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Monitoring daily activity of people living with cognitive impairment using wearable sensors and a tailored platform for health-care professionals: A long-term observational study

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Topic

Dementia diagnosis, treatment, care and support: Telemedicine

Abstract

Aims: To investigate the potential of long-term monitoring daily functionality in people with cognitive impairment across the Alzheimer's Disease (AD) spectrum using and maintaining a system based on wearable sensors.

Method: An eHealth monitoring platform was developed to collect health and lifestyle data from wearable sensors, which are analyzed, transformed, and presented in visual analytics dashboards to enable clinicians to observe changes over time and adapt interventional programs. 41 participants (16 with mild cognitive impairment, 13 with subjective cognitive decline, 7 with AD, and 5 healthy controls) used the platform at home for 4 to 12 months, while clinicians periodically observed changes in the dashboards and provided feedback about the system usage.

Results: After continuous monitoring, the participants showed statistically significant improvement in sleep patterns and physical activity. These results support the notion that monitoring of physical health and providing feedback to people with cognitive impairment, who received the sensor-based system, have shown improvement in domains such as sleep quality and daily activity.Overall, paired-sample t-test analysis revealed significant improvement ($p<0.05$) from the beginning to the end of the trial, in physical condition, and in the domains of sleep.Meanwhile, clinicians found the eHealth system extremely helpful and beneficial for receiving objective information about the participants' status.

Conclusion: Deploying a sensor-based system in real home settings of people with cognitive limitations living alone and maintaining its long-term use is not only possible, but also beneficial for clinical decision making in order to tackle cognitive, functional, and behavioral problems.

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