Does the Initial Screening of Syncope in the Emergency Department and During Hospitalization Adhere to ESC Guidelines?

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ABSTRACT **Background:** The evaluation of syncope in emergency departments (EDs) and during hospitalization can be ineffective. The European Society of Cardiology (ESC) guidelines were established to perform the evaluation based on risk stratification.

Objectives: To investigate whether the initial screening of syncope adheres to the recent ESC guidelines.

Methods: Patients with syncope who were evaluated in our ED were included in the study and retrospectively classified based on whether they were treated according to ESC guidelines. Patients were divided into two groups according to the ESC guideline risk profile: high risk or low risk.

Results: The study included 114 patients (age 50.6 ± 21.9 years, 43% females); 74 (64.9%) had neurally mediated syncope, 11 (9.65%) had cardiac syncope, and 29 (25.45%) had an unknown cause. The low-risk group included 70 patients (61.4%), and the high-risk group included 44 (38.6%). Only 48 patients (42.1%) were evaluated according to the ESC guidelines. In fact, 22 (36.7%) of 60 hospitalizations and 41 (53.2%) of 77 head computed tomography (CT) scans were not mandatory according to guidelines. The rate of unnecessary CT scans (67.3% vs. 28.6%, respectively, $P = 0.001$) and unnecessary hospitalization (66.7% vs. 6.7%, respectively, $P < 0.02$) were higher among low-risk patients than high-risk patients. Overall, a higher percentage of high-risk patients were treated according to guidelines compared to low-risk patients (68.2% vs. 25.7% respectively, $P < 0.0001$).

Conclusions: Most syncope patients, particularly those with a low-risk profile, were not evaluated in accordance with the ESC guidelines.

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Syncope is defined as a transient loss of consciousness due to cerebral hypoperfusion. Cerebral hypoperfusion can occur due to a drop in cardiac output and/or a drop in total peripheral resistance [1]. The most common cause of syncope is reflex mediated, which is a benign condition; however, cardiovascular origin and unknown origin are also important as they can be more malignant. Syncope occurs suddenly, for a short period, and with spontaneous resumption of consciousness. Many other conditions can mimic syncope including epilepsy, psychogenic conditions, and trauma, which can lead to misdiagnoses and unnecessary as well as expensive evaluation. Syncope is presented in 3–5% of emergency department (ED) visits and 1–2% of hospitalizations in the United States [2,3]. Forty percent of the general population will experience a syncopal episode during their lifetime, and about one-third will not have a definite diagnosis [4]. There are different causes of syncope, some are benign, and some may be malignant. Without a systematic and guided approach, an evaluation can be ineffective and expensive [1]. Furthermore, a fast and correct diagnosis impacts prognosis, as the risk of mortality increases in patients with cardiovascular syncope [5].

According to recent European Society of Cardiology (ESC) guidelines, the initial evaluation of syncope in the ED should be based on risk profile, and the triage of patients should proceed based on risk stratification [1,6]. The aim of this study was to evaluate whether the initial evaluation of syncope in ED and during hospitalization was conducted according to the ESC guidelines.

PATIENTS AND METHODS

Patients who presented with syncope who were evaluated in our ED and/or during hospitalized in 2018–2019 were retrospectively included in the study and were classify based on whether they were treated according to ESC guidelines. Patients were divided into two groups according to ESC risk profile guidelines: high (having any high-risk features) or low (no high-risk features). Risk stratification is based on parameters related to the syncopal event, past medical history, physical examination, and electrocardiogram [1]. Each parameter has low- and high-risk components. A high-risk profile is defined as any high-risk feature present. This retrospective study was approved by the local institutional research ethics committee at Tzafon Medical Center. Informed consent was waived as the study design was retrospective.

Patients were considered to be treated according to ESC guidelines if they were triaged (discharged or hospitalized for at least 24 hours as we do not have a syncope observational unit) according to the risk profile and evaluated (including blood tests, carotid sinus massage, head-up tilt testing, exercise tests, echocardiography, and imaging studies) based on history, clinical scenario, physical examination, and 12 lead electrocardiogram and immediate electrocardiogram monitoring [1]. Low-risk profile (low-risk features only) patients (i.e., reflex, situational, or orthostatic) could be discharged directly from the ED and high-risk patients (any high-risk feature) should be monitored and evaluated in a syncope observational unit (if available) or admitted for diagnosis and treatment. In general, patients with suspected malignant brady or tachy arrhythmias were admitted to the cardiology department, and patients with less malignant conditions were admitted to the internal medicine department.

STATISTICAL METHODS

The clinical characteristics of the cohort were summarized. We compared low-risk patients with high-risk patients. We also compared patients who were treated according to guidelines and those who were not.

Values were presented as mean ± standard deviation, and categorical variables were represented by percentage and prevalence. Comparisons between low- and high-risk patients, and between guided treated and non-guided treated patients were conducted using a *t*-test or Mann–Whitney U test for the continues data, and a chi-square test for categorical data.

Table 1. Baseline characteristics (n=114)

Characteristic	Value
Age in years	50.6 ± 21.96
Sex: female, n (%)	49 (43.0%)
Previous admission for syncope, n (%)	31 (27.7%)
Return to hospital within 3 months, n (%)	22 (19.3%)
Risk summary	
High-risk profile, n (%)	44 (38.6%)
Low-risk profile, n (%)	70 (61.4%)
Syncope event with high-risk characteristics, n (%)	29 (25.4%)
Past medical history with high-risk characteristics, n (%)	21 (18.4%)
Physical examination with high-risk characteristics, n (%)	7 (6.1%)
Electrocardiogram with high-risk characteristics, n (%)	28 (24.6%)
Evaluation according to ESC guidelines	
No, n (%)	66 (57.9%)
Yes, n (%)	48 (42.1%)
Diagnosis	
Neurally mediated syncope, n (%)	74 (64.9%)
Cardiac mediated syncope, n (%)	11 (9.6 %)
Unknown cause, n (%)	29 (25.4%)

ESC = European Society of Cardiology

RESULTS

The study was comprised of 114 patients with syncopal event treated in Tzafon Medical Center during 2018–2019. Mean age was 50.6 ± 21.9 years, and 49 (43%) are females [Table 1]. Thirty-one patients (27.7%) had a previous syncopal event and 22 (19.3%) revisited the ED within 3 months. Overall, 44 patients (38.6%) had a high-risk profile and 70 (61.4%) had a low-risk profile according to the 2018 ESC guidelines. A high-risk feature of syncopal event was found in 29 (25.4%) patients, past medical history in 21 (18.4%), physical examination in 7 (6.1%), and electrocardiogram findings in 28 (24.6%). Forty-eight patients (42.1%) had an ESC guided evaluation, and 66 patients (57.9%) had an ESC non-guided evaluation. Cardiac syncope was found in 11 patients (9.65%), neurally mediated syncope in 74 (64.9%), and unknown cause in 29 (25.45%).

Twenty-nine patients (25.4%) had head trauma. Of 77 patients (67.5%) who had a head computed tomography (CT) scan, 41 (53.2%) had an unnecessary CT scan. A CT scan should be performed if major head trauma is suspected and or if there are any new neurological signs. There were no significant findings in any CT scans. Swelling of soft tissue was found in three patients, and one patient had a fracture of the mandibular bone due to trauma. Overall, 60 patients (52.6%) were hospitalized, 10 (8.8%) refused hospitalization, and 44 (38.6%) were discharged from the ED [Table 2]. In addition, 36.7% of these hospitalizations were unnecessary; 42 patients (36.8%) were hospitalized in the internal medicine department and 18 (15.8%) in the cardiology department.

HIGH-RISK VS. LOW-RISK PATIENTS

Seventy patients (61.4%) had a low-risk profile and 44 (38.6%) had a high-risk profile [Table 3]. Fifteen (34.1%) of the high-risk patients had a history of syncope compared to 16 (22.9%) of the low-risk patients (non-significant [NS] difference). A head CT scan was performed in most high-risk (63.6%) and low-risk (70%) patients (P = NS). The rate of low-risk patients who had an unnecessary head CT scan (67.3%) was significantly higher than the rate of high-risk patients (28.6%) (P = 0.001). The rate of low-risk patients (42.9%) who were hospitalized was significantly lower than the rate of high-risk patients (68.2%, P < 0.01). Even though the rate of high-risk patients (27.3%) who revisited the ED was higher than the rate of low-risk patients (14.3%), the difference was not statistically significant.

Table 2. Hospitalization

Hospitalization	Value
Yes, n (%)	60 (52.6%)
No, n (%)	44 (38.6%)
Refusal, n (%)	10 (8.8%)
Unnecessary hospitalization, n (%)	22 (36.7%)
Hospitalization department	
Left the emergency department, n (%)	54 (47.4%)
Internal medicine department, n (%)	42 (36.8%)
Cardiology department, n (%)	18 (15.8%)

The rate of hospitalization in the cardiology department among high-risk patients (46.7%) was significantly higher than the rate among low-risk patients (13.3%, $P < 0.02$). The rate of unnecessary hospitalization among the low-risk patients (66.7%) was significantly higher than the high-risk patients (6.7%, $P < 0.02$). Moreover, the rate of high-risk patients (68.2%) who were treated according to ESC guidelines was significantly higher than the rate of low-risk patients (25.7%, $P < 0.0001$).

The low-risk patients had more unnecessary diagnostic tests (0.84 ± 1.13) than high-risk patients (0.31 ± 0.60, $P < 0.02$). In addition, the unnecessary recommended diagnostic tests were higher for the low-risk patients (1.54 ± 1.48) compared to the high-risk patients (0.4 ± 0.65, $P < 0.02$).

THE QUALITY OF EVALUATION

Only 48 (42.1%) patients were treated according to ESC guidelines [Table 4]. Recurrent syncope was not different between patients treated (31.25%) and not treated (24.2%) according to guidelines. The majority of patients (62.5%) treated according to ESC guidelines were from the high-risk group. The majority of patients (78.8%) not treated according to ESC guidelines were from the low-risk group

DISCUSSION

Most of the patients with syncope had a low-risk profile, and most had neurally mediated syncope. Most of the syncope patients, mainly the low-risk patients, were not triaged or treated in the ED according to ESC guidelines.

The ESC syncope guidelines were published online in March 2018 [1]. The aim of the publication was to provide guidelines to primary physicians and experts treating syncope for professional and quick evaluation and to avoid unnecessary diagnostic tests and hospitalization to reduce costs. The need for guidelines was raised because of the wide differences regarding the evaluation of syncope, even within a single institute. According to ESC guidelines, patients should be stratified based on risk profile. Low-risk patients (mostly vasovagal syncope) can be discharged from the ED after a basic evaluation including history, physical examination, and electrocardiogram. In contrast, high-risk patients need to be monitored and evaluated in the relevant department or in the dedicated syncope unit, if available.

In our study, about 65% of patients had a neurally mediated syncope, 10% had cardiac syncope, and 25% had an unknown cause. These rates are consistent with the literature data [7,8]. Therefore, our study may represent the epidemiology of syncope in most institutes. Most patients in our study (61.4%) were defined as low risk, and only 38.6% were defined as high risk. Only 42% of patients were evaluated and treated according

Table 3. Differences between low-risk and high-risk groups

Risk class	Low risk	High risk	*P*-value
Recurrent syncope, n (%)	16 (22.9%)	15 (34.1%)	NS
Head CT, n (%)	49 (70%)	28 (63.6%)	NS
Unnecessary CT, n (%)	33 (67.3%)	8 (28.6%)	0.001
Hospitalization, n (%)	30 (42.9%)	30 (68.2%)	< 0.01
Administration to cardiology department, n (%)	4 (13.3%)	14 (46.7%)	< 0.02
Unnecessary hospitalization, n (%)	20 (66.7%)	2 (6.7%)	< 0.02
Return to hospital within 3 months, n (%)	10(14.3%)	12(27.3%)	NS
Treated according to guidelines (n=48), n (%)	18 (25.7%)	30 (68.2%)	< 0.0001
Treated not according to guidelines (n=66), n (%)	52 (74.3%)	14 (31.8%)	< 0.0001
Days of hospitalization	0.82 ± 1.11	2.25 ± 3.09	< 0.02
Unnecessary tests	0.84 ± 1.13	0.31 ± 0.60	< 0.02
Missing tests	0.071 ± 0.31	0.068 ± 0.33	NS
Unnecessary recommended tests at discharge	1.54 ± 1.48	0.40 ± 0.65	< 0.02

CT = computed tomography, NS = not significant

Table 4. Differences between those treated according to guidelines and those not treated according to guidelines

	Not according to guidelines (n=66)	According to guidelines (n=48)	*P*-value
Recurrent syncope, n (%)	16 (24.2%)	15 (31.25%)	0.4
High-risk syncopal event, n (%)	6 (9.1%)	23 (47.9%)	< 0.0001
High-risk past medical history, n (%)	4 (6%)	17 (35.4%)	< 0.0001
High-risk physical examination, n (%)	1 (1.5%)	6 (12.5%)	0.015
High-risk electrocardiogram, n (%)	10 (15.1%)	18 (37.5%)	0.006
High-risk profile, n (%)	14 (21.2%)	30 (62.5%)	< 0.0001
Low-risk profile, n (%)	52 (78.8%)	18 (37.5%)	< 0.0001
Unnecessary computed tomography, n (%)	41 (78.8%)	0 (0%)	-
Unnecessary hospitalization, n (%)	22 (42.3%)	0 (0%)	-
Unnecessary tests	1.08 ± 1.1	0	< 0.00001
Missing tests	0.12± 0.4	0	0.01
Unnecessary recommended tests at discharge	1.7 ± 1.29	0	< 0.0001

to the guidelines. The main reason for the low rate of patients treated according to guidelines was the high number of low-risk patients. Only 25.7% of this group was treated according to guidelines compared to 68.2% of high-risk patients. This rate is represented by more unnecessary hospitalizations and diagnostic tests among the low-risk group compared to the high-risk group. This finding is very important, as most of the patients had a low-risk profile, thus unnecessary costs including diagnostic tests and hospitalization, and the risk of hospital-acquired infections. These results can be explained by the fact that in high-risk patients, most of the physicians are able to deal with the clinical scenario. In low-risk patients, physicians should avoid unnecessary hospitalizations and diagnostic tests, which are not always easy. Therefore, most of the tests and hospitalizations for the low-risk group would be considered unnecessary.

A Canadian cohort study found no difference in financial costs in syncope patients who were discharged from the ED and patients who were hospitalized [9]. Another study found that the hospitalization of patients who presented to the ED with syncope did not reduce mortality, rather the mortality was mainly related to co-morbidities [10]. Based on these studies, hospitalization and evaluation are not justified when the syncope is low risk according to ESC guidelines.

Several studies have shown that adherence to the guidelines and the availability of detected syncope unit significantly improve the treatment of syncope [11]. A detected syncope unit includes qualified staff (physicians, nurses, and technicians) and special equipment. The aim of the syncope unit is to manage syncope based on predefined pathways and updated guidelines. Patient management using the syncope unit decreased hospitalizations and costs [12]. Thus, the recent ESC guidelines emphasized the need to train physicians and nurses and to establish detected syncope units. It seems that these units can improve the adherence to guidelines. Our study emphasizes the need for a detected syncope unit, as most of the patients were not treated according to ESC guidelines. Most patients in our study were treated after the online publication of the ESC guidelines. However, there was no optimal adherence to guidelines. One of the reasons for low adherence may be due to the prolonged time needed for the application of new guidelines in practice. Furthermore, these clinical practice guidelines are cumbersome and perhaps a summary that can be used in the ED and internal medicine departments is more practical. We believe that this problem is widespread and exists in many centers, especially those without dedicated staff and a syncope unit. Low adherence to syncope guidelines was reported. According to a survey including 45 European centers, there was a gap between the recommendation for the utilization of an implantable loop recorder (ILR) for the evaluation of syncope of unknown cause and the actual clinical use [13]. The minority of patients with syncope of unknown cause had ILR as part of the evaluation process. A Canadian retrospective cohort study showed that there were no differences between patients who were treated according to ESC guidelines and those who were not [14]. Thus, there is a need for multicenter randomized studies to investigate the effectiveness of adherence to guidelines compared to no adherence.

LIMITATIONS

This study is a retrospective study that was conducted at one center. The study included patients who were evaluated to syncope close to or within 2 years after the online publication of ESC guidelines in March of 2018. Thus, it could be that there was not enough time for implementation of the new guidelines. It is possible that the results may be different if the study is performed 2–3 years later. Furthermore, the data were retrospectively collected from the medical files, so the diagnosis and the adherence to guidelines were based on the quality of the reports.

CONCLUSIONS

Most patients with syncope are low-risk patients, and most have neurally mediated syncope. Most syncope patients, mainly the low-risk patients, were not triaged or treated in the ED and during hospitalization according to ESC guidelines. There is a need to simplify the guidelines and make them applicable in daily practice.

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Sometimes you can't see yourself clearly until you see yourself through the eyes of others.

Ellen DeGeneres (born 1958), comedian, TV host, actor, and writer

Capsule

ARTsy antibodies

Posttreatment controllers (PTCs) can durably suppress HIV-1 after patients stop taking antiretroviral therapy (ART). However, the features that distinguish PTCs from noncontrollers (NCs) remain unclear. **Esmaeilzadeh** and colleagues evaluated plasma samples from six patients taking PTCs and six taking NCs who started ART early after infection, measuring viral load, viral diversity, and titers of HIV-1-neutralizing antibodies. The authors found that autologous neutralizing antibodies matured during ART and were an important contributor to viral suppression after ART discontinuation. PTCs could be distinguished from NCs by a stronger neutralizing antibody response and a less diverse proviral reservoir. These features may be used to identify PTCs, although the authors stress the need to look at a more diverse pool of individuals living with HIV-1.

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Eitan Israeli

Capsule

γδ17 T cells stress the system

Interleukin-17-producing γδ (γδ17) T cells, which reside in the meninges, play important roles in anxiety-like behavior, synaptic plasticity, and memory function. **Zhu** et al. reported that mice subjected to chronic social-defeat stress and human patients with major depressive disorder show a reduction in specific *Lactobacillus* species in their gut microbiota. In mice, a dearth of these bacteria, which normally degrade fungal-derived β-glucan polysaccharides in the gut, was associated with an increase in colonic and meningeal γδ17 T cells expressing the β-glucan polysaccharide receptor dectin-1. Dectin-1-mediated expansion and differentiation of γδ17 T cells were associated with social avoidance by mice exposed to chronic social-defeat stress. Moreover, inhibition of γδ T cells led to a reduction in stress-susceptible behavior in these animals.

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