Research Article

Lipothymia and Syncope—Aetiology and Outcome in a Prehospital Setting: A Retrospective Study

Stine T. Zwisler¹ and Søren Mikkelsen^{1,2}

¹Department of Anaesthesiology and Intensive Care, Odense University Hospital, Sdr. Boulevard 29, 5000 Odense C, Denmark

²Mobile Emergency Care Unit, Department of Anaesthesiology and Intensive Care, Odense University Hospital, Sdr. Boulevard 29, 5000 Odense C, Denmark

Correspondence should be addressed to Søren Mikkelsen, soeren.mikkelsen@ouh.regionsyddanmark.dk

Received 26 September 2012; Accepted 24 October 2012

Academic Editors: A. Banerjee, O. Karcioğlu, and W. Kloeck

Copyright © 2012 S. T. Zwisler and S. Mikkelsen. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Background. A firm aetiology of lipothymia or syncope can be difficult to establish prehospitally. The aim of the study was to investigate patients initially assigned the diagnosis of lipothymia or syncope prehospitally and establish the aetiology of their condition either based on prehospital or in-hospital medical records. **Methods.** From May 1, 2006 to April 30, 2010, all patients receiving the diagnosis of lipothymia or syncope by the MECU were investigated. If admitted to hospital, the patients' medical records were investigated to confirm the prehospital diagnosis. **Results.** Within 17980 MECU runs registered, 678 were assignments in which the patients were diagnosed with lipothymia or syncope (3.8%). 578 patients (85%) were admitted to hospital. 278 of the patients were discharged directly from the emergency department, while 271 were admitted to a ward. 112 patients refused treatment offered by the MECU or at the emergency department, died, or were left at the scene following treatment. 17 were lost to followup. Of all patients investigated, 299 were discharged with the diagnosis of lipothymia or syncope. 250 patients were discharged with other diagnoses. **Conclusions.** In 44% of the patients presenting with lipothymia or syncope, no other diagnosis was established at the hospital, and no explanatory aetiology was found.

1. Background

1.1. Lipothymia or Syncope. Lipothymia or syncope is defined as transient loss of consciousness due to transient global cerebral hypoperfusion characterized by rapid onset, short duration, and spontaneous complete recovery [1]. In American recordings, syncope accounts for approximately 1.3% of all patients presenting to the emergency department [2] and approximately 6% of hospital admissions [3]. Several papers have tried to identify risk stratification and develop guidelines in order to establish prediction rules of necessary admissions, clinical tests, and overall outcome [2–6]. However, mostly due to small sample sizes, many questions concerning diagnostic strategies and the possibility to predict outcome remains unanswered [7].

There is some discrepancy in the literature concerning the most common cause of syncope, and so far all studies, to our knowledge, have concentrated on patients seen

in the emergency department or hospitalized groups. In an extensive review from 2000, the most frequent cause of syncope was reported to be the clinical diagnosis of vasovagal attack [8]. This finding was supported in another study, in which 18% of the patients admitted because of a syncopal attack were diagnosed with vasovagal syncope [4]. Other frequent diagnoses included neurological causes, psychiatric disorders, orthostatic hypotension, medication-related syncope, and cardiac illness.

In approximately 30% of the hospitalized patients, no exact aetiology for the syncope can be established [2, 4, 8]. When the patients are treated in the emergency department, and not admitted to a ward, 40–50% of the patients will not have the cause of their syncope established [3].

1.2. The Mobile Emergency Care Unit. The Mobile Emergency Care Unit (MECU) in Odense operates as a part of a two-tiered system, in which the MECU is dispatched

with an ordinary ambulance manned with two Emergency Medical Technicians (EMT).

The MECU in Odense consists of one rapid-response car, operating all year round and manned with a specialist in Anaesthesiology and an EMT.

The MECU covers an area of approximately 2.500 square km and services a population of 260.000.

The MECU is dispatched either by the dispatch centre on the basis of the information given by the caller, or by secondary request from the EMTs on the primary ambulance. One of the criteria for dispatching the MECU along with an ambulance is sudden loss of consciousness (see Table 1).

In a typical year, the MECU is handling 4900 calls (13.5 calls per day). Due to apparent overtriage at the dispatch centre, in 13% of the calls, the ambulance waives the MECU en route following initial contact.

As a result of coincident requests for assistance, 3.2% of the requests are left unanswered.

Eleven per cent of the patients treated by the MECU receive final treatment obviating the need for admission to hospital. Among these patients, a relatively large proportion is assigned the diagnosis lipothymia or syncope.

Following each MECU run, patient characteristics (including the patient's Civil Registration System number (or Social Security Number), forming a unique identification of the patient), patient diagnosis, and the treatment administered, is entered into the MECU database.

The aim of the study was to investigate the patients attended to by MECU in Odense, Denmark, who were assigned the diagnosis lipothymia or syncope in order to establish the aetiology.

2. Methods

The study is a retrospective, descriptive study approved by the Danish Data Protection Agency (journal number 2010-41-5096). Within a four-year period (May 1st 2006 to April 30th 2010), all records at the MECU concerning patients with the diagnosis lipothymia and collapsus (International Classification of Diseases 10th revision, R55.9) were sought. The discharge letters from Odense University Hospital for these patients according to their Civil Registration System number were then sought in the hospital's patient registry database. All records were thoroughly read by the primary investigator to determine the immediate outcome of the patients following contact with the MECU. For the patients admitted to hospital, the discharge diagnosis was registered in order to establish the aetiology of the prehospital lipothymia or syncope diagnosis. If a patient, following examinations at the hospital was assigned another diagnosis than lipothymia or syncope in the discharge letter, that particular diagnosis was regarded as the conclusive diagnosis of that particular patient, overruling the diagnosis attributed to the patient by the MECU. The specific diagnoses were divided into organ and disease-related groups to determine if previous findings of aetiology of lipothymia or syncope in hospitalized groups of patients were comparable to these findings for a prehospital patient population.

TABLE 1: MECU Dispatch criteria in the observation period.

Ambulance + MECU
Life-threatening conditions:
(i) Sudden loss of consciousness
(ii) Absence of breathing
(iii) Noisy or otherwise impaired breathing
Possible life-threatening conditions:
(i) Dyspnea
(ii) Severe chest pain
(iii) Sudden onset of serious headache
(iv) Impaired breathing in infants and children
(v) Suspected serious illness in children or infants
(vi) Sudden onset of severe oral or rectal bleeding
(vii) Sudden onset of bleeding in pregnant women beyond 20th gestational week
Accidents, implying a risk of life-threatening conditions:
(i) Motorway accidents
(a) On highways
(b) High velocity car crash
(c) Entrapment
(d) Roll-over
(e) Lorry or bus involved
(f) Motorcycle involved
(g) Pedestrian against car/motorcycle
(ii) Other accidents
(a) Fall from heights
(b) Entrapped persons
(c) Accidents with bleeding victims
(d) Accidents involving horses
(e) Gunshot or stab wounds towards torso, neck, head
(f) Hanging
(g) Drowning
(h) Burns involving face or exceeding 20% (adults) or 10% (infants and children) of body surface area
(iii) Accidents involving trains or aeroplanes
(iv) Fire implying a risk of damage to people
(v) Chemical exposure

All data were categorized using Microsoft Office Excel 2007 and figures were prepared in Adobe Indesign CS4.

3. Results

In all nearly 17980 runs were recorded for the MECU during the four-year period. Of these patients, 678 were coded as lipothymia or syncope. Only 13 of these patients were younger than 15 years of age (data not shown). 578 (85%) of the patients were admitted to Odense University Hospital, 278 discharged directly from the emergency department, and 271 admitted to a ward. In 299 (44%) of all patients,

FIGURE 1: Flowchart.

the lipothymia or syncope diagnosis was the sole diagnosis, whereas 250 patients were given a more specific organ related or disease-related diagnosis following examinations at the hospital (Figure 1).

Approximately a quarter of the specific diagnoses were categorized within the central nervous system (CNS) with diagnoses such as convulsions, stroke, and nervous disease being prominent. The specific diagnoses combined into organ or disease related diagnoses are shown in Table 1. Approximately 17% of the patients were categorized with a cardiovascular diagnosis and 10% were categorized with varying diagnoses from the musculoskeletal system,

hyperventilation and fatigue, gastrointestinal and electrolyte derangement (including anaemia). The remaining 17% of the specific diagnoses were a mixture of several diagnoses. The organ-related diagnoses for the 250 patients are presented in Table 2.

Three patients died at the scene being assigned the diagnosis lipothymia or syncope. All three patients died from witnessed cardiac arrest and as such, were most likely erroneously registered.

Five patients died at the hospital within 24 hours following admission: Three died from cardiac failure and two died with ruptured aortic aneurysm.

TABLE 2: Complete distribution of the 250 specific diagnoses according to ICD-10 classification.

Diagnoses	Total	Total within diagnosis group (percentage)
Central Nervous System (CNS)		
Convulsions, epilepsy, and tremor	26	
Stroke	10	66 (26%)
Nervous condition and unspecified anxiety	7	
Others ^a	13	
Cardiology		
Observation for myocardial infarct and vascular disease	17	
Myocardial infarct and unstable angina	7	43 (17%)
Atrial fibrillation	5	
Others ^c	19	
Musculoskeletal		
Fall patients	9	
Joint and muscle pain and arthritis	6	27 (11%)
Fractures	5	
Others ^b	8	
Mixture of unspecific diagnoses		
Hyperventilation, fatigue, and indisposition	19	
Superficial lesions and small wounds	4	27 (11%)
Observation on suspicion of unspecific illness	4	
Gastrointestinal		
Haematemesis and ulcer	10	
Infection and diarrhoea	8	25 (10%)
Tumour and haemorrhage from rectum	3	
Others ^d	4	
Dehydration, electrolyte derangement, and anaemia		
Dehydration	11	
Anaemia	8	22 (9%)
Hyponatraemia	2	
Hyperkalaemia	1	
Pulmonary		
Pneumonia	6	
Respiratory insufficiency	3	13 (5%)
Others ^e	4	
Urology and gynaecology		
Cystitis	5	
Menorrhagia and pregnancy complications	5	13 (5%)
Nephropathia and renal insufficiency	2	
Nephrolithiasis	2	
Other ^f	14	14 (6%)

^aCNS others include: tumour, confusion, dementia, vertebrobasilar insufficiency, cephalgia, somnolence, narcolepsy, vestibular neuritis, and concussion.

^bMusculoskeletal others include: distortions and rehabilitation organisation.

^cCardiology others include: chronic ischaemic cardiac disease, observation for arrhythmia, cardiac insufficiency, cord disorder, valve stenosis and insufficiency, ventricular and supraventricular tachycardia, aorta dissection and hypotension.

^dGastrointestinal others include: cirrhosis, nausea and vomiting and dyspepsia.

^ePulmonary others include: bronchitis, chronic obstructive pulmonary disease, tumour and suspicion of tumour.

^fOther include: Intoxications, endocrinology, and unspecific infections.

4. Discussion

This retrospective study is, to our knowledge, the first of its kind to evaluate the aetiology of the lipothymia or syncope diagnosis in a prehospital setting and comparisons to other

regions and countries are therefore not possible. However, a valid comparison can be made to a population presenting at the emergency department with lipothymia or syncope, since the diagnostic testing there is also somewhat limited. 44% of the patients seen by the MECU and given the diagnosis

lipothymia or syncope were left with this as their sole diagnosis even after evaluation in the hospital. This finding is in line with previous observations from the emergency department [3]. As expected, this percentage is reduced in patients admitted to wards at hospitals, where more specific diagnostic testing is possible.

Given that one of the criteria for dispatching the MECU is sudden loss of consciousness, it is reasonable to assume that almost all of the patients suffering from syncope in the in the study period were seen by the MECU.

During the study period, however, 3.3% of the tasks assigned to the MECU were not answered because of an already accepted assignment. It is possible that some of these patients suffered from syncope and thus evaded this investigation. The 13.2% of the assignments that are waived en route possibly includes some patients with sudden loss of consciousness regained when the ambulance arrives at the scene. It would be interesting to investigate this group of patients of whom some may be assigned to the diagnosis syncope upon arrival at the hospital. These patients, however, are not registered in the MECU database and as such evade evaluation.

In this study, data from each patient has been manually scrutinized following retrieval from the databases. This has led to a qualitative assessment of patients erroneously registered. As such, three patients, initially assigned the diagnosis group lipothymia or syncope were eliminated, as their diagnoses all were cardiac arrest. Seventeen of the 678 patients were lost to followup as discharge notes were unobtainable in the patient administrator systems.

This small number of patients lost to followup is probably a result of the MECU referring almost all of their patients to one hospital, The Odense University Hospital. Only a small number of patients treated on the geographical outskirts of the MECUs operational area are admitted to other hospitals.

When the patients' discharge note from the MECU and the hospital were compared, the consistency of name and Civil Registry system number was confirmed by the primary investigator. The lipothymia or syncope diagnosis was coded by the attending physician on the MECU. This may cause the initial diagnosis lipothymia or syncope to have been less than exact, as lipothymia or syncope is merely a symptom. It thus is possible, that the diagnosis in some cases was used, not as the exact diagnosis but as a diagnosis assigned in the absence of any other explanation to an incident.

The distribution of patients with specific diagnoses, however, are in line with previous findings in hospitalized patients [4], even if a smaller proportion of our prehospital patient population is given a specific diagnosis than admitted patients. In Denmark, the diagnosis of vasovagal syncope lies within the lipothymia and collapse diagnosis (R55.9a and R55.9) and a distinction between these did not seem meaningful, even if vasovagal syncope is considered the most frequent specific diagnosis within the lipothymia group.

5. Conclusions

Following a syncopal attack, 85% of patients required admission to hospital. Of the patients admitted to hospital, 48% were discharged from the emergency department and 47% were admitted to a hospital ward.

In 44% of the patients presenting with lipothymia or syncope, that particular diagnosis was considered the sole diagnosis at the hospital and no underlying aetiology was found.

This is somewhat similar to previous findings in patients presenting in the emergency department.

Conflict of Interests

None of the authors have any conflict of interests to declare.

Authors' Contribution

S. T. Zwisler contributed to this manuscript with acquisition and analysis of the data and was involved in the drafting and revising of the manuscript. S. Mikkelsen contributed to this manuscript with idea and design as well as acquisition of data and drafting and revising of the manuscript. Both authors read and approved the final manuscript.

Acknowledgments

Winnie Kvist Johansen and Kirsten Henriksen, both secretaries at the MECU, are thanked for retrieving data from the databases at MECU and Odense University Hospital. Daniel Henriksen is thanked for graphic consultancy regarding the layout of the figures. Funding for the presentation of the abstract and poster at ERC 2010 in Porto, Portugal was provided by the Department of Anaesthesiology and Intensive Care and the Region of Southern Denmark.

References

- [1] K. Carey, "Understanding syncope. The pathophysiology & assessment of a challenging condition that EMS crews frequently encounter," *A Journal of Emergency Medical Services*, vol. 28, no. 11, pp. 50–65, 2003.
- [2] H. Ouyang and J. Quinn, "Diagnosis and evaluation of syncope in the emergency department," *Emergency Medicine Clinics of North America*, vol. 28, no. 3, pp. 471–485, 2010.
- [3] C. Kessler, J. M. Tristano, and R. De Lorenzo, "The emergency department approach to syncope: evidence-based guidelines and prediction rules," *Emergency Medicine Clinics of North America*, vol. 28, no. 3, pp. 487–500, 2010.
- [4] S. Sule, C. Palaniswamy, W. S. Aronow et al., "Etiology of syncope in patients hospitalized with syncope and predictors of mortality and rehospitalization for syncope at 27-month follow-up," *Clinical Cardiology*, vol. 34, no. 1, pp. 35–38, 2011.
- [5] R. Sutton, M. Brignole, D. Benditt, and A. Moya, "The diagnosis and management of syncope," *Current Hypertension Reports*, vol. 12, no. 5, pp. 316–322, 2010.
- [6] D. D. Limmer, J. J. Mistovich, and W. S. Krost, "Beyond the basics: syncope," *EMS Magazine*, vol. 38, no. 3, pp. 76–81, 2009.

- [7] W. N. Kapoor, "Syncope. Past, present and future," *Clinical Autonomic Research*, vol. 14, supplement 1, pp. 1–3, 2004.
- [8] W. N. Kapoor, "Syncope," *New England Journal of Medicine*, vol. 343, no. 25, pp. 1856–1862, 2000.