

Diagnostic evaluation of syncope in a tertiary hospital in Metro Manila: a 5 year retrospective study

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Abstract

Background: Diagnostic evaluation of syncope is imperative to prevent disability, injury and sudden cardiac death. Work-ups and approach may differ due to geographical factors and the clinical setting where the patient is being managed. This study aims to determine the incidence and evaluation practices for syncope in a single private tertiary center in the Philippines.

Methods: A 5-year retrospective study was done wherein records of patients admitted for loss of consciousness were reviewed on domains regarding initial evaluation, specialty referrals, ancillary procedures requested and final diagnosis upon discharge.

Results: A total of 572 patients were included. The majority (93%) was referred to cardiology and/or neurology services. Aside from electrocardiogram (ECG), other most common work-ups requested were 2D echocardiogram, brain imaging via Magnetic Resonance Imaging (MRI) or Computed Tomography (CT) scan, electroencephalogram (EEG) and 24-hour Holter monitoring- all of which has a low diagnostic yield ($\leq 5\%$). The most common cause of syncope was neurally-mediated syncope (56%), followed by cardiac syncope (18%), orthostatic hypotension (10%), syncope mimics (7.3%), unspecified cause (7%) and psychogenic cause (1.5%).

Conclusion: The incidences of syncope types in this southeast Asian population is consistent with previous findings from Western and other Asian countries. The low percent yield of additional diagnostic modalities to syncope work ups strengthens recommendations for a focused initial evaluation (pertinent history-taking, physical examination, electrocardiogram) to reduce unnecessary tests and exhaustion of resources in concordance with the latest international guidelines.

Keywords: syncope; loss of consciousness; neurally-mediated syncope; vasovagal syncope; cardiac syncope; orthostatic hypotension; Philippines

1. Introduction

Syncope is transient loss of consciousness (LOC) distinguished by its quick onset and brief duration with complete spontaneous recovery. In the general population, the annual number of episodes are 18.1–39.7 per 1000 patients, with similar incidence between genders [1]. The most common etiology of syncope is neurally-mediated wherein external factors or circumstances results to bradycardia and/or hypotension. Neurally-mediated syncope is divided into 2 types: carotid sinus syncope and vasovagal syncope. The latter is further subdivided into 3 categories: postural (precipitated by prolonged standing, hot/crowded environment, and meal intake); central (due to emotional outburst) and situational (related to specific triggers like urination, defecation, coughing, laughing or sneezing). The other major etiologies of syncope are cardiac which can either be secondary to arrhythmias or structural heart disease; and orthostatic hypotension which is believed to have underlying autonomic dysfunction [2,3,4]. Based on a strong consensus, despite no independent gold/reference standard test is available, the most probable cause of syncope can be determined through the initial evaluation which consists of the following: focused and careful history taking, complete physical examination and an electrocardiogram (ECG). One of the major challenges in managing syncope is reducing costs for admissions and tests that are not appropriate while making sure that the patient is safe from possible disability, injury and sudden cardiac death [5]. The selection of additional diagnostic tests is a clinical decision based on the initial evaluation, patient's clinical presentation, risk stratification, and a clear understanding of

diagnostic and prognostic value of any further testing [6].

In the Philippine context, there is a need for further studies on the specific etiologies of syncope, as well as established standardized clinical practices in its diagnosis and treatment. Research is necessary to set forth the recognition of this diagnosis by other important stakeholders. This study aims to provide a helpful review on the diagnostic evaluation of syncope in a private tertiary institution in terms of work-ups done with corresponding diagnostic yield, and final diagnosis upon discharge). This is necessary to serve as basis to formulate our own recommendations or develop a structured syncope protocol.

2. Methodology

2.1 Ethics approval

The study was initiated after approval from the Institutional Review Board. All identifying information were concealed in the data-gathering process. Corresponding codes or numbers were assigned to patients to ensure the confidentiality of data.

2.2 Study site and patient inclusion criteria

A 5-year retrospective study was done on diagnostic evaluation of syncope in Makati Medical Center, a private tertiary hospital in Metro Manila, Philippines. Records of all patients who were admitted due to loss of consciousness (LOC) between January 2015 to December 2019 were reviewed. Patients included were 18 years old and above who fulfilled the definition of syncope which is transient loss of consciousness producing a brief period of unresponsiveness, ultimately resulting in spontaneous recovery requiring no resuscitation measures. Patients who were less than 18 years old and those with prolonged duration (more than 5 minutes) or with no LOC on history were excluded from the study.

2.3 Main variables collected

Data of each patient were collected in domains regarding initial evaluation, specialty referrals, diagnostic work-ups done, and final diagnosis upon discharge. The details on initial evaluation included the following: comorbidities (especially history of cardiac diseases), number of recurrences, position of patient, symptoms and events preceding LOC. All data were accessed through the electronic medical records (EMR) system of Makati Medical Center. A test or procedure was considered diagnostic when the result, alone or combined with the history of the patient's syncope, explained the cause of syncope.

2.4 Statistical analysis

The distribution of age, sex, comorbidities, referrals, investigations conducted, therapeutic interventions and identified etiology of syncope were analyzed by means and standard deviations for continuous variables and proportions for categorical variables.

3. Results

3.1 Patient population

A total of 716 patients were admitted for LOC between January 2015 to December 2019, out of which 572 patients were reviewed after excluding 79 patients who did not have LOC, 33 patients who had prolonged duration of LOC and 31 patients who were less than 18 years old. There was a slightly higher incidence of syncope in females (51%) than males (49%), especially in the younger age group (Figure 1). The mean age of patients was 51.17 with range from 18 to 98 years.

3.2 Initial evaluation

The most common prodromal symptoms observed in patients are dizziness, dimming/tunneling of vision, diaphoresis, loss of muscle tone and pallor. Most patients had a single episode of loss of consciousness which usually lasted 1-5 minutes (Table 1) and were typically preceded by the following events: after eating, defecation, change of position, urination and after experiencing pain (Table 2). Cardiac comorbidities were present prior to onset of syncope in 51.4% of patients with the following conditions: hypertension, coronary artery disease, arrhythmias, valvular heart disease, heart failure and cardiomyopathy. No comorbidities was

seen in 35.3% of patients (Table 3).

Figure 1. Age and sex distribution of patients admitted for transient loss of consciousness in Makati Medical Center from January 2015 to December 2019.

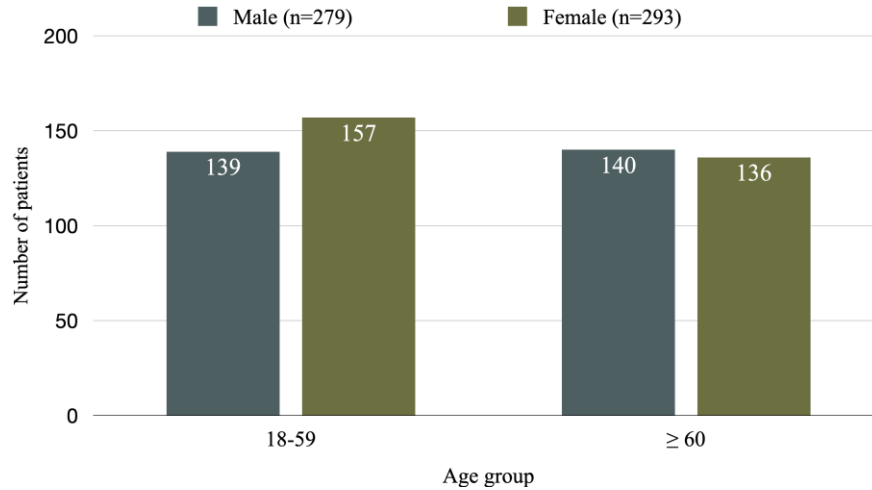


Table 1. Associated symptoms and descriptions of loss of consciousness of patients admitted for syncope. *Other associated symptoms include headache, hearing loss, tinnitus.

Associated symptoms	Number (%)	Position prior to LOC	Number (%)
Dizziness	243 (42%)	Standing	220 (38%)
Dimming/tunneling of vision	157 (27%)	Sitting	166 (29%)
Diaphoresis	97 (17%)	Lying	1 (0.1%)
Loss of muscles tone	72 (12.5%)	Not specified	185 (32%)
Pallor	70 (12%)	Recurrence	
Jerking of extremities	51 (9%)	Single episode	467 (82%)
Palpitations	49 (8.5%)	More than 1 episode	105 (18%)
Chest pain	42 (7.3%)	Duration of LOC	
Upward rolling of eyeballs	40 (7%)	Seconds	262 (45%)
Others*	37 (6.4%)	1-5 Minutes	310 (55%)
None	113 (19%)		

3.3 Specialty referrals

Suspected syncope patients were primarily referred to Cardiology and Neurology services. Majority of cases (54%) had both Cardiology and Neurology on board; 21% of patients were managed by Cardiology alone, and 18% by Neurology alone. Only 7% of patients were not referred to either Cardiology or Neurology and managed by other specialties (Figure 2).

Table 2. Events preceding loss of consciousness of patients admitted for syncope.

Events preceding LOC	Number (%)
After eating	42 (7.3%)
Defecation	37 (6.4%)
Upon standing	33 (5.7%)
Urinating	33 (5.7%)
After experiencing pain	32 (5.6%)
Prolonged sitting/standing	24 (4.2%)
While walking	22 (3.8%)
Emotional stress	20 (3.5%)
Coughing	19 (3.3%)
Straining	15 (2.6%)
After alcohol intake	15 (2.6%)
While resting/sitting	14 (2.4%)
While attending mass	10 (1.7%)
After exercise/exertion	7 (1.2%)
Not described	234 (40.9%)

Table 3. Pre-existing comorbidities prior to onset of LOC in patients admitted for syncope.

Co-Morbidities	Number (%)
Cardiac	
Hypertension	259 (45.8%)
Arrhythmia	32 (5.6%)
Coronary Artery Disease	32 (5.6%)
Valvular Heart Disease	9 (1.5%)
Heart Failure	8 (1.4%)
Cardiomyopathy	2 (0.3%)
Diabetes mellitus	97 (17%)
Cerebrovascular Disease	23 (4.0%)
Cancer	16 (2.8%)
Chronic Kidney Disease	14 (2.4%)
Asthma	14 (2.4%)
Parkinsons	10 (1.7%)
Seizure	7 (1.2%)
Lewy Body Dementia	7 (1.2%)
Alzheimers Disease	6 (1.0%)
No co-morbidities	202 (35.3%)

Figure 2. Specialties of on-board physicians who managed patients with transient LOC. * Other specialties: Nephrology, Internal Medicine, Pulmonology, Otolaryngology, Gastroenterology, Surgery, Rheumatology, Infectious Disease, Obstetrics and Gynecology.

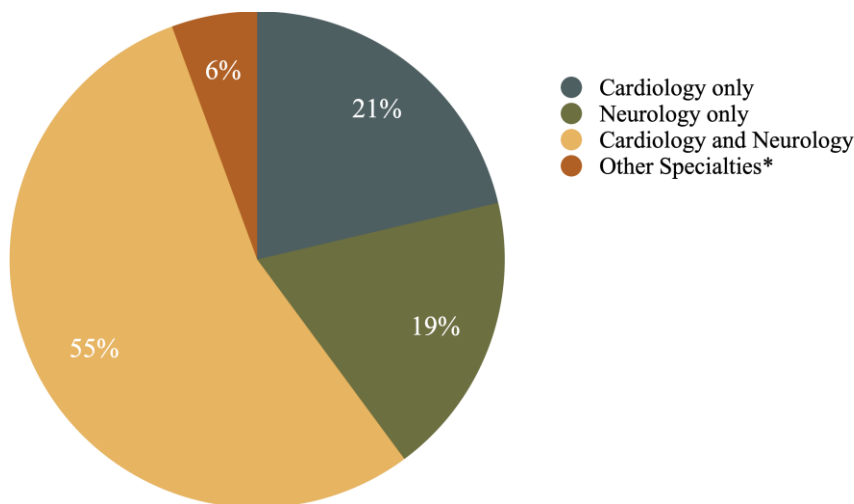
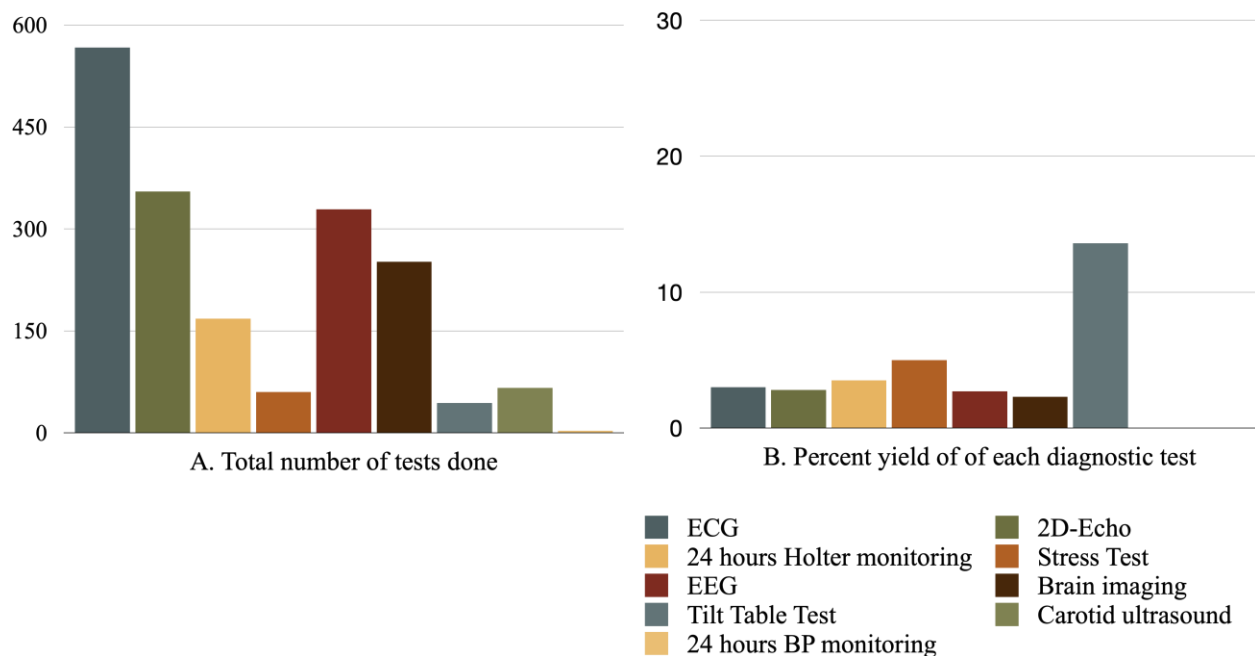


Figure 3. Diagnostic tests done in syncope evaluation (A) with their corresponding percent yield (B).



3.4 Diagnostic tests

An electrocardiogram (ECG) was done to 99% of all patients admitted for transient loss of consciousness. The most common additional diagnostic test requested was 2D echocardiogram (62%). Other cardiac work-ups included 24-hour Holter monitoring, treadmill/echocardiogram stress test, and 24-hours BP monitoring. Neurologic evaluations included electroencephalogram (EEG), brain imaging via Magnetic Resonance Imaging (MRI) or Computed Tomography (CT) scan, and carotid ultrasound. Tilt table test (TTT) was done to 7.7% of patients (Figure 3A). Diagnostic yield percentage (number of tests with significant findings that led to diagnosis of specific cause of syncope) was highest in TTT (13.6%) while the rest of the tests were $\leq 5\%$ (Figure 3B).

Among the laboratory tests done, there were 20 patients who had elevated troponin levels, 11 of which were eventually diagnosed with cardiac syncope. There were 24 patients with anemia, 8 of which were diagnosed with orthostatic hypotension from hypovolemia.

3.5 Overall diagnosis

The most common cause of syncope is the neurally-mediated type comprising 56% of total patients (Figure 4). This is further subdivided into postural vasovagal (34%), central vasovagal (1%) and situational syncope (21%). Cardiac syncope was the next most common cause comprising 18% of patients, mostly were due to arrhythmias. Syncope due to orthostatic hypotension were secondary to the following: hypovolemia, drug induced, postural orthostatic hypotension syndrome, and autonomic failure. There was no patient diagnosed with carotid sinus hypersensitivity in this study. No identified cause of syncope was noted in 7% whereas 7.3% had syncope mimics who were diagnosed with the following conditions: 25 seizure, 4 transient ischemic attack, 3 stroke, 3 hypoglycemia, 3 anaphylaxis/hypersensitivity reactions, 2 vertebrobasilar insufficiency, 1 neurasthenic syndrome, and 1 encephalitis.

3.6 Management

Non-pharmacologic treatment was advised to patients diagnosed with neurally-mediated syncope. There were 27 patients with cardiac syncope who underwent specific procedures for treatment namely

pacemaker insertion (11), coronary angiogram with percutaneous transluminal angioplasty or stenting (5), implantation of dual chamber cardioverter-defibrillator (4), coronary artery bypass graft procedure (2), aortic valve repair (2), mitral valve replacement (1), and battery replacement for pacemaker (1) and cardioversion (1).

There were 105 patients (Table 1) who had recurrence of syncope after diagnosis and management.

4. Discussion

This study showed that the incidence of syncope per age, sex and type in this southeast Asian population is consistent with findings from the Western and other Asian population [1,3,7]. Similar to findings in the general population, cases of syncope in males and females were almost equal in overall distribution in this study [1]. The pattern wherein females have increased incidence than males in the younger age group is also observed in this study [3,7]. Most studies have shown that among the groups, increased incidence was observed in the elderly which can be explained by the presence of multiple comorbidities and use of several maintenance medications. In addition to that, factors that contribute to higher incidences in old age are the following: diminished baroreceptor and autonomic reflexes, diastolic dysfunction, impaired sympathetic reactivity, and dysfunctional intravascular volume maintenance associated with decrease in salt/water handling and renin-aldosterone levels [8]. This is not the case in our findings. The greater number of patients in the younger age group (18-59 years old) than the elderly (≥ 60 years old) may be due to earlier onset of comorbidities, relatively younger population of the Philippines and

Focused and careful history taking, complete physical examination are essential initial evaluation for decision-making in syncope patients. In this study, the most common prodromal symptoms recorded were those that are suggestive of a neurally-mediated etiology [9]. Fifty-nine percent of patients had at least 1 of these symptoms present and with no cardiac symptoms (chest pain or palpitations). Among these patients, 34% were eventually diagnosed with neurally-mediated syncope. When a precipitating event suggestive of a neurally-mediated syncope is mentioned in the history, the yield increased from 34% to 70% and when no cardiac comorbidities were elucidated, the yield increased further to 75%. A more complete expert history taking which focuses on the prodromal symptoms, predisposing factors and possible physiologic triggers for transient LOC can even improve the diagnostic yield up to as much as 90% [10]. In addition, patients who are less than 50 years old with symptoms consistent with neurally-mediated syncope, with normal ECG and no comorbidities are considered low risk and does not require admission [4,9]. There were patients in this study (17%) who met the criteria for low risk but were still admitted and subjected to hospital-based evaluation. This is critical because unnecessary admission in low-risk patients could also be harmful due to the following possible adverse events: delirium, transfusion error, hypoglycemia, fall, missed medication errors and complications from intravenous and urinary catheter placement (Canzoniero, 2015).

Management of transient loss of consciousness is not restricted to or claimed by any specialty because it falls in between medical disciplines [10,11]. The physician who most likely to see a patient with suspected syncope are the following: general internist, neurologist, cardiologist, or geriatrician. Those who subspecializes in syncope are often cardiologists with interest in electrophysiology and pacing, neurologists with interest in autonomics and epilepsy, or internists with an interest in cardiovascular physiology [12]. As shown in Figure 2, syncope cases in our study were most commonly referred to Cardiology and Neurology services. It is advantageous to have sufficient knowledge on physiology of syncope including mimics for better and more cost-effective evaluation. However, the situation is aggravated because the physiology and historical clues needed to recognize major causes of LOC are not extensively taught by most specialty training programs [12].

The observed low diagnostic yield of additional tests in syncope is in keeping with the results of previous studies [12,13]. This is because, for multispecialty hospitals like the institution in this study, there is a tendency for specialists to request tests to rule out conditions in their own field. This leads to low diagnostic yield, excessive visits to specialists and high cost of evaluation. It is important to rule out causes of LOC with serious prognostic implications but patients are usually not interested in a diagnosis that is ruled out [10,11].

The patient's age and clinical setting where they are evaluated may affect the prevalence of the different causes of syncope. However, some general comments are possible and are observed to be similar in our findings. Neurally-mediated syncope is the most frequent cause of syncope in any setting and at all ages. Cardiac syncope is the second most common cause. There are wide variations in frequencies of cardiac syncope cases observed between

different studies. Greater numbers are observed in emergency settings mainly in older subjects, and in settings oriented towards cardiology [5]. Cardiac syncope tends to occur slightly more frequently in males, while neurally-mediated syncope is slightly more likely in females.

5. Conclusion

This is the first study that describes syncope incidence in the Philippines. A total of 572 patients presenting with syncope were admitted and referred mostly to Cardiology and Neurology services. The incidences of syncope types in this southeast Asian population is consistent with previous findings from Western and other Asian countries. The low percent yield of additional diagnostic modalities to syncope work ups strengthens recommendations for a focused initial evaluation (pertinent history-taking, physical examination, electrocardiogram) to reduce unnecessary tests and exhaustion of resources in concordance with the latest international guidelines.

6. Limitations

This study is a retrospective review hence the established diagnoses or lack thereof is dependent on the quality of chart documentations. The data collected showed syncope cases with details that can be inaccurate and may underestimate epidemiologic data that have not been obtained in a consistent fashion. It is also inevitable that misdiagnosis could have occurred because not every neurally-mediated syncope patients underwent tilt table test and carotid sinus examination was not recorded. Misdiagnosis is possible because the different types of syncope have overlapping features.

Another limitation is that the study was done in a private tertiary hospital where diagnostics are available. Most of the institutions in the Philippines may not have a Tilt-Table Test readily available. Lastly, the outcomes of patients were not recorded in this study since records of outpatient follow-ups were not included in the Electronic Medical Records System of the hospital.

7. Recommendations

There are several possible causes of syncope, hence a physician should have broader understanding with regards to its clinical features. Sufficient knowledge of historical and physical examination clues to recognize major causes of syncope, including the mimics, is vital in the initial evaluation of patients. The awareness of physicians, especially those who mostly see syncope patients like emergency doctors, neurologists and cardiologists, can be assessed whether lack of understanding about syncope leads to excessive and costly work-ups of patients. Risk assessment scoring methods can also be used as a guide in evaluating syncope patients. However, current available scales are still pending validation. Institutions should develop a structured management pathway starting from the emergency department and possibly develop syncope units which are promising strategies that can be implemented.

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