

## EDITORIAL

# Supervised exercise therapy apps for claudication

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Peripheral arterial disease (PAD) has been recognised as a healthcare burden affecting up to 5.56% of the global population over 25 years of age.<sup>1</sup> Intermittent claudication (IC) is often debilitating and results in reduced physical activity which is associated with increased cardiovascular disease and all-cause mortality.<sup>2,3</sup> Early identification and management of PAD is essential to improve symptoms and prevent a downward trajectory towards limb loss. Supervised exercise therapy (SET) is the widely recommended first-line treatment for IC. Despite the benefits of SET, uptake and adherence rates are recognised to be poor.<sup>4</sup> The reasons for poor SET compliance are multifactorial and include time constraints, travelling distance, personal, financial and institutional barriers.<sup>5</sup> To overcome these barriers, alternative methods for delivering SET need to be explored.

The COVID-19 pandemic accentuated the vital contribution of digital health models in modern medicine.<sup>6</sup> Digital health models reduce the need for travel and its associated barriers such as transportation, travel costs and time constraints. They also reduce the utilisation of hospital resources such as healthcare staff, space allocation and equipment.<sup>7</sup> With increasing improvement and usage of electronic healthcare technology, delivering SET through mobile health (mHealth) technology may be the next way forward. mHealth is defined as "medical and public health practice supported by mobile devices such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices".<sup>8</sup> This editorial discusses the role of mHealth technology in improving SET compliance in patients with IC.

The prevalence of PAD has increased by 25% over the last decade and this trend is expected to

continue.<sup>9</sup> SET has been widely acknowledged as an effective treatment modality for PAD and has been given level I recommendation by NICE.<sup>10</sup> SET has been shown to improve walking distance, physical activity, quality of life and reduce cardiovascular mortality.<sup>11</sup> Despite the benefits of SET, its provision is variable and compliance poor. A survey of UK vascular units identified that only 38.5% of vascular units had access to SET, with the majority based in hospital facilities. Of all patients referred for SET, less than 60% attended a single session. Of those who attended SET, only 62% sustained 12 weeks of training and only 20% were offered 2–3 sessions per week.<sup>12</sup> Institutional barriers contributing to poor SET implementation include lack of funding, facilities, resources, trained staff and poor referral pathways.<sup>13</sup> Patient barriers contributing to poor attendance and compliance are multifactorial and include time constraints, motivation, transportation, financial and psychological barriers. To optimise the benefits of SET, the barriers to poor compliance need to be overcome.

It has been estimated that over 5 billion people are mobile device users, with half of these using a smartphone.<sup>13</sup> Although the use of mobile technology has expanded in the field of entertainment and communications, the use of apps in healthcare is a relatively recent development which lacks a convincing evidence base.<sup>14</sup> mHealth technologies are considered digital solutions to offer personalised and interactive access to health services. A systematic review looking at mHealth applications in the use of PAD showed a positive correlation with increasing effectiveness and adherence to exercise therapy.<sup>14</sup> Mobile technologies show benefits of personalisation, real-time monitoring, increased accessibility without geographical or

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structural barriers, 24/7 availability and high cost-effectiveness. They remove geographical barriers for those living in rural areas or those with barriers to transport. The trend of mHealth is evolving in vascular surgery. Applications such as “Control Telehealth Claudication Intermittent (CONTECI)”, “TrackPAD” and “JBZetje” promote self-monitoring of disease progression and exercise therapies.<sup>15–17</sup> Other applications are aimed at tracking disease progression, such as “VascTrac”.<sup>18</sup>

mHealth applications aimed at delivering SET should focus on goal setting, self-monitoring and performance feedback.<sup>19</sup> The application should use a simple and clear interface to make it appealing to users of all ages. Patients should be able to set their own flexible schedule and reminders to achieve their 3-weekly sessions and monitor their exercise activity throughout the week. To increase motivation and encourage long-term usage, “TrackPAD” integrated positive reinforcements such as incentives (eg, medals and monitoring personal success) and gamification features.<sup>17</sup> Additional social networking features could provide group support, optional group exercises and increase motivation.<sup>20</sup> A feasibility study demonstrated that participants assigned to teams were 66% more likely to engage than those alone.<sup>21</sup>

The “JBZetje” application has evolved synchronisation of real-time data using raw accelerometer data.<sup>15</sup> The ability to synchronise with wearable technologies provides real-time data for users to self-monitor their progress and provide feedback. Wearable technologies are smart devices that can be worn on the wrist, ankle or arm. These devices are comfortable and fashionable accessories that have increased in popularity in recent years with a forecast of 1 billion users by 2022.<sup>14</sup> Wearables use accelerometers and global positioning systems (GPS) to provide valuable information for self-monitoring fitness and daily physical activity. The benefits of using wearables allow for accurate tracking distance and monitoring of physiological activity (eg, heart rate), which would be more accurate at measuring physical activity than more subjective measurements such as pain threshold measurements. Recording of real-time data allows the supervising training practitioner to provide accurate and individualised community assessments.<sup>14</sup> GPS tracking provides options to recommend local training routes, activities and social groups.

Providing alternative modes of exercise is important in keeping users engaged and widening user profile. Although treadmill-based exercises have shown superior outcomes compared with others, using alternative options can increase motivation and compliance. Alternative aerobic exercise (eg, leg/arm ergometry, pole striding, progressive resistance training) can be equally effective as walking-based exercises.<sup>16,22</sup> With these alternative options, users should also have access to free online tutorials to help guide training and proper exercise techniques.

Equality of service is paramount in providing SET via mHealth. It is important that vulnerable groups are not excluded. The typical PAD patient is aged 60 or above and is likely to have fewer experiences with rapidly expanding smartphone technology. People

## KEY MESSAGES

- mHealth applications show increased effectiveness and adherence to exercise therapy
- Applications should focus on goal setting, self-monitoring and performance feedback
- There remains huge potential to tap into mHealth technology to provide SET

aged 55–70 years have reported more positive outcomes with the use of mHealth, with independence being the most prevalent factor. Complexity associated with using technology was the main barrier to mHealth in the elderly population. As people continue to age, the next elderly user group in 10–15 years will more likely be accustomed to smartphone and mobile technology, thus more likely to adapt to mHealth options. Strategies such as psychological and technological support to overcome such barriers require further research.

Although mHealth has been in the background over the last 20 years or so, the pandemic has played a significant role in bringing it into the limelight. There is huge potential to tap into mHealth technology to better promote and deliver SET. MHealth applications targeting PAD patients are slowly emerging but are far from standard practice. Creating an mHealth application aimed at delivering SET would need to incorporate a comprehensive programme covering all elements from real-time monitoring, alternative exercise options, trainer feedback, goal setting, nutrition, lifestyle modification and social media interaction. There is a pressing need for a randomised controlled trial to evaluate the traditional hospital-based SET versus an mHealth-based SET.

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