



**Syncope Management From Emergency Department to Hospital**

Michele Brignole, and Win K. Shen  
*J. Am. Coll. Cardiol.* 2008;51;284-287  
doi:10.1016/j.jacc.2007.07.092

**This information is current as of February 15, 2009**

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://content.onlinejacc.org/cgi/content/full/51/3/284>



## EDITORIAL COMMENT

# Syncope Management From Emergency Department to Hospital\*

Michele Brignole, MD,†  
Win K. Shen, MD, FACC‡

*Lavagna, Italy; and Rochester, Minnesota*

There are two main reasons for evaluating a patient with syncope. The first reason is to make a diagnosis, that is, to define the mechanism that caused loss of consciousness. The vast majority of these patients have a disturbing or disabling condition that is not immediately life-threatening but may diminish quality of life and lead to physical injury. Defining the mechanism is the prerequisite for finding a specific therapy to prevent syncopal recurrences. The treatment of syncope frequently differs from the treatment of the underlying disease. Therapy should be aimed either at eliminating the cause of syncope or curing the underlying disease that predisposes to syncope. Therapeutic decisions in both situations greatly depend on the estimation of the relative prognostic significance that physicians attribute to syncope and to underlying disease.

See page 276

The second reason is to determine the prognosis, that is, to stratify the risk of future adverse clinical events to which the patient is subject either directly related to syncope or more generally related to the underlying disease, of which syncope may be only an ominous finding or one of the clinical manifestations. Physicians should be aware not to confound the prognostic significance of syncope with that of the underlying disease.

Frequently, the emergency department (ED) evaluation of a patient presenting with syncope does not reveal a clear etiology. The emergency physician must then determine which patients require further diagnostic evaluation and monitoring and in what setting, whether in hospitals or outpatient clinics. The role and responsibility of the emer-

gency physician in evaluating the patient with syncope has expanded from efforts to determine a specific cause of syncope (diagnosis) to that of risk stratification and clinical outcomes (prognosis), similar to the process of chest pain evaluation (1). Once the ED evaluation is completed, subsequent optimal patient management (by whom and where) remains a subject of frequent debate. A validated standardized triage pathway has not been established. The article by Constantino et al. (2) in this issue of the *Journal* presents valuable prognostic information potentially useful to the design of a standardized syncope management pathway. In this editorial, we would like to briefly discuss some recent clinical evidence, including the information presented by Constantino et al. (2), with a friendly intent to challenge the authors of the article and readers of the *Journal* with a proposed novel syncope model/facility to ultimately improve the efficiency and effectiveness of managing this large and difficult patient population.

## Management of Risk

**Short-term (within 10 days) risk.** Few studies have directly evaluated the short-term risk of syncope. The risk of life-threatening conditions in the few days after ED referral is obviously the main reason for immediate hospital admission and exhaustive evaluation.

In the StePS (Short-Term Prognosis of Syncope) study (2), published in this issue of the *Journal*, abnormal electrocardiogram (ECG), concomitant trauma, absence of symptoms of impending syncope, and male gender were associated with 10 days' higher risk of death or serious adverse events (defined as cardiopulmonary resuscitation, pacemaker or defibrillator implant, and intensive care unit admittance) and early readmission to a hospital. However, owing to the relatively low rate of these events, their clinical utility was hampered by a very low positive predictive value that ranged between 11% and 14%.

The San Francisco Syncope Rule (3) considers patients with an abnormal ECG, a complaint of shortness of breath, hematocrit <30%, systolic blood pressure <90 mm Hg, or a history of congestive heart failure. The rule was 98% sensitive and 56% specific to predict serious outcomes within 7 days of ED presentation (defined as death, myocardial infarction, arrhythmia, pulmonary embolism, stroke, subarachnoid hemorrhage, significant hemorrhage, or any condition causing a return ED visit and hospitalization). However, in 1 external validation cohort (4), the San Francisco Syncope Rule had a lower sensitivity and specificity than in previous reports (89% and 42%).

Both studies have shown that the risk of death and of adverse outcome is high in the few days following the index syncopal episode among high-risk patients, thus justifying the effort for identification and immediate hospitalization with intensive management of these patients. Most of the deaths and many detrimental outcomes seemed to be related to the severity of the underlying disease rather than to

\*Editorials published in the *Journal of the American College of Cardiology* reflect the views of the authors and do not necessarily represent the views of *JACC* or the American College of Cardiology.

From the †Department of Cardiology and Arrhythmologic Center, Ospedali del Tigullio, Lavagna, Italy; and the ‡Division of Cardiovascular Diseases, Department of Internal Medicine, Mayo Clinic College of Medicine, Rochester, Minnesota.

Table 1

**Factors That Lead to Stratification as High-Risk for Adverse Outcome (Hospital Admission Recommended) Used in the Clinical Policy of the American College of Emergency Physicians (1)**

- Older age and associated comorbidities\*
- Abnormal electrocardiogram (including acute ischemia, dysrhythmias, or significant conduction abnormalities)
- Hematocrit <30% (if obtained)
- History or presence of heart failure, coronary artery disease, or structural heart disease

\*Different studies use different ages as threshold for decision-making. Age is likely a continuous variable that reflects the cardiovascular health of the individual rather than being an arbitrary value.

syncope per se. For example, in the STePS study, 5 patients (0.7%) died; the causes of death were disseminated intravascular coagulation, acute pulmonary edema, aortic dissection, pulmonary embolism, and stroke. Similarly, in EGSYS (Evaluation of Guidelines in Syncope Study) (5), 10 patients (1%) died before discharge: sudden death in 1 case, cardiac nonsudden death in 3 cases, pulmonary disease in 2 cases, cancer in 3 cases, and undefined in 1 case.

The recommendations for hospitalization from the recent policy statement of the American College of Emergency Physicians (1), targeting ED patients without an established diagnosis, are based primarily on the evaluation of risk; they are summarized in Table 1.

**Long-term (1-year) risk.** In the STePS study (2), long-term severe outcome was correlated with an age >65 years and history of neoplasms, cerebrovascular diseases, structural heart diseases, and ventricular arrhythmias. This finding is likely to reflect the importance of comorbidities, as suggested by long-term risk factors such as cardiac and cerebrovascular diseases and neoplasms.

Martin et al. (6) studied 252 syncope patients to develop a risk classification system and then tested the system in a validation cohort of 374 patients. Predictors of arrhythmia or 1-year mortality in the validation cohort were found to be abnormal ECG result, history of ventricular arrhythmia, history of congestive heart failure, or age >45 years. The event rate (clinically significant arrhythmia or death) at 1 year ranged from 0% for those with none of the 4 risk factors to 27% for those with 3 or 4 risk factors.

For the OESIL (Osservatorio Epidemiologico della Sincope nel Lazio) risk score (7), mortality increased significantly within 1 year in patients with age >65 years, history of cardiovascular disease, lack of prodromes, and abnormal electrocardiogram (0% for no factor, 0.8% for 1 factor, 19.6% for 2 factors, 34.7% for 3 factors, and 57.1% for 4 factors).

Again, similar to the short-term events, most of the deaths and serious outcomes seemed to be correlated to the severity of the underlying disease rather than to syncope per se. High-risk patients need to be followed closely; optimal therapy and management must be provided. However, the presumption that an immediate in-hospital evalua-

tion improves a patient's long-term clinical outcome has never been demonstrated, and alternative strategies could be considered.

## Management (Diagnosis and Treatment) of Syncope

Contrary to the recommendations of the American College of Emergency Physicians that are based on the evaluation of risk stratification, the recommendations for hospitalization from the Guidelines on Syncope of the European Society of Cardiology (8) are based on the evaluation of the mechanism of syncope and of its treatment. The recommendations are summarized in Table 2.

**A new proposed model of syncope management (role of syncope facilities).** A recent randomized, single-center study, SEEDS (Syncope Evaluation in the Emergency Department Study) (9), showed that a syncope observational unit in the ED, with appropriate resources and a multidisciplinary collaboration, could improve the diagnostic yield, reduce hospital admission, and achieve favorable long-term outcome in survival and recurrent symptoms of syncope. After initial assessment with a complete history, physical examination, and standard ECG, the patients received continuous cardiac telemetry for up to 6 h, hourly vital signs and orthostatic blood pressure checks, and echocardiogram for patients with abnormal cardiovascular examination or electrocardiographic findings. Tilt-table testing, carotid sinus massage, and electrophysiology consultations (and other subspecialties) were made available to the ED physician. After completion of syncope observational unit evaluation, follow-up appoint-

Table 2

**Hospital Admission for Syncope Management Recommended by the ESC Syncope Guidelines (8)**

**For diagnosis**

**Strongly recommended**

- Suspected or known significant heart disease
- Electrocardiographic abnormalities suggestive of arrhythmic syncope
- Syncope occurring during exercise
- Syncope causing severe injury
- Strong family history of sudden death

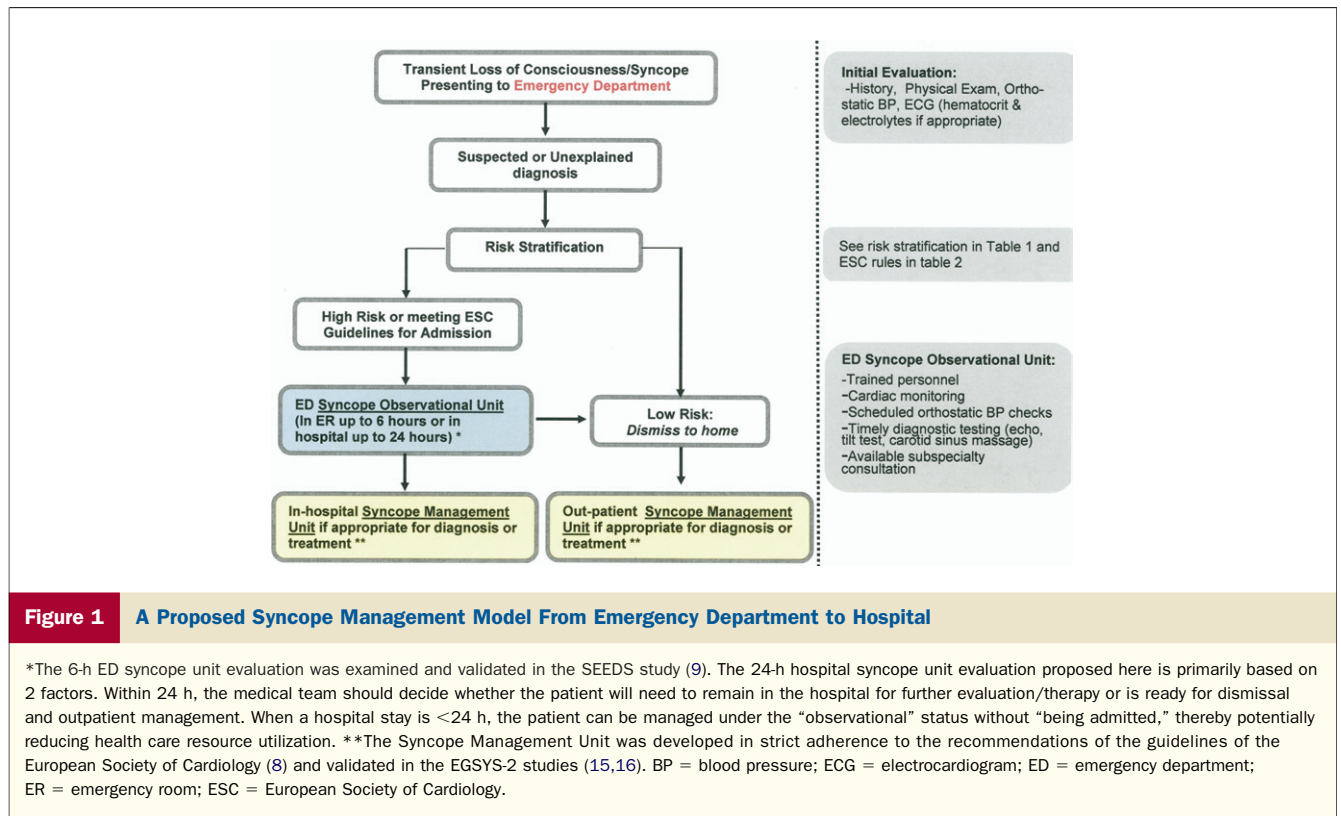
**Occasionally may need to be admitted**

- Patients with or without heart disease but with:
  - sudden onset of palpitations shortly before syncope
  - syncope in supine position
  - worrisome family history
  - significant physical injury
- Patients with minimal or mild heart disease when there is high suspicion for cardiac syncope
- Suspected pacemaker or implantable cardioverter-defibrillator problem

**For treatment**

- Cardiac arrhythmias as cause of syncope
- Syncope due to cardiac ischaemia
- Syncope secondary to the structural cardiac or cardiopulmonary diseases
- Stroke or focal neurologic disorders
- Cardioinhibitory neurally mediated syncope when a pacemaker implantation is planned

ESC = European Society of Cardiology.



ment at the outpatient syncope management unit can be arranged, when needed, if the patient is not to be admitted to the hospital.

Following hospital admission, concerns that “well-appearing” syncope patients may have a “malignant” or adverse outcome frequently result in extensive broad-based evaluations that are often deemed unnecessary and cost-ineffective (10–14). A recent prospective study, EGSYS-2 (15,16), evaluated a new method of management of syncope based on a decision-making approach developed in strict adherence to the recommendations of the guidelines of the European Society of Cardiology (8). To maximize its application, decision-making guideline-based software was used, and trained core medical personnel were designated, both locally in each hospital and centrally, to verify adherence to the diagnostic pathway and give advice on its correction. The study showed that this standardized care pathway significantly improved diagnostic yield and reduced hospital admissions, resource consumption, and overall costs compared with usual care.

Although the results of SEEDS and EGSYS-2 studies are difficult to reproduce in everyday practice, these results are encouraging preliminary evidence that supports the notion that a designated syncope management unit, in the ED and/or at a hospital, can provide more efficient and effective triage and evaluation of patients in selected centers. The general strategy in a specialized syncope management unit concept is proposed in Figure 1.

Several critical questions remain to be addressed. Is the syncope unit model/critical pathway implemented in SEEDS suitable only in large referral centers with sufficient resources such as continuous monitoring, availability of cardiac and tilt-table testing, and immediate consultations from electrophysiologists, cardiologists, neurologists, or other subspecialists? Can the training and educational efforts made by the medical staff in EGSYS-2 be successfully implemented in other hospitals? Should a more “basic” syncope management model suitable for most community hospitals be examined? What additional clinical outcome data may be required to validate a standardized syncope unit practice model that can be widely adapted in all hospital practices? Defining and managing the syncope patient will continue to be a challenge. We anticipate that the syncope management unit concept will continue to evolve and to be refined with additional evidence, such as that presented by Constantino et al. (2), to eventually provide the optimal patient care.

**Reprint requests and correspondence:** Dr. Michele Brignole, Arrhythmologic Centre, Department of Cardiology, Ospedali del Tigulio, 16033 Lavagna, Italy. E-mail: [mbrignole@ASL4.liguria.it](mailto:mbrignole@ASL4.liguria.it).

#### REFERENCES

- Huff JS, Decker WW, Quinn J, et al. Clinical policy: critical issues in the evaluation and management of adult patients presenting to the emergency department with syncope. *Ann Emerg Med* 2007; 49:431–44.



2. Costantino G, Perego F, Dipaola F, et al., on behalf of the STePS Investigators. Short- and long-term prognosis of syncope, risk factors, and role of hospital admission: results from the STePS (Short-Term Prognosis of Syncope) study. *J Am Coll Cardiol* 2008;51:276–83.
3. Quinn J, McDermott D, Stiell I, Kohn M, Wells G. Prospective validation of the San Francisco Syncope Rule to predict patients with serious outcomes. *Ann Emerg Med* 2006;47:448–54.
4. Sun BC, Mangione CM, Merchant G, et al. External validation of the San Francisco Syncope Rule. *Ann Emerg Med* 2007;49:420–7.
5. Disertori M, Brignole M, Menozzi C, et al. Management of patients with syncope referred urgently to general hospitals. *Europace* 2003;5:283–91.
6. Martin TP, Hanusa BH, Kapoor WN. Risk stratification of patients with syncope. *Ann Emerg Med* 1997;29:459–66.
7. Colivicchi F, Ammirati F, Melina D, Guido V, Imperoli G, Santini M. Development and prospective validation of a risk stratification system for patients with syncope in the emergency department: the OESIL risk score. *Eur Heart J* 2003;24:811–9.
8. Brignole M, Alboni P, Benditt D, et al. Guidelines on management (diagnosis and treatment) of syncope—update 2004. *Europace* 2004;6:467–537.
9. Shen WK, Decker WW, Smars PA, et al. Syncope Evaluation in the Emergency Departments (SEEDS): a multidisciplinary approach to syncope management. *Circulation* 2004;110:3636–45.
10. Brignole M, Disertori M, Menozzi C, et al. Management of syncope referred urgently to general hospitals with and without syncope units. *Europace* 2003;5:293–8.
11. Ammirati F, Colivicchi F, Minardi G, et al. Hospital management of syncope: the OESIL study (Osservatorio Epidemiologico della Sincope nel Lazio). *G Ital Cardiol* 1999;29:533–9.
12. Ammirati F, Colivicchi F, Santini M, on behalf of the Investigators of the OESIL Study. Diagnosing syncope in clinical practice: implementation of a simplified diagnostic algorithm in a multicentre prospective trial—the OESIL 2 study (Osservatorio Epidemiologico della Sincope nel Lazio). *Eur Heart J* 2000;21:935–40.
13. Del Greco MCS, Scillieri M, Caprari F, Scivales A, Disertori M, for the ECSIT Study (Epidemiology and Costs of Syncope in Trento). Diagnostic pathway of syncope and analysis of the impact of guidelines in a district general hospital. *Ital Heart J* 2003;4:99–106.
14. Benditt D. Syncope management guidelines at work: first steps towards assessing clinical utility. *Eur Heart J* 2006;27:7–9.
15. Brignole M, Bartoletti A, Giada F, et al. A new management of syncope: prospective systematic guideline-based evaluation of patients referred urgently to general hospitals. *Eur Heart J* 2006;27:76–82.
16. Brignole M, Bartoletti A, Ponassi I, et al. Standardized-care pathway vs. usual management of syncope patients presenting as emergencies at general hospitals. *Europace* 2006;8:644–50.

## Syncope Management From Emergency Department to Hospital

Michele Brignole, and Win K. Shen  
*J. Am. Coll. Cardiol.* 2008;51;284-287  
doi:10.1016/j.jacc.2007.07.092

**This information is current as of February 15, 2009**

<b>Updated Information &amp; Services</b>	including high-resolution figures, can be found at: <a href="http://content.onlinejacc.org/cgi/content/full/51/3/284">http://content.onlinejacc.org/cgi/content/full/51/3/284</a>
<b>References</b>	This article cites 16 articles, 10 of which you can access for free at: <a href="http://content.onlinejacc.org/cgi/content/full/51/3/284#BIBL">http://content.onlinejacc.org/cgi/content/full/51/3/284#BIBL</a>
<b>Rights &amp; Permissions</b>	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: <a href="http://content.onlinejacc.org/misc/permissions.dtl">http://content.onlinejacc.org/misc/permissions.dtl</a>
<b>Reprints</b>	Information about ordering reprints can be found online: <a href="http://content.onlinejacc.org/misc/reprints.dtl">http://content.onlinejacc.org/misc/reprints.dtl</a>

