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Authors

Romanelli, Antonio

Moore, David

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The importance of wearables: sleep assessment devices for people with HIV

Antonio Romanelli[a] and David Moore[b]

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De Francesco *et al.* [1], in their article entitled 'Agreement between self-reported and objective measures of sleep in people with HIV and lifestyle-similar HIV-negative individuals', evaluated the correlation and agreement between self-reported questionnaires (SRQ) and actigraphy-assessed time spent in bed and sleep onset latency in a larger cohort of people with HIV (PWH) and HIV-negative individuals. They investigated the association between actigraphy-assessed sleep parameters and self-reported insomnia symptoms in PWH and reported poor-to-moderate agreement between self-reported and actigraphy-assessed sleep measures. The study represents a clear example of the importance of applying new wearable devices in order to obtain objective data on the complex phenomenon of sleep.

Sleep is one of the most interesting aspects of human life that influences health status and daily-life performances. In PWH, it is estimated that up to 73% experienced sleep disturbances compared to only 10–35% of the general population [2]. Sleep disorders are the most prevalent and distressing symptoms experienced, even when HIV disease is well managed [3]. Sleep is further relevant if one considers that PWH life expectancy is similar to HIV-negative individuals and can impair quality of life. Daytime sleepiness alters concentration and cognitive functions, causing depression, fatigue and reducing overall productivity [4,5]. Poor sleep has been linked to HIV disease progression [6], lower $CD4^+$ T-lymphocyte counts – a strong predictor of AIDS-related mortality) [7], and increased cardiovascular mortality – now one of the leading causes of death among PWH [8].

On the basis of this evidence, it is recommended that HIV clinicians routinely assess sleep quality with standardized sleep scales to identify and treat disorders [3]. The literature provides several SRQ to assess sleep [9] but most studies analyzing sleep disorders in PWH have used the Pittsburgh Sleep Quality Index (PSQI). Despite the fact that the PSQI has demonstrated good reliability and validity, questions regarding its underlying factor structure, the long recall period (1 month), and the scoring system lessen its value for distinguishing poor and good sleepers.

An objective measure of the quality of sleep is polysomnography, and is considered the 'gold standard'. Unfortunately, polysomnography is not readily available to most clinicians and is expensive, time-consuming, and impractical for epidemiological and research studies. Thanks to technological advances, wearable devices, like wrist-worn actigraphy monitors, are available and offer an objective method to assess sleep patterns over multiple days. The first generation of wearable devices used an accelerometer-type sensor, associating sleep and wake states to patient moving. The limitation of these devices was that people could lie in bed awake for prolonged periods without moving and, in that case, the algorithm would misclassify wake epochs as sleep. For this reason, the first generation of sleep wearable devices was limited in detecting wake state. Miniaturization, low power consumption, low cost, connectivity, and functionality of bio-sensors, has allowed a new generation of wearable devices to continuously record a broad range of bio-signals using, for example, skin temperature and optical photoplethysmography sensors in addition to motion sensors that may advance sleep stage classification [10].

[a]Antonio Romanelli, Department of Anaesthesia and Intensive Care, AOU San Giovanni di Dio e Ruggi D'Aragona, Salerno, Italy, and [b]David J. Moore, HIV Neurobehavioral Research Program, University of California, San Diego, CA, USA.

Correspondence to Antonio Romanelli, MD, Department of Anaesthesia and Intensive Care, AOU San Giovanni di Dio e Ruggi D'Aragona, Via San Leonardo, 1, 84131 Salerno, Italy.

Tel: +39 3409316112; e-mail: antonioromanelli86@gmail.com

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The introduction of wearable devices to clinical practice represents a new frontier of a 'contactless medicine', providing real-time data on patients' health status. To evaluate outcomes, such as sleep time, the advantages of wearables are unquestionable. These devices have been increasingly used in sleep research focusing on the general population [11], and when compared with polysomnography, have demonstrated promising performance for tracking sleep and wake time [12]. Data from wearables highlight the descrepancy between self-report and objective data [13]. A recent cross-sectional study found the average agreement between subjectively (SRQ) versus objectively (actigraphy) assessed sleep patterns was moderate (57%) and the self-reported sleep pattern was not specific [14].

Given the potential implications of a lack of agreement between subjective and objective measures of sleep for interpreting findings from epidemiological studies, it is time to consider new-generation wearable devices as a clinical and research tool to detect sleep disorders among PWH.

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Conflicts of interest

There are no conflicts of interest.

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