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THE 7th ICOH INTERNATIONAL CONFERENCE
ON WORK ENVIRONMENT AND CARDIOVASCULAR DISEASES

Bridging the gap between knowledge and preventive interventions
at the workplace to reduce cardiovascular diseases.

MAY 3-5, 2017 - Varese, Italy

Neuromediated syncope and high risk activities

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May 3rd 2017

Two twin brothers are brought to the ED after T-LoC

SAD

HAPPY

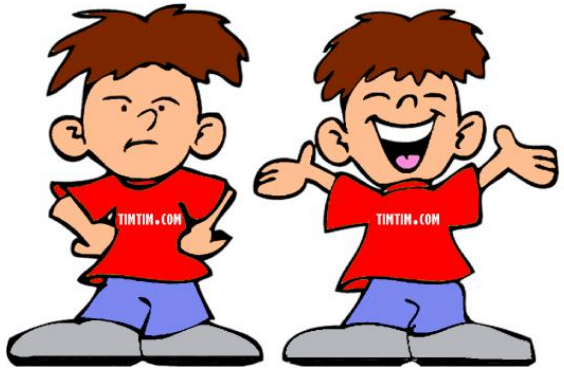
- 55 years old;
- Lateral myocardial infarction 3 years ago;
- Current therapy: Aspirin 100 mg, Metoprolol 50 mg bid, Ramipril 5 mg, Simvastatin 40 mg;
- Syncope with no prodrome while going from the bed to the bathroom during the flu;
- ECG: sinus bradycardia 56 bmp, PR 240 msec, RBBB and left posterior fascicular block (previously unknown);
- No previous syncopal episodes;
- During ED ECG monitoring prolonged asystolic pause due to sudden-onset paroxysmal AV block.

- 55 years old;
- Unremarkable past medical history;
- Not under any medication;
- Faints while standing during a concert;
- He reports multiple previous episodes with or without prodromes in the past years;
- ED physical examination, vital signs and ECG are normal.

Admitted for permanent PM implant

Discharged home with a diagnosis of neuromediated syncope

Happy ending?



No more episodes at the 3-month follow-up.

2 months later syncope at work with fall and severe injury.

Clinical risk

Occupational risk

Does syncope affect workers' prognosis?

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Prospective Assessment of the Risk of Vasovagal Syncope During Driving

Vern Hsen Tan, MD, Debbie Ritchie, MN, Connor Maxey, BSc, Robert Sheldon, MD, PhD,
on behalf of the POST Investigators

- To assess the likelihood of a motor vehicle accident causing serious risk or harm in patients with frequent vasovagal syncope (POST 1 and POST 2 patients), and compare this with international accident data;
- 418 patients (age 38 ± 17 years) with a median of 10 lifetime faints and a median of 3 faints in the previous year;
- Total follow-up time was 323 years, or 0.77 years per person;
- A total of 174 subjects fainted, having a total of 615 faints;
- **Limitation: very selected population.**

TABLE 2 Estimated Risk of Harm Caused by Syncope While Driving in the POST-1 and -2 Subjects

Item	Count or Frequency
Subjects fainted while driving, n	2
Subjects fainted while driving per year	2.59
Percent subjects fainted while driving	0.48%
Percent subjects fainted while driving per year	0.62%
Estimated risk of serious harm or death	0.0035%

The risk of harm according to the CCS Guidelines is (probability of fainting while driving per year) × 0.02 × 0.28.

CCS = Canadian Cardiovascular Society; POST = Prevention of Syncope Trial.

TABLE 4 Estimated Risk of Harm Caused by Syncope While Driving Compared With the Frequency of MVAs and Injuries in Alberta, Canada, the United Kingdom, and the United States

Location, Year (Ref. #)	MVAs, %	Injuries, %	Serious Injury, %	Death, %	Serious Injury and Death, %
Canada, 2012 (19,20)	0.56 (est)	0.51	0.044	0.009	0.053
United States, 2009 (21)	2.29	0.63	NR	0.013	>0.013
United Kingdom, 2013 (22,23)	0.49	0.52	0.078	0.0044	0.082
Country averages	1.11 ± 1.02	0.55 ± 0.07	0.061 (exc U.S.)	0.009 ± 0.004	0.067 (exc U.S.)
CCS Guidelines (12)	<1	N/A	<0.005	<0.005	<0.005
Syncope	0.31	N/A	≤0.0017 (est)	≤0.0017 (est)	≤0.0017 (est)

The rates are expressed as likelihood of event per 100 driver-years, denoted as %.

est = estimated; exc = excluding; MVA = motor vehicle accident; NR = not reported; other abbreviation as in Table 2.

Does syncope affect workers' prognosis?

Research

Original Investigation

Syncope and Motor Vehicle Crash Risk
A Danish Nationwide Study

Anna-Karin Numé, MD; Gunnar Gislason, MD, PhD; Christine B. Christiansen, MD, PhD; Deewa Zahir, MB; Mark A. Hlatky, MD; Christian Torp-Pedersen, MD, DSc; Martin H. Ruwald, MD, PhD

JAMA Intern Med. 2016;176(4):503-510. doi:10.1001/jamainternmed.2015.8606
Published online February 29, 2016.

Corresponding Author: Anna-Karin Numé, MD, Department of Cardiology, Copenhagen University Gentofte Hospital, Kildegaardsvej 28, 8.3, Post 635, DK-2900 Hellerup, Denmark (annakarin.nume@gmail.com).

- All Danish residents between 2008 and 2012 who were at least 18 years old;
- 4265301 people, of whom 41039 had a first-time diagnosis of syncope from hospital or emergency department (sensitivity 63%, positive predictive value 95%);
- Median age of 66 (IQR 47-78) years; 51% women;
- During a median follow-up of 2.0 years, a total of 1791 patients with syncope (4.4%) experienced a motor vehicle crash that required medical evaluation in an emergency department or hospital; 0.3% of these crashes were fatal, and 78.1% resulted in crash-related injury;
- The crude incidence rates of motor vehicle crashes per 1000 person-years were higher among the syncope population (20.6; 95% CI, 19.7-21.6) compared with the general population (12.1; 95% CI, 12.0-12.1);
- Patients with syncope had a 2-fold higher RR of motor vehicle crashes compared with the general population (RR, 2.04; 95% CI, 1.95-2.14; P < .001]);
- The average interval between syncope discharge and the occurrence of a crash was 315 (IQR 59-698) days.

Does syncope affect workers' prognosis?

Original Article

Syncope and Its Impact on Occupational Accidents and Employment

A Danish Nationwide Retrospective Cohort Study

Anna-Karin Numé, MD; Kristian Kragholm, MD, PhD; Nicolas Carlson, MD; Søren L. Kristensen, MD, PhD; Henrik Bøggild, MD, PhD; Mark A. Hlatky, MD; Christian Torp-Pedersen, MD, DSc; Gunnar Gislason, MD, PhD; Martin H. Ruwald, MD, PhD

(*Circ Cardiovasc Qual Outcomes*. 2017;10:e003202. DOI: 10.1161/CIRCOUTCOMES.116.003202.)

- All Danish residents between 2008 and 2012 who were 18 to 64 years;
- Among 3410148 eligible individuals, 21729 had a fist-time diagnosis of syncope;
- Median age 48.4 years (IQR 33.0-59.5), and 10757 (49.5%) employed at time of the syncope event;
- Over a median follow-up of 3.2 years, 622 people with syncope had an occupational accident requiring hospitalization (2.1/100 person-years). In multiple Poisson regression analysis, the incidence rate ratio in the employed syncope population was higher than in the employed general population (1.44; 95% confidence interval [CI], 1.33–1.55) and more pronounced in people with recurrences (2.02; 95% CI, 1.47–2.78);
- The 2-year risk of termination of employment was 31.3% (95% CI, 30.4%–32.3%), which was twice the risk of the reference population (15.2%; 95% CI, 14.7%–15.7%).

JACC Vol. 61, No. 3, 2013
January 22, 2013:325–32

Prognosis Among Healthy Individuals Discharged With a Primary Diagnosis of Syncope

Objectives This study sought to examine the risk of major cardiac adverse events and death in a nationwide cohort of patients without previous comorbidity admitted for syncope.

Background Syncope is a common clinical event, but knowledge of prognosis is not fully elucidated in healthy individuals.

Methods Patients without previous comorbidity admitted for syncope in Denmark from 2001 to 2009 were identified in nationwide administrative registries and matched by sex and age with 5 control subjects from the Danish population. The risk of death or recurrent syncope, implantation of pacemaker or implantable cardioverter-defibrillator, and cardiovascular hospitalization were analyzed with multivariable Cox proportional hazard models.

Results We identified 37,017 patients with a first-time diagnosis of syncope and 185,085 control subjects; their median age was 47 years (interquartile range, 32 to 63 years) and 47% were male. A total of 3,023 (8.2%) and 14,251 (7.1%) deaths occurred in the syncope and the control population, respectively, yielding an event rate of 14.3 per 1,000 person-years (PY) in the syncope population. Multivariable Cox regression analysis demonstrated a significantly increased risk of all-cause mortality (hazard ratio [HR]: 1.06; 95% confidence interval [CI]: 1.02 to 1.10), cardiovascular hospitalization event rate of 26.5 per 1,000 PY (HR: 1.74; 95% CI: 1.68 to 1.80), recurrent syncope event rate of 45.1 per 1,000, stroke event rate of 6.8 per 1,000 PY (HR: 1.35; 95% CI: 1.27 to 1.44), and pacemaker or implantable cardioverter-defibrillator event rate of 4.2 per 1,000 PY (HR: 5.52; 95% CI: 4.67 to 5.73; $p < 0.0001$).

Conclusions The first admission for syncope among healthy individuals significantly predicts the risk of all-cause mortality, stroke, cardiovascular hospitalization, device implantation, and recurrent syncope. (J Am Coll Cardiol 2013;61: 325–32)


AP

Assessing “low” risk patients in high risk settings

- Risk of recurrence;
- Risk of serious outcomes in case of recurrence;
- Syncope situation and precipitating factors.

Risk of recurrence

Europace (2015) **17**, 300–308
doi:10.1093/europace/euu327

CLINICAL RESEARCH
Syncope

Syncope recurrence and mortality: a systematic review

Table 2 Pooled incidence of mortality, syncope relapse, major events, and overall serious outcomes at different times

Outcome	Time	Number of studies	Number of patients	Number of events	Pooled rate (%)	95% CI (%)	I^2 (%)[b]	Heterogeneity *P*-value[c]
Syncope recurrence	30 days	1 (S24)	380	1	0.3	0–1.8[a]	0	–
	6 months	2 (S13; S20)	350	18	5.2	3.3–8.2	0	0.3915
	1 year	2 (S7; S22)	797	72	9.0	7.2–11.3	0	0.5987
	1.5 years	4 (S10; S16; S22; S24)	1254	202	16.1	14.2–18.3	0	0.9582
	2 years	2 (S21; S25)	164	36	22.0	16.3–29.1	0	0.4727

Risk of recurrence

Circulation

ARTICLES

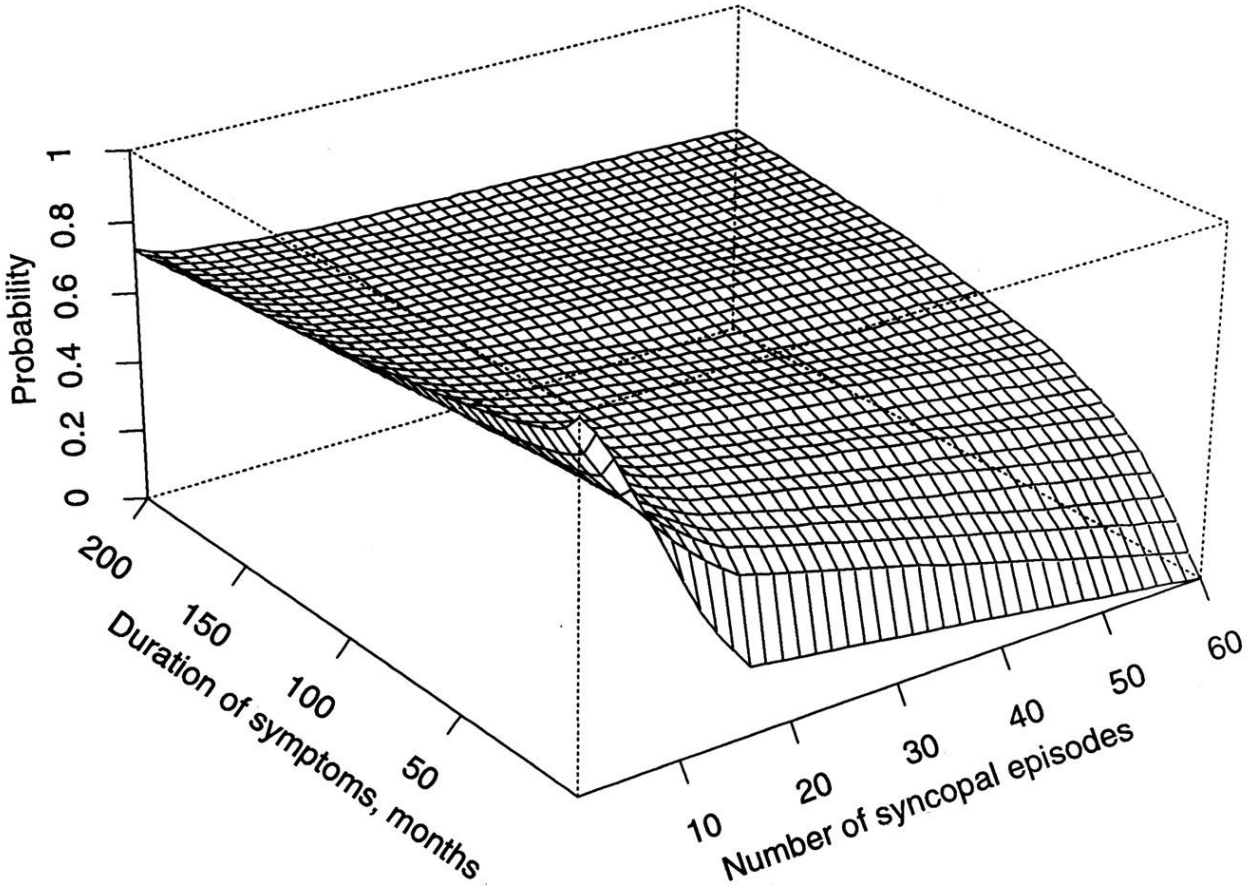
Risk Factors for Syncope Recurrence After a Positive Tilt-Table⇓ Test in Patients With Syncope

Robert Sheldon, Sarah Rose, Patricia Flanagan, Mary Lou Koshman, Shawn Killam

DOI https://doi-org.pros.lib.unimi.it:2050/10.1161/01.CIR.93.5.973

Circulation. 1996;93:973-981

- Multivariate proportional hazards analysis demonstrated that the most powerful predictor of a recurrence of syncope was the logarithm of the number of preceding syncopal spells (P<.001);
- The probability of a recurrence of syncope also varied with the logarithm of the frequency of preceding spells (P=.008);
- The median frequency of pretest spells was 0.3/month; after the tilt test, the median frequency dropped ≈90% to 0.03 per month.



A quantitative model

Autonomic Neuroscience: Basic and Clinical 184 (2014) 46–52

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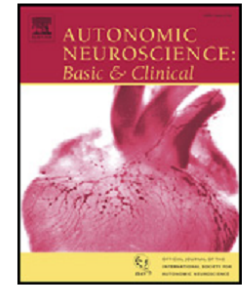
Autonomic Neuroscience: Basic and Clinical

journal homepage: www.elsevier.com/locate/autneu



Driving and Working with Syncope

Franca Barbic [a,*], Giovanni Casazza [b], Antonio Roberto Zamunér [a,c], Giorgio Costantino [d], Mauro Orlandi [a], Franca Dipaola [a], Chiara Capitanio [a], Sara Achenza [a], Robert Sheldon [e], Raffaello Furlan [a]

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[e] *Department of Cardiac Sciences, University of Calgary, Canada*

- The *syncope recurrence risk* assessed 6 months after the event, in a working population (RR). This risk is accounted for by individual factors such as syncope etiology, number of syncope spells before the reference event, patient's age, gender and comorbidities.
- The actual *job task duration (T)*. T furnishes the duration, i.e. the magnitude, of the "exposure" to a specific risk associated to the corresponding job task.
- The presence of *features facilitating (FF) a syncope relapse* characterizing a specific job task. Based on the literature and on occupational medicine expert opinions we have identified 5 facilitating features (Table 3).
- The *estimated expected harm (EH)* for the worker and/or for bystanders and others, likely to be produced by the worker's loss of consciousness, during the job task considered.

$$RI_i = FF_i \times EH_i$$

$$RI_W = RR_w \times (T_1 RI_1 + T_2 RI_2 + \cdots + T_k RI_k)$$

Future perspectives…

- Workers and physicians education (think and report);
- Prospective ad hoc studies;
- Management guidelines.