Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

research-grade inertial sensor systems, such as the Opal (APDM Inc., Portland, OR, USA). Indeed, algorithms to interpret turning have been previously validated for use in a research-grade sensor (Opal, version 1). Despite validation, high costs associated with research grade devices have prohibited widespread clinical deployment. As such there is demand for validation of low-cost wearable sensors that can be widely deployed in low resource settings.

This study aimed to validate turning assessment with a low-cost inertial sensor (Axivity AX6), by simultaneously capturing and comparing to turn algorithm output from the previously validated Opal sensor (Research-grade 'gold-standard' reference measure), during several turning tasks in healthy young adults.

Methods: Thirty healthy young adults (18 males, 12 females; aged 23.1 ± 5.5 years) wore an AX6, (accelerometer; 100 Hz, ± 16 g, gyroscope; 2000 deg/s, weight 11grams, Axivity, Newcastle-upon-Tyne, UK) and an Opal (accelerometer 128 Hz, ± 6 g, gyroscope; 2000 deg/s, weight 24 g, version 1) sensor on their waist (lumbar L5 region) while they performed 3 mobility assessments; 8 laps of a turns course including turns at 45°, 90° and 135°; a two-minute walk between two lines set 5m apart completing a 180° turn at each line; turning 360° continuously back and forth, on the spot, for 2 min. Turning was assessed using a previously validated custom-made Matlab (MathWorks Inc., Natick, Massachusetts, USA) algorithm, and turn outcomes included number, duration, angle, peak velocity and jerk. All data were analysed using SPSS (version 26, IBM). Intra-class correlation coefficients (ICC) were used to assess the absolute agreement between the turn outcomes from Axivity and Opal sensors.

Results: Agreement between the outcomes from the Axivity AX6 and Opal sensors was strongest between the two sensors during the turning 360° continuously, with good to excellent agreement shown for turn duration, angle, peak velocity and jerk (all ICCs > 0.85). There was slightly less agreement for the two-minute walk task, with good agreement for all turn characteristics (all ICCs > 0.80), with the exception of the moderate agreement for turn angle (ICC 0.683). Agreement for turn outcomes was moderate to good during the turns course (ICCs range: 0.58–0.87), with lowest agreement for turn duration.

Conclusion(s): This study demonstrated that a low-cost wearable sensor, Axivity AX6, had moderate to excellent agreement with a previously validated research-grade sensor, Opal (version 1), when measuring turns in healthy young adults. Our findings suggest that the low-cost Axivity AX6 sensor is valid tool for assessment of turning outcomes, particularly during continuous turning tasks.

Impact: Assessment of turning using low-cost wearable devices could enable adoption of objective digital assessment technology into clinical practice, which could detect mobility impairments in a range of populations. Future research is needed to further assess the validity of the Axivity AX6 sensor in turning assessment in clinical populations, such as Parkinson's disease or mild traumatic brain injury.

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P057

Virtual exercise in response to the Covid-19 pandemic in people with cystic fibrosis

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Keywords: Virtual; Exercise; Cystic fibrosis

Purpose: The Covid-19 pandemic led to strict shielding restrictions for the vulnerable, including people with cystic fibrosis (PWCF). Many hospital based services had to quickly adapt and find different ways of delivering treatment that would usually be delivered face to face at hospital or in the community. At the Manchester Adults Cystic Fibrosis Centre (MACFC), virtual exercise sessions were introduced to help PWCF stay active during lockdown.

The service was implemented quickly due to the pandemic and ongoing evaluation and feedback informed service changes.

Methods: Patients were referred for individual virtual exercise sessions based on need and took part in six weekly sessions via the platform Attend Anywhere. A risk assessment was completed prior to each session to determine wellness and safety to exercise. The modified breathlessness scale was used to determine the patients perception of exercise intensity to ensure an appropriate level. Patients were asked for verbal feedback after the first session and via a questionnaire at the end. Feedback was used to inform future service changes via the plan, do, study, act approach.

Data was also collected on number of sessions completed, cancelled appointments, adverse events and technology issues.

Results: Ten patients were referred and eight completed the program. One patient declined further input after their initial session. Another patient stopped after the fourth session as their gym reopened and they returned to their previous exercise routine. Seven patients completed the feedback questionnaire. 100% would recommend the service, would continue to participate in virtual exercise in the future and felt they had met their goals. 54 exercise sessions were completed with 25 cancelled appointments. Five patients experienced

minor technology issues. There were no adverse patient incidents.

Conclusion(s): Overall patient feedback was extremely positive

"It was good having a video call as I was able to be lead through each part and see examples of how it should be done!"

"Everything was clear and straight forward and modified to my needs."

"I absolutely loved having a personalised plan"

There were difficulties with session booking, with a high number of sessions being rearranged by patients. This could be improved by offering group drop-in sessions or by asking for a commitment to a day and time for the duration of the sessions. The technology issues experienced were resolved with a switch to another digital platform which could be used at short notice. However, as patients and clinicians get more established with digital working these issues may reduce.

Impact: Regular virtual exercise sessions have now been implemented into the MACFC physiotherapy service and can be accessed individually or as part of a small group. Previously, group exercise has not been possible due to the need to segregate patients to prevent cross infection and support from peers may improve motivation and compliance.

As a regional CF centre covering a large geographical area, virtual exercise sessions will enable patients who live some distance away more regular access for support which may help with progression of exercise plans, improving patient goals and outcomes.

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P058

Virtual or face to face modified Constraint Induced Movement Therapy (mCIMT) or CIMT – real world service transformation considerations

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Keywords: Virtual; CIMT; Service

Purpose: Upper limb weakness is a common complaint post stroke. Motor impairment and learned non-use can lead to secondary complications such as muscle atrophy, weakness, stiffness and contractures, which reduce function. Constraint induced movement therapy (CIMT) is a daily intensive rehabilitation treatment for upper limb weakness post stroke shown to improve activity of the weaker limb by constraining the non-affected hand and undertaking repetitive task and motor learning exercises.

However CIMT is sometimes difficult to implement due to the length of time of the programme (daily attendance for 2–3 weeks) and the therapy staff and time needed.

COVID-19 and the global pandemic halted face to face therapy and our aim was to redesign and deliver CIMT virtually. The objective was to consider the practicalities of virtual programmes and use patient reported outcomes to determine any difference between virtual and face to face.

Methods: From September 2020 to March 2021 patients referred for CIMT were assessed using established criteria. Programmes were individually tailored to include daily supervised and independent practice. The virtual programme was established to align with the face to face programme as closely as possible. The main requirements for the virtual programme were patients' acceptance and ability to undertake a virtual programme and access to technology that supported video consultation. Patients were supported via email/telephone and a member of the therapy team monitored progress daily in a 45 min video consultation.

The ArmA (Arm Activity Measure) was completed pre and post programme for both virtual and face to face. ArmA consists of two parts; ArmA-A asks whether the patient is able to care for their arm themselves or with a carer and ArmA-B asks how easy or hard it is to use their affected arm in functional tasks. Lower scores indicate better ability.

Results: Four patients completed a CIMT programme face to face and 6 virtually.

ArmA scores for the whole group pre CIMT; ArmA-A, range 1–18 (maximum score 32) and ArmA-B, range 8–43 (maximum score 52).

Post CIMT; ArmA-A range 0–15 with 4 patients scoring 0 or 1 and ArmA-B range 4–31.

Virtual versus face to face ArmA scores reduced in both groups with change scores of between 4–14 points on ArmA-A and 3–22 points on ArmA-B.

Conclusion(s): This is a small service evaluation of CIMT delivery methods in an outpatient service. Both groups showed improvements in caring for and functional use of their arm. Patients found CIMT delivered virtually or face to face as acceptable and all adhered to the programme.

Impact: There are clear advantages to virtually delivered therapy programmes with the impact of flexibility and choice for patients and a 'Greener NHS' service due to decreased daily travel and reduction in carbon footprint that could transform physiotherapy practice and contribute to greater accessibility for many. Services that have been traditionally thought of as face to face delivery are showing commensurate benefit that needs further evaluation and research.

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