

Epidemiology of syncope in emergency medicine practice

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Summary:

Introduction: Syncope poses a serious clinical and diagnostic problem in pre-hospital care. Preliminary diagnostics should encompass detailed history taking, measurement of blood pressure and a standard ECG. **Purpose:** The purpose of this study was to analyze interventions of Emergency Medical Service Teams due to syncope. **Material and Method:** The study was conducted with a retrospective analysis of medical documentation consisting of the departure order cards from the Otwock Emergency Medical Services in a period from 01 Jan 2009 to 31 Dec 2009. **Results:** The study involved 501 patients from the Otwock district presenting with out-of-hospital syncope. **Conclusions:** Syncopal episodes pose a serious problem for Emergency Medical Service. They affect women (62.08%) more frequently than men (37.92%). Mean age of the affected men and women is 61.41 years. They occur most often in people aged 70-90 years. The most common etiology of syncope is neurogenic (reflex). They usually take place in the afternoon and during summer.

Key words: loss of consciousness, syncope, emergency medical services, epidemiology.

Introduction

Syncope poses a serious clinical and diagnostic problem. Together with transient loss of consciousness, it is responsible for 3% of all ambulatory visits and 6% of all hospitalizations [1,2,3]. It is a common reason for summoning Emergency Medical Services (EMS). Therapy initiated by the EMS in patient's home should be continued at hospital as, according to Ahnfeld, EMS should be "an extended arm of the Hospital."

European Society of Cardiology (ESC) defines syncope as a transient loss of consciousness due to transient global cerebral hypoperfusion

characterized by rapid onset, short duration, spontaneous and complete recovery. The definition of syncope presented above narrows down the previous, wider definition of syncope, by including the cause of unconsciousness through introduction of the term "transient global cerebral hypoperfusion" [1,4,5].

Since 2001, ESC has been successively publishing guidelines on the diagnostics and management of syncope. The most recent guidelines were presented in 2009. According to those guidelines, syncope should be differentiated from other conditions associated with partial or total loss of consciousness due to causes other than cerebral hypoperfusion as well as syncope-like incidents without

impaired cerebral perfusion. In fact, we can distinguish syncope and pseudo-syncope from a true or apparent loss of consciousness by finding whether loss of consciousness occurred and whether features such as: transient character of the episode, rapid onset, short duration of symptoms and spontaneous recovery were present. Generally, episodes of transient loss of consciousness may be divided into traumatic and non-traumatic [6] (Fig. 1).

syncopal incidents, sudden deaths in the family, physical examination, blood pressure measurements in a horizontal and standing position (a decrease in systolic blood pressure by ≥ 20 mmHg or to the value of ≤ 90 mmHg on assuming an erect posture regardless of the presence of symptoms is called orthostatic hypotension), and standard ECG (evaluation of heart rate, atrioventricular and interventricular conduction disturbances, signs

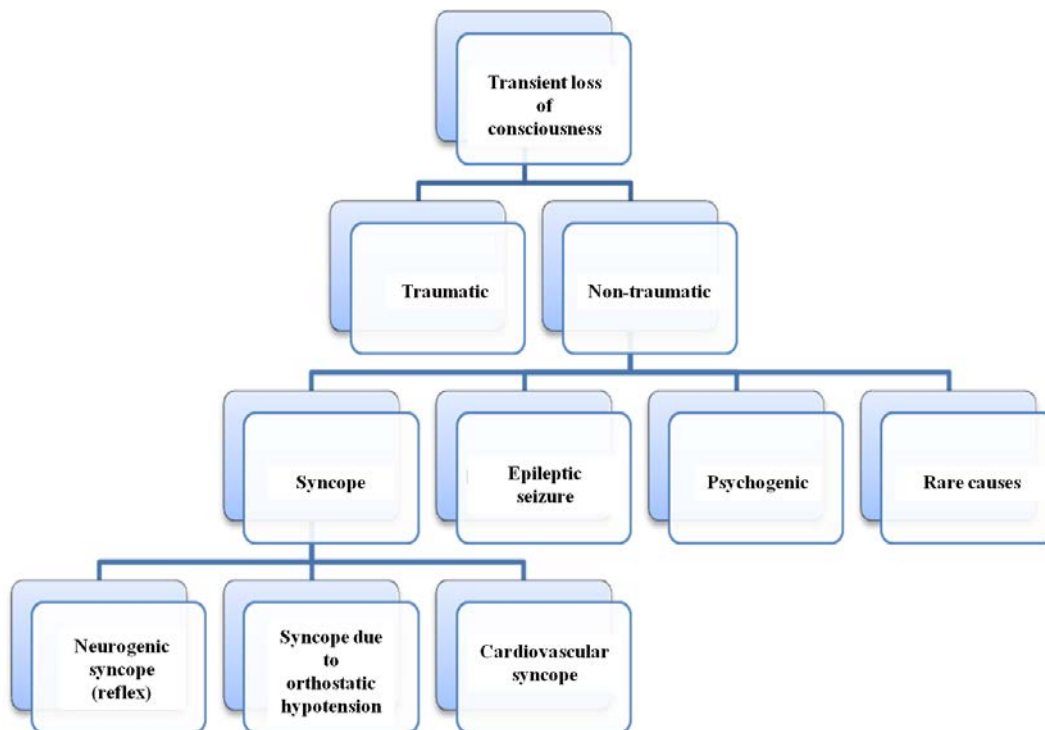


Figure 1: Causes of transient loss of consciousness according to the ESC 2009

Conditions incorrectly diagnosed as syncope may be divided into disorders with partial or total loss of consciousness and disorders without impairment of consciousness [7,8]. In the first group we may include: metabolic disorders (including hypoxia, hypoglycemia, hyperventilation with hypocapnia), epilepsy, intoxication and vertebrobasilar transient ischemic attacks (TIA) [9]. The following states belong to the second group of conditions misdiagnosed as syncope: falls, drop attacks, cataplexy, TIA of carotid origin and functional disorders (psychogenic pseudosyncope) [4,10–12].

Preliminary diagnostics carried out by either a general practitioner, personnel of Emergency Medical Service Teams or an Emergency Department doctor should include taking a detailed history of the circumstances and frequency of

of heart muscle hypertrophy, arrhythmias, ST-T segment changes) [13–15]. An abnormal ECG recording at rest constitutes an independent predictor of cardiogenic syncope [13,16,17]. The following electrocardiographic anomalies may be the causes of syncope:

- sinus bradycardia < 40 /min or recurrent sinoatrial blocks,
- sinus arrest lasting $> s$,
- II degree atrioventricular block (Mobitz type II or III),
- supraventricular or ventricular tachycardia,
- intermittent left and right bundle branch block,
- acute ischemia with or without ST segment elevation,
- pre-excitation syndrome,
- cardiac stimulator malfunction with pauses,

- long QT,
- Brugada syndrome,
- T-wave inversion in right-sided precordial leads and an epsilon wave suggestive of arrhythmogenic right ventricular dysplasia,
- interventricular conduction abnormalities (QRS \geq 0.12s).

While some incidents of syncope can be accompanied by a prodromal period encompassing: lightheadedness, nausea, “cold sweat”, weakness or blurred vision, syncopal episodes due to arrhythmias or conduction abnormalities appear suddenly [9,18,19].

Purpose of the study

Analysis of prevalence of syncopal events in the practice of Medical Emergency Service in Otwock with particular focus on the relationship between age, sex of the patient, time of the day and a season and occurrence of syncope.

Material and methods

The data was collected based on the departure order cards of the Emergency Medical Services operating in Otwock district during 2009.

The data acquired from medical documentation were collected in a questionnaire. The following predicting factors were analyzed: age, sex, time of a day and a season when symptoms appeared and signs.

All data were gathered in a Microsoft Access database and some calculations were performed using a Microsoft Excel sheet of the Microsoft® Office 2007 suite.

Statistica 10 program (StatSoft®, Tulsa, USA) was used for statistical analysis. Distribution of nominal scale variables upon examining the differences with regard to the operational type of the emergency medical team, type of the dispatched team and type of organ damage was illustrated using line graphs, bar, circular and radar charts.

Normal distribution of variables was tested using the statistical significance p-value for Shapiro-Wilk test. In case of normal distribution, mean differences were examined using paired Student's t-test. In the remaining cases, we used a non-parametric Wilcoxon test and the acquired results were expressed and presented in graphs as medians.

Examination of the relationships between frequency of occurrence of the tested variables in analyzed sections was conducted using chi-squared test for independence with the accepted level of significance $p=0.05$. For contingency tables, the strength of association between variables was additionally evaluated with Cramer's V coefficient.

Results

The analysis of 6936 interventions by the Emergency Medical Services that took place during 2009 allowed for selection of 501 cases, in which the diagnosis of syncope was stated (code R55 according to ICD 10).

While analyzing the group of 501 medical interventions due to syncope, we found that they were carried out notably more often by the Basic “P” Teams – 401 interventions (80.04%), than the Specialist “S” Teams – 100 interventions (19.96%), and the differences were statistically significant with regard to the type of the dispatched team ($p=0.0000$).

Interventions involving women predominated among all incidents of syncope – 311 cases (62.08%). Emergency Medical Services intervened in 190 cases involving men (37.92%). This result is also statistically significant ($p<0.001$).

Ages of patients in the study group varied from 4 to 99 years. Mean age in the whole group was 61.41 years with standard deviation of 22.26 years. Mean age among women (62.61 years) was slightly higher than mean age among men (59.67 years; Fig. 2).

The most numerous group consisted of people aged 80-89years – 113 cases (22.55%), followed by the group of 70-79-year-olds – 97 cases (19.36%). The lowest number of cases was noted in the age group 1-9 years. There were only 2 such cases, which comprised 0.4% of all interventions due to syncope ($p=0.0000$; Fig. 3). A detailed age and sex distribution of the study group is presented in Table 1.

Distribution of the study group according to the hour of syncopal episode revealed a relationship between syncope occurrence and time of day. The peak of medical interventions falls between 5:00 and 5:59 p.m. – 49 cases (10%), and subsequently 4:00 and 4:59 p.m. – 45 cases (9%). There were no cases noted between 5:00 and 6:59 a.m. ($p<0.0001$). Additionally, in order to depict a

Table 1: The frequency of occurrence of syncope with regard to the month

Month	Male		Female		Total	
	N	%	N	%	N	%
January	28	5.59	22	4.39	50	9.98
February	6	1.20	22	4.39	28	5.59
March	15	2.99	25	4.99	40	7.98
April	15	2.99	22	4.39	37	7.39
May	17	3.39	20	3.99	37	7.39
June	23	4.59	42	8.38	65	12.97
July	22	4.39	21	4.19	43	8.58
August	11	2.20	30	5.99	41	8.18
September	14	2.79	17	3.39	31	6.19
October	9	1.80	38	7.58	47	9.38
November	19	3.79	19	3.79	38	7.58
December	28	5.59	22	4.39	50	9.98
<i>P value</i>	0.0000		0.0000		0.0000	

diurnal cycle of syncope occurrence we divided the day into four periods. According to the applied method, there was an apparent increase in frequency of syncope in the afternoon with a significant drop during nighttime ($p=0.0000$). Comparison between men and women with regard to the frequency of syncopal episodes in a diurnal cycle did not reveal a statistically significant difference ($p=0.1598$). Frequency of syncope with regard to the hour is presented in Figure 4 and with regard to the time of day in Figure 5.

In order to determine whether there is a relationship between occurrence of syncope and time of year, the group was divided into 12 months. Distribution of syncopal episodes with regard to the month and patient sex is presented in Table 1. The most cases of syncope were noted in June – 65 cases (12.97%). During remaining months, the number of syncopal episodes remained on a similar level. We also grouped months into seasons for illustration of seasonal changes in syncope incidence. The statistical analysis revealed statistical differences in the frequency of syncope in the whole study group, both with regard to the month ($p=0.0000$) as well as the season ($p=0.0000$; Fig. 6).

The study group was also analyzed with respect to syncope occurrence in a weekly cycle. The largest number of cases was noted on Monday ($n=84$; 17%), followed by Friday ($n=78$; 16%). On the other hand, the lowest number of cases was noted on Sunday ($n=62$; 12%; $p=0.0000$). Distribution of syncopal episodes with regard to the day of the week is presented in detail in Table 2.

Table 2: The frequency of occurrence of syncope with regard to the month

Day of week	Male		Female		Total	
	N	%	N	%	N	%
Monday	31	17	53	17	84	17
Tuesday	23	12	41	13	64	13
Wednesday	31	17	46	15	77	15
Thursday	15	8	54	17	69	14
Friday	32	17	46	15	78	16
Saturday	31	17	36	11	67	13
Sunday	23	12	39	12	62	12
<i>P value</i>	0.0000		0.0000		0.0000	

We determined, on the basis of the data acquired from the departure order cards of the EMS, that the most common etiology of syncope was neurogenic (reflex) – 219 cases (43.71%), followed by cardiovascular reasons – 145 cases (28.98%) and episodes due to orthostatic hypotension – 91 cases (18.16%). In 46 cases, the most probable cause of syncope was not determined (9.18%; $p<0.001$).

Discussion

Syncope and transient loss of consciousness are the causes of 3% of all ambulatory visits and 6% of all hospitalizations [1,2,3]. Therefore, they pose a serious clinical and diagnostic problem. The most common type of syncope is reflex syncope (vasovagal) resulting from dysfunction of sympathetic nervous system, which is responsible among other things for regulation of blood pressure and heart rate [4]. The second most frequent reason for syncopal episodes is cardiogenic. This thesis is supported by our own studies showing that reflex syncope comprised 43.71% of all cases and syncope due to cardiovascular disease

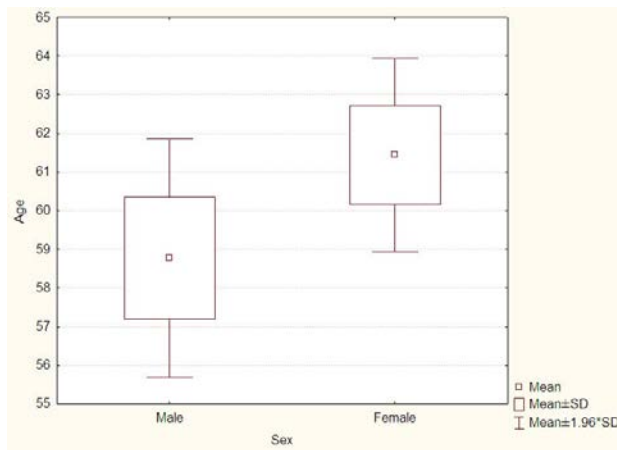


Figure 2: The box plot for average ages of male and female patients

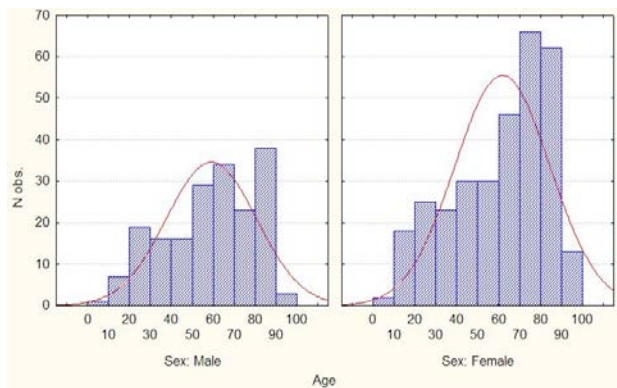


Figure 3: The counts of the investigated group on the basis of age.

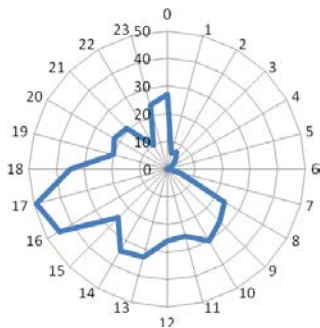


Figure 4: The frequency of syncope cases in the diurnal cycle.

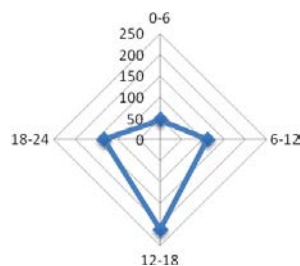


Figure 5: The counts of the investigated group on the basis of age.

29.88%. In the study by Bianchi these results were respectively 21% and 19% [4]. Petel, on the other hand, received the following results: 47% vs 18% [20], Shiyovivh 26.6% [21] vs 17.3%, and Vanbrabant – 58.5% vs 11.1% [22].

Women predominated in our material, comprising 62% of all cases. This prevalence of females in a population of patients treated for syncope is also reflected in the research of other authors: Chen –

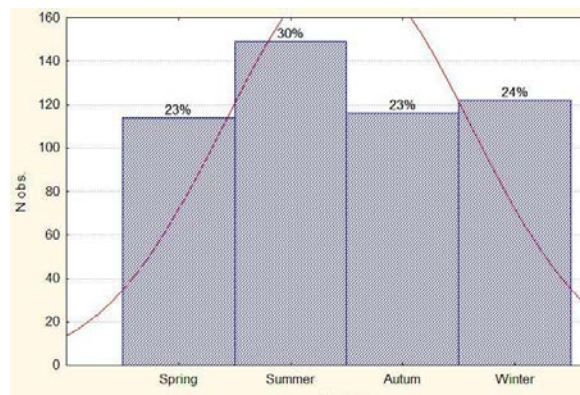


Figure 6: The frequency of syncope on the basis of the day of season.

53% [23], Vanbrabant – 55% [22], Mitro – 62% [24], DiMario – 63.8% [25], Gajek – 72.5% [26], Cooke – 75% [27]. However, Patel and Furukawa demonstrated higher prevalence of males – 75% [20] and 57% [28], respectively.

In case of syncope, proper diagnostics is the key element. If there is a fall, syncope may be mistaken for the end result, and not the cause. Incidence of undiagnosed episodes of syncope raises rapidly in patients above the age of 70, who often suffer from syncope just a moment before the fall.

Mean patient age varies in both national and international studies. Our results revealed mean age of 61.41 years in the study group. Similar results were acquired by Chen – 62 years [23], Furukawa – 64 years [28] and Mitro – 65 years [24]. Higher means were presented in studies by Asensio-Laufente – 77.6 years [29], Cooke – 75 years [27], and Maung – 76.9 years [30]. Lower mean patient ages appeared in the analyses by Vanbrabant – 57 years [22], Patel – 57.4 years [20] and Gajek – 36.6 years [26].

Analysis of our research material revealed an increase in the frequency of syncope during evening hours, on Mondays and during the summer

season. Complete analyses have not been yet conducted on the seasonal incidence of syncope.

Conclusions

- ▶ Syncope poses a serious medical problem for the Emergency Medical Teams.
- ▶ Syncopal episodes are more common in women

(62.08%) than men (37.92%).

- ▶ Mean age of men and women with syncope is similar – 61.41 years. It most often affects people aged 70-90 years.
- ▶ The most common etiology of syncope is neurogenic (reflex).
- ▶ Syncopal episodes occur most often in the afternoon and during summer.

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