



# Risk of syncope during work

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## Aims

Little is known regarding the overall prevalence of syncope in a population of workers and the risk of occurrence during working time.

## Methods and results

A total of 452 consecutive workers (mean age:  $46 \pm 9$  years) were invited to answer an anonymous questionnaire. They had been employed for  $22 \pm 10$  years for a total of 9765 years worked. In the cohort, 160 subjects (35%) reported a total of 465 episodes of syncope during their lives; 64 (14%) suffered a syncopal episode after the start of employment, but only 26 (5.7%) reported syncope at work, 7 (1.5%) having had 2 episodes, and 1 (0.2%) 3 episodes (total: 36 episodes). The risk of syncope during work was 4.6 times higher for those who had a prior history of syncope [18 of 138 (13%)] than for those who did not [8 of 314 (3%),  $P = 0.001$ ]. The occurrence of syncope during work for the patients with a history of syncope was one syncopal episode in every 99 years worked and for those who had already had an episode during work, one episode in every 16 years worked. Only one patient experienced minor trauma as a consequence of syncope during work and three were referred to the emergency department. All patients continued their employment without any problems.

## Conclusion

The prevalence of syncope during work is low and its impact is benign. The probability of syncope during work is higher for subjects with a history of syncope.

## Keywords

Syncope • Work

## Introduction

Syncope is defined as a loss of consciousness caused by overall and transient cerebral hypoperfusion. It is characterized by a rapid onset, short duration, and spontaneous and complete recovery.<sup>1,2</sup> It is quite frequent in the general population, with a cumulative incidence equal to 6.2 cases/1000 adults/year.<sup>3</sup> However, its prevalence varies depending on age, with a very high prevalence among teenagers. It peaks around the age of 15, followed by a decline in the subsequent decades, which usually coincide with a person's productive life, and finally a sharp rise after the age of 65.<sup>1</sup> There is not much information regarding the overall prevalence of syncope and the recurrence rate in the population of workers, or about its prevalence during work.

## Methods

We performed a cross-sectional survey designed to determine the prevalence, recurrence rate, and consequences of syncope in a population of workers.

From May to September 2012, employees of an Italian Community Health Center running four hospitals and several outpatient care services were invited to take part in this study. Employees were contacted during the routine yearly visit by the Occupational Health Service and asked to complete a questionnaire (reported in Appendix). The recruiting had been consecutive. The 12-item questionnaire was designed to explore the history of syncope before and during the respondents' working life. In the questionnaire, medical and scientific terms were avoided; hence the lay term 'fainting' was used rather than 'syncope'. Participants received explanations of the questions and the definition of fainting, but no influence was exerted on the choices of the subjects.

The participants received information about the purpose of this project and their participation was voluntary. The questionnaires were analysed anonymously by the authors only. All attempts were made to protect participants' privacy. The raw data were kept secure and no third parties could access it. Therefore, no informed consent was requested. Furthermore, the choice to keep the questionnaire anonymous ensured that the participants did not raise concerns about possible consequences for their own jobs. The results of the questionnaire were entered in a database and analysed by some members of our

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### What's new?

- Literature contains little information regarding syncope occurring at work. This paper illustrates the outcomes of a survey regarding the overall prevalence of syncope and the recurrence rate in a population of workers.
- The main results of this analysis are that the prevalence and incidence of syncope during work are low and its impact is benign.
- Our results may contribute to a reassessment of the implication of syncope in workers.

team (G.G., M.L., and M.B.). The comparison between proportions was made by means of the  $\chi^2$  test or Fisher's exact test when appropriate.

## Results

### Demographic

A total of 456 employees were asked to complete the questionnaire. Since four questionnaires were excluded due to incompleteness, 452 forms were analysed. There were 239 women (53%) and 213 men (47%); the mean age was  $46 \pm 9$  years. The mean age of respondents when they started working was  $25 \pm 5$  years. The years of work were  $22 \pm 10$  with a total of 9765 years worked. The respondents included 246 nurses, 84 physicians, 66 blue-collar workers, and 56 clerks.

### Outcome

In our cohort, 160 subjects (35%) reported a total of 465 episodes of syncope during their lives; 64 (14%) suffered a syncopal episode after the start of employment, but only 26 (5.7%) reported syncope at work, 7 (1.5%) having had 2 episodes, and 1 (0.2%) 3 episodes (total: 36 episodes) (Table 1).

The mean number of syncopal spells was 2 (interquartile range 1–3). Trauma related to syncopal spells had occurred in 29 subjects (6%), but only 4 reported some consequence during work: 1 patient experienced minor trauma and 3 were referred to the emergency department out of prevention, but no health problem was identified. All patients continued their employment without any problems.

Among the subjects with a history of syncope, 138 (86%) had already experienced syncope before starting employment: 96 (70%) of these subjects had no more episodes during their working life and 42 (30%) had recurrence during working life. Of the 314 subjects who had never experienced syncopal episodes before starting employment, only 22 (7%) did so during their working life. Thus, the prevalence of syncope was 31% (138 of 452) before the age of  $25 \pm 5$  years and decreased to 14% (64 of 452) during the following  $22 \pm 10$  years (mean age:  $46 \pm 9$  years) (Figure 1).

The risk of syncope during work was 4.6 times higher for those who had a history of syncope/syncopal episodes starting before employment [18 of 138 (13%)] than for those who did not [8 of 314 (3%),  $P = 0.001$ ]. The incidence of syncope during work was of 1 in every 99 years worked for the patients with a history of syncope, 1 in every 16 years worked for those who had already had an episode during work, and 1 in every 13 years worked for those with recurrent syncope during work (Table 2).

## Discussion

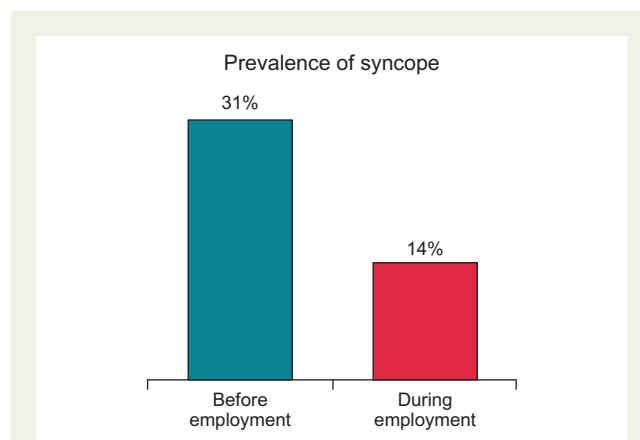
The main results of this analysis are that the prevalence and incidence of syncope during work are low and its impact trivial. This low incidence is favoured by a decline in the prevalence of syncope during middle age. The outcome is benign. The probability of syncope during work is higher for subjects who have a history of syncope.

The literature contains little information regarding syncope occurring at work. It is common belief that, when syncope occurs at work, it is more likely to have serious medical consequences for both the worker and the third party.<sup>4</sup> Syncope in the workplace may also have work-related consequences such as suspension from work or changes in duties. In Italy in 2010, 250 physicians participated in a workshop on syncope and potential risk at work. Overall, 70% of the physicians surveyed considered syncope relevant in clinical practice for the risk assessment at work (29% considered it 'very important', while 41% considered it 'quite important').<sup>4</sup>

Some studies also suggest that patients admitted to the emergency department for syncope are frequently (50% of cases) aged between

**Table 1** Main findings

	Number of subjects	%
Completed the questionnaire	452	
Reported history of syncope during life	160	35
Subjects who suffered syncopal episodes after the start of employment	64	14
Any syncope during work	26	5.7
2 syncopal episodes during work	7	1.5
3 syncopal episodes during work	1	0.2
Any syncopal episode during work with consequences	4	0.9



**Figure 1** Prevalence of syncope before the age of  $25 \pm 5$  years (before employment) and in the subsequent  $22 \pm 10$  years of working life (mean age:  $46 \pm 9$  years).

**Table 2** Risk of syncope during work

	Number of subjects	Years worked	Number of syncopal episodes during work	Years of work needed for one episode
Total study cohort	452	9765	36	271
Subjects with any syncope	160	3567	36	99
Subjects with syncope during work	26	576	36	16
Subjects with recurrent syncope during work	8	222	17	13

18 and 65; that is, at a 'potential working age'.<sup>5</sup> However, these data conflict with other observations about the epidemiology of syncope, indicating that the age distribution of syncope is bimodal with a peak in teenagers<sup>6,7</sup> and another in the elderly.<sup>7</sup> Only 5% of adults experience the first syncopal episode after the age of 40.<sup>6</sup> The majority of subjects with syncope experienced reflex-mediated episodes as teenagers.<sup>7</sup>

In our experience, the overall prevalence of syncope (35%) is similar to that reported in the literature.<sup>1</sup> The different prevalence of syncope before employment (31%) and during employment (14%) is consistent with the epidemiological data of a higher prevalence during adolescence, before people start working, than during adulthood.

Moreover, the possibility that syncope occurs at work is related to the number of hours worked, so that the number of patients who experienced syncopal episodes at work (6%) are obviously a minority among those with syncope during their working life (14%). These results are similar to those reported by Rudnicki *et al.*,<sup>8</sup> who focused on surgeons and nurses subjected to orthostatic stress in the operating room and found a prevalence of syncopal events in 4.7% of those surveyed during operation and in 11% outside the operating room. Therefore, although syncope is a common symptom, it is not so frequent in working life or, in particular, in the workplace.

Since the subjects considered in our survey were healthy workers, the cause of syncopal episodes is likely vasovagal and typically benign. We have no data about prodromal symptoms in our experience, but in a similar population and a similar context as that of the study of Rudnicki *et al.*,<sup>8</sup> prodromal symptoms were present in 92% of the cases. This high rate of prodromal symptoms can favour preventive measures to reduce trauma. In fact, in our study only one subject reported a minor traumatic event.

The probability of syncope during work is higher for subjects with a history of syncope; the risk of syncope during work was 4.6 times higher for those who had a prior history of syncopal episodes. This finding is consistent with the study of Rudnicki *et al.*,<sup>8</sup> although these authors found an even higher odds ratio of 20. However, despite the fact that a history of syncope outside work increases the risk of syncope during work, only a minority (about one out of six) will actually experience such an event for the reasons outlined above, and the event is diluted among several years of work (Table 2). Our results may contribute to a reassessment of the implication of syncope in workers. Syncope in the working population, and particularly in the workplace, is a symptom less frequent than commonly assumed and its impact is usually benign.

We believe, however, that restrictive measures regarding the resumption of work are often not appropriate given the rarity of recurrences and the rarity of significant consequences. Inability to work because of syncope should be limited to few cases, when either the type of work involves risk of serious injury or some evidence suggests the possibility of a recurrence in the absence of prodromal symptoms. Clearly, even a low risk of incidence or recurrence of syncope at work may not be considered socially acceptable in different contexts at higher risk (see the Limitations Section).

## Limitations

The results of our evaluation relate to a healthy population, as periodically controlled by the Occupational Health Service. Being part of the health care staff of four hospitals, the level of information regarding our population may have been higher than average and this could have encouraged the use of preventive measures, particularly to prevent recurrence. Therefore, these results may be only partially extrapolated to other contexts. Our survey is also limited by a population not at high risk of serious injury. Although this should not affect the prevalence of syncope in a similar healthy population, it is probably responsible for the limited number of clinical and employment registered consequences. Thus, our complication rate may not apply to a population of workers at higher risk of injury. We did an absolute count of syncope at work, but we did not have a benchmark for what is the likelihood that it might involve injury, and what is socially acceptable. Clearly, even a low risk of incidence or recurrence of syncope at work may not be considered socially acceptable in certain contexts. The Canadian Cardiovascular Guidelines on driving did this and its multiplying factors could be used.<sup>9</sup> For example, the risk of harm estimated by the Canadian Cardiovascular Guidelines on driving was different among private drivers and truck drivers and so the eventually suggested time of suspension of driving.

Finally, the results of our study may be affected by the possibility of recall bias. Participants could have not been precise when recalling previous episodes which had occurred in the past.

## Conclusions

The prevalence and incidence of syncope during work is low and its impact is benign. The probability of syncope during work is higher for subjects with a history of syncope.

## Acknowledgements

G.G., M.L., M.M., A.M., P.R., M.B. fully meet the criteria for authorship since they all gave substantial contributions to (i) conception and design, analysis of data; (ii) drafting the article or revising its content; and (iii) final approval of the current version.

**Conflict of interest:** none declared.

## Appendix

Syncope and work activities (anonymous questionnaire to be completed by the researcher):

Source (hospital, company et al.) \_\_\_\_\_

N ° progressive form \_\_\_\_\_

1. Year of birth: \_\_\_\_\_
2. Sex: M F (please tick)
3. Work performed: \_\_\_\_\_
4. Which year did you start working? \_\_\_\_\_
5. Have you ever experienced fainting spells?:  
Yes No (please tick)  
If the answer is yes:
- 6A. How many?: Total no. \_\_\_\_\_
- 6B. Did you sustain injuries due to fainting?  
Yes No (please tick)
7. Have you ever experienced fainting spells during your working life?  
Yes No (please tick)  
If the answer is yes:
8. How many?: Total no. \_\_\_\_\_
9. Have you ever experienced fainting spells while working?

Yes No (please tick)

If the answer is yes

10. How many?: Total no. \_\_\_\_\_
11. Have you ever reported effects following a fainting spell that occurred while you were at work?  
Yes No (please tick)
12. If you answered yes, please specify \_\_\_\_\_

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