

Paving the way for better sleep in Alzheimer's

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A new sleep pattern monitoring system has been developed by UK researchers to help spot sleep disturbance in people diagnosed with early dementia. The system, known as PAViS, could be used remotely by healthcare workers to view sleep profiles and analyse sleep patterns based on sensory data gathered at the patient's home.

Writing in the *International Journal of Computers in Healthcare*, Huiru Zheng and colleagues at the University of Ulster at Jordanstown, County Antrim, Northern Ireland explain how sleep disturbance is one of the most distressing of symptoms in Alzheimer's disease and might also be an early indicator of the onset of the disease in some cases. They point out that so-called "telecare" systems allow healthcare workers to monitor patient activity whether in normal or supported housing.

There are almost half a million people in the UK with Alzheimer's disease and for many of those [sleep disorders](#) and disruptive nocturnal behaviour present a significant clinical problem for healthcare workers and are a cause of distress for caregivers. Sleep-related problems generally worsen as the disease progresses and are an indicator of [cognitive impairment](#) and lead to the patient being less alert than would be expected during waking hours as well as reducing their overall wellbeing.

Various systems have been developed in recent years to monitor sleeping patients. However, these would often tend to involve other people in the patient's home as well as simply monitoring sleep patterns rather than

long-term monitoring and analysis of sleep profiles for assessing sleep quality. PAViS, pattern analysis and visualisation system, circumvents the problems and allows healthcare workers to quickly see shifts in sleep pattern and detect unusual patterns in order to assess the changes in health condition of people with early [dementia](#) over the course of weeks and months. Data are collected from infrared movement detectors and sensors on bedroom and other doors in the patient's home. This provides a non-invasive, pervasive and objective monitoring and assessment solution, the team says.

The team has worked with Paul Jeffers of the Fold Housing Association in Hollywood on patient case studies to demonstrate proof of principle in monitoring a patient's total amount of sleep time, sleep episodes and their rhythm of sleep. The PAViS component of their approach daily, weekly and monthly charts to allow sleep patterns, and more importantly changing patterns, to be spotted quickly and easily. The team found that it was relatively easy to distinguish between the sleep patterns of a non-Alzheimer's patient with only one or two sleeping "episodes", big movements, such as getting out of bed during the night reflecting many hours of undisturbed sleep. This compares with 35 episodes or more in Alzheimer's patients and many fewer hours of total sleeping time.

"PAViS provides a tool to enable telecare service and carers to be able to have a better overview of the client's behaviour so as to provide sufficient support when necessary," the team says. "While current telecare service focuses on providing telemonitoring of clients' daily activity, and tries to detect abnormal behaviour, it is also important to investigate the correlation of behaviour profile, such as sleep pattern profile, with the clients' health condition," the team adds. They conclude that, "The knowledge discovered or obtained from the long-term sleep profiles can also be used to support intervention in detecting and responding to abnormal [sleep](#) pattern."

More information: "A pattern analysis and visualisation system for sleep monitoring in ambient assisted living environment" in *Int. J. Computers in Healthcare*, vol 1(4), 320-331

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