Editorial

Could a Chronobiological Approach have a Role in Falls Prevention?

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The sentence "inadvertently coming to rest on the ground, floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects" defines accidental falls [1]. US data reported that direct medical costs of falls were $30 billion [2]. The longevity of people is actually an achievement for modern civilization, although it is also an important challenge for public authorities, policy makers, healthcare, providers and payers [3]. Age could be considered a risk factor for different diseases and their complications, and falls are considered a Geriatric Syndrome [4], posing major medical, social and economic burdens both for the victim and his/her family [5,6]. According to the World Health Organization (2007), the risk of falling and fall-related injuries increases exponentially with advancing age. In fact, it is know that one-third of people aged ≥ 65 years in community-dwelling elderly experience a fall [7], and the prevalence is even higher in institutionalized elderly [8]. Also during hospitalization falls could complicate hospital stay and quantification of the problem is still a matter of debate, ranging their prevalence from 2% to 17% [9,10]. Falls are related to a complex interaction between multiple risk factors [11]. Epidemiological investigations have been developed to identify the interactions between intrinsic factors (specifics to the individual) and extrinsic factors [12-14]. Intrinsic factors include i) biological characteristics such as age, sex, chronic disease and emotional, neurocognitive and physical abilities and ii) behavioral factors such as medication use, alcohol consumption, activity/fitness and presence of footwear. On the other hand also extrinsic risk factors including i) socioeconomic features such as income, education, housing quality, social interaction level, health status, social care access, community resources and ii) environmental structures such as building design, lighting and flooring condition, should be taken into consideration. Many of them should be modified and intervention in just one risk factor could impact positively morbidity of falls [15]. Health care systems continuously plan efforts in order to prevent falls; however a considerable risk factor has been seldom considered, it is time of fall. This lack of interest in the time of falls has been recently highlighted by Manfredini et al. [16], less than 50% of recent falls studies have reported time of fall. A chronobiological approach could help health care professionals in preventing negative events. Many falls are often not registered because they do not require medical attention or because they are not witnessed. Time of events is of great importance in the field of epidemiology, different acute diseases such as stroke and myocardial infarction [17-19] do not occur randomly, they exhibit 24h variations. Manfredini et al. [20] using a chronobiological analysis (Cosinor analysis), demonstrated a biphasic 24h pattern in hospital falls, a first peak was reported at ~10:30h and a second one in late afternoon. Application of chronobiology principles to epidemiology could help health care professionals in approaching by a temporal scheme well known risk factors [21]. In 1979 Tarquini et al. [22] defined the term "chrono-risk" as "the systematic risk showing a frequency of occurrence". Also a recent systematic review [23] evaluated temporal pattern of falls in hospitalized/institutionalized older adults addressing clock-time, day-of-week and month-of-year fall patterns. Only nine articles could be analyzed because the great majority of studies disregarded the temporal aspects of fall incidents. Authors found a single or double-peak 24h pattern of fall incidence, with time of greatest incidence seemingly associated with circadian rhythm-dependent differences in the symptom intensity of dominating medical diagnoses such as heart failure. However data were not homogeneous due to the differences in quality, institutional setting and medical diagnoses. In community-dwelling elderly persons, we expect a morning peak in falls [24], because people move around and carry out higher number of activities of daily living. On the other hand, in independent people who lived in long-term healthcare institutions, the peak of events was higher between 00:00 and 02:00h [25]. Therefore, the use of appropriate investigative and time series analytical methods could provide more comprehensive perspective about the different relative risk of falls and fall-induced injuries in different populations living in different settings. Finally with such comprehensive perspective,

optimal preventive counter-measures could be designed. For these reasons, further studies considering a chronobiological approach are required, allowing the health care professionals the possibility to anticipate events.

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