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Is our initial evaluation of patients admitted for syncope guideline-directed and cost-effective?

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Introduction Recent American College of Cardiology and European Society of Cardiology guidelines for syncope evaluation help distinguish high-cardiac risk patients from those with low-risk orthostatic and neurogenic syncope. Inpatient evaluation is recommended if at least one high-risk feature is present.

Objective To assess guideline adherence and its impact on hospitalization in patients who presented with syncope before and after the introduction of guideline-based syncope protocol in the emergency department (ED).

Methods All adult patients admitted to general medicine from the ED with the primary diagnosis of syncope in the months of October 2016 and October 2018 (before and after the introduction of syncope protocol in 2017). Electronic charts were retrospectively reviewed for high-risk cardiac features and orthostatic blood pressure measurement.

Results Sixty patients were admitted for syncope in October 2016 ($n = 32$) and October 2018 ($n = 28$), out of which 33 (55%) were female and 47 (78.3%) were over age 50. Forty-five patients had at least one high-risk feature. Excluding one patient with an alternate diagnosis at discharge, 14 out of 60 patients (23.3%) admitted for syncope did not have any high-risk feature. Orthostatic blood pressure was measured in 3 patients (5%) in the ED and 27 patients (45%) later in the hospitalization. Six out of eight patients with implanted cardioverter-defibrillator or pacemaker had their devices interrogated. After the introduction of syncope protocol, there was an improvement in the proportion of high-risk patients admitted [68.7% (22/32) in October 2016 vs. 82.1% (23/28) in October 2018].

Conclusion Utilizing syncope protocol in the ED may improve guideline adherence, direct appropriate disposition, and reduce healthcare expenses.

Keywords Syncope • Guideline adherence • Cost-effectiveness

Introduction

About 10% of patients presenting to the emergency department (ED) for syncope will suffer from a serious adverse outcome within 7–10 days of the visit.[1] However, the admission rates for syncope reported to be up to 70% suggest that a significant proportion of patients are inappropriately hospitalized.[2] This has led to an increase in the annual cost of syncope-related hospitalizations in the USA to $2 billion.[3] Recent American College of Cardiology (ACC) and European Society of Cardiology (ESC) guidelines for syncope evaluation recommend a thorough history and physical, electrocardiography, and orthostatic blood pressure measurement to identify high-risk patients requiring inpatient evaluation.[1,4]

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We conducted an audit of adult patients admitted for syncope evaluation from the ED to general internal medicine and the potential impact of guideline adherence on safe and cost-effective disposition.

Methods

Excluding the first 2 months of the academic year (July and August) when new trainees at our teaching hospital are becoming accustomed to responsibilities, the month of October was chosen randomly. The same month was studied 2 years apart, before and after the introduction of guideline-directed syncope protocol in the ED in 2017 (*Figure 1*). All ED to general internal medicine adult admissions with the primary diagnosis of syncope (ICD.10: R55) in October 2016 and October 2018 were reviewed retrospectively for guideline-directed evaluation. This included history, physical examination, and electrocardiography to identify high-risk cardiac features at presentation (*Table 1*), orthostatic blood pressure measurement and implanted cardioverter-defibrillator or pacemaker (ICD/PPM) interrogation. Length of stay, whether echocardiography was performed and/or cardiology consulted were also recorded. As recommended by ACC/ESC guidelines, inpatient evaluation was determined to be justified if at least one high-risk feature was present. High-risk features listed in *Table 1* include characteristics that have been used in prior studies to classify patients as intermediate risk.[5] Therefore, in the absence of these features and an unrelated reason for hospitalization, a patient was deemed low risk and safe for discharge from the ED. Subsequent syncope-related hospitalization(s) were noted for these low-risk patients to assess short-term (30 days) and long-term (12 months) risk of

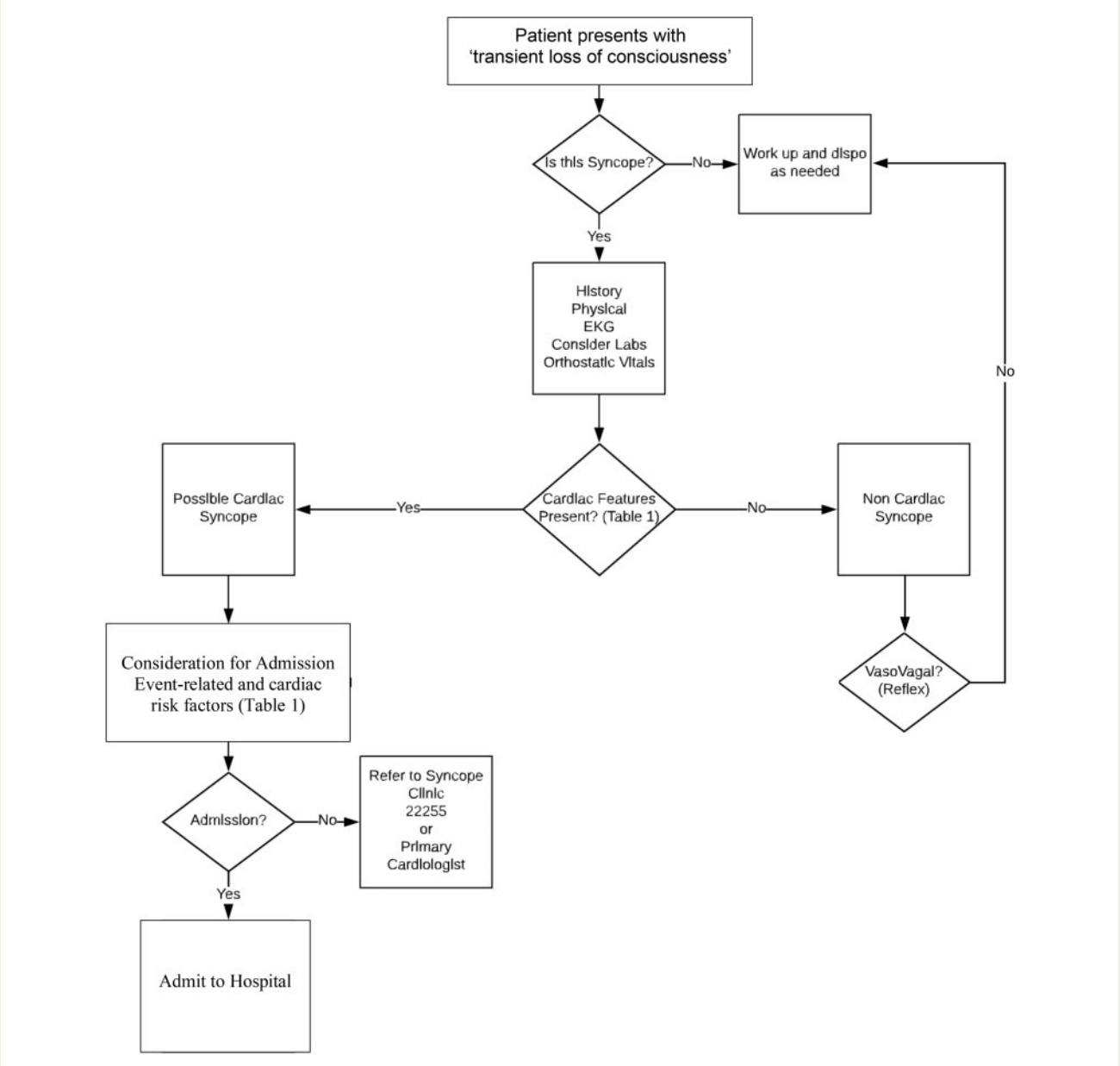

Figure 1 Guideline-based algorithm for initial syncope evaluation introduced in the emergency department in 2017.

Table 1 High-cardiac risk features based on ACC 2017 and ESC 2018 syncope guidelines[1,4]

	n, frequency (%)
History	
Chest pain/dyspnoea/new headache	10 (16.7)
Syncope (supine or exertional)	8 (13.3)
Syncope while sitting[a]	23 (38.3)
Past medical history	
Coronary artery disease	19 (31.7)
Structural heart disease or LVEF <40%[b]	9 (15.0)
History of myocardial infarction	9 (15.0)
Family history of sudden cardiac death (age < 50)[a]	0 (0)
Physical examination/investigations in emergency department	
Systolic blood pressure <90 mmHg at presentation	5 (8.33)
Awake heart rate persistently <40 b.p.m.	1 (1.67)
New systolic murmur on exam	5 (8.33)
Haemoglobin<11 g/dL or rectal bleeding	10 (16.7)
High-risk ECG[c]	19 (32.7)

[a]Counted as high risk only if EKG also high risk.
[b]Severe aortic stenosis or prosthetic valve dysfunction, heart failure, and hypertrophic cardiomyopathy.
[c]Bifascicular block (LBBB or RBBB with left anterior or posterior fascicular block); interventricular conduction delay (QRS > 120 ms); new ST-T abnormalities irrespective of cardiac biomarkers; inappropriate sinus bradycardia or slow atrial fibrillation (HR < 40) in the absence of negative chronotropic medications; ventricular tachycardia (sustained or non-sustained); Mobitz II or third-degree heart block. Mobitz I or 1st degree AV block with PR > 200 ms; pacemaker/ICD malfunction; and inheritable cardiovascular conditions predisposing to arrhythmias (long/short QT, pre-excitation, Brugada type I, and arrhythmogenic right ventricular cardiomyopathy).

recurrent syncope requiring inpatient evaluation. The study was approved by the institutional review board at Albany Medical Center.

Frequencies are expressed in percentages. Continuous variables expressed as mean with standard deviation. SQUIRE reporting guidelines were used.

Results

Sixty adult patients were admitted for syncope evaluation in October 2016 ($n = 32$) and October 2018 ($n = 28$), out of which 33 (55%) were female and 47 (78.3%) were over 50 years old. Electrocardiography was done in 58 patients (96.7%) and 45 patients (75%) had at least one high-risk feature. Excluding one patient with an alternate discharge diagnosis and reason for hospitalization, 14 out of 60 patients (23.3%) admitted for syncope did not have any high-risk feature. Orthostatic blood pressure was measured in 3 patients (5%) in the ED and 27 patients (45%) later in the hospitalization. Six out of eight patients with ICD/PPM had their devices interrogated.

Fifty-six patients (93.3%) were admitted on telemetry monitoring. Echocardiography was performed in 38 patients, 78.9% (30/38) of which were high risk. Cardiology was consulted only in high-risk patients [(26/45), 57.8% of high-risk patients]. Mean length of stay was 3.2 days (SD ±2.22).

There was an improvement in the proportion of high-risk patients admitted after the introduction of syncope protocol; 68.7% (22/32) in October 2016 vs. 82.1% (23/28) in October 2018. Among the 14 low-risk patients, there was no syncope-related hospitalization within 30 days of discharge; one patient was admitted for syncope secondary to new-onset symptomatic bradycardia between 30 days and 12 months after index hospitalization.

Discussion

Out of 60 patients admitted for evaluation of syncope, 45 patients (75%) had at least one high-risk feature to justify admission. Fourteen patients (23.3%) without any high-risk feature, or alternate reason for hospitalization, did not require admission. At the time of initial presentation, orthostatic blood pressure was measured at presentation in 3 patients only (5%). Fifty-six patients (93.3%) were on telemetry monitoring, whereas only 75% of patients were high risk.

According to a 2005 estimate, the cost of a syncope-related hospitalization is $5300.[3] Since there is no updated information on the nationwide cost of syncope-related hospitalization, we used hospital-specific information to estimate health care cost. At Albany Medical Center, the average payment for a low-acuity and high-acuity [non-intensive care unit (ICU)] general internal medicine admission in 2018 were $6700 and $18 000, respectively. This translates into an estimated excess cost of $93 800 ($6700 × 14) for 14 low-risk syncope admissions. The beds assigned to the safely preventable low-risk syncope admissions could have been assigned to high-acuity non-ICU patients. Compared with higher payment per high-acuity non-ICU admission, these 14 less-appropriate admissions represent a potential loss of $158 200 [(18 000-6700) × 14]. It must also be noted that syncope is one of the leading diagnosis associated with Medicare and Medicaid payment denials.[6]

Our hospital does not have a syncope unit. Since both intermediate- and high-risk patients are admitted, we did not differentiate between the two groups. Among 14 low-risk patients, there was no recurrent syncope-related hospitalization within 30 days of discharge; only one patient had a subsequent syncope-related hospitalization on 12-month follow-up. The patients deemed safe for discharge did not have any intermediate- or high-risk feature, and no syncope-related rehospitalization within 30 days of discharge.

This is a small retrospective study. The interpretation of our findings is limited by the use of hospital-specific cost estimates. However, patterns of guideline adherence in the evaluation of syncope are generalizable and consistent with prior reports from North America and Europe.[7,8] Due to differences in health care payment in Europe, the demonstrated impact of guideline adherence on health care cost is extrapolatable only to USA.

Orthostatic blood pressure measurement is a safe, inexpensive diagnostic test. Despite its inclusion in guidelines and utility at identifying non-cardiac syncope, it is overlooked during evaluation. Although the sample size was not large enough to detect a statistically significant change ($n \geq 720$ for 95% confidence level), there was an improvement in the proportion of admission of high-risk patients by 13% with the introduction of guideline-based algorithm. By preventing unnecessary hospitalizations, telemetry monitoring and testing,

adherence to syncope guidelines improves efficiency of healthcare delivery by reducing expense and losses.

Lead author biography

An Aga Khan University Medical College graduate, Muhammad Hamza is a third-year Internal Medicine resident at Albany Medical Center. He will begin Cardiology fellowship training at the University of South Dakota in July 2020.

Conflict of interest: none declared.

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