

Management of syncope referred urgently to general hospitals with and without syncope units

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Objective We tested the hypothesis that management of patients with syncope admitted urgently to a general hospital may be influenced by the presence of an in-hospital structured syncope unit.

Background The management of syncope is not standardized.

Methods We compared six hospitals equipped with a syncope unit organized inside the department of cardiology with six matched hospitals without such facilities. The study enrolled all consecutive patients referred to the emergency room from 5 November 2001 to 7 December 2001 who were affected by transient loss of consciousness as their principal symptom.

Results There were 279 patients in the syncope unit hospitals and 274 in the control hospitals. In the study group, 30 (11%) patients were referred to the syncope unit for evaluation. In the study group, 12% fewer patients were hospitalized (43 vs 49%, not significant) and 8% fewer tests were performed

(3.3 ± 2.2 vs 3.6 ± 2.2 per patient, not significant). In particular, the study group patients underwent fewer basic laboratory tests (75 vs 86%, $P = 0.002$), fewer brain-imaging examinations (17 vs 24%, $P = 0.05$), fewer echocardiograms (11 vs 16%, $P = 0.04$), more carotid sinus massage (13 vs 8%, $P = 0.03$) and more tilt testing (8 vs 1%, $P = 0.000$). In the study group, there was a +56% rate of final diagnosis of neurally mediated syncope (56 vs 36%, $P = 0.000$).

Conclusion Although only a minority of patients admitted as an emergency are referred to the syncope unit, overall management is substantially affected. It is speculated that the use of a standardized approach, such as that typically adopted in the syncope unit, is able to influence overall practice in the hospital.

(Europace 2003; 5: 293–298)

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Key Words: Syncope, diagnosis, emergency medicine, syncope unit.

Manuscript submitted 30 January 2003, and accepted after revision 26 April 2003.

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Introduction

Data from some pilot studies in Italy^[1–3] and the U.K.^[4] have shown that the management of patients with syncope admitted as an emergency to a general hospital is not standardized. The method of diagnosis and treatment varies not only from hospital to hospital

but also from one department to another (cardiology, general medicine, neurology, etc.) and very often the procedures followed are substantially different from those recommended by the guidelines, such as those recently issued by the European Society of Cardiology^[5].

In this study, we tested the hypothesis that the management of patients admitted urgently to a general hospital may be influenced by the presence of an in-hospital structured syncope unit.

Method

The study was designed to compare the strategy of management of patients admitted to the emergency rooms of six general hospitals equipped with an in-hospital syncope unit with that of six matched general hospitals without such a facility. The study was a prospective registry that included all patients admitted to emergency rooms from 5 November 2001 to 7 December 2001 because of an episode of transient loss of consciousness as the principal symptom that had occurred <48 h before admission.

The centres were selected among those participating in the Evaluation of Guidelines in Syncope Study (EGSYS), a large registry on syncope which involved 28 general hospitals in Italy during the same period. All were large or medium-sized public general hospitals that had a 24-h emergency department and on-site facilities for all the investigations generally indicated for the evaluation of unexplained syncope. In particular, they had facilities for tilt testing, electrophysiological study, prolonged electrocardiographic monitoring and neurological investigations.

The six syncope units are of similar organization. These are units managed by cardiologists within the department of cardiology and have specialized medical and support personnel. Patients referred to the syncope unit have preferential access to all the other facilities of the department and can promptly undergo any investigation considered useful; they may also be admitted to the cardiology ward or intensive care unit, if necessary. When appropriate, other specialists, e.g. neurologists, are involved in patient management and non-cardiological examinations are performed. Patients are referred from the emergency room as well as from the inpatient service or the outpatient clinic, but the personnel of the unit is not usually involved in the initial evaluation performed in the emergency department.

The six control hospitals were matched 1:1 with those with syncope units before the start of the study according to the following criteria: similar number of total patients admitted to the emergency room, similar number of patients admitted for loss of consciousness and similar number of inhabitants in the district of referral. In the control hospitals, syncope patients were managed according to the local practice.

Study protocol

Since the aim of the study was to record the usual practice, we tried not to influence this by drawing up protocols or rules. In order to collect data, we instructed the personnel of the emergency service to fill in a questionnaire regarding the history of the patients and to record all the examinations they had undergone from admission until discharge from the hospital or admission to another ward. In each hospital, an investigator collected the questionnaires, followed the subsequent diagnostic flow of the patients and recorded all the investigations performed until discharge. The investigator had no contact with the patients and no role in clinical decisions. However, he was responsible for reviewing the patients' files and assigning the reported final diagnosis to one of the categories of the classification of loss of consciousness of the Guidelines on Syncope of the European Society of Cardiology. Whenever discrepancies made assignment doubtful or uncertain, he reevaluated the case with the physicians who had made the diagnosis.

Size of the sample and duration of enrolment

Italian epidemiological studies^[1-3] have reported a percentage of diagnoses of neurally mediated syncope $\leq 35\%$, a figure which is less than that expected from the guidelines. On hypothesizing an increase from 35 to 50% in diagnoses of neurally mediated syncope in the syncope unit hospitals as a result of better evaluation, 170 patients would have been necessary for each arm in order to show a significant difference with a level of probability <0.05. Moreover, considering that the enrolment rate of the above-mentioned studies was of 1.5 per day per hospital, an enrolment period of 30 days was deemed necessary in order to reach the target population.

Comparisons between proportions were made by means of Fisher's exact test.

Results

The hospitals in the two groups had very similar demographic features, similar numbers of patients admitted as emergencies and similar numbers of patients admitted for syncope (Table 1). The clinical characteristics of the patients with syncope were also similar in the two groups of hospitals with regard to age, sex, associated co-morbidities and clinical presentation of the syncopal attacks (Table 2). The two groups differed only in terms of the presence or absence of syncope units; the effect of this variable could therefore be evaluated.

Findings

There were 279 patients in the syncope unit hospitals and 274 in the control hospitals (Table 3). In the study

Table 1 Demographics

	Syncope unit hospitals (n = 6)	Control hospitals (n = 6)
Total number of inhabitants of the district of referral	1,127,048	1,066,671
Total number of patients admitted to emergency room	24,909	25,195
Range per hospital	2123–5988	2623–5455
Total number of patients with loss of consciousness (%)	279 (1.1%)	274 (1.1%)
Percent range per hospital	0.5–1.8%	0.5–1.6%

group, 46% of patients were discharged directly from the emergency service, 43% were hospitalized and 11% were referred to the syncope unit for further investigation. In the control group, 51% were discharged and 49% hospitalized; thus, hospitalization was 12% lower among the study group patients. The study group patients underwent 8% fewer tests than the control group (920 tests— 3.3 ± 2.2 per patient vs 983 tests— 3.6 ± 2.2 per patient). In particular, the study group patients underwent 13% fewer basic laboratory tests, 40% fewer brain computed tomography or magnetic resonance imaging examinations and 31% fewer echocardiograms. By contrast, the study group patients underwent 38% more carotid sinus massage and 87% more tilt testing. In

Table 2 Characteristics of patients with loss of consciousness

	Syncope unit hospitals	Control hospitals
Patients with loss of consciousness admitted to ER	279	274
Admission within 6 h of loss of consciousness (%)	81%	85%
Mean age, years	61 ± 23	60 ± 23
Females (%)	161 (58%)	140 (51%)
Co-morbidities		
Hypertension	97/271 (36%)	108/270 (40%)
Structural heart disease	89/279 (32%)	94/274 (35%)
Neurological diseases	55/274 (20%)	61/269 (23%)
Diabetes	20/266 (8%)	23/269 (9%)
Any therapy at the time of syncope	152/259 (59%)	166/267 (62%)
History of syncope: first episode	62/263 (24%)	85/211 (40%)
Injuries related to fainting		
Major injuries (fractures, brain concussion)	16/279 (6%)	14/274 (5%)
Minor injuries (bruises, etc)	53/279 (19%)	66/274 (24%)
No warning of the onset of the attack	69/240 (29%)	73/245 (30%)
Neurological symptoms after the attack	15/257 (6%)	28/268 (10%)

the study group there was a +56% rate of final diagnosis of neurally mediated syncope.

Discussion

The main result of the study is that the management of patients with syncope referred to general hospitals with a syncope unit was substantially different from that observed in the hospitals without this facility. Fewer hospitalizations (not significant) and fewer tests were recorded in the syncope unit hospitals; this was mainly due to the fact that those investigations (basic laboratory tests, computed tomography, magnetic resonance imaging and echocardiography) which, according to the recommendations of the Guidelines on Syncope^[5], are not usually considered useful for diagnosis were less frequently undertaken. By contrast, carotid sinus massage and tilt testing, which the Guidelines recommend in many patients with syncope, were more frequently performed in the syncope unit hospitals. Thus, a more appropriate diagnostic approach can be hypothesized. These results are partly surprising, as only a minority of patients was actually referred to the syncope units or to the cardiology department, whereas the majority was directly managed by the emergency services. The different results can only partly be ascribed to the small percentage of the patients directly managed by the syncope unit. Similarly, the large difference in the percentage of diagnoses of neurally mediated syncope can only partly be ascribed to the higher number of carotid sinus massages and tilt tests performed in the syncope unit hospitals. Thus, we can speculate that the presence of the syncope unit *per se* and the introduction of the standardized guideline-based approach that is typically applied in such units are able to modify the overall hospital practice, even if the personnel of the syncope unit is not directly involved in the management of the patients.

On the other hand, current practice, even in those hospitals equipped with a syncope unit, differs greatly from that reported for patients referred to the syncope units and from that recommended in the Guidelines. For example, in a study of patients referred to three syncope units^[6,7] in which standardized evaluation based on the Guidelines of the Italian 'Associazione Nazionale Medici Cardiologi Ospedalieri'^[8] was followed, carotid sinus massage was judged appropriate in 57% of patients, tilt testing in 52% and electrophysiological study in 17%. Such a huge difference from the percentages observed in the present study cannot be explained by a different selection of patients. We believe that these tests are greatly underused in patients admitted to the emergency department. For instance, tilt testing was undertaken in only 3% of patients admitted to the emergency room of a university hospital in France^[9] and in 1.9% of patients in 15 hospitals in Italy's Lazio region^[11]; in the same studies, the figures for electrophysiological study were 2 and

Table 3 Results

	Syncope unit hospitals	Control hospitals	P value
Total patients with loss of consciousness admitted to ER	279	274	
<i>In-hospital pathway</i>			
Discharged from ER	128 (46%)	141 (51%)	
Discharged and referred to syncope unit	30 (11%)	—	
Hospitalized	121 (43%)	133 (49%)	
Cardiology	13 (5%)	13 (5%)	
Internal medicine/Geriatrics	97 (35%)	92 (34%)	
Neurology	5 (2%)	15 (5%)	0.02
Other wards	6 (2%)	13 (5%)	0.02
<i>Tests performed</i>			
Electrocardiography	258 (92%)	253 (92%)	
Basic laboratory tests	208 (75%)	237 (86%)	0.000
Chest X-ray	68 (24%)	80 (29%)	
Brain CT scan and/or MRI scan	48 (17%)	67 (24%)	0.02
Prolonged electrocardiographic monitoring	39 (14%)	48 (18%)	
Carotid sinus massage	37 (13%)	22 (8%)	0.03
Carotid echo-Doppler	34 (12%)	31 (11%)	
Electroencephalography	33 (12%)	37 (14%)	
Echocardiography	31 (11%)	45 (16%)	0.04
Tilt testing	23 (8%)	3 (1%)	0.000
Abdominal ultrasound examination	15 (5%)	17 (6%)	
Electrophysiological study	4 (1%)	2 (0%)	
Coronary angiography	2 (1%)	2 (0%)	
Exercise test	1 (0%)	4 (1%)	
Miscellaneous (1 or more test per patient)	64 (23%)	54 (20%)	
Total tests	920	983	
Mean number of tests per patient	3.3 ± 2.2	3.6 ± 2.2	
<i>Final diagnosis*</i>			
Neurally mediated reflex syncopal syndromes	155 (56%)	99 (36%)	0.000
Orthostatic	11 (4%)	27 (10%)	0.009
Cardiac	21 (8%)	31 (11%)	
Cerebrovascular	4 (1%)	6 (2%)	
Non-syncopal attacks [†]	42 (15%)	63 (23%)	0.02
Unexplained syncope	46 (16%)	48 (18%)	
<i>In-hospital mortality</i>			
	4 (1%)	4 (1%)	

CT, computed tomography; MRI, magnetic resonance imaging.

*According to the Classification of Loss of Consciousness of the Guidelines of the European Society of Cardiology^[5].

[†]Non-syncopal attacks include: metabolic disorders (hypoglycaemia, hypoxia, hyperventilation), epilepsy, intoxication, transient ischaemic attack, cataplexy, drop attacks, and psychogenic 'syncope' (somatization disorders).

0.1%, respectively. These figures were higher in a population-based study^[11] that used an in-hospital standardized protocol, tilt tests being performed in 15% of patients and electrophysiological study in 3.8%. Thus, guidelines need to be widely implemented, and the syncope unit must be more fully integrated within the organization of the hospital as a whole and not just within the department that runs it.

Our results can be compared with those recently observed in two single centre studies^[9,10]. In a study^[9] from a centre equipped with a cardiology department specialized in the evaluation of syncope, the final diagnosis was neurally mediated in 48%, orthostatic in 4%, cardiac in 10%, cerebrovascular in 1%, syncope-like in 10% and unexplained in 24% of 454 patients who were evaluated. In another study^[10] from a tertiary centre that used an in-hospital standardized protocol, the final diagnosis was neurally mediated in 38%,

orthostatic in 24%, cardiac in 11%, cerebrovascular in 5%, syncope-like in 3% and unexplained in 14% of 650 patients who were evaluated.

Limitations

The syncope units were managed by cardiologists within the department of cardiology and actually they showed only a small interaction with the emergency department. There were no specifically defined criteria to select the patients to be referred to the syncope units and decision was left entirely to the individual physicians. It is likely that a more accurate integration and the use of specific in-hospital protocols would have greatly increased the referral rate and enhanced the management of patients.

It is possible that the control hospitals do not constitute a rigorous control as they were selected in order to match

with those with syncope units as regards a few general characteristics. The selection of other control hospitals according to other methods could possibly modify substantially the overall results of the study. On the other hand, a formal randomization seems difficult to achieve in this kind of study.

Conclusions

Guidelines from scientific societies should provide the standard, but these are not widely known and are sometimes difficult to apply in clinical practice. Moreover, physicians in specialties different from those who draw up the guidelines are reluctant to apply them to their patients. Thus, guidelines alone are unlikely to change the usual practice. They merely provide the background of knowledge to support a different management of syncope.

Initial studies support the introduction of in-hospital syncope units and of the standardized guideline-based approach that is typically applied in such units in order to increase the appropriateness of the diagnostic pathway and to reduce the costs of evaluation^[6,7]. However, the definition of 'syncope unit' is itself still uncertain and we lack accepted criteria to define its standards of quality, personnel, functions, etc. The present study suggests that, in order to maximize its effect, the syncope unit should work in close liaison with the emergency service to which syncope patients are first referred and where they are screened as well as with the other departments where most patients are actually hospitalized. Nevertheless, further large-scale studies are needed before the wide use of syncope units can be recommended.

We wish to thank Silvia Signorelli and Fabiola Zanna for their technical support in preparing the database.

Appendix

Evaluation of Guidelines in Syncope Study (EGSYS)

Endorsed by the Working Group on Pacing of the European Society of Cardiology, Area Aritmie of Associazione Nazionale Medici Cardiologi Ospedalieri (ANMCO), Associazione Italiana di Aritmologia e Cardioritmo (AIAC), Società Italiana di cardiologia (SIC) and with the organizational support of Medtronic Italy.

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