The limitations of using commercial wearable activity trackers, such as FitBits, for the clinical monitoring of patient activity levels

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Objective There is increasing interest in remote monitoring of patients within the comfort and safety of their homes or care homes and became more pertinent during the COVID-19 pandemic to reduce hospital footfall and staff risk. While specifically designed medical devices exist, commercial wearable activity trackers (WAT), such as FitBits, are cheap, easy to use, and patients may already use them for lifestyle advice so their value in clinical intervention is of interest.

The feasibility of using commercial WAT for daily monitoring within a tertiary oncology centre was investigated, including limitations of non-medical devices, such as data collection and synchronisation errors.

Methods Participants were recruited for a study that investigated if remote monitoring of step counts was feasible and acceptable. Patients with advanced lung, upper and lower gastrointestinal cancer, or mesothelioma who were starting a new line of systemic anti-cancer treatment were recruited between December 2020 and December 2021.

Once recruited, participants were provided with a FitBit Inspire HR or Inspire 2 and asked to wear it every day for a 16-week monitoring period. Pseudo-anonymous accounts were created to register the FitBits without sharing patient identifiable data and the devices were set up to automatically synchronise data to the cloud-based platform, Fitbase, via their smartphone.

Steps were monitored on every workday and the ability to record heart rate was used as a proxy marker for compliance as it confirmed that the device was being worn. A day was considered a complaint if the device was worn for >70% of waking hours, assumed for purpose of trial to be 7am to 10pm.

The manufacturer or age of the participant’s smartphone was not recorded. Previous discussions with FitBit regarding synchronisation issues had highlighted potential clashes with other Bluetooth devices preventing automatic synchronisation so use of such devices was documented.

Results Forty-seven patients were recruited and 43 were eligible for ongoing monitoring. Average age was 66 (SD 9) and majority were men (72%). Twenty-nine patients completed the maximum 112 days of monitoring.

Patients were eligible for monitoring on 3855 days. Of these, synchronisation errors occurred on 482 days (13%) and all data from the previous 24 hours was missed on 275 days (7%) due to synchronisation not occurring on the day on monitoring. Only 5 (11%) of participants did not have synchronisation errors during their monitoring period. The median number of synchronisation errors per patient was 8 and maximum of 49, which accounted for 64% of that participant’s monitored days. One participant was withdrawn due to 100% synchronisation error over the first seven monitored days.

Twenty-two participants (47%) used other Bluetooth devices but there was no correlation between their use and synchronisation errors (r=-0.32), nor significant difference in synchronisation error rate (p=0.08).

562 days (15%) were considered non-compliant as heart rate was documented for less than 70% of the waking hour period. When synchronisation errors were removed, however, only 216 days (7%) were truly non-compliant due to the patient not wearing the device, rather than not having access to the data.

Conclusion This study has revealed a potential limitation of using commercial wearable activity trackers, such as FitBits, for clinical monitoring. While compliance with monitoring was good and matched previous reports on compliance at over 80%, the loss of data due to synchronisation errors reduced perceived compliance and, importantly for clinical interventions, reduced data available for immediate action.

Correcting these issues and restarting automatic synchronisation was not a complex procedure but did necessitate a telephone call with the participant to manually synchronise the device, restart their smartphone or occasionally reinstall the app, which added to the participant burden of the investigation and overwhelmed the technological abilities of some participants. Currently, it is not clear what causes these synchronisation errors and, therefore, it is not possible to select patients who would be more suitable for this intervention.
The frequency of synchronisation errors mean that it is not feasible to use commercially available WAT for remote monitoring of patients and caution is needed if the results are used to guide clinical intervention, rather than simply offer lifestyle advice.

Objective Digital health (DH) is the integration of technologies to tackle challenges in healthcare. Its applications include mobile health, remote & wireless healthcare, artificial intelligence, and robotics. Digital technologies are increasingly being used to deliver routine care, whilst simultaneously patients are increasing their uptake of DH solutions (e.g. wearables).

With the adoption of DH increasing across the NHS, there is a growing need for a digitally literate workforce. However, there are no national standards on DH education for UK medical students. Consequently, this study sought to assess the current provisions, perceptions and challenges regarding DH education in the undergraduate medical curriculum.

Methods An anonymous cross-sectional online survey was developed following a literature search and by collecting iterative feedback from both researchers and external collaborators. The survey consisted of questions in 6 areas: (a) understanding of DH; (b) existing provision of DH education; (c) interest in DH education; (d) preferred means of delivering and assessing DH education; (e) impact of the COVID-19 pandemic on DH; and (f) demographic information.

The survey was administered via Qualtrics from March to October 2021, and disseminated to UK medical students via university mailing lists, social media and student representatives. Quantitative and qualitative data were collected pertaining to demographics, attitudes, preferences, and current provisions regarding DH education. Qualitative responses underwent thematic analysis. For quantitative analysis, R (version 3.5.0) and R Studio (version 1.1a) were used.

Results 514 complete responses were received from 39 UK medical schools in 2021. 57.2% of respondents were female, with a mean age of 22.9 ± 3.2. 65.4% thought DH proficiency should be assessed in some capacity, of which 75.6% preferred formative assessment.

Conclusion This study represents the first national survey of UK medical students on DH education. Overwhelmingly, the results indicate that medical students recognise the significance of DH and would appreciate better formal integration into their curriculum; which is supported by previous similar studies in the literature. This study also identified how students would prefer to be taught and assessed on DH, in particular that they would prefer it to be mandatory yet remain formative at present. Given the increasing ubiquity of DH in clinical practice, it is therefore crucial that universities and wider medical education organisations work to improve and standardise DH education, to better prepare medical students to adapt to the continuously developing digital landscape. This rings especially true in light of the recent COVID-19 pandemic which has highlighted the quintessential nature of DH to medical practice. Our intended future research from this study includes undergraduate focus groups for greater qualitative depth of information, and Delphi panels from wider medical education stakeholders into what should be included in DH education, with the eventual goal of developing a comprehensive and standardised national DH curriculum.