Abstract

AIMS:
The aim of this study was to determine the long-term effects and determinants of success of cardiac pacing in patients affected by reflex syncope enrolled in the Syncope Unit Project 2 (SUP 2) study. Initial results have validated the effectiveness of a standardized guideline-based algorithm which can be used in clinical practice in order to select suitable candidates for cardiac pacing.

METHODS AND RESULTS:
In this prospective, multicentre, observational study, patients aged >40 years, affected by severe unpredictable recurrent reflex syncope, underwent carotid sinus massage (CSM), followed by tilt testing (TT) if CSM was negative, followed by implantation of an implantable loop recorder (ILR) if TT was negative. Those who had an asystolic response to one of these tests received a dual-chamber pacemaker. Of 281 patients who met the inclusion criteria, 137 (49%) received a pacemaker and were followed up for a mean of 26 ± 11 months: syncope recurred in 25 (18%) of them. At 3 years, the actuarial syncope recurrence rate was 20% [95% confidence interval (CI) 12-30] and was significantly lower than in 142 patients who did not receive a pacemaker and were observed by means of an ILR [43% (95% CI 29-57), P = 0.01]. The 3-year recurrence rate was not different among 78 CSM+, 38 TT+, and 21 ILR+ patients, whereas it was lower in 20 patients with negative TT [5% (95% CI 0-15)] than in 61 patients with positive TT [24% (95% CI 10-38)].

CONCLUSION:
The benefit of cardiac pacing is maintained at 3 years, irrespective of the index diagnostic test, and is maximum in patients with negative TT.


A long-term follow-up of patients with prolonged asystole of greater than 15s on head-up tilt testing.


Abstract

BACKGROUND:
Head-up tilt (HUT) is used for diagnosis of vasovagal syncope (VVS), and can provoke cardioinhibition. VVS is usually considered benign, however pacemaker insertion may be indicated in some patients. We sought to characterize the long-term outcomes of patients with prolonged asystole (>15s) on HUT.

METHODS:

We conducted a retrospective study on patients with asystole >15s on HUT identified from 5133 patients who were investigated between 1998 and 2012 at our institution. Patients were mailed questionnaires or telephoned to ascertain outcomes. Where contact was not possible, the patients' general practitioners were contacted to request up-to-date information.

RESULTS:

A total of 26 patients with a mean age of 45±18 years and a mean duration of asystole on HUT of 26±7s were successfully followed up from a total of 77 patients identified. The follow-up duration was 99±39 months. Six patients had undergone pacemaker (PPM) implantation. Of the patients without PPM, 16 reported spontaneously improved symptoms. Ten patients sustained injury prior to HUT compared with one after HUT, when a clear diagnosis was made and management advice was given. There were no major injuries or deaths after HUT. The 6 patients with PPMs had a mean age of 60±16 (67% male) at HUT. Four patients had no further syncope after PPM and two demonstrated improvement but still experienced recurrent syncope.

CONCLUSIONS:

Prolonged asystole (>15s) on tilt does not necessarily predict adverse outcomes with most patients improving spontaneously over the long-term. Pacemaker insertion in selected patients may reduce syncope recurrence but does not always abolish it.

Europace.2015 Oct 29. [Epub ahead of print]

External prolonged electrocardiogram monitoring in unexplained syncope and palpitations: results of the SYNARR-Flash study.

Locati ET1, Moya A2, Oliveira M3, Tanner H4, Willems R5, Lunati M6, Brignole M7.

Abstract

AIMS:

SYNARR-Flash study (Monitoring of SYNcopes and/or sustained palpitations of suspected ARRhythmic origin) is an international, multicentre, observational, prospective trial designed to evaluate the role of external 4-week electrocardiogram (ECG) monitoring in clinical work-up of unexplained syncope and/or sustained palpitations of suspected arrhythmic origin.

METHODS AND RESULTS:
Consecutive patients were enrolled within 1 month after unexplained syncope or palpitations (index event) after being discharged from emergency room or hospitalization without a conclusive diagnosis. A 4-week ECG monitoring was obtained by external high-capacity loop recorder (SpiderFlash-T®, Sorin) storing patient-activated and auto-triggered tracings. Diagnostic monitorings included (i) conclusive events with reoccurrence of syncope or palpitation with concomitant ECG recording (with/without arrhythmias) and (ii) events with asymptomatic predefined significant arrhythmias (sustained supraventricular or ventricular tachycardia, advanced atrio-ventricular block, sinus bradycardia <30 b.p.m., pauses >6 s). SYNARR-Flash study enrolled 395 patients (57.7% females, 56.9 ± 18.7 years, 28.1% with syncope, and 71.9% with palpitations) from 10 European centres. For syncope, the 4-week diagnostic yield was 24.5%, and predictors of diagnostic events were early start of recording (0-15 vs. >15 days after index event) (OR 6.2, 95% CI 1.3-29.6, P = 0.021) and previous history of supraventricular arrhythmias (OR 3.6, 95% CI 1.4-9.7, P = 0.018). For palpitations, the 4-week diagnostic yield was 71.6% and predictors of diagnostic events were history of recurrent palpitations (P < 0.001) and early start of recording (P = 0.001).

CONCLUSION:

The 4-week external ECG monitoring can be considered as first-line tool in the diagnostic work-up of syncope and palpitation. Early recorder use, history of supraventricular arrhythmia, and frequent previous events increased the likelihood of diagnostic events during the 4-week external ECG monitoring.

Europace.2015 Oct 12. [Epub ahead of print]

The benefit of a remotely monitored implantable loop recorder as a first line investigation in unexplained syncope: the EaSyAS II trial.

Sulke N1, Sugihara C2, Hong P2, Patel N2, Freemantle N3.

Abstract

AIMS:

This prospective randomized controlled study evaluated the first-line use of a novel remotely monitored implantable loop recorder (ILR) in the initial investigation of unexplained syncope, and compared this to conventional therapy and a dedicated Syncope Clinic (SC).

METHODS AND RESULTS:

A total of 246 patients (mean age 70.3 years) were randomly allocated to conventional management, SC alone, ILR alone, or SC + ILR. Median follow-up was 20 months (IQR 15-25 months). Time to electrocardiogram (ECG) diagnosis was significantly shorter with ILR alone vs. conventional [hazard ratio (HR) 35.5, P = 0.0004] and with SC vs. conventional (HR 25.6, P = 0.002). Seventy-four per cent of first syncopal events documented in the SC groups occurred during provocative tilt testing. Twenty-two per cent of patients who received an ILR were found to have a bradycardia indication for permanent pacing, compared with 3% of patients who did not. Overall,
more investigative tests were undertaken in the conventional group than in any other. Only patients who received an ILR had a significant increase in time to second syncope (P = 0.02), suggesting successful diagnosis and management of treatable causes of syncope.

CONCLUSIONS:

Implantable loop recorder monitoring achieved a more rapid diagnosis in unexplained syncope than usual care. Conventional management of syncope failed to achieve an ECG diagnosis despite a large number of investigative tests. Syncope Clinic and provocative tilt testing delivered a rapid ECG diagnosis, but did not prevent recurrent syncope. Implantable loop recorders offered rapid diagnosis, increased the likelihood of syncope being reported, demonstrated a high rate of intermittent bradycardia requiring pacing, and reduced recurrent syncope.


Simplified Cardioneuroablation in the Treatment of Reflex Syncope, Functional AV Block, and Sinus Node Dysfunction.

Aksu T1, Golcuk E1, Yalin K2, Guler TE1, Erden I1.

Abstract

BACKGROUND:

Cardio neuroablation (CNA) is a lesser-known technique for management of patients with excessive vagal activation on the basis of radiofrequency catheter ablation (RFCA) of the areas related to the three main autonomic ganglia around the heart. We investigated the effectiveness of selective and/or stepwise RFCA of these areas via right atrium (RA) and/or left atrium (LA) in the patients with recurrent syncope due to excessive vagal activity.

METHODS:

Twenty-two patients presenting symptomatic functional bradyarrhythmias, neurally mediated reflex syncope (NMS), symptomatic atrioventricular (AV) block, and symptomatic sinus node dysfunction (SND; number = 8, 7, 7, respectively) were enrolled. The three main paracardiac ganglia were targeted via RA and LA in the patients with NMS and SND. The procedure was performed via RA in the patients with AV block, followed by RFCA of all ganglia via LA, if AV conduction disorder persists. The sites showing fragmented potentials were identified by electrical mapping and verified by high-frequency stimulation and ablated until atrial electrical potential was completely eliminated (<0.1 mV).

RESULTS:

The patients with NMS and SND were free from new syncopal episode at a mean 12.3 ± 3.4 months and 9.5 ± 3.1 months follow-up, respectively. Ablation from RA was successful in six of seven patients with AV block. Despite the increased heart rate, the resolution of AV block after the RFCA could not be achieved in one patient who had partial resolution with atropine infusion on admission.
CONCLUSION:

CNA may be an alternative and safe strategy to reduce NMS episodes, and to treat functional AV block and symptomatic SND, especially in young patients.


National cost savings from observation unit management of syncope.

Baugh CW1, Liang LJ2, Probst MA3, Sun BC4.

Abstract

OBJECTIVES:

Syncope is a frequent emergency department (ED) presenting complaint and results in a disproportionate rate of hospitalization with variable management strategies. The objective was to estimate the annual national cost savings, reduction in inpatient hospitalizations, and reduction in hospital bed hours from implementation of protocolized care in an observation unit.

METHODS:

We created a Monte Carlo simulation by building a model that reflects current clinical practice in the United States and uses inputs gathered from the most recent available peer-reviewed literature and national survey data. ED visit volume was adjusted to reflect observation unit availability and the portion of observation visits requiring subsequent inpatient care. A recent multicenter randomized controlled study informed the cost savings and length of stay reduction per observation unit visit model inputs. The study population included patients aged 50 years and older with syncope deemed at intermediate risk for serious 30-day cardiovascular outcomes.

RESULTS:

The mean (±SD) annual cost savings was estimated to be $108 million (±$89 million) from avoiding 235,000 (±13,900) inpatient admissions, resulting in 4,297,000 (±1,242,000) fewer hospital bed hours.

CONCLUSIONS:

The potential national cost savings for managing selected patients with syncope in a dedicated observation unit is substantial. Syncope is one of many conditions suitable for care in an observation unit as an alternative to an inpatient setting. As pressure to decrease hospital length of stay and bill short-stay hospitalizations as observation increases, syncope illustrates the value of observation unit care.
Adenosine and Clinical Forms of Neurally-Mediated Syncope.

Syncope Unit: rationale and requirement--the European Heart Rhythm Association position statement endorsed by the Heart Rhythm Society.

Clinical Predictors of Pacemaker Implantation in Patients with Syncope Receiving Implantable Loop Recorder with or without ECG Conduction Abnormalities.
Ahmed N1, Frontera A1, Carpenter A1, Cataldo S1, Connolly GM1, Fasiolo M2, Cripps T1, Thomas G1, Diab I1, Duncan ER1.

Abstract
BACKGROUND:
Implantable loop recorders (ILR) allow prolonged cardiac rhythm monitoring and improved diagnostic yield in syncope patients. Predictive factors for pacemaker (PM) implantation in the ILR population with unexplained syncope have not been adequately investigated. In this single center, retrospective, observational study we investigated factors that predict PM implantation in this population.

METHODS:
We retrospectively analyzed our ILR database of patients aged over 18 years who underwent ILR implantation for unexplained syncope between January 2009 and June 2013. Patient case notes were examined for demographics, history, electrocardiogram (ECG) abnormalities, investigations, and events during follow-up. The primary end-point was the detection of a symptomatic or asymptomatic bradycardia requiring PM implantation.

RESULTS:
During a period of 4.5 years, 200 patients were implanted with ILR for unexplained syncope, of whom n = 33 (16.5%) had clinically significant bradycardia requiring PM implantation. After multivariable analysis, history of injury secondary to syncope was found to be the strongest independent predictor for PM implantation (odds ratio [OR]: 9.1; P < 0.001; 95% confidence interval [CI]: (3.26-26.81). Other significant predictors included female sex, PR interval > 200msec, and age >75 years. In patients without conduction abnormalities on the ECG, history of injury secondary to syncope was found to be the strongest independent predictor for PM implantation (OR: 8.16; P = 0.00027; 95% [CI]: (2.67-26.27).

CONCLUSIONS:

A history of injury secondary to syncope and female sex were independent predictive factors for bradycardia necessitating PM implantation in patients receiving an ILR for syncope with or without ECG conduction abnormalities.


National trends in resource utilization associated with ED visits for syncope.

Probst MA1, Kanzaria HK2, Gbedemah M3, Richardson LD4, Sun BC5.

Abstract

BACKGROUND:

Over the last 20 years, numerous research articles and clinical guidelines aimed at optimizing resource utilization for emergency department (ED) patients presenting with syncope have been published.

HYPOTHESIS:

We hypothesized that there would be temporal trends in syncope-related ED visits and associated trends in imaging, hospital admissions, and diagnostic frequencies.

METHODS:

The ED component of National Hospital Ambulatory Medical Care Survey was analyzed from 2001 through 2010, comprising more than 358000 visits (representing an estimated 1.18 billion visits nationally). We selected ED visits with a reason for visit of syncope or fainting and calculated nationally representative weighted estimates for prevalence of such visits and associated rates of advanced imaging utilization and admission. For admitted patients from 2005 to 2010, the most frequent hospital discharge diagnoses were tabulated.

RESULTS:

During the study period, there were more than 3500 actual ED visits (representing 11.9 million visits nationally) related to syncope, representing roughly 1% of all ED visits. Admission rates for
syncope patients ranged from 27% to 35% and showed no significant downward trend (P = .1). Advanced imaging rates increased from about 21% to 45% and showed a significant upward trend (P < .001). For admitted patients, the most common hospital discharge diagnosis was the symptomatic diagnosis of "syncope and collapse" (36.4%).

CONCLUSIONS:

Despite substantial efforts by medical researchers and professional societies, resource utilization associated with ED visits for syncope appears to have actually increased. There have been no apparent improvements in diagnostic yield for admissions. Novel strategies may be needed to change practice patterns for such patients.

Prognostic Value of a Very Prolonged Asystole during Head-Up Tilt Test.
Carvalho MS1, Reis Santos K2, Carmo P1,2, Cavaco D1,2, Parreira L2, Morgado F1, Adragão P1,2.

Abstract

BACKGROUND:

Clinical significance and prognosis of a cardioinhibitory response to head-up tilt (HUT) test with a very prolonged asystole (≥30 seconds) is poorly studied. Our aim was to evaluate the treatment (including pacemaker implantation) and prognosis (syncope recurrence, syncope-related trauma, and overall mortality) of patients with a very prolonged asystole on a HUT test.

METHODS AND RESULTS:

A retrospective study was conducted in two centers between January 2003 and December 2013 and included a total of 2,263 consecutive HUT tests (sensitized with isosorbide dinitrate) performed in 2,247 patients with syncope of unknown etiology. Cardioinhibitory response with asystole was observed in 149 (6.6%) of these tests (44.3% women, mean age 37 ± 18 years old, 16.1% in the nonpharmacological phase), with a median duration of asystole of 10 (6-19) seconds. Very prolonged asystole (≥30 seconds) was documented in 11 (0.5%) patients (45% women; mean age 40 ± 19 years; only one in the nonpharmacological phase, 9 minutes after HUT). The longest pause lasted 63 seconds. In all patients, avoidance of triggering factors and physical counterpressure maneuvers were recommended. Telephone follow-up was performed: in one patient, fludrocortisone was started; tilt training was conducted in one patient and none received a pacemaker. After a median follow-up of 42 (30-76) months, four patients (36%) had syncopal recurrences, one patient had a syncope-related injury (scalp laceration), and no patient died.

Role of yoga as an adjunctive therapy in patients with neurocardiogenic syncope: a pilot study.

Gunda S1, Kanmanthareddy A, Atkins D, Bommana S, Pimentel R, Drisko J, Dibiase L, Behtiy S, Hao S, Natale A, Lakkireddy D.

Abstract

BACKGROUND:

Neurocardiogenic syncope (NCS) is a common clinical condition characterized by abrupt cardiovascular autonomic changes resulting in syncope. This is a recurring condition with mixed results from current strategies of treatment.

METHODS:

Subjects with a diagnosis of NCS were screened and enrolled. All the participants were given a DVD containing yoga videos and were instructed to practice yoga therapy for 60 min, three times a week for 3 consecutive months. Syncope functional status questionnaire score (SFSQS) was administered at the beginning and the end of the study. The subjects were followed for 3 months and underwent repeat tilt table testing at the end of the study.

RESULTS:

Of the 60 patients screened, 44 subjects were enrolled, 21 in the intervention group and 23 in the control group. Most of the participants were females, and the mean age was 21 ± 3 years. In the intervention group, who finished the yoga regimen, there was a statistically significant improvement from control phase to the intervention phase, in number of episodes of syncope (4 ± 1 vs 1.3 ± 0.7, p < 0.001) and presyncope (4.7 ± 1.5 vs 1.5 ± 0.5, p < 0.001). The mean SFSQS also decreased from 67 ± 7.8 to 29.8 ± 4.6 (p < 0.001). All subjects had positive head up tilt table (HUTT) study at the time of enrollment compared to only six patients at the completion of intervention phase (10/100 vs 6/28 %, p < 0.0001).

CONCLUSION:

Yoga therapy can potentially improve the symptoms of presyncope and syncope in young female patients with NCS.


Syncope in the Pediatric Emergency Department - Can We Predict Cardiac Disease Based on History Alone?

Hurst D1, Hirsh DA2, Oster ME3, Ehrlich A1, Campbell R1, Mahle WT1, Mallory M2, Phelps H1.

Abstract

BACKGROUND:
The American Heart Association recommends a "meticulous history" when evaluating patients with an initial episode of syncope. However, little is known about which historical features are most helpful in identifying children with undiagnosed cardiac syncope.

OBJECTIVES:

Our objectives were 1) to describe the cardiac disease burden in Emergency Department (ED) syncope presentations, and 2) to identify which historical features are associated with a cardiac diagnosis.

METHODS:

Using syncope presentations in our ED between May 1, 2009 and February 28, 2013, we 1) performed a cross-sectional study describing the burden of cardiac syncope, and 2) determined the sensitivity and specificity of four historical features identifying cardiac syncope.

RESULTS:

Of 3445 patients, 44.5% were male presenting at 11.5 ± 4.5 years of age. Of patients with a cardiac diagnosis (68, ~2%), only 3 (0.09%) were noted to have a previously undiagnosed cardiac cause of syncope: 2 with supraventricular tachycardia and 1 with myocarditis. Among the three cases and 100 randomly selected controls, the respective sensitivity and specificity of the historical features were 67% and 100% for syncope with exercise, 100% and 98% for syncope preceded by palpitations, and 67% and 70% for syncope without prodrome. The presence of at least two features yielded a sensitivity of 100% and specificity of 100%.

CONCLUSIONS:

Our study, which represents the largest published series of pediatric syncope presenting to the ED, confirms that newly diagnosed cardiac causes of syncope are rare. Using a few specific historical features on initial interview can help guide further work-up more precisely.


Costs of unstructured investigation of unexplained syncope: insights from a micro-costing analysis of the observational PICTURE registry.

Edvardsson N1, Wolff C2, Tsintzos S3, Rieger G4, Linker NJ5.

Abstract

AIMS:

The observational PICTURE (Place of Reveal In the Care pathway and Treatment of patients with Unexplained Recurrent Syncope) registry enrolled 570 patients with unexplained syncope, documented their care pathway and the various tests they underwent before the insertion of an
implantable loop recorder (ILR). The aims were to describe the extent and cost of diagnostic tests performed before the implant.

METHODS AND RESULTS:

Actual costs of 17 predefined diagnostic tests were characterized based on a combination of data from PICTURE and a micro-costing study performed at a medium-sized UK university hospital in the UK. The median cost of diagnostic tests per patient was £1114 (95% CI £995-£1233). As many patients received more than the median number of tests, the mean expenditure per patient was higher with £1613 (95% CI £1494-£1732), and for 10% of the patients the cost exceeded £3539. Tests were frequently repeated, and early use of specific and expensive tests was common. In the 12% of patients with types of tests entirely within the recommendations for an initial evaluation before ILR implant, the mean cost was £710.

CONCLUSION:

Important opportunities to reduce test-related costs before an ILR implant were identified, e.g. by more appropriate use of tests recommended in the initial evaluation, by decreasing repetition of tests, and by avoiding early use of specialized and expensive tests. A structured multidisciplinary approach would be the best model to achieve an optimal outcome.


AF is associated with self-reported syncope and falls in a general population cohort.

Jansen S1, Frewen J2, Finucane C3, de Rooij SE1, van der Velde N1, Kenny RA2.

Abstract

BACKGROUND:

Syncope is an important, but underestimated clinical problem in older persons. It is often overlooked in clinical practice or mistaken for falls. Atrial fibrillation (AF) is the most common cardiac arrhythmia, but little evidence exists regarding the association between AF, falls and syncope in the general population.

METHODS:

Cross-sectional analyses within a population sample of people aged 50+, taken from The Irish Longitudinal Study on Ageing. Ten-minute electrocardiogram recordings (n = 4,885) were analysed to detect AF. Syncope (self-reported fainting or blackouts) and falls in the past year, co-morbidities, health measures and medications were gathered through computer-aided personal interviews. Multivariable logistic regression was performed to study associations between AF, falls and syncope.

RESULTS:
mean age was 62 years (range: 50-91), 54% were female. Prevalence of AF was 3%, increasing to 8% in participants aged 75+. Of participants, 5% (n = 223) reported syncope and 20% (n = 972) reported falls. After adjustment for confounders, AF was significantly associated with fainty and blackouts (odds ratio (OR) 2.0 [95% confidence interval (CI) 1.0-3.9]). After stratification by age category, we found that this association was strongest and only significant in participants aged 50-64 years (OR 4.4 [1.5-12.6]). Stratified for age group, AF was significantly associated with falls in participants aged 65-74 years (OR 2.0 [1.0-4.1]).

CONCLUSIONS:

adults aged 50+ with self-reported syncope and adults aged 65-74 years with falls are twice as likely to have AF at physical examination. These associations are independent of stroke, cardiovascular and psychotropic drugs and other confounders. Further longitudinal studies are needed to explore this association and potential causality further.

Echocardiography. 2015 Sep;32(9):1352-8.

Prognostic Value of Stress Echocardiography in Patients Presenting with Syncope.

Po JR1, Chaudhry FA1, Balasundaram K1, Shami W1, Penesetti S1, Kommaraju KK1, Mohareb S1, Patel S1, Agarwal V1, Argulian E1.

Abstract

BACKGROUND:

Evaluation for ischemia is appropriate in patients at risk for or with a history of coronary artery disease presenting with syncope. The aim of this study is to determine the prognostic value of stress echocardiography in patients presenting with syncope.

METHODS:

We examined our database of all patients undergoing stress echocardiography at our institution. Patients referred due to syncope were grouped as high risk based on any of the following: (1) known history of coronary artery disease, (2) left ventricular ejection fraction <50%, (3) moderate or severe mitral or aortic valve regurgitation, and (4) moderate mitral or aortic valve stenosis. The main outcomes were the presence of ischemia on stress imaging and all-cause mortality using the social security death index.

RESULTS:

A total of 225 patients were identified; mean age was 64.3 ± 14.5 years, the mean follow-up duration was 29.2 ± 13.8 months. There were 163 patients in the low-risk group and 62 patients in the high-risk group. On imaging, 7% of the overall cohort had ischemia. The low-risk group had 5 (3%) patients with ischemia and the high-risk group had 10 patients (16%) with ischemia (P < 0.01). The mortality rate was significantly higher in the high-risk group (3.99%/year vs. 1.02%/year; P = 0.02); this difference was not affected by the presence of ischemia.
CONCLUSIONS:

High-risk patients with syncope as defined by appropriateness criteria and existing evidence carry a higher risk of ischemia and all-cause mortality. The presence of ischemia may not be predictive of long-term outcome in this group.

Intern Emerg Med. 2015 Oct 23. [Epub ahead of print]

Prognostic value of cardiac biomarkers in the risk stratification of syncope: a systematic review.

Thiruganasambandamoorthy V1,2,3, Ramaekers R4,5, Rahman MO4,6, Stiell IG7,4,5, Sikora L8, Kelly SL9,10, Christ M11, Claret PG4,12, Reed MJ9,10.

Abstract

The role of cardiac biomarkers in risk stratification of syncope is unclear. We undertook a systematic review to assess their predictive value for short-term major adverse cardiovascular events (MACE). We conducted a systematic review using MEDLINE, EMBASE, DARE and Cochrane databases from inception to July 2014. We included studies involving adult syncope patients that evaluated cardiac biomarker levels for risk stratification during acute management and excluded case reports, reviews and studies involving children. Primary outcome (MACE) included death, cardiopulmonary resuscitation, myocardial infarction (MI), structural heart disease, pulmonary embolism, significant hemorrhage or cardiac procedural interventions. Secondary outcome analysis assessed for prediction of MI, cardiac syncope and death. Two reviewers extracted patient-level data based on the cut-off reported. Pooled sensitivities and specificities were calculated using patient-level data. A total of 1862 articles were identified, and 11 studies with 4246 patients were included. Studies evaluated 3 biomarkers: contemporary troponin (2693 patients), natriuretic peptides (1353 patients) and high-sensitive troponin (819 patients). The pooled sensitivities and specificities for MACE were: contemporary troponin 0.29 (95% CI 0.24, 0.34) and 0.88 (95% CI 0.86, 0.89); natriuretic peptides 0.77 (95% CI 0.69, 0.85) and 0.73 (95% CI 0.70, 0.76); high-sensitive troponin 0.74 (95% CI 0.65, 0.83) and 0.65 (95% CI 0.62, 0.69), respectively. Natriuretic peptides and high-sensitive troponin showed good diagnostic characteristics for both primary and secondary outcomes. Natriuretic peptides and high-sensitive troponin might be useful in risk stratification.
Mapping clinical journeys of Asian patients presenting to the Emergency Department with syncope: Strict adoption of international guidelines does not reduce hospitalisations.

Kojodjojo P, Boey E, Elangovan A, Chen X, Tan Y, Singh D, Yeo WT, Lim TW, Seow SC, Sim TB.

Abstract

BACKGROUND:

Limited data exists about management of syncope in Asia. The American College of Emergency Physicians (ACEP) and European Society of Cardiology (ESC) guidelines have defined the high-risk syncope patient. This study aims to determine the effectiveness of managing syncope in an Asian healthcare system and whether strict adherence of international guidelines would reduce hospitalizations.

METHODS:

Patients attending the Emergency Department of a Singaporean tertiary hospital with syncope were identified. Clinical journeys of all patients were meticulously mapped by interrogation of a comprehensive electronic medical record system and linkages with national datasets. Primary endpoint was hospitalization. Secondary endpoints were recurrent syncope within 1 year and all-cause mortality. Expected admission rates based on application of ACEP/ESC guidelines were calculated.

RESULTS:

638 patients (43.8±22.4 years, 49.0% male) presented with syncope. 48.9% were hospitalized for 2.9±3.2 days. Yields of common investigations ranged from 0 to 11.5% and no diagnosis was reached in 51.5% of patients. Diuretics use (HR 5.1, p=0.01) and prior hospitalization for syncope (HR 6.9, p<0.01) predicted recurrent syncope. Over 2.8 SD 0.3 years of follow-up, 40 deaths occurred. 24 patients who died within 12 months of presentation were admitted or had a firm diagnosis upon discharge. Application of guidelines did not significantly reduce hospitalisations, with limited agreement which patients warrant admission. (Actual 376, ACEP 354, ESC 391 admissions, p=NS).

CONCLUSIONS:

Unstructured management of syncope results in nearly half of patients being admitted and substantial healthcare expenditures, yet with limited diagnostic yield. Strict adoption of ACEP or ESC guidelines does not reduce admissions.
Abstract

BACKGROUND AND OBJECTIVE:

Syncope is a common condition and complex to diagnose. The yield of the 24h-Holter ECG in this context has not been clearly defined. The aim of this study was to evaluate its diagnostic and prognostic capacity in these patients.

PATIENTS AND METHOD:

Retrospective study of 6,006 consecutive patients sent to our unit for 24h-Holter ECG monitoring for syncope. We registered the diagnostic findings and abnormal findings potentially related to an arrhythmic cause of syncope. The prognostic endpoint was a combination of death or the need for device implantation (pacemaker or defibrillator) within one year.

RESULTS:

242 patients (4%) presented diagnostic findings and 472 (7.9%) had some abnormal findings. In 328 cases device implantation was necessary within one year, but up to 66% of these patients did not have any relevant findings on the Holter monitoring. A total of 564 patients presented the combined event, including 36.8% of patients with diagnostic findings and 8.2% without them.

CONCLUSIONS:

24h-Holter ECG monitoring presents a limited diagnostic and prognostic yield in unselected patients with syncope.

Acad Emerg Med. 2016 May 14. [Epub ahead of print]

Short term prognosis and current management of syncopal patients at intermediate-risk. Results from the IRiS (Intermediate-Risk Syncope) Study.

Numeroso F, Mossini G, Giovanelli M, Lippi G, Cervellin G.

Abstract

OBJECTIVES:

Despite guidelines, admission rates and expenditures for syncope remain high. This may be caused by an imprecise definition of cardiovascular disease considered at risk and an overestimation of the role of comorbidities and advanced age. In a cohort of patients with undetermined syncope, we prospectively compared the short-term prognosis of patients at intermediate risk (i.e. with stable heart diseases or comorbidities, of any age) vs. those at high risk for cardiogenic syncope and identified factors associated with serious events. Secondarily, we analyzed the current management of intermediate-risk patients.

METHODS:
In a cohort of patients with undetermined syncope, we analyzed personal data, the presence of stable heart
diseases or comorbidities, destination, length of hospitalization, incidence of serious events at 30 days and
costs.

RESULTS:

In a six-month period, 347 patients (185M and 162F, age 72.8) with undetermined syncope were enrolled,
250 at intermediate risk and 97 at high risk. Intermediate-risk patients were younger, with less frequent
comorbidities and with a drastically lower incidence of serious events (0.8% vs. 27.8%, p < 0.001). Risk
factors for cardiogenic syncope were the unique variable associated with serious events. Intermediate-risk
patients were mostly admitted (62.8%) in an ordinary ward or into an Emergency Department Observation
Unit; in the case of ordinary admission we observed a mean prolonged hospitalization (8.8 days), elevated
costs ($ 270,183) and a high rate of unexplained syncope (51%).

CONCLUSIONS:

According to the results of this study, the authors believe that intermediate-risk patients could be safely
discharged, with potentially significant costs saving. In prognostic stratification, priority is to seek risk
factors for cardiogenic syncope while advanced age, stable heart diseases or comorbidities likely lead to
inappropriate hospitalization. This article is protected by copyright. All rights reserved.


Implantable loop recorder versus conventional diagnostic workup for unexplained recurrent syncope.

Solbiati M¹, Costantino G, Casazza G, Dipaola F, Galli A, Furlan R, Montano N, Sheldon R.

Abstract

BACKGROUND:

The most recent syncope guideline recommends that implantable loop recorders (ILRs) are implanted in the
early phase of evaluation of people with recurrent syncope of uncertain origin in the absence of high-risk
criteria, and in high-risk patients after a negative evaluation. Observational and case-control studies have
shown that loop recorders lead to earlier diagnosis and reduce the rate of unexplained syncopes, justifying
their use in clinical practice. However, only randomised clinical trials with an emphasis on a primary
outcome of specific ILR-guided diagnosis and therapy, rather than simply electrocardiogram (ECG)
diagnosis, might change clinical practice.

OBJECTIVES:

To assess the incidence of mortality, quality of life, adverse events and costs of ILRs versus conventional
diagnostic workup in people with unexplained syncope.

SEARCH METHODS:

We searched the Cochrane Central Register of Controlled Trials (CENTRAL, Issue 3, 2015), MEDLINE,
EMBASE, ClinicalTrials.gov and the World Health Organization (WHO) International Clinical Trials
Registry Platform (ICTRP) Search Portal in April 2015. No language restriction was applied.

SELECTION CRITERIA:
We included all randomised controlled trials of adult participants (i.e. ≥ 18 years old) with a diagnosis of unexplained syncope comparing ILR with standard diagnostic workup.

**DATA COLLECTION AND ANALYSIS:**

Two independent review authors screened titles and abstracts of all potential studies we identified as a result of the literature search, extracted study characteristics and outcome data from included studies and assessed risk of bias for each study using the criteria outlined in the Cochrane Handbook for Systematic Reviews of Interventions. We contacted authors of trials for missing data. We analysed dichotomous data (all-cause mortality and aetiologic diagnosis) as risk ratios (RR) with 95% confidence intervals (CI). We used the Chi(2) test to assess statistical heterogeneity (with P < 0.1) and the I² statistic to measure heterogeneity among the trials. We created a 'Summary of findings' table using the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness and publication bias) to assess the quality of a body of evidence as it relates to the studies which contribute data to the meta-analyses for the prespecified outcomes.

**MAIN RESULTS:**

We included four trials involving a total of 579 participants. With the limitation that only two studies reported data on mortality and none of them had considered death as a primary endpoint, the meta-analysis showed no evidence of a difference in the risk of long-term mortality between participants who received ILR and those who were managed conventionally at follow-up (RR 0.97, 95% CI 0.41 to 2.30; participants = 255; studies = 2; very low quality evidence) with no evidence of heterogeneity. No data on short term mortality were available. Two studies reported data on adverse events after ILR implant. Due to the lack of data on adverse events in one of the studies' arms, a formal meta-analysis was not performed for this outcome. Data from two trials seemed to show no difference in quality of life, although this finding was not supported by a formal analysis due to the differences in both the scores used and the way the data were reported. Data from two studies seemed to show a trend towards a reduction in syncope relapses after diagnosis in participants implanted with ILR. Cost analyses from two studies showed higher overall mean costs in the ILR group, if the costs incurred by the ILR implant were counted. The mean cost per diagnosis and the mean cost per arrhythmic diagnosis were lower for participants randomised to ILR implant. Participants who underwent ILR implantation experienced higher rates of diagnosis (RR (in favour of ILR) 0.61, 95% CI 0.54 to 0.68; participants = 579; studies = 4; moderate quality evidence), as compared to participants in the standard assessment group, with no evidence of heterogeneity.

**AUTHORS' CONCLUSIONS:**

Our systematic review shows that there is no evidence that an ILR-based diagnostic strategy reduces long-term mortality as compared to a standard diagnostic assessment (very low quality evidence). No data were available for short-term all-cause mortality. Moderate quality evidence shows that an ILR-based diagnostic strategy increases the rate of aetiological diagnosis as compared to a standard diagnostic pathway. No conclusive data were available on the other end-points analysed. Further trials evaluating the effect of ILRs in the diagnostic strategy of people with recurrent unexplained syncope are warranted. Future research should focus on the assessment of the ability of ILRs to change clinically relevant outcomes, such as quality of life, syncope relapse and costs.

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**Reliability of clinical assessments in older adults with syncope or near syncope.**

Nishijima DK, Laurie AL, Weiss RE, Yagapen AN, Malveau SE, Adler DH, Bastani A, Baugh CW, Caterino JM, Clark CL, Diercks DB, Hollander JE, Nicks BA, Shah MN, Stiffler KA, Storrow AB, Wilber ST, Sun BC.
Abstract

OBJECTIVES:

Clinical prediction models for risk stratification of older adults with syncope or near syncope may improve resource utilization and management. Predictors considered for inclusion into such models must be reliable. Our primary objective was to evaluate the interrater agreement of historical, physical examination, and electrocardiogram (ECG) findings in older adults undergoing ED evaluation for syncope or near syncope. Our secondary objective was to assess the level of agreement between clinicians on the patient's overall risk for death or serious cardiac outcomes.

METHODS:

We conducted a cross-sectional study at 11 EDs in adults 60 years of age or older who presented with unexplained syncope or near syncope. We excluded patients with a presumptive cause of syncope (e.g., seizure), or if they were unable or unwilling to follow-up. Evaluations of the patient's past medical history and current medication use were completed by treating provider and trained research associate pairs. Evaluations of the patient's physical examination and ECG interpretation were completed by attending/resident, attending/advanced practice provider, or attending/attending pairs. All evaluations were blinded to the responses from the other rater. We calculated the percent agreement and kappa statistic for binary variables. Interrater agreement was considered acceptable if the kappa statistic was 0.6 or higher.

RESULTS:

We obtained paired observations from 255 patients; mean age was 73 years (SD 9 years), 137 (54%) were male and 204 (80%) were admitted to the hospital. Acceptable agreement was achieved in 18 of the 21 (86%) past medical history and current medication findings, none of the 10 physical examination variables, and 3 of the 13 (23%) ECG interpretation variables. There was moderate agreement (Spearman correlation coefficient, r=0.40) between clinicians on the patient's probability of 30-day death or serious cardiac outcome though, as the probability increased, there was less agreement.

CONCLUSIONS:

Acceptable agreement between raters was more commonly achieved with historical rather than physical examination or ECG interpretation variables. Clinicians had moderate agreement in assessing the patient's overall risk for a serious outcome at 30 days. Future development of clinical prediction models in older adults with syncope should account for variability of assessments between raters and consider the use of objective clinical variables. This article is protected by copyright. All rights reserved.

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Regional Implementation of a Pediatric Cardiology Syncope Algorithm Using Standardized Clinical Assessment and Management Plans (SCAMPS) Methodology.

Paris Y1, Toro-Salazar OH2, Gauthier NS3, Rotondo KM4, Arnold L5, Hamershock R6, Saudek DE7, Fulton DR8, Renaud A6, Alexander ME9; New England Congenital Cardiology Association (NECCA).

Abstract

BACKGROUND:
Pediatric syncope is common. Cardiac causes are rarely found. We describe and assess a pragmatic approach to these patients first seen by a pediatric cardiologist in the New England region, using Standardized Clinical Assessment and Management Plans (SCAMPs).

METHODS AND RESULTS:

Ambulatory patients aged 7 to 21 years initially seen for syncope at participating New England Congenital Cardiology Association practices over a 2.5-year period were evaluated using a SCAMP. Findings were iteratively analyzed and the care pathway was revised. The vast majority (85%) of the 1254 patients had typical syncope. A minority had exercise-related or more problematic symptoms. Guideline-defined testing identified one patient with cardiac syncope. Syncope Severity Scores correlated well between physician and patient perceived symptoms. Orthostatic vital signs were of limited use. Largely incidental findings were seen in 10% of ECGs and 11% of echocardiograms. The 10% returning for follow-up, by design, reported more significant symptoms, but did not have newly recognized cardiac disease. Iterative analysis helped refine the approach.

CONCLUSIONS:

SCAMP methodology confirmed that the vast majority of children referred to the outpatient pediatric cardiology setting had typical low-severity neurally mediated syncope that could be effectively evaluated in a single visit using minimal resources. A simple scoring system can help triage patients into treatment categories. Prespecified criteria permitted the effective diagnosis of the single patient with a clear cardiac etiology. Patients with higher syncope scores still have a very low risk of cardiac disease, but may warrant attention.


Diagnostic Yield of Echocardiography in Syncope Patients with Normal ECG.

Chang NL¹, Shah P², Bajaj S², Virk H², Bikkina M², Shamoon F².

Abstract

Aim. This study aimed to assess the role of echocardiography as a diagnostic tool in evaluating syncope patients with normal versus abnormal electrocardiogram. Methods. We conducted a retrospective study of 468 patients who were admitted with syncope in 2011 at St. Joseph's Regional Medical Center, Paterson, NJ. Hospital records and patient charts, including initial emergency room history and physical, were carefully reviewed. Patients were separated into normal versus abnormal electrocardiogram groups and then further divided as normal versus abnormal echocardiogram groups. Causes of syncope were extrapolated after reviewing all test results and records of consultations. Results. Three hundred twelve of the total patients (68.6%) had normal ECG. Two-thirds of those patients had echocardiograms; 11 patients (5.7%) had abnormal echo results. Of the aforementioned patients, three patients had previous documented history of severe aortic stenosis on prior echocardiograms. The remaining eight had abnormal but nondiagnostic echocardiographic findings. Echocardiography was done in 93 of 147 patients with abnormal ECG (63.2%). Echo was abnormal in 27 patients (29%), and the findings were diagnostic in 6.5% patients. Conclusions. This study demonstrates that echocardiogram was not helpful in establishing a diagnosis of syncope in patients with normal ECG and normal physical examination.


Safety and tolerability of Tilt Testing and Carotid Sinus Massage in the octogenarians.
Abstract

OBJECTIVE:

to evaluate the safety and tolerability of Tilt Testing (TT) and Carotid Sinus Massage (CSM) in octogenarians with unexplained syncope.

METHODS:

patients consecutively referred for transient loss of consciousness to the 'Syncope Units' of three hospitals were enrolled. TT and CSM were performed according to the European Society of Cardiology guidelines on syncope. Complications were evaluated in each group. An early interruption of TT was defined as 'intolerance' and considered as a non-diagnostic response.

RESULTS:

one thousand four hundred and one patients were enrolled (mean age 72 ± 16 years, male 40.8%). Six hundred and ninety-four patients (49.5%) were 80 years old or older (mean age 83 ± 3 years) and 707 (50.5%) were younger (mean age 60 ± 17 years). Complications after TT occurred in 4.5% of older patients and in 2.1% of the younger ones (P = 0.01). All complications were 'minor/moderate', as prolonged hypotension, observed in ∼3% of patients ≥80 years. Major complications such as sustained ventricular tachycardia, ventricular fibrillation, asystole requiring cardiac massage, transient ischaemic attack, stroke and death were not observed in any patient. The presence of orthostatic hypotension and the mean number of syncopal episodes were predictors of TT complications. Intolerance was reported in 2.4% of older patients and 1% of the younger ones (P = 0.08), mainly due to orthostatic intolerance. No complications occurred after CSM.

CONCLUSIONS:

TT and CSM appear to be safe and well tolerated in octogenarians, who should not be excluded by age from the diagnostic work-up of syncope.


Long-term cardiac monitoring in older adults with unexplained falls and syncope.

Bhangu J¹, McMahon CG², Hall P¹, Bennett K³, Rice C⁴, Crean P⁵, Sutton R⁶, Kenny RA¹.

Abstract

AIMS:

Unexplained falls account for 20% of falls in older cohorts. The role of the implantable loop recorder (ILR) in the detection of arrhythmias in patients with unexplained falls is unknown. We aimed to examine the diagnostic utility of the ILR in detection of arrhythmogenic causes of unexplained falls in older patients.

METHODS:
A single centre, prospective, observational cohort study of recurrent fallers over the age of 50 years with two or more unexplained falls presenting to an emergency department. Insertion of an ILR (Reveal, Medtronic, Minnesota, USA) was used to detect arrhythmia. The primary outcome was detection of cardiac arrhythmia associated with a fall or syncope. The secondary outcome was detection of cardiac arrhythmia independent of falls or syncope, and falls or syncope without associated arrhythmia.

RESULTS:

Seventy patients, mean age 70 years (51-85 years) received an ILR. In 70% of patients cardiac arrhythmias were detected at a mean time of 47.3 days (SD 48.25). In 20%, falls were attributable to a modifiable cardiac arrhythmia; 10 (14%) received a cardiac pacemaker, 4 (6%) had treatment for supraventricular tachycardia. Patients who had a cardiac arrhythmia detected were more likely to experience a further fall.

CONCLUSIONS:

14 (20%) patients demonstrated an arrhythmia which was attributable as the cause of their fall. Patients who have cardiac arrhythmia are significantly more likely to experience future falls. Further research is important to investigate if early detection of arrhythmogenic causes of falls using the ILR prevents future falls in older patients.

Europace. 2016 Jan 18. [Epub ahead of print]

Diagnostic role of head-up tilt test in patients with cough syncope.


Abstract

AIMS:
The aim of this study was to describe the head-up tilt (HUT) test and carotid sinus massage (CSM) responses, and the occurrence of syncope with coughing during HUT in a large cohort of patients.

METHODS AND RESULTS:

A total of 5133 HUT were retrospectively analysed to identify patients with cough syncope. Head-up tilt followed by CSM were performed. Patients were made to cough on two separate occasions in an attempt to reproduce typical clinical symptoms on HUT. Patients with cough syncope were compared with 29 age-matched control patients with syncope unrelated to coughing. A total of 29 patients (26 male, age 49 ± 14 years) with cough syncope were identified. Coughing during HUT reproduced typical prodromal symptoms of syncope in 16 (55%) patients and complete loss of consciousness in 2 (7%) patients, with a mean systolic blood pressure reduction of 45 ± 26 mmHg, and a mean increase in heart rate of 13 ± 8 b.p.m. No syncope or symptoms after coughing were observed in the control group. The HUT result was positive in 13 (48%) patients with the majority of positive HUT responses being vasodepressor (70% of positive HUT). Carotid sinus massage was performed in 18 patients being positive with a vasodepressor response causing mild pre-syncopal symptoms in only 1 patient.

CONCLUSION:

Syncope during coughing is a result of hypotension, rather than bradycardia. Coughing during HUT is a useful test in patients suspected to have cough syncope but in whom the history is not conclusive.
Assessment of endothelin and copeptin as biomarkers for vasovagal syncope.

Rash A¹, McRae M¹, Fatehi J², Richie D¹, Solbiati M¹, Pillay N², Ulke-Lemée A¹, MacDonald J¹, Sheldon R¹.

Abstract

BACKGROUND:

The diagnosis of vasovagal syncope continues to be difficult despite the use of accurate histories, tilt testing and implantable loop recorders. A circulating biomarker might be useful to facilitate diagnoses. Both endothelin-1 and vasopressin are increased during positive tilt tests resulting in syncope. Copeptin is a stable cleavage product of vasopressin formation. We conducted a pilot study to assess the utility of endothelin-1 and copeptin as circulating biomarkers of vasovagal syncope.

METHODS:

Three populations were studied: syncope patients, epilepsy patients and controls. Vasovagal syncope diagnosis was ascertained with the Calgary Syncope Score and epilepsy diagnosis was confirmed with EEG. Plasma levels of endothelin-1 were measured using by ELISA and copeptin levels were determined using an EIA kit.

RESULTS:

Asymptomatic control subjects had mean age 35 ± 11 years (7/22 male); epileptic subjects had mean age 32 ± 7 years (4/15 male); and syncope subjects had mean age 33 ± 16 years (4 of 21 male). Circulating plasma levels of endothelin-1 and copeptin were no different among the three groups. Mean concentrations of endothelin-1 were as follows: syncope, 23 ± 32 pg/mL; controls, 21 ± 17 pg/mL; and epileptics, 18 ± 12 pg/mL. Mean concentrations of copeptin were as follows: syncope, 1·29 ± 0·79 ng/mL; controls, 1·25 ± 0·45 ng/mL. There were no significant correlations between syncope frequency and copeptin or endothelin-1 levels.

CONCLUSION:

Circulating plasma endothelin-1 and copeptin levels are not significantly different among populations of controls, syncope patients and seizure patients.
Assessment of a structured management pathway for patients referred to the Emergency Department for syncope: results in a tertiary hospital.

Ungar A¹, Tesi F², Chisciotti VM², Pepe G³, Vanni S³, Grifoni S¹, Balzi D⁴, Rafanelli M², Marchionni N², Brignole M⁵.

Abstract

AIMS:

High hospitalization rates (39-58% in the literature) of patients admitted to Emergency Department (ED) for transient loss of consciousness (T-LOC) suspected for syncope are still an unresolved issue. The presence of an Observation Unit has reduced hospital admissions and the duration of hospitalization in controlled studies, and a Syncope Unit (SU) in the hospital may reduce hospitalization and increase the number of diagnoses in patients with T-LOC. We assessed the effect of a structured organization on hospitalization rate and outcome.

METHODS AND RESULTS:

Consecutive patients referred to the ED for a T-LOC of a suspected syncopal nature as the main diagnosis were included. The ED physician was trained to choose between: hospital admission (directly or after short observation); discharge after short (<48-h) observation; discharge on a fast track to the SU; and direct discharge without any further diagnostics. From January to June 2010, 362 patients were evaluated in the ED: 29% were admitted, 20% underwent short observation in the ED, 20% were referred to the SU, and 31% were directly discharged. Follow-up data were available on 295 patients who were discharged alive: of these, 1 (0.3%) previously hospitalized patient died within 30 days and 16 (5.4%) died within 1 year. Death rates were 12.9, 3.3, 0, and 2.5% among admitted, observation, SU, and ED-discharged patients, respectively. No death could be directly attributed to T-LOC. Re-admission within 1 year for any cause occurred in 72 (24%) patients; re-admission rates were 45.9, 19.3, 11.5, and 18.0% among admitted, observation, SU, and ED-discharged patients, respectively.

CONCLUSIONS:

The availability of short observation and a SU seems to reduce the hospitalization rate compared with previous reported historical reports from our and other centres. Most deaths during follow-up occurred in patients who had been hospitalized. High rates of re-admission to the ED within 1 year are still an issue.
depletion in 39 patients (16%), orthostatic hypotension in 13 patients (5%), primary cardiac arrhythmias in 25 patients (10.3%), structural cardiac disease in 6 patients (2%), and drug overdose in 5 patients (2%). The etiology of syncope could not be determined in 84 patients (35%). Of the 242 patients, 6 (2%) were rehospitalized for syncope and 12 (5%) died. Stepwise logistic regression analysis showed that the significant independent prognostic factors for rehospitalization for syncope were drug overdose [odds ratio (OR): 11.506; 95% confidence interval (CI): 1.083-22.261]. Stepwise logistic regression analysis showed that significant independent prognostic factors for time to mortality were undetermined etiology of syncope (OR: 4.665; 95% CI: 1.002, 21.727), San Francisco Syncope Score (OR: 3.537; 95% CI: 1.472-8.496), hypertension (OR: 0.099; 95% CI: 0.019-0.504), and glomerular filtration rate (OR: 0.964; 95% CI: 0.937-0.993).