



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

^a Internal Medicine, BIOMETRA Department, Humanitas Clinical and Research Center, Rozzano (MI), University of Milan, Italy

^b Department of Biomedical and Clinical Sciences "L. Sacco", University of Milan, Italy

^c Department of Physical Therapy, Federal University of Sao Carlos, Brazil

^d Division of Medicine and Pathophysiology, Department of Biomedical and Clinical Sciences "L. Sacco", University of Milan, Italy

^e Department of Cardiac Sciences, University of Calgary, Canada

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ABSTRACT

Syncope is usually addressed in the Emergency Department (ED) by the doctor in charge of the clinical picture, i.e. the patient's risk is stratified, a diagnostic work-up is done and a prognosis is set. Patients are ultimately admitted to hospital or discharged. However, other aspects related to syncope may deeply affect their daily lives. These include how and when to return to work and to driving, the feelings about a recent loss of consciousness, and the potential relapse of syncope. This is particularly significant if the work setting is intrinsically hazardous. These patients need adequate clinical and psychological support.

For patients with syncope, two main parameters should be considered regarding returning to work and to driving. The first is to evaluate the risk of syncope recurrence and the second is to consider the expected harm if syncope does indeed occur during these activities. In the present paper we detail the problem of driving (including professional driving) and work after syncope.

We propose a new quantitative model that will guide the physician in stratifying the risk for patients who have had a previous syncope event. The new model considers the syncope recurrence risk, the job task duration, and features that facilitate a syncope during work. On the basis of these variables, the global risk index for a worker is calculated. Following appropriate validation, this method might help ED and occupational physicians in their decision-making process with the goal of safely readmitting syncope patients to the workplace.

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1. Introduction

Risk stratification of patients who present with syncope in Emergency Departments (ED) is essential in order to optimize a diagnostic and therapeutic strategy. However, after ED or hospital discharge, other aspects that may deeply affect patients' daily lives, such as work and its relationship to syncope and potential syncope recurrence should be addressed by the physician to adequately support the patient both from a clinical and a psychological perspective.

Indeed, daily activities with an inherent risk such as driving or performing hazardous jobs, may become exceedingly risky if pursued by individuals suffering from syncope or at risk of syncope relapse. In Western countries, adults spend a considerable part of the day driving vehicles (on average about 1 h/day) (Krumm, 2012) and/or working (on average about 8 h/day) (U.S. Bureau of Labor Statistics, 2013). In particular, syncope incidence is estimated to be 18.1–39.7 events/1000

patients/year, that is about 20 times higher than it would be expected on the basis of Emergency Department (ED) admissions rate (0.7/1000 patients/year) (Ganzeboom et al., 2006).

The sudden loss of consciousness and postural tone characterizing syncope while driving or working in high-risk occupations may represent a potential hazard not only for the patient but also for third-party. Therefore, even a benign syncope such as the vasovagal type may become exceedingly risky in particular conditions such as driving trucks, working at high workstation, on mobile stairs, close to hot materials and flames in metal foundry or in a steel plant (see Table 1 for more details).

As reported by the International Labor Organization (Takala, 2002), every day 5000 people die from work-related accidents in both developing and industrialized countries with three deaths per minute. In addition, as reported by the EUROSTAT Health and Safety at Work in Europe (EUROSTAT European Commission, 2012), most accidents at work are classified as occurring after "loss of control", "slipping", "stumbling" and "falling". In this context, if the lack of work safety procedures is likely to be the prevalent cause accounting for these accidents, it is possible to hypothesize that an occult syncope or pre-syncope leading to a loss of control might also play a role (Barbic et al., 2013).

* Corresponding author at: Internal Medicine, Humanitas Clinical and Research Center, Via Manzoni, 56, 20089 Rozzano (Milano), Italy. Tel.: +39 028224 7228 7267; fax: +39 028224 4590.

E-mail address: franca.barbic@humanitas.it (F. Barbic).

Table 1

The 10 most dangerous jobs based on number of fatalities and the main cause of deaths by US Bureau of Labor Statistics (www.bls.gov) in 2012.

Job description	Main cause of death
Timber and Logging workers	Contact with objects and equipment
Fishermen and related fish industry workers	Transportation incidents
Aircraft pilot and flight engineers	Transportation incidents
Structural iron and steel workers	Contact with objects and equipment
Farmers and ranchers	Transportation incidents
Roofers and Linemen	Falls
Electrical power-line installers and repairers	Harmful substances exposure / environment
Drivers and truck drivers	Transportation incidents
Refuse and recyclable material collectors	Transportation incidents
Military and Police Personnel	Transportation incidents
Construction laborers	Falls
Firefighters	Fires and explosions
Helpers, construction trades	Falls
Grounds maintenance workers	Falls

Because of the intrinsic complexity in identifying the loss of consciousness as the cause of accidents while driving and working, especially when fatal accidents occur, the exact impact of syncope on public and occupational safety is unknown. Obviously, the resumption of a hazardous job without the necessary precaution, i.e. an appropriate diagnostic work-up and risk stratification, may result in high risk for the patient and possibly for third-party as well. In addition, there is a lack of individualized advice regarding the timing and safety of driving and work resumption after syncope. This may generate apprehension and unjustified delay in resuming driving or work. On the other hand, it could be harmful if the patient decides on his/her own to return to a high risk job without the necessary precaution. In such a context, social costs to the community are likely to rise. There are no published data supporting these statements but a general agreement is present especially among occupational physicians. In preparation for the First International Workshop on Syncope Risk Stratification in the Emergency Department, which was held in Gargnano, Italy 19–21 September 2013, a questionnaire was provided to the 32 previously identified experts and discussants. As a result, 96% of interviewed physicians reported that work aspects should definitively be considered by the ED physician whenever dealing with a patient suffering from a syncope.

Two main parameters should be assessed in patients with syncope with regard to driving and working. The first variable to consider is the risk of syncope recurrence while the second is the expectation of harm if syncope does occur during these activities.

While private driving itself should not promote syncope, some working conditions do, and must be taken into account. For example, warm/hot environment, prolonged standing, exercise, the standing up maneuver (Ganzeboom et al., 2006) are all recognized triggers for syncope onset, and are frequently found in certain work activities (Maas et al., 2003).

In the present paper we address the problem of working and driving (including professional driving) after syncope. In addition, we highlight and discuss particular environmental situations that are likely to provoke syncope that are commonly observed in certain working conditions or job tasks. Finally, we propose a new quantitative model to stratify the working risk for patients who had previously suffered from a spell of syncope. After an appropriate validation, the method we outline may help ED and occupational physicians in deciding how to safely allow syncope patients to return to work.

2. Private Driving

Compared to the general population, patients with syncope may be at an elevated risk for serious injury and death while driving.

About 25 years ago the Canadian Cardiovascular Society (CCS) embarked on an exercise to ground driving guidelines for cardiovascular

patients in evidence-based reality (Canadian Cardiovascular Society, 1992, 1996). The goal was to develop guidelines that would restrict the risk of serious injury or death to less than 1/20,000 per year. This was based on the only existing guideline with outcome evidence: the risk of a commercial truck driver following myocardial infarction (Antecol and Roberts, 1990). In relation to this, each syndrome or presentation was addressed separately and the guidelines were formally accepted by the CCS (Canadian Cardiovascular Society, 1992, 1996).

In order to establish fitness to drive for a patient with syncope, a formula (Harm Formula) was developed by CCS, as follows: $RH = TD \times V \times SCI \times Ac$, where RH indicates the acceptable Risk of Harm (0.00005 in Canada); TD (%) is the driving time over the day; V is the value depending on the type of vehicle; SCI (%) is the risk of Sudden Cardiac Incapacitation and Ac (%) is the probability that such an event, i.e. syncope, will result in a fatal or injury-producing accident. For private driving the following values were used: $TD = 0.04$; $V = 0.28$; $Ac = 0.02$.

Therefore, if the acceptable RH is 0.00005, the yearly acceptable risk of Sudden Cardiac Incapacitation is 22% (Simpson et al., 2004). In addition, this formula can be applied in establishing fitness to drive for a patient with syncope based on the estimation of syncope recurrence risk (Canadian Cardiovascular Society, 1992, 1996).

In their review, Sakaguchi and Li (2013) compared different recommendations for resuming private driving (Epstein et al., 1996; Simpson et al., 2004; Moya et al., 2009) regarding patients with vasovagal syncope. The authors concluded that patients with a low risk of syncope relapse, i.e. less than 22% (Simpson et al., 2004), may soon return to driving with minimal or no restrictions.

Sorajja et al. (2009) addressed the potential role of driving itself as an activity that provoked syncope. Out of 3877 patients who presented with syncope during the period of the study, 381 (9.8%) suffered from syncope while driving. The driving group had a higher percentage of males and individuals with a history of cardiovascular disease and stroke. The main cause of syncope during driving was identified unexpectedly as neurally mediated (37.3%), while the rate of syncope due to cardiac arrhythmias was 11.8%. Despite the fact that neurally mediated syncope is not common while in the seated position, the authors have proposed different potentially underlying mechanisms such as abnormal venous pooling, excessively high temperatures inside the vehicle, and strong emotional stimulation while driving (Mosqueda-Garcia et al., 2000; Brignole et al., 2001; Sorajja et al., 2009). Interestingly, both the risk of syncope relapse and the causes of syncope were similar in both the patients who fainted while driving and those who had syncope unrelated to driving. These findings suggest that clinical management of patients who presents syncope while driving should be similar to that pursued in the general population of syncope patients (Epstein et al., 1996, 2007; Moya et al., 2009).

3. Working

There are no compelling data concerning syncope and its relation to different work activities. While recommendations were set for professional driving (Miles, 1997; Bansch et al., 1998; Blitzer et al., 2003; Epstein et al., 2007), to the best of our knowledge nothing has been proposed regarding work activities characterized by exaggerated hazard. This unknown scenario is of paramount importance because it involves a large sector of the working population, particularly in developing countries where safety procedures and devices in work settings are still inappropriate. Table 1 summarizes the most dangerous jobs and relative cause of death, classified on the basis of the number of associated fatalities by the Bureau of Labor Statistics of US. Note that a simple and benign vasovagal syncope may turn out to be the cause of a dramatic and life-threatening event in the setting of one of these jobs.

In addition, some common features triggering neurally mediated syncope (Maas et al., 2003) may be present in some working activities. Table 2 lists the job features that potentially promote syncope. Note that

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