



Daily step count and walking speed as general measures of patient wellbeing

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Simple measures of a patient's walking capacity such as walking speed (WS) and daily step count (DSC) are often measured by activity trackers in fitness watches or smartphones, giving insight into a patient's daily walking patterns without the influence of the Hawthorne effect. Both metrics have literature backing their importance as measures of general health. Reduction in WS is a key characteristic of ageing and frailty (1), as well as a predictor of falls (2), a finding in many neurological diseases (3,4) and a predictor of mortality regardless of age (5). While increasing daily activity, measured by DSC, is linked to lower all-cause mortality by reducing incidence of metabolic syndrome and related diseases (6), it is itself impacted in many disease states. Patient WS and DSC can be collected from activity trackers (7) built into fitness watches and smartphones, with some early reports of devices collecting these metrics in day-to-day living (8,9).

Simple and objective assessment of walking would be of significant benefit for physicians to monitor a patient's overall health, in conjunction with other routine health metrics and vital signs. Objective outcome assessments overcome limitations of subjective, patient-reported outcome measures, which suffer from poor reliability, recall and reporting bias (10) and a lack of capacity for continuous assessment (11). Simple scores which incorporate DSC and WS may assist the rapid identification of individuals, or indeed populations, with declining health, facilitating early intervention, which may delay the typical increased healthcare costs and diminished quality of life associated with ageing and frailty.

Unfortunately commercial smart devices tend to have

low levels of inaccuracy (3–10%) in step detection (12), but this increases to 40% in distance-based calculations using GPS software (13). Fortunately, distance calculations can also be made by a device's built in accelerometer without sacrificing much battery longevity. Finally, for assessment of patients using screening tools from these metrics, it would be necessary to know the normal range of these metrics. Fortunately, a number of citizen science projects collected by phone apps like *Argus* have generated large databases of population gait factors, stratified by gender, age and location (14).

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