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Management of syncope in the Emergency Department: a single hospital observational case series based on the application of European Society of Cardiology Guidelines

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Aims The aim of this study was to evaluate the effect of introducing a European Society of Cardiology guideline-based Integrated Care Plan (ICP) for Syncope on hospital admissions and referral patterns to an outpatient Syncope Management Unit, of patients presenting to an Emergency Department (ED) with a syncopal episode and to determine the underlying causes of syncope.

Methods and results This study is a single-centre observational case series of consecutive adult patients presenting to the ED over a 5-month period. Two hundred and fourteen of 18 898 patients (1.1%) had a syncopal episode, 110 (51.4%) of whom were admitted. Forty-six (41.8%) admissions were indicated by the ICP. All potential cardiac syncope cases were admitted. There was a 500% increase in the overall number of referrals to the Syncope Management Unit with a small increase in the number of unnecessary referrals.

Conclusion The introduction of an ICP for syncope was not associated with any cases with potential adverse outcomes being lost to follow-up and resulted in increased referral rates to the syncope unit. However, hospitalization rates for syncope remain high, and a large number of patients requiring early outpatient assessment were not referred. There remains a need to develop further interventions to guide appropriate and safe syncope management in the ED.

Keywords Syncope • Integrated Care Plan • Hospitalization • Guidelines

Introduction

Syncope accounts for 1–3% of Emergency department (ED) visits.[1–10] Studies to date have shown significant inter-hospital differences in the approach to diagnosis and management of patients presenting with syncopal episodes. One of the key issues in managing syncope in the ED setting is deciding whether or not to admit patients for further evaluation. This has implications from a diagnostic yield, with potential inappropriate utilization of acute hospital resources. Ensuring that patients who are not admitted also receive appropriate outpatient investigations and interventions is also problematic.

There are a number of published pathways, policy statements, and consensus statements on the management of syncope.[11–14] The European Society of Cardiology (ESC) syncope taskforce published guidelines on the management of patients with syncope. These guidelines provide advice on indications for hospitalization, further investigation, and treatment.[15,16] Further validation of their effectiveness in a clinical setting is required.

Study aims

Our aims were to determine the effect of the introduction of an ESC guideline-based Integrated Care Plan (ICP) for syncope on rates of hospitalization, and referral to an outpatient Syncope Management Unit, of patients presenting to the ED with a syncopal episode. The appropriateness of admission (as recommended by the ICP), referral rates to the outpatient Syncope Management Unit, and ultimate diagnoses were determined. Our hypothesis

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was that introducing the ICP would increase outpatient referral to the Syncope Management Unit, while ensuring capture of cardiac syncope cases requiring urgent admission.

Methods

Study design

This was a single-centre observational case series. Ethics submission was not sought for, as this was an evaluation of a clinical service that did not otherwise have a research component.

Setting

The study was based in the ED of a Dublin teaching hospital with a catchment population of 300 000 and ~45 000 new attendances per year. Trained emergency physicians and emergency trainees staff the ED. A dedicated outpatient Syncope Management Unit was established in 2003. The unit operates on an outpatient basis and does not accept patients directly from the ED. It has facilities for head-up tilt table testing and carotid sinus massage. It also has 24 h cardiac monitors and event monitors. It is staffed by physicians trained in general internal medicine and gerontology and has access to neurology and cardiology physicians who provide electroencephalogram telemetry and implantable loop recorders as required. Financial issues do not affect whether or not patients attend. In order to standardize the management of patients with syncope presenting to the ED, an ICP based on ESC guidelines[15] was introduced in November 2005, in collaboration with the departments of cardiology, neurology, emergency medicine, and gerontology (Appendix). Emergency Department staff were instructed in the use of the ICP on several occasions prior to its introduction. A presentation summarizing and explaining the ESC guidelines and the ICP was delivered on a 4-weekly basis to ensure all ED staff were equally familiar with the ICP. The ICP was available in the ED at all times, and staff were encouraged to use it to guide them through the management of patients presenting with potential syncope, and they were not bound to total adherence.

Selection of participants

Consecutive patients over the age of 16 years presenting to the ED from 10 November 2005 to 13 April 2006 were included and their ED charts were reviewed.

Data collection

All ED attendance records were reviewed within 48 h by the principal researcher, a clinician with syncope experience. These handwritten records are scanned on to a computer and include the medical history, examination details, electrocardiogram (ECG), and basic blood results. To ensure that all potential syncope cases were included, the records were subcategorized into 'probable syncope', 'possible syncope', and 'syncope unlikely' on the basis of predetermined keywords. If a primary keyword (collapse, blackout, faint, syncope, vasovagal, drop attack, found on floor, found collapsed, slip, trip, stumble, fall in patients $\geq$65 years) was present, these patients were considered probable syncope cases and were contacted by telephone to determine whether syncope took place. Those with secondary keywords present (dizziness, weakness, laceration, fall in patients $<$65 years, injury, seizure, loss of consciousness, unresponsive, transient ischaemic attack) were considered as potential syncope cases and categorized as either 'possible syncope' or 'syncope unlikely' by the researcher based on the evidence available on the ED card and 12-lead ECG. Those categorized as 'possible syncope' were also contacted by telephone. If none of the above-listed keywords were present, syncope was felt to be unlikely and no further action was taken.

The reliability of this method was tested by having the attendance records for a single day ($n = 128$) marked blindly by two other senior clinicians experienced in syncope [and agreement with the primary researcher was very good ($\kappa = 0.87$ and 0.82, respectively)].

Patients admitted with possible syncope were also contacted by telephone following discharge. Inpatients over 30 days were excluded, as uncomplicated syncope was deemed unlikely.

Telephone contact was attempted on 3 separate days, and if contact was not established, a letter was sent requesting the patient to make contact with the department. A standard set of questions was administered to determine whether loss of consciousness occurred and whether syncope was the likely cause.

Following review of all available clinical information of both admitted and discharged potential syncope cases, the researcher formed an opinion on whether hospital admission or referral to the Syncope Management Unit for outpatient assessment was indicated as per the ICP. Patient factors requiring immediate admission, referral to the Syncope Management Unit, or reassurance and discharge were defined in terms of need for diagnosis, inpatient therapy, or significant co-morbidity (*Figure 1*).

High-risk features, i.e. features suggestive of a cardiac aetiology, were defined as: syncope preceded by palpitations, occurring during exercise, while supine and syncope in those with a family history of sudden death. Electrocardiogram features suggestive of a cardiac aetiology included: intraventricular conduction delays such as bifascicular block, pre-excited QRS complexes, long QT interval, right bundle branch block with ST elevation in V1 and V2, and Mobitz 1 second-degree heart block.[15]

Secondary trauma was defined as trauma resulting in an injury that required urgent treatment.

Following telephone contact, all patients with probable syncope were offered assessment in the Syncope Management Unit if not previously referred directly by the ED staff or medical physicians.

Results

Eighteen thousand eight hundred and ninety eight ED attendance cards were reviewed, of which 10 700 (56.6%) related to males and mean (SD) age was 45 (20.7) years. Three thousand four hundred and twelve (18.1%) of these patients registered at the ED but did not wait to be assessed by a doctor and were not included in the study. Eighty-three (0.4%) patients were inpatients for longer than 30 days and were not included. Thirty-nine (0.2%) had died and were not subsequently included in the analysis.

One thousand one hundred and fifty one (6.1%) had a potential syncopal episode, of whom 1111 (96.5%) were contactable and 625 (3.3%) had definite loss of consciousness as primary presenting problem, 214 (1.1%) of which in the researcher's opinion were due to true syncope (*Table 1*). Further analysis is based on these 214 cases. Eighty-six (40.2%) were male and mean (SD) age was 57.8 (22.7) years, ranging from 16 to 91 years.

Admission data

Forty-six of the 214 (21.5%) patients with syncope had an indication for admission as per ESC guidelines, and all (100%) of these were admitted. The indications for admission were for

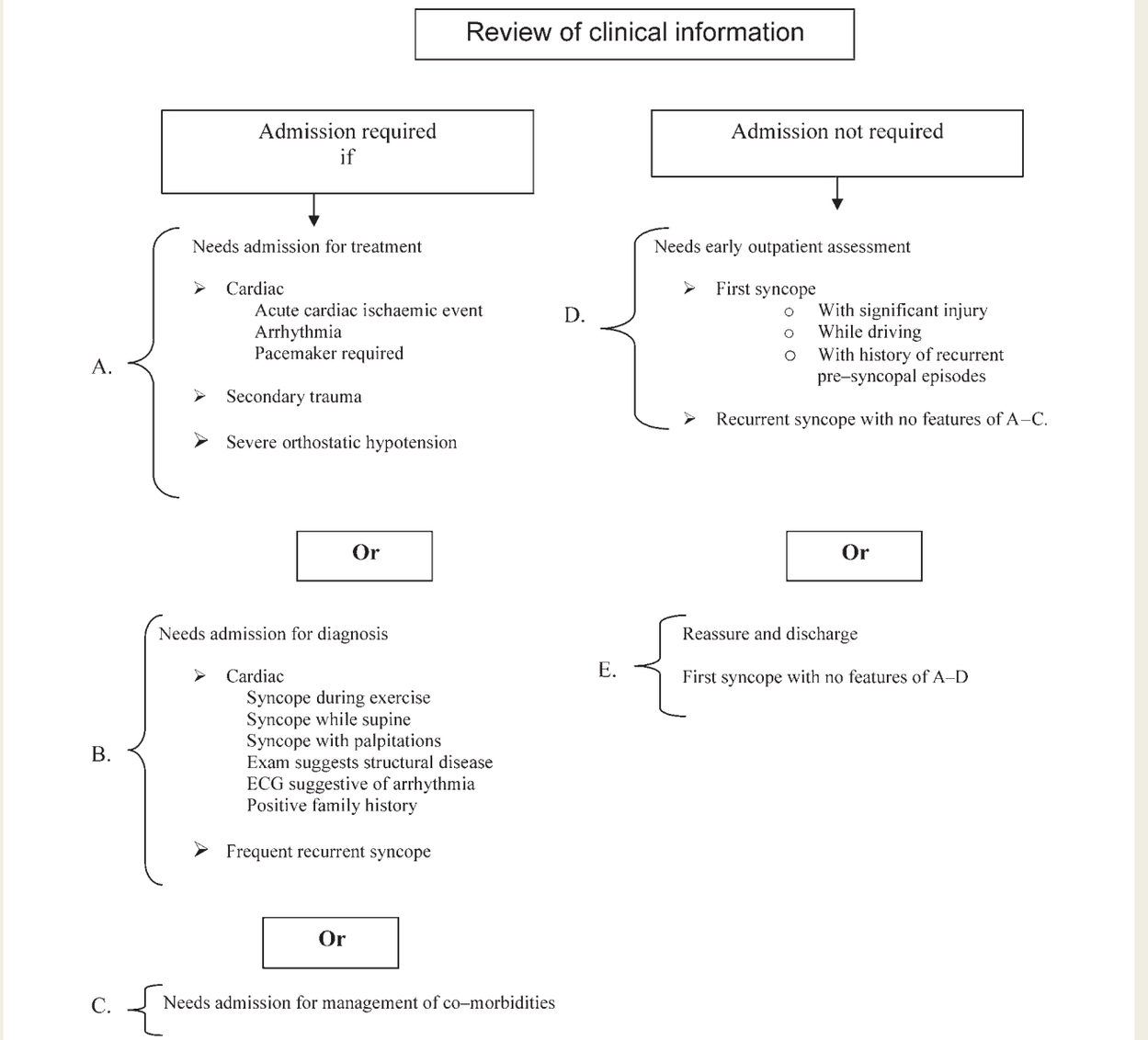

Figure 1 Decision-making pathway for hospital admission and syncope unit referral.

therapeutic reasons in 31 (61.7%) patients: 22 for the management of cardiac syncope, 8 for the treatment of secondary trauma, and 1 for the management of severe orthostatic hypotension; associated significant co-morbidities in 9 (19.6%) cases; and for diagnostic purposes in the remaining 6 (13%) cases, 4 of which were possible cardiac syncope cases and 2 had recurrent frequent syncope.

One hundred and sixty-eight (78.5%) patients with syncope did not, according to the ICP, require admission and could have been safely discharged. One hundred and four (61.9%) of these were discharged and 64 (38.1%) were admitted (*Figure 2*). The monthly admission rates of patients without an indication for hospitalization did not vary appreciably across the 5-month study period.

Referral to Syncope Management Unit

Of the 214 syncope cases, 26 (12.1%) were cardiac cases requiring admission for management and all of them were appropriately admitted. Eighty-eight (41.1%) were first syncopal episodes with no high-risk features and did not require further assessment, of these 11 (5.1%) were referred to the Syncope Management Unit.

The remaining 100 (46.7%) cases required outpatient assessment in the Syncope Management Unit according to the ESC guidelines. Fifty of these were admitted, of whom 15 were referred by the admitting physician to the Syncope Management Unit following discharge. The ED physicians referred 24 of the 50 patients discharged from the ED to the Syncope Management Unit. Therefore, the overall sensitivity of the referral pathway for

appropriate outpatient referral to the Syncope Management Unit was 39% (95% confidence interval 32–46).

There was a large increase in the overall number of ED referrals to the Syncope Management Unit after the introduction of the ICP. There were 15 referrals in the 9-month period (January to September 2005) prior to commencing this study and 90 in the same period the following year (500% increase). Of the 72 ED referrals to the Syncope Management Unit during the 22-week study period, 33 were deemed unnecessary [11 were un-complicated first syncope, 4 were transient loss of consciousness due to non-syncopal mechanisms (mainly alcohol intoxication), 13 were falls without loss of consciousness, and 5 were non-specific weakness].

Aetiology of syncope

In the researcher's opinion, 88 (41.1%) of the 214 patients who presented with syncope had a first syncopal episode and no high-risk features associated with their clinical presentation and were therefore reassured and not offered a formal assessment (*Figure 3*).

The remaining 126 (58.9%) had either recurrent syncope (more than one episode, not on the same day as presentation) or first syncope with high-risk features and required further investigation.

Twenty-six (12.3%) of these patients were diagnosed with a cardiac aetiology, and the rest [$n = 100$ (46.7%)] were offered assessment at the Syncope Management Unit, of whom 76 accepted. Sixty (28%) were subsequently diagnosed with neurally mediated syncope, the underlying cause remained unclear in 13 (6.1%) cases and 3 (1.4%) had miscellaneous causes. Twenty-four (11.2%) patients deemed to require further assessment declined the invitation to attend.

Table 1 Causes of transient loss of consciousness

Syncope	$n = 214$ (1.13%)
Epilepsy	$n = 151$ (0.79%)
Alcohol-related	$n = 69$ (0.37%)
Head injury	$n = 51$ (0.27%)
Acute illness	$n = 49$ (0.26%)
Drug-related	$n = 43$ (0.23%)
Hypoglycaemia	$n = 20$ (0.11%)
CVA	$n = 15$ (0.08%)
Blood loss	$n = 12$ (0.06%)
Pseudoseizure	$n = 1$ (0.005%)
	$n = 625$ (3.3%)

CVA, cerebrovascular accident.

Limitations

This was a single-centre study and therefore we cannot conclude that our findings would be similar to other hospitals. Cases were evaluated by a single investigator so bias cannot be excluded. We did not evaluate clinical practice in terms of admission and discharge practice before introduction of the guidelines and therefore cannot be certain that their introduction has altered these parameters. However, the increase in outpatient referral rates is suggestive of a significant change in practice.

Discussion

Our study adds further information on the applicability of the ESC guidelines for syncope in the ED. We have shown that introducing a care pathway based on these guidelines was associated with a significant increase in referral rate to an outpatient Syncope Management Unit. No patients requiring admission were inappropriately discharged, and there was only a small increase in unnecessary referrals to the Syncope Management Unit.

Our admission rate of 51.4% is similar to that of other published studies.[1–10,17] In our study, 21.5% of the patients had indications for admission, which is significantly less than two recent Italian studies in which 38–39% of the syncope patients were considered to require admission.[1,2] This difference may reflect differences in the methodology of the study design. In our study, we reviewed all potential syncope cases presenting to the ED, whereas previous studies only assessed cases brought to their attention by the ED staff.

One hundred and sixty-eight patients could have been safely discharged, but 64 (38.1%) were admitted without an obvious indication. This rate is higher than that reported previously by Bartoletti *et al.* (25.4%).[2] This suggests that when a new pathway and guidelines is introduced to a busy department, physicians prefer to err on the side of caution. This may change as confidence in the guidelines is established.

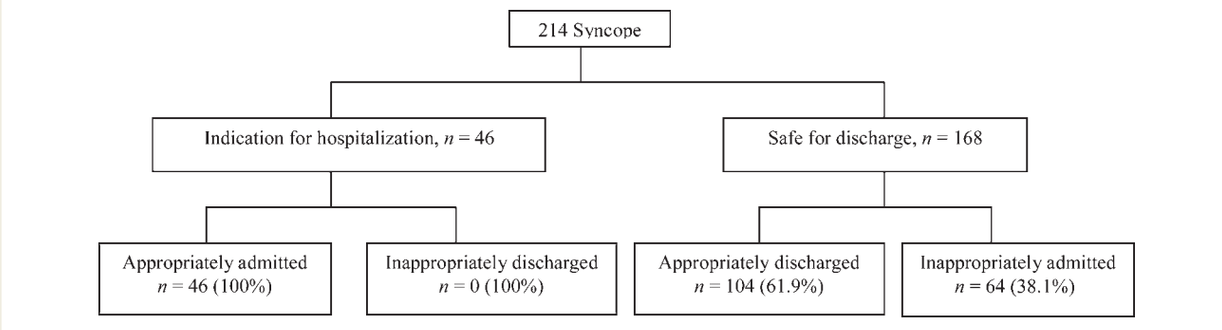

Figure 2 Adherence to European Society of Cardiology indications for admission and discharge.

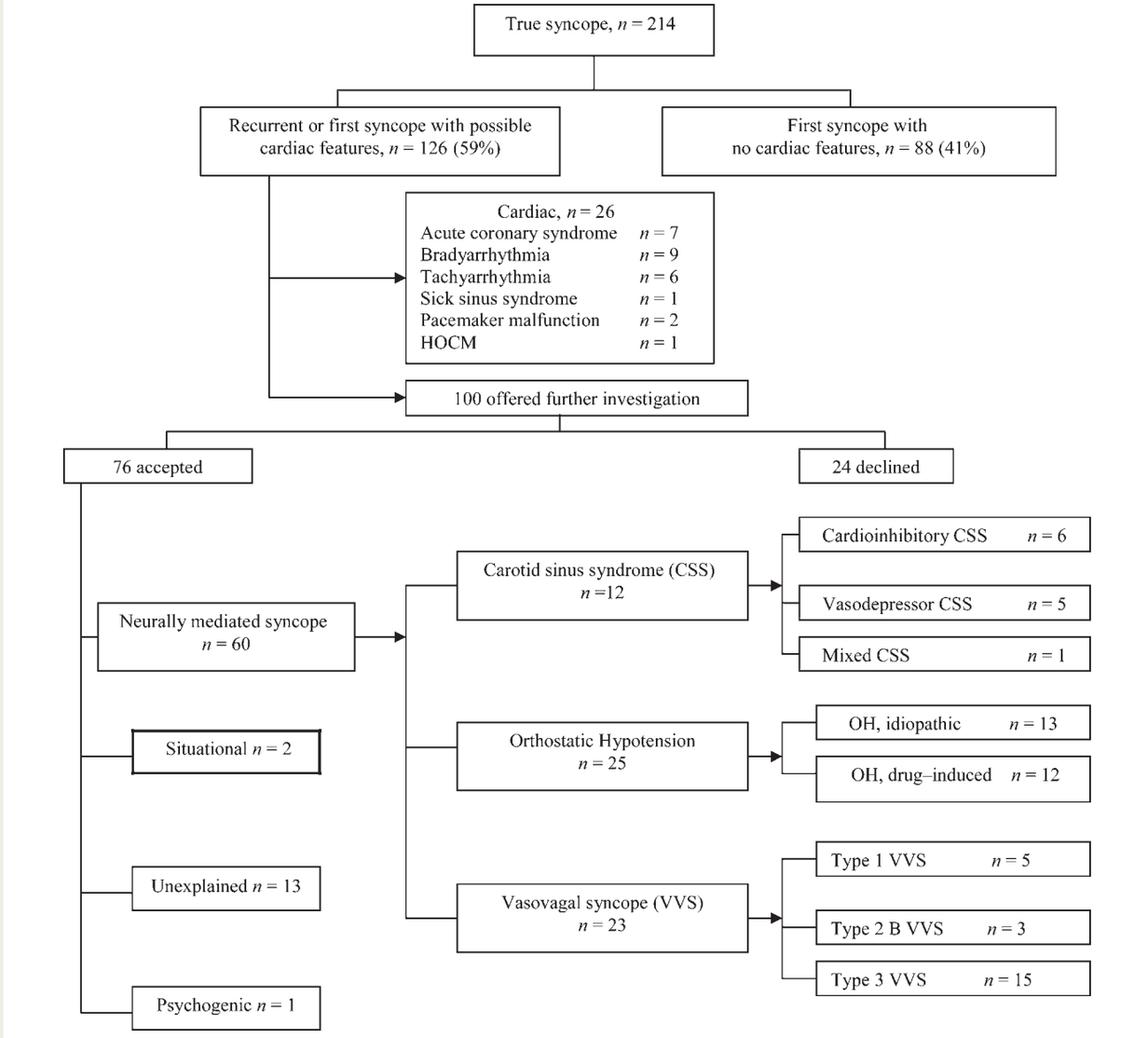

Figure 3 Aetiology of syncope.

Although interventions to reduce the rates of unnecessary hospital admissions have obvious advantages, the possibility of increasing the rate of inappropriate discharges (i.e. missing cases that require admission) must also be considered. Our observation of no inappropriate discharges is reassuring. A recent study of 11 Italian hospitals using a computer-aided care plan for syncope, in which deviations from protocol were discouraged by the software, showed impressive results,[1] and greater use of such technology should be considered.

Other scoring systems such as the OESIL[17] and the San Francisco Syncope Rule[5] were developed to improve sensitivity without increasing unnecessary admissions and without missing those with potential adverse outcomes. However, these have shown variable success.[18] There are limitations to what care pathways can achieve. Other interventions such as a syncope rapid response team that would evaluate each case directly require evaluation. Immediate assessment of syncope cases is likely to be cost-effective only in larger or linked centres where the number of syncope cases justifies such a service.

Our study adds extra information to that already available, in that we also have information on the follow-up arrangements for patients with syncope who were discharged from the ED. Referrals to the outpatient Syncope Management Unit from the ED increased significantly, although only about a third of eligible patients were referred and a small proportion of referrals did not adhere to the care pathway (mainly first syncope with no worrying features and older individuals with falls without syncope). The additional workload associated with unnecessary referrals was however negligible and corresponded to approximately one extra case per week.

Our ultimate diagnoses were similar to that of other series. Previous studies have reported diagnostic rates for cardiac syncope ranging

from 6 to 33%[1,4,6,19] and for neurally mediated syncope ranging from 11 to 66%.[1,4,6,19] Our findings of 12.3 and 28% are within these ranges.

In conclusion, this study shows that a care pathway based on ESC guidelines can be introduced safely into an ED setting. There were clear advantages identified with a large increase in appropriate outpatient referral to the Syncope Management Unit. All cardiac patients were identified and admitted appropriately. Further research into initiatives to reduce inappropriate admission of patients with syncope would be important.

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Conflict of interest: none declared.

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Appendix

ST JAMES'S HOSPITAL

Syncope Assessment

Medical Integrated Care Plan

Name: _____	Next of kin: _____
Address: _____	NOK Tel No.: _____
_____	Date seen in Emergency Department: _____
Telephone number: _____	Patient informed of referral: Yes ☐ No ☐
M.R.N._____ D.O.B._____	Consultant(s) _____

Syncope Assessment Unit Operational Overview

The aim of the care plan is:
To facilitate same day discharge from the Emergency Department (ED) of a selected group of patients presenting with syncope. Early (within 2 weeks) comprehensive assessment will be offered at the Syncope Unit.

Patients with suspected cardiac or acute medical causes for syncope will be evaluated in the Emergency Department and referred for cardiology/medical assessment if appropriate.

Syncope is a transient self-limited loss of consciousness, usually resulting in falling. The onset of syncope is relatively rapid, and the subsequent recovery is spontaneous, complete, and usually prompt.

To arrange a Syncope Unit appointment:
This completed form, together with a copy of the 12-lead ECG should be left with Reception in the Emergency Department

Syncope Assessment Unit: Main Hospital, near ED
Obs. ward & Top Floor Hospital 4 (secretary)
To discuss a case with a doctor in the unit ring:

EXT: 4105/4106/2370

Name: MRN: Date:

A. Consider same day discharge and referral for early Syncope Unit assessment in patients >16 years of age presenting with:
   1. First syncope with the following complicating factors
      - Significant injury sustained
      - Preceding history of recurrent pre-syncopal events
      - Occurred while driving

      (uncomplicated first syncopal presentations can generally be discharged and referred to their GP for follow-up)
   2. Recurrent syncope

   Ensure that all patients fulfil appropriate inclusion criteria and have no exclusion criteria

Inclusion criteria	Yes	No
Patients presenting with a transient self-limited loss of consciousness, the onset of which was relatively rapid, and the subsequent recovery spontaneous, complete, and prompt.		

Exclusion criteria		Yes	No
1.	Acutely unwell requiring admission • Collapse secondary to acute illness, e.g. pulmonary embolus/sepsis • Acute MI or arrhythmia • Persisting focal neurological deficit • Very frequent recurrent episodes		
2.	Features suggestive of cardiac syncope • Presence of definite structural heart disease (hypertrophic obstructive cardiomyopathy/aortic stenosis/significantly reduced ejection fraction) • ECG abnormalities suggestive of arrhythmic syncope (*Table 1*) • Murmur suggestive of aortic stenosis/hypertrophic obstructive cardiomyopathy • Syncope occurring during exercise • Family history of sudden death • Syncope associated with palpitations • Syncope while supine		
3.	Features suggestive of epilepsy • Tonic clonic activity persisting for >15 s, from onset of the attack • Prolonged unconsciousness for more than a few minutes • Prolonged recovery with disorientation and drowsiness		

B. Consider medical referral if any exclusion criteria present

C. Consider Cardiology referral if any ECG changes suggestive of cardiac arrhythmia (see next page)

Name: MRN: Date:

Table 1. ECG changes suggestive of cardiac arrhythmia	Yes	No
1. Bifascicular block (either left BBB or right BBB, combined with left anterior or left posterior hemiblock)		
2. Other intraventricular conduction abnormalities (QRS duration > 0.12 s)		
3. Mobitz i and ii second-degree atrioventricular block		
4. Sinus bradycardia (< 50,bpm), SA block or sinus pause > 3s in absence of precipitating medications		
5. Complete heart block		
6. Pre-excited QRS complexes		
7. Prolonged QT interval (QTc > 0.44 s)		
8. Right BBB pattern with ST elevation in leads V1 – V3 (Brugada Syndrome)		
9. Q waves suggesting MI		

History of presenting complaint
Include: activity and position immediately prior to the event/associated symptoms/ potential precipitating factors for vasovagal syncope/History of similar events/ witness account

Name: MRN: Date:

Medications	

Allergies		

Past medical history	

Family history of sudden death
Yes: seek cardiology opinion
No:

Name: MRN: Date:

Clinical examination			
Temp:	Heart rate:	BP lying:	BP standing (at 1 and 3 min)
Cardiovascular *			
Neurological			
Respiratory			
Gastrointestinal			
*	1. Murmur heard: Yes ☐ No ☐ Details if yes: 2. Carotid bruit heard: Yes ☐ No ☐ Details if yes: 3. Evidence of heart failure: Yes ☐ No ☐ Details if yes:		

Blood investigations performed	Yes	No	Result
FBC			
RP			
LP			
Glucose			
Other			

Radiology investigations performed (list the investigation and result)

Name: MRN: Date:

Outcome of ED assessment:

Patient discharged to GP	Yes ☐	No ☐
Patient referred to Syncope Unit for assessment	Yes ☐	No ☐
Patient referred for Medical opinion	Yes ☐	No ☐
Patient referred for Cardiology opinion	Yes ☐	No ☐
Patient admitted	Yes ☐	No ☐

Signature and contact number : Date:

To arrange a Syncope Unit appointment:
This completed form, together with a copy of the 12–lead ECG should be left with Reception in the Emergency Department

Please inform the patient they will be contacted by the Syncope Unit staff

Syncope Assessment Unit, Top Floor Hospital 4

To discuss a case: Contact EXT: 4105 / 4106 / 2370

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