Clinician's Commentary on Baldwin et al.¹

Critically ill patients invariably spend most of their time lying in bed, and they potentially endure a whole host of conditions acquired in the hospital: ventilator-associated pneumonia, atelectasis, secretion retention, decubitus ulcers, deconditioning, total body weakness, pulmonary emboli, deep vein thrombosis, intolerance of vertical positions, balance and gait disturbances, delirium, and other deleterious complications of immobility. The introduction and practice of early mobility and physical activity in the intensive care unit (ICU) have been shown to significantly improve clinical outcomes,² and information on activity levels may help clinicians assess and plan exercise activity programs without having to rely on patient self-reporting, nursing notes, or activity logs. A small device that can be useful for this is an accelerometer, which senses movement and can continuously measure patients' activity; however, the use of an accelerometer with critically ill patients has been limited, and its reliability in this population has not yet been fully substantiated.³

The study by Baldwin and colleagues¹ represents an important start to validating the use of this device with critical care patients. The authors compared activPAL accelerometer data with direct observation of eight subjects, looking at frequency of transitions (sit-to-stand); time spent standing, stepping, upright, and sedentary; and total steps. Although their sample size was relatively small, they found 100% agreement in capturing sit-to-stand transitional movements. They also found, however, that the device overestimated the time spent standing and underestimated the time spent stepping. Likewise, they found that the device overestimated the time spent upright and underestimated the time spent sedentary, although in the latter measurement the error was relatively small. The total steps were also underestimated compared with direct observation.

It may be important to note that Baldwin and colleagues¹ chose to attach the device to patients' thigh because it can better differentiate between posture and sit-to-stand transitions, whereas other studies have used an ankle-worn device, which may be more accurate in determining step count. Does the location of the device matter? Perhaps, considering that patients recovering from critical illness can have extreme difficulty mobilizing and can be grossly deconditioned. They are likely to have altered gait and poverty of movement, both of which an accelerometer may have difficulty measuring. Perhaps a device worn distally (on the ankle) would capture smaller amplitude movement more readily than a device worn more proximally (on the thigh).

Overall, the study by Baldwin and colleagues¹ was well done, and the data were informative. The authors concluded that the activPAL device compared well with direct observation but underreported total steps, so these data should be interpreted with caution. Whether the activPAL has been compared with other devices is unknown.

Future studies might consider comparing the accuracy of different devices—for example, by using more than one device and wearing them at different locations (thigh and ankle) to improve accuracy. Accelerometers are an interesting measurement modality, and the data they produce can enable clinicians to better understand how much or how little patients are engaging in activity during their ICU or hospital stay. Such devices could be used to assess mobility as an outcome measure in itself, as an indicator of quality of care, or to reveal the potential impact of mobility on other outcome measures, such as hospital length of stay, quality of life, incidence of delirium or pressure ulcers, and long-term physical performance in ICU survivors.

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