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CURRENT OPINION

Syncope clinical management in the emergency department: a consensus from the first international workshop on syncope risk stratification in the emergency department

Giorgio Costantino[1]*, Benjamin C. Sun[2], Franca Barbic[3], Ilaria Bossi[4], Giovanni Casazza[5], Franca Dipaola[3], Daniel McDermott[6], James Quinn[7], Matthew J. Reed[8], Robert S. Sheldon[9], Monica Solbiati[1], Venkatesh Thiruganasambandamoorthy[10], Daniel Beach[11], Nicolai Bodemer[12], Michele Brignole[13], Ivo Casagranda[14], Attilio Del Rosso[15], Piergiorgio Duca[5], Greta Falavigna[16], Shamai A. Grossman[17], Roberto Ippoliti[18], Andrew D. Krahn[19], Nicola Montano[1], Carlos A. Morillo[20], Brian Olshansky[21], Satish R. Raj[19], Martin H. Ruwald[22], Francois P. Sarasin[23], Win-Kuang Shen[24], Ian Stiell[10], Andrea Ungar[25], J. Gert van Dijk[26], Nynke van Dijk[27], Wouter Wieling[28], and Raffaello Furlan[3]

[1]Dipartimento di Medicina Interna, Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico, Portland, Italy; [2]Department of Emergency Medicine, Oregon Health and Science University, Portland, OR, USA; [3]BIOMETRA Department - Humanitas Research Hospital, Università degli Studi di Milano, Rozzano, MI, Italy; [4]Emergency Medicine Department, S. Anna Hospital, Como, Italy; [5]Department of Biomedical and Clinical Sciences 'L. Sacco', Università degli Studi di Milano, Milan, Italy; [6]School of Medicine, University of California-San Francisco, San Francisco, CA, USA; [7]Division of Emergency Medicine, Stanford University, Stanford, CA, USA; [8]Emergency Medicine Research Group Edinburgh, Royal Infirmary of Edinburgh, Edinburgh, UK; [9]Department of Cardiac Sciences, University of Calgary, Calgary, Canada; [10]Department of Emergency Medicine, University of Ottawa, Ottawa, Canada; [11]STARS, UK; [12]Max Planck Institute for Human Development, Berlin, Germany; [13]Division of Cardiology, Ospedali del Tigullio, Lavagna, Italy; [14]Department of Emergency Medicine, Ospedale di Alessandria, Alessandria, Italy; [15]Electrophysiology Unit, Cardiology Division, Department of Medicine, Ospedale S. Giuseppe, Empoli, Italy; [16]CNR, Torino, Italy; [17]Department of Emergency Medicine, Harvard Medical School, Beth Israel Deaconess Medical Center, Boston, MA, USA; [18]Ospedale di Alessandria, Alessandria, Italy; [19]Division of Cardiology, University of British Columbia, Vancouver, Canada; [20]McMaster University, Population Health Research Institute, Hamilton Health Sciences, Hamilton, Canada; [21]Division of Cardiology, University of Iowa Medical Center, Iowa City, IA, USA; [22]Division of Cardiology, Gentofte Hospital, Copenhagen, Denmark; [23]Division of Emergency Medicine, Hopital Cantonal, University of Geneva Medical School, Geneva, Switzerland; [24]Division of Cardiology, Mayo Clinic, Phoenix, AZ, USA; [25]Syncope Unit, Geriatric Medicine and Cardiology, Careggi University Hospital, Firenze, Italy; [26]Department of Neurology, Leiden University Medical Centre, Leiden, The Netherlands; [27]Department of General Practice/Family Medicine, Academic Medical Centre, Amsterdam, The Netherlands; and [28]Department of Internal Medicine, Academic Medical Centre, Amsterdam, The Netherlands

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The optimal emergency department (ED) evaluation of syncope is uncertain. Research reports from multiple countries suggest extensive practice variation, high costs, and questionable benefit associated with current approaches.[1–5] Moreover, only a few of the recommendations from international syncope guidelines deal with ED management.[6–8] For example, the European Society of Cardiology guidelines, which are the most inclusive syncope guidelines, do not address the ED management. This could be due to limited evidence on how to stratify the risk and decide on disposition of these patients in the ED.[1,9]

We organized a multi-specialty workshop of North American and European syncope experts on 26–27 September 2013 in Gargnano, Italy, with the aim of obtaining a modified Delphi consensus on the best way to manage ED syncope patients. As already described,[10] we followed a four-step conceptual model for the ED decision-making in syncope: (i) Is it syncope? (ii) Is there a serious underlying condition identified in the ED? (iii) If the cause is uncertain, what is the risk of a serious outcome? (iv) For a given risk profile, how can these patients be best managed in the ED and what evaluation and restrictions are required? (*Figure 1*).

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* Corresponding author. Tel: +39 02 5503 1, Email: giorgic2@gmail.com

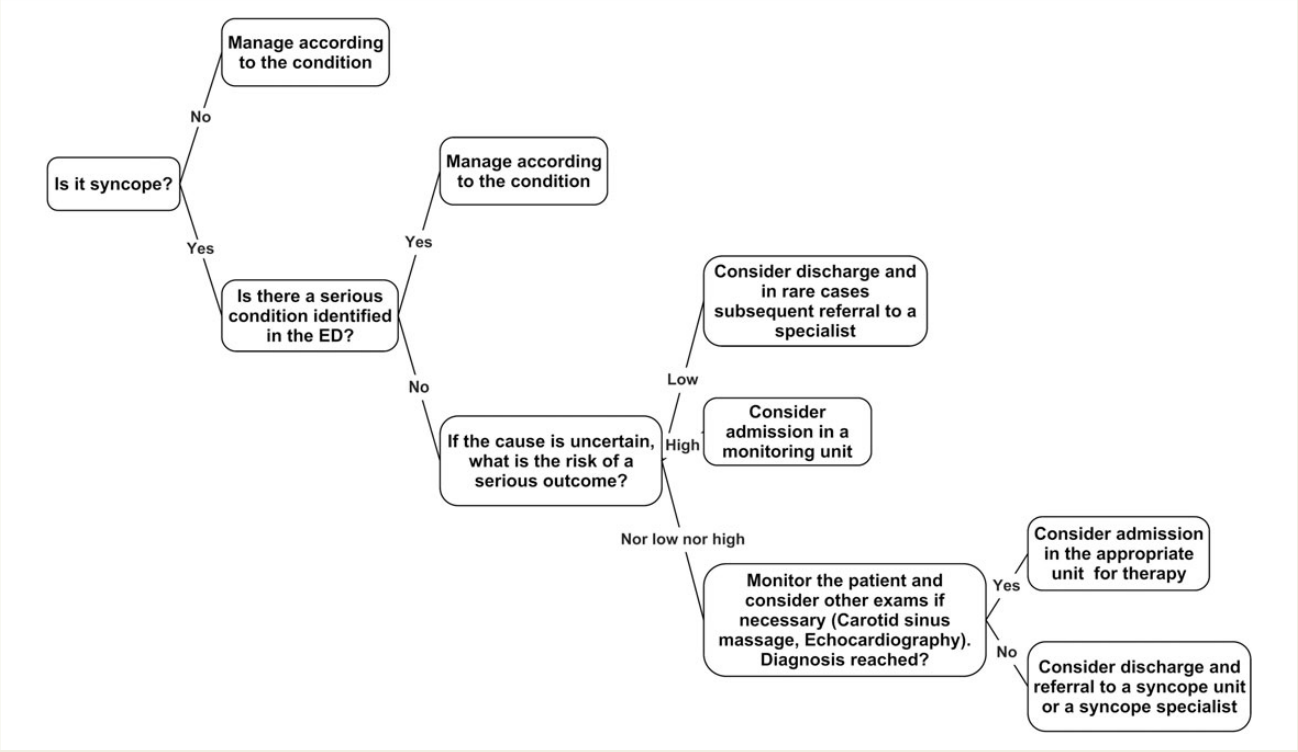

Figure 1 Conceptual model: ED management of syncope.

Expert recruitment and consensus development have been described previously.[10] Details can be found in Supplementary material online, *Appendix S1*. The full list of questions and answers to the first and second survey rounds as well as the degree of agreement on each item is reported in Supplementary material online, *Appendix S2*.

Is it syncope?

According to the ESC guidelines, syncope is defined as a transient loss of consciousness (T-LOC) due to transient global cerebral hypoperfusion characterized by rapid onset, short duration, and spontaneous complete recovery.[7] Since the presence of cerebral hypoperfusion cannot always be determined on clinical grounds in the ED, every T-LOC without apparent causes should be considered as syncope until proven otherwise.

Is there a serious condition identified in the emergency department?

As addressed in previous guidelines,[6,7,11] the patient's assessment should include history, physical examination, ECG, supine and standing blood pressure measurement and subsequent tests (such as blood sampling, carotid sinus massage, echocardiogram, chest X-ray, blood gas analysis) according to clinical characteristics and physician judgment. If the aetiology of syncope is identified during ED stay, the patient will be managed according to the causal condition.

If the cause is uncertain, what is the risk of a serious outcome?

Since the cause for syncope can be difficult to determine in the ED, risk stratification is an important part of ED physician decision-making. Patients with an established underlying syncope diagnosis should be evaluated according the cause of syncope and the presence or absence of co-morbid conditions. Patients with low-risk symptoms (symptoms consistent with neurally mediated syncope) might need risk stratification only if other high-risk characteristics exist (e.g. a history of cardiac disease). Some scenarios can be problematic. For example, orthostatic hypotension can coexist with an asymptomatic tachyarrhythmia and only their association provokes syncope. Therefore, the finding of abnormalities does not always lead to a definitive diagnosis.

It is unknown if hospitalization can reduce adverse events in patients with unexplained syncope, nor it is known if a patient's prognosis is affected by syncope or by other co-morbidities.[12] Therefore, it is not possible to identify a definitive common acceptable risk threshold to be used to discharge patients with syncope from ED. The decision to admit a patient should take into account cost, possible adverse events related to the hospitalization itself, and the clinical utility of hospitalization in the management of these patients.

Risk stratification tools

Different risk stratification tools have been developed and tested so far but none have definitely proved to perform better than clinical judgment.[1,9,13,14] Moreover, as the admission rates vary widely across different countries, the available clinical rules, which aim at identifying high- and low-risk patients to guide hospital admission, cannot be applied universally. For example, a clinical decision rule enabling a reduction in admissions in a setting characterized by previous high rate of admissions may paradoxically increase the admission rate in a different setting.

Table 1 High- and low-risk factors

Low-risk factors	High-risk factors
Characteristics of the patients	
Young age (<40 years)	
Characteristics of syncope	
Only while in standing position	During exertion
Standing from supine/sitting position	In supine position
Nausea/vomiting before syncope	New onset of chest discomfort
Feeling of warmth before syncope	Palpitations before syncope
Triggered by painful/emotionally distressing stimulus	
Triggered by cough/defecation/micturition	
Factors present in the history of the patient	
Prolonged history (years) of syncope with the same characteristics of the current episode	Family history of sudden death
	Congestive heart failure
	Aortic stenosis
	Left ventricular outflow tract disease
	Dilated cardiomyopathy
	Hypertrophic cardiomyopathy
	Arrhythmogenic right ventricular cardiomyopathy
	Left ventricular ejection fraction <35%
	Previously documented arrhythmia (ventricular)
	Coronary artery disease
	Congenital heart disease
	Previous myocardial infarction
	Pulmonary hypertension
	Previous ICD implantation
Symptoms, signs, or variables associated with the syncopal episode	
	Anemia (Hb <9 g/dL)
	Lowest systolic blood pressure in the ED <90 mmHg
	Sinus bradycardia (<40 bpm)
ECG features[a]	
	New (or previously unknown) left bundle branch block
	Bifascicular block + first degree AV block
	Brugada ECG pattern
	ECG changes consistent with acute ischemia
	Non-sinus rhythm (new)
	Bifascicular block
	Prolonged QTc (>450 ms)

According to characteristics of the patient and the syncopal episode, the subject can be defined as low, high or indeterminate risk. Low risk: patients with one or more low-risk characteristics and without any high-risk characteristics. High risk: patients with at least one high-risk characteristic. Intermediate or indeterminate risk: Patients without any high- or low-risk characteristics, or patients with only low-risk factors and some co-morbidities such as chronic renal failure, respiratory failure, hepatic failure, neoplasm, cerebrovascular disease or previous history of heart diverse. Note that finding any of these abnormalities does not always lead to a definite diagnosis.
ICD, implantable cardioverter defibrillator; AV, atrioventricular.
[a]Note that not all the ECG patterns are covered by the table and some other ECG patterns could be considered in stratifying the patients risk such as short QT syndrome, early repolarization, ECG findings indicating hypertrophic cardiomyopathy, arrhythmogenic right ventricular cardiomyopathy, and incidental finding of Q wave.

Although there is increasing interest in the use of biomarkers for syncope risk stratification, including troponins and brain natriuretic peptides, these biomarkers cannot be recommended for routine care at present.[15,16]

What are the characteristics for low, intermediate, and high-risk patients?

The classification of a patient in a risk category depends on the characteristics of both the syncopal episode and the patient. Here we suggest three levels of risks:

(1) Low risk: patients with one or more low risk characteristics and without any high-risk characteristics;
(2) High risk: patients with at least one high-risk characteristic;
(3) Patient neither at high, nor at low risk. Namely, patients with any of the following:
   (a) comorbidities who would otherwise be at low risk;
   (b) without any comorbidity whose syncope has some worrisome characteristics itself;
   (c) without any low- or high-risk characteristics'.
   Table 1 shows the low- and high-risk characteristics.

For a given risk profile, how can these patients be best managed in the ED and which tests and functional restrictions are required?

Patient management

The classification of patients into high, low and indeterminate risk categories leads to different management algorithms (*Figures 1* and *2*).

High-risk patients

These patients deserve an intensive diagnostic approach and should be monitored in the ED or in a setting where resuscitation can be performed in the case of deterioration.

Low risk: hospitalization is not useful, because it will not modify the already excellent prognosis.

High risk: hospitalization, as a diagnostic and therapeutic strategy, may modify the prognosis

Patients neither at high, nor at low risk (Intermediate/indeterminate): for these patients a proper management strategy during the ED stay could subsequently lead to hospitalization or discharge. With a proper assessment (diagnostic tests, observation) during ED stay, intermediate-risk patients might eventually be reclassified as low or high risk.

Figure 2 Patient management according to risk categories.

Low-risk patients

These patients do not need any other diagnostic tests. The patient can be managed as an outpatient in a syncope clinic, syncope unit or specialty clinic if further assessment is considered, mainly for reassurance, therapy, or counselling.

Neither high- nor low-risk patients

Dealing with these patients is very difficult, because their risk is still indeterminate. Electrocardiographic monitoring was considered the cornerstone for their management. Unfortunately, there is neither evidence nor consensus on the nature and duration of monitoring (most of the experts suggested that monitoring should last at least 3 h).

Goal and criteria for electrocardiographic monitoring

Whether or not inpatient or outpatient ECG monitoring could be more cost-effective is not the aim of the present manuscript.

Emergency department monitoring should be considered positive if any of the characteristics of *Table 2* are present. Some of them will establish a diagnosis and lead to a prompt treatment (i.e. complete atrioventricular block), others will require hospital admission for further tests.

Emergency department observation protocols and syncope units

There is increasing interest in ED observation protocols and syncope units[17,18] but the evidence that they can improve patients' prognosis is still lacking.[8]

Driving and work recommendations

Driving and working following syncope must be addressed prior to discharge from the ED. Patients with cardiac syncope should follow existing guidelines and individualized based on their specific diagnosis and treatment. Those with syncope due to an unknown cause but

Table 2 Goals and criteria for monitoring

Which patients should be monitored?	Intermediate and high risk patients
Where should intermediate risk patients be monitored?	In ED or observation unit
Which should be the goal for monitoring intermediate risk patients	Decision on admission/ discharge
Monitoring should be considered positive in the presence of any the following:	
Pause (>3 s)	
Sustained or non-sustained ventricular tachycardia whether symptomatic or asymptomatic	
High grade AV block	
Bradycardia (<30 b.p.m.) whether symptomatic or asymptomatic	
Bradycardia (<50 b.p.m.) in a symptomatic patient	
Tachycardia (>120 b.p.m.) in a symptomatic patient	

AV, atrioventricular.

at high risk should be more extensively evaluated for potential causes and treatments before being allowed to go back to driving or work environments that would put themselves or others at risk.[19,20] This recommendation should also be considered for non-high-risk patients who suffered significant personal injury from their episode of syncope or from those with recurrent syncope without prodrome. While these guidelines lack strong evidence, they seem reasonable and physicians should also be aware of local mandatory reporting guidelines for driving.

Some limitations of the present article should be acknowledged. Since evidence on the best ED management is scant, our recommendations are only based on expert opinion.

Moreover, syncope diagnosis is rarely based on a single sign or symptom, and the criteria stated here to indicate high risk do not universally do so. For instance, syncope during exercise does not always indicate cardiac syncope: depending on the circumstance such features can be ignored at times, but only if the full history strongly suggests a benign explanation.

In conclusion, while evidence regarding the optimal management of patients with syncope in the ED is still incomplete, we attempted to overcome the lack of evidence by giving clinical advice for everyday clinical practice based on expert consensus. Syncope patients in the ED should be stratified into three different risk categories according to the characteristics present in *Table 1*. Low-risk patients could be safely discharged. High-risk patients should be assessed and treated more urgently. Patients neither in the high-, nor in the low-risk category should be managed in the ED with ECG monitoring and other diagnostic tools, as appropriate. There is no consensus about the duration of monitoring. Emergency department observation protocols and referral to an outpatient syncope clinic or syncope unit may be helpful.

Supplementary material

Supplementary Material is available at *European Heart Journal* online.

Authors' contributions

G.C., M.S., G.C., and R.F. acquired the data. G.C., B.C.S., F.B., I.B., G.C., F.D., D.M., J.Q., M.J.R., R.S.S., M.S., V.T., and R.F. conceived and designed the research. G.C., B.C.S., F.B., I.B., G.C., F.D., D.M., J.Q., M.J.R., R.S.S., M.S., V.T., and R.F. drafted the manuscript. G.C., B.C.S., F.B., I.B., G.C., F.D., D.M., J.Q., M.J.R., R.S.S., M.S., V.T., D.B., N.B., M.B., I.C., A.D.R., P.D., G.F., S.A.G., R.I., A.D.K., N.M., C.A.M., B.O., S.R.R., M.H.R., F.P.S., W.-K.S., I.S., A.U., J.G.v.D., N.v.D., W.W., and R.F. Made critical revision of the manuscript for key intellectual content.

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