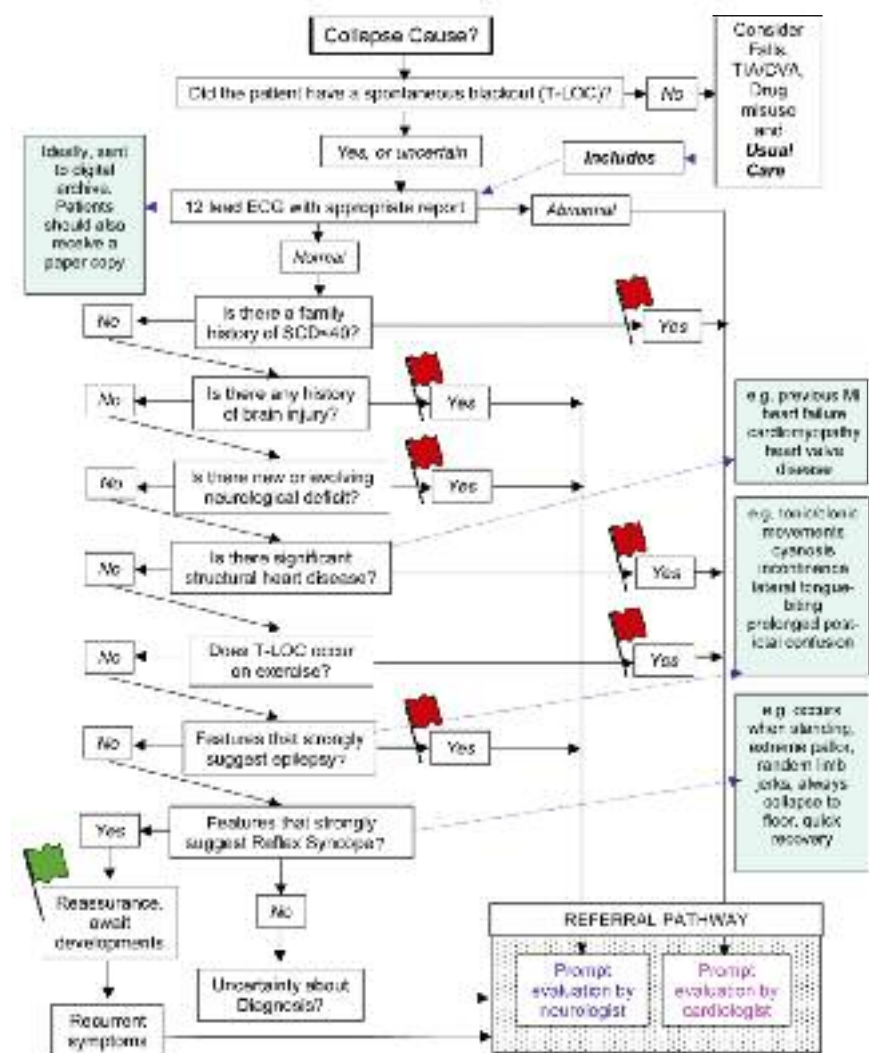
Negotiating a fragmented system and undergoing various (often duplicated) tests in different hospital departments in the pursuit of a diagnosis, inevitably takes time and costs money. In order to minimise this, we have established the model for a Rapid Access Blackouts Triage Clinic (RABTC) at the Manchester Heart Centre in the Manchester Royal Infirmary. This clinic draws together specialist nurses from several disciplines including cardiology,

epilepsy and falls (elderly patients may fall because of T-LoC; however, they are unable to recall losing consciousness because of retrograde amnesia). Through this single-entry point, nurses thoroughly assess patients to diagnose the underlying cause of the T-LoC, and make the appropriate referrals. The aim of the clinic, which opened in May 2007, and has assessed over 200 patients, is to make sure that all patients have a web-based structured clinical assessment and a 12-lead ECG, and are then referred onward, where necessary, to the correct specialist quickly, especially where a Red Flag is detected. Preliminary analysis of our data indicates that only 3% of unselected patients are

referred for a neurological opinion, about 70% have definite syncope, and rapid evaluation through this service seems to reduce re-admission rates from 40% to 4%. We continue to analyse our data which will be published soon.

Initial assessment, which focuses on separating patients presenting with syncope and epilepsy, involves four key components: medical history with the aid of a computer-based, html-developed, extended questionnaire (taking into account the observations of eye-witnesses), a carotid sinus massage, an ECG and supine and upright blood pressure. The clinic acts as an important bridge between 'first responders' (such as ambulance crews, family doc-

Figure 2: Red flags in T-LOC.



tors and casualty staff) and referral to a specialist, and this model of triage has been accepted by the Department of Health as part of the '18-Week Pathway for Blackouts'. In its first year, more than 100 patients were investigated by the clinic and directed on to the appropriate specialty for further investigation and treatment.

A member of our team, Win Bell, a specialist arrhythmia nurse explains the impact that the RABTC has had on the way in which we receive and assess patients: "Establishing the clinic at the Manchester Heart Centre has revolutionised the way in which we can investigate and diagnose the

underlying causes of a patient's blackouts. By centrally co-ordinating and streamlining the process, we have reduced the time taken from first presentation to a health professional to diagnosis to approximately four weeks. We've not only reduced the burden on the hospital, but also the burden on our patients, who can – understandably – be extremely concerned about their blackouts and the impact it has on their lives." We are now seeing eight patients a week, and with rising waiting-times, need to open a second clinic each week. However, we plan to publish our results first, since we currently have no dedicated NHS budget supporting our activity.

The Medical Advisory Committee of blackout charity STARS (Syncope Trust And Reflex-anoxic Seizures) are currently developing a website with the aim of assisting other health care providers in establishing such services. The site will provide examples of models of care provided by a number of clinics. We are hoping that STARS will host our web-based blackouts assessment tool, so that any new clinic can access it with an internet connection, collecting their own data in an encrypted cache, and contributing to national data-

collection. The STARS website also includes advice about establishing a RABTC, information, tools and access to online forums and patient databases, to aid research. We hope that the roll-out of this model will facilitate the development of other RABTCs and ultimately expedite the process of diagnosis for many more T-LoC patients around the country. ■

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STARS (www.stars.org.uk) is a member of the Arrhythmia Alliance (www.heartrhythmcharity.org.uk) which provides guidelines on how to establish rapid access blackout clinics, which are also endorsed by the Department of Health. The establishment of blackout / T-LoC facilities across the country is a priority for STARS as quick and correct diagnosis can save lives in cardiac syncope, improve quality of life and result in correct treatment for those suffering with syncope, epilepsy and other causes of blackout / T-LoC.

