

The future is not just a 6-minute walk test

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We commend the authors for demonstrating that consumer technology (i.e. the iPhone 7 and the Apple Watch Series 3) can achieve at-home 6-minute walk test (6MWT) results comparable to those monitored in-clinic in patients with cardiovascular disease.¹ This is especially crucial during the COVID-19 pandemic, which has highlighted the need for remote monitoring of patients where in-person consultations are not viable. In addition, there is promising data to suggest that the integration of health technology can empower patients in their management, leading to better outcomes.^{2,3}

However, we believe that technological advancements permit us to evolve beyond traditional methodology like the 6MWT, which possesses several limitations. Therefore, though the paper's validation of this methodology in consumer devices is encouraging, we propose exploring alternative metrics which can more easily and effectively monitor health outcomes such as frailty and mortality.

For example, the daily accelerometer-measured step count has been shown to be a superior parameter to the 6MWT, as it is easy-to-use and well-validated in predicting patient outcomes, with studies observing a significant linear relationship between a greater daily step count and a decreased likelihood of cardiovascular morbidity and mortality as well as all-cause mortality.^{4,5} Additionally, Sehgal *et al.*⁶ found that step count and activity level significantly correlated with changes in health-related quality of life, an important patient-centred metric. Furthermore, this study did not record the 'ceiling effect' noted with the 6MWT, which masks patients' degree of impairment.⁷

Moreover, as a continuous measurement, a daily step count can provide a more holistic view of patients' functional capacity compared to the short timeframe captured by the 6MWT. A daily step count could also be simpler to implement than the 6MWT, which requires familiarity with the testing protocol and designated time to perform. This may ameliorate the divergence seen between in-clinic and at-home results and issues with compliance seen in Mak and Ren's study. Step count can also be monitored across a range of devices, unlike the VascTrac-assisted 6MWT, which was devised for Apple's operating system.

Furthermore, technology can be used to trial novel techniques, which can be superior to traditional metrics, such as the combined Fitness-tracker assisted Frailty Assessment (FIFA) score.⁸ This

consisted of three parameters (heart rate, pre-procedural stress, and walking) and proved to be a better positive predictor of and hospital mortality than the 6MWT. This could suggest that the use of several parameters as opposed to a single parameter, as seen in the 6MWT, can provide a more robust quantification of patients' health and prognosis.

Modern medicine increasingly emphasizes a patient-centred approach, and we would suggest achieving this by integrating health monitoring into patients' daily life. As such, we again commend the authors for their validation of the 6MWT measured using consumer technology. However, we believe technological advances allow us to develop more intuitive methodology and these innovations in health monitoring can maximize the potential of health technology, benefiting both patients and clinicians alike.

Conflict of interest: none declared.

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