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Physical Activity and Sedentary Behaviour After Critical Illness: A Scoping Review of Device-Based Instruments

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Introduction: The use of devices to measure both physical activity and sedentary behaviour after critical illness has advanced in recent years. Researchers and clinicians will need to be able to accurately select the appropriate devices and use consistent processes for data analysis to evaluate physical activity engagement, and assess the effectiveness of interventions designed to change physical activity and sedentary behaviour.

Aims: This review aimed to explore the current use of device-based instruments to measure physical activity and sedentary behaviour during and following critical illness.

Methods: A scoping review was conducted following the Arksey and O'Malley (2005) framework and reported according to the PRISMA-ScR. A comprehensive search of four electronic databases (MEDLINE, ProQuest, Scopus, and CINAHL) was conducted using pre-agreed search terms from inception to December 2023. Two independent reviewers conducted screening and data extraction.

Results: Twenty-two studies were included, with the majority being observational (n = 12) while one randomised control trial was conducted. Studies covered the continuum of critical illness from intensive care admission to 18 months post-hospital discharge. A total of 11 devices (e.g. *Actiwatch* and *activPAL*) were used to assess physical activity and sedentary behaviour, with many different processing decisions used for data analysis. There was an inconsistent approach to device-based measurement in the intensive care unit (ICU), making it difficult to compare across different studies. Physical activity levels were low, coupled with high levels of sedentary behaviour in the ICU, and these patterns remained following discharge from intensive care.

Conclusion: The use of device-based measurement in critical illness is an emerging research area, with several devices available to measure physical activity and sedentary behaviour in this cohort. This review highlights the need for an agreed protocol(s) to guide the use, processing, and analysis of data for people after critical illness. Further consensus is required on important processing decisions, such as valid wear-time and cut-points for ICU survivors. Investment is also needed to support the recovery of physical activity and reduce sedentary behaviour following discharge from the hospital setting.