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Current investigation and management of patients with syncope: results of the European Heart Rhythm Association survey

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The aim of this European Heart Rhythm Association (EHRA) survey was to provide an insight into the current practice of work-up and management of patients with syncope among members of the EHRA electrophysiology research network. Responses were received from 43 centres. The majority of respondents (74%) had no specific syncope unit and only 42% used a standardized assessment protocol or algorithm. Hospitalization rates varied from 10% to 25% (56% of the centres) to >50% (21% of the centres). The leading reasons for hospitalization were features suggesting arrhythmogenic syncope (85% of respondents), injury (80%), structural heart disease (73%), significant comorbidities (54%), and older age (41%). Most widely applied tests were electrocardiogram (ECG), echocardiography, and Holter monitoring followed by carotid sinus massage and neurological evaluation. An exercise test, tilt table test, electrophysiological study, and implantation of a loop recorder were performed only if there was a specific indication. The use of a tilt table test varied widely: 44% of respondents almost always performed it when neurally mediated syncope was suspected, whereas 37% did not perform it when there was a strong evidence for neurally mediated syncope. Physical manoeuvres were the most widely (93%) applied standard treatment for this syncope form. The results of this survey suggest that there are significant differences in the management of patients with syncope across Europe, specifically with respect to hospitalization rates and indications for tilt table testing in neurally mediated syncope. The majority of centres reported using ECG, echocardiography, and Holter monitoring as their main diagnostic tools in patients with syncope, whereas a smaller proportion of centres applied specific assessment algorithms. Physical manoeuvres were almost uniformely reported as the standard treatment for neurally mediated syncope.

Keywords Syncope • Syncope unit • Tilt test • EHRA survey • EP wire

Introduction

The diagnostic work-up and treatment of patients with syncope is a frequent and often challenging task for physicians of various specialties. The main goals in the management of patients are the identification of individuals at high risk of major cardiovascular events and sudden cardiac death, and the prevention of recurrent syncopal episodes.[1] The current European Society of Cardiology (ESC) Guidelines provide a framework for diagnosis and risk stratification of patients with syncope.[2] However, a significant variety of causes, diagnostic tests, and treatment strategies make this field complex.[3] As a result, much diversity is observed in clinical practice. The aim of this European Heart Rhythm Association (EHRA) survey was to provide insights into the current European clinical practice regarding the work-up and treatment of patients with syncope.

Methods and results

Participating centres

Forty-three centres—members of the EHRA electrophysiology (EP) research network responded to the survey. There was a wide geographic distribution of the responding centres from 17 countries (6 centres from Italy, 4 each from Greece and Spain, 3 from

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Argentina, 2 each from Austria, Belgium, Denmark, and the United Kingdom, and 1 centre each from 9 other countries). The majority (74%) of the responding centres were university hospitals.

As evident from their overall activity, a large spectrum from low- to high-volume centres was represented in the survey: 47% of the responding centres had implanted <100 defibrillators, 28% of the centres 100–199 and 26% of the centres ≥ 200 defibrillators in the last calendar year; 9% of the centres had implanted <100 pacemakers, 28% 100–199, 44% 200–399, and 19% of the centres ≥ 400 pacemakers; 30% of the responders had performed <100 ablation procedures, 35% 100–399 ablations and 30% of the centres ≥ 400 ablations in the past year. A cardiac surgery unit on-site was available in 81% of the centres.

Availability of syncope units and specific protocols

Only a minority (26%) of the responding centres had a dedicated syncope unit. A significant majority (74%) treated patients with syncope like any other patient. When there was a syncope unit, this was staffed mainly by cardiologists (83%) and less commonly by neurologists (17%).

Only 42% of the centres had a specific standardized protocol or algorithm for the assessment of patients with syncope, whereas 58% of the respondents treated syncope patients according to the local practices and preferences of the treating physician. The volume of interventions among centres with a specific assessment protocol varied.

Hospitalization for syncope

The percentage of patients presenting with syncope at the emergency department who were hospitalized was 10–25% in the majority (56%) of responding centres. However, a considerable proportion of respondents (21%) had a much higher, $>50\%$, hospitalization rate. The most significant reasons for hospitalization were clinical signs or electrocardiogram (ECG) features suggesting arrhythmogenic syncope (85%), injury associated with syncope (80%), the presence of structural heart disease (73%), significant comorbidities such as anaemia or electrolyte disturbances (54%), and older age (41%). The mean duration of hospital stay was 3.6 ± 1.3 days.

Diagnostic tools

The utilization of the various diagnostic examinations is shown in *Figure 1*. Most widely applied examinations were ECG (performed always or almost always in all but one centre), echocardiography (always or almost always by 66% of respondents), and 24 or 48 hours Holter monitoring (always or almost always by 59% of respondents), followed by carotid sinus massage and neurological evaluation. Exercise testing, tilt table testing, electrophysiological study, and implantation of a loop recorder were done in most centres in the selected patients only.

The indications for tilt table testing are shown in *Figure 2*. There was a divergent approach regarding tilt table testing; 44% of the respondents almost always used it when a neurally mediated syncope was suspected and 37% did not perform it when there was a strong suspicion for neurally mediated syncope because the patient history was considered sufficient. The main agent used for pharmacological provocation during tilt table testing was nitroglycerin (61% of the centres) or isoproterenol (10% of the centres), whereas 27% did not routinely perform pharmacological provocation during tilt testing.

The majority of respondents (56%) used electrophysiological testing only rarely during the diagnostic work-up of syncope patients (56% of respondents). Only 22% of the centres routinely performed electrophysiological testing if the non-invasive examinations failed to provide adequate explanation for the syncopal episodes.

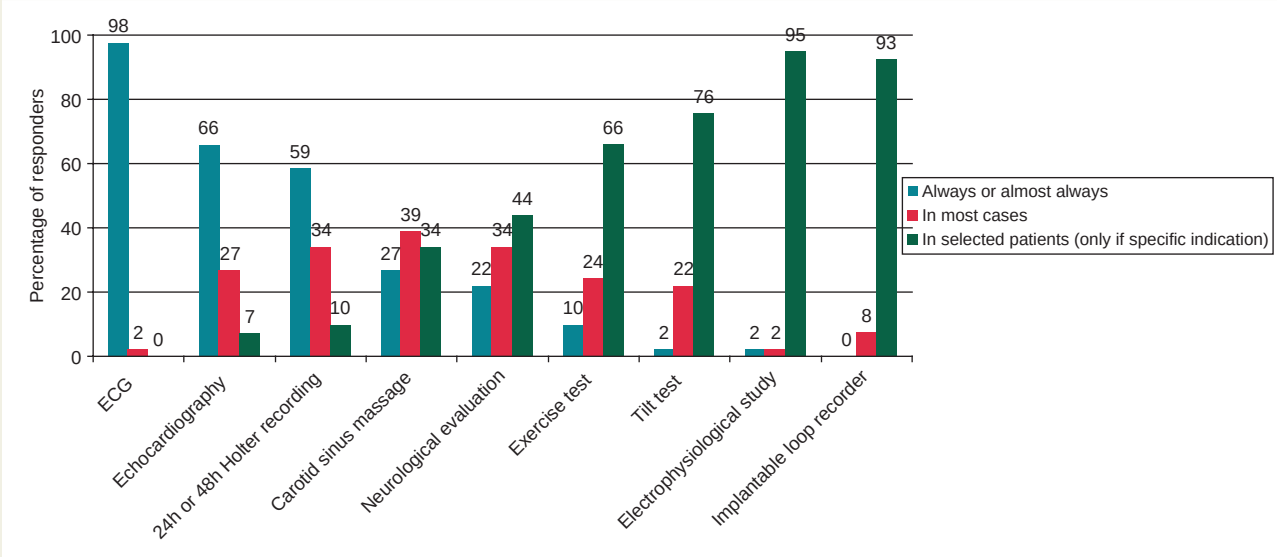

Figure 1 Utilization of different diagnostic examinations for the assessment of patients with syncope.

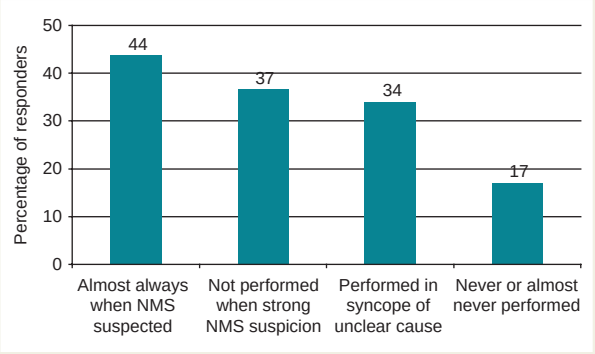

Figure 2 Utilization of tilt table testing. NMS, neurally mediated syncope.

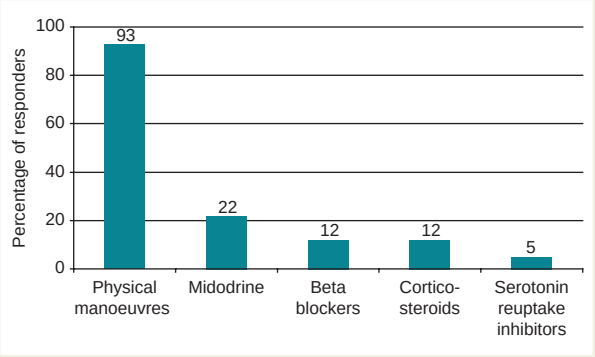

Figure 3 Standard treatment or recurrent neurally mediated syncope.

Treatment strategies

Figure 3 shows the treatment strategies for recurrent neurally mediated syncope across the participating centres. Physical manoeuvres were the most widely applied standard treatment (93% of respondents). Other treatment modalities were only used by the minority of centres: midodrine by 22%, beta-blockers by 12%, corticosteroids by 12%, and serotonin reuptake inhibitors by 5%. Pacing for recurrent neurally mediated syncope had only limited use: 61% of the respondents almost never or only very rarely implanted a pacemaker, whereas 24% would consider pacing based mainly on the documentation of asystole by an implantable loop recorder, and 15% based on the documentation of a cardio-inhibitory response during tilt testing.

Discussion

Syncope is a very frequent event and a common cause for presentation at the emergency department or referral for further evaluation. There is a significant variety of causes ranging from harmless conditions to diseases with poor prognosis and high risk of sudden death.[4] Identification of high-risk patients is crucial and is the main goal of management of syncope.[2,3] Despite recommendations on the diagnostic approach and treatment of patients with syncope, there is a great variation in daily clinical practice. Hence, the aim of this EP Wire survey was to provide an insight into daily clinical practice among centres of the EHRA EP research network.

An important observation is the lack of specialized syncope units in the majority of the responding centres. Such specialized units have been proposed as a means for more efficient management of patients with syncope.[2,3,5] Interestingly, when such units exist, they are almost exclusively managed by cardiologists rather than by a multidisciplinary team as proposed in the guidelines. Although the benefit of these specialized units has been questioned, experts uniformly recommend the use of formal diagnostic algorithms which have proven to have a higher diagnostic yield and are associated with a lower hospitalization rate and a lower utilization of costly tests and consultations.[1,6–9] Yet only 42% of the respondents use such algorithms in their clinical practice and instead the majority manages syncope patients according to the preference and judgment of the treating physician.

The divergence in clinical practice is also evident by the varying number of hospitalized patients. The hospitalization rate is 10–25% in the majority of centres but much higher (exceeding 50%) in a considerable proportion (21%) of responding centres. The decisional process for hospitalization seems to be more uniform and is mainly influenced by the presence of clinical or ECG features suggesting arrhythmogenic syncope, injury associated with the syncopal event, structural heart disease, and to a lesser extent, significant comorbidities such as anaemia or electrolyte disturbances, and older age. This practice is in line with current recommendations.[2]

Different diagnostic tests may be utilized for the assessment of patients with syncope. There was no significant variation in this field: ECG, echocardiography, and Holter monitoring were used by the majority of centres, whereas carotid sinus massage and neurological evaluation were used less frequently but still in a considerable proportion of patients. On the contrary, the tilt table test, exercise test, and electrophysiological study are used only if physicians feel that there is a specific indication. Implantable loop recorders also have a limited use, despite evidence for a high diagnostic yield when applied early in patients presenting with syncope.[10,11]

A considerable divergence is also observed in the use of tilt table testing, with many centres almost always performing it when neurally mediated syncope is suspected and many other centres not performing it when there is significant evidence (e.g. from the patient history) for neurally mediated syncope. Treatment of neurally mediated syncope consists mainly of physical manoeuvres. This is expected given the unsatisfactory results or limited availability of pharmacological therapies.[12,13] Pacing is only infrequently applied in patients with recurrent neurally mediated syncope. Due to the controversial results of the randomized clinical trials, the 2013 ESC/EHRA Guidelines on cardiac pacing and cardiac resynchronization therapy only support pacing in patients with tilt-induced cardioinhibitory syncope (Class of recommendation IIb, level of evidence B).[14] New evidence suggests the beneficial role of pacing at least in a subgroup of these patients[15,16] and could lead to an increased application of pacing in specific circumstances.

Conclusions

Management of patients with syncope shows significant variations but also considerable uniformities. Only 26% of responding centres have specialized syncope units and only 42% use specific algorithms for the assessment of syncope patients. The rate of hospitalized patients varies significantly. Main diagnostic tools for work-up are ECG, echocardiography, and Holter monitoring; other examinations are less commonly used. There is also a wide divergence in the indication for tilt table testing in neurally mediated syncope, which is uniformly treated by physical manoeuvres.

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References

1. Sheldon RS, Morillo CA, Krahn AD, O'Neill B, Thiruganasambandamoorthy V, Parkash R *et al.* Standardized approaches to the investigation of syncope: Canadian Cardiovascular Society position paper. *Can J Cardiol* 2011;**27**:246–53.
2. Moya A, Sutton R, Ammirati F, Blanc JJ, Brignole M, Dahm JB *et al.* Guidelines for the diagnosis and management of syncope (version 2009). *Eur Heart J* 2009;**30**:2631–71.
3. Brignole M, Hamdan MH. New concepts in the assessment of syncope. *J Am Coll Cardiol* 2012;**59**:1583–91.
4. Costantino G, Furlan R. Syncope risk stratification in the emergency department. *Cardiol Clin* 2013;**31**:27–38.
5. Daccarett M, Jetter TL, Wasmund SL, Brignole M, Hamdan MH. Syncope in the emergency department: comparison of standardized admission criteria with clinical practice. *Europace* 2011;**13**:1632–8.
6. Brignole M, Hamdan MH. A standardized guideline-based algorithm coupled with online decision-making tool: the new frontier for efficient management of syncope? *Europace* 2011;**13**:1359–61.
7. Sanders NA, Jetter TL, Brignole M, Hamdan MH. Standardized care pathway versus conventional approach in the management of patients presenting with faint at the University of Utah. *Pacing Clin Electrophysiol* 2013;**36**:152–62.
8. Mitro P, Kirsch P, Valočik G, Murín P. A prospective study of the standardized diagnostic evaluation of syncope. *Europace* 2011;**13**:566–71.
9. Fedorowski A, Burri P, Juul-Möller S, Melander O. A dedicated investigation unit improves management of syncopal attacks (Syncope Study of Unselected Population in Malmo - SYSTEMA I). *Europace* 2010;**12**:1322–8.
10. Edvardsson N, Frykman V, van Mechelen R, Mitro P, Mohii-Oskarsson A, Pasquié JL *et al.* Use of an implantable loop recorder to increase the diagnostic yield in unexplained syncope: results from the PICTURE registry. *Europace* 2011;**13**:262–9.
11. Brignole M, Vardas P, Hoffman E, Huikuri H, Moya A, Ricci R *et al.* Indications for the use of diagnostic implantable and external ECG loop recorders. *Europace* 2009;**11**:671–87.
12. Madrid AH, Ortega J, Rebollo JG, Manzano JG, Segovia JG, Sánchez A *et al.* Lack of efficacy of atenolol for the prevention of neurally mediated syncope in a highly symptomatic population: a prospective, double-blind, randomized and placebo-controlled study. *J Am Coll Cardiol* 2001;**37**:554–9.
13. Romme JJ, van Dijk N, Go-Schön IK, Reitsma JB, Wieling W. Effectiveness of midodrine treatment in patients with recurrent vasovagal syncope not responding to non-pharmacological treatment (STAND-trial). *Europace* 2011;**13**:1639–47.
14. Brignole M, Auricchio A, Baron-Esquivias G, Bordachar P, Boriani G, Breithardt OA *et al.* 2013 ESC guidelines on cardiac pacing and cardiac resynchronization therapy: the task force on cardiac pacing and resynchronization therapy of the European Society of Cardiology (ESC). Developed in collaboration with the European Heart Rhythm Association (EHRA). *Europace* 2013;**15**:1070–118.
15. Brignole M, Menozzi C, Moya A, Andresen D, Blanc JJ, Krahn AD *et al.* Pacemaker therapy in patients with neurally mediated syncope and documented asystole: Third International Study on Syncope of Uncertain Etiology (ISSUE-3): a randomized trial. *Circulation* 2012;**125**:2566–71.
16. http://www.escardio.org/about/press/press-releases/pr-13/Pages/europace-2013-late-breaking-trials-two.aspx?hit=dontmiss (1 October 2013, date last accessed).