Digital postural management platform for remote seating assessment and real-time postural adjustments

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Summary
This paper first outlines current trends, limitations and opportunities for internet-connected solutions in remote postural assessment and management. This is followed by an introduction to Aergo Health's technical exploration in developing a digital postural management platform that enables real-time assessment and adjustment for therapists managing the seating needs of wheelchair users.

Aims & Objectives
Our aim was to develop a digital postural management portal for therapists to remotely assess clients' seating needs and make real-time adjustments to clients' posture.

Our objective is to enable therapists to have a high level of intervention through a digital control interface coupled with internet-connected postural support air modules.

Background
The impact of COVID-19 has led to a decrease in healthcare access for existing and new wheelchair users who are categorised as at high risk of developing severe illnesses from the virus. Staff shortages across the NHS have further exacerbated accessibility to clinical support. In order to overcome this, conference calls and telehealth technology have been widely adopted to provide care and treatments remotely.

An international survey with over 1000 therapists has found the pandemic has increased the integration of telehealth in their clinical practices by 66% (Chantal Camden & Mindy Silva 2021). Video platforms such as Zoom and Microsoft Meet are commonly used for remote patient screening and follow-up appointments. Although further studies have shown that the increase in telehealth usage has improved patient satisfaction and caseload management, not all physical assessments are easily replicated remotely.

Wheelchair and seating prescriptions are intrinsically complex, and require therapists to conduct an extensive in-person assessment in order to provide the correct equipment. Often, finding the right postural support for paediatric wheelchair users is especially challenging as their bodies and needs change so quickly. Findings from an equivalency study in Telerehabilitation for wheeled mobility and seating assessments found that effectiveness between in-person and telehealth treatments were highly comparable (Schein et al., 2010). Wheelchair manufacturer, Permobil, stated that 10,000 users of their power wheelchairs have activated internet connection in their wheelbases for remote technical diagnosis. Research and development work in internet-connected specialist equipment is on the rise, and the benefits of connecting clinicians and trained technicians to users' wheelchairs and equipment will benefit remote clinical support significantly.

Technique
Primary interviews were conducted with wheelchair service occupational therapists through conference calls. A series of open questions were asked to understand the changes in the therapist's clinical practice and experience with integrating telehealth into assessments and routine check-ups with clients. The qualitative feedback provided insights that led us to create user requirement documentation and informed our software feature list.

To bridge the gap between digital and in-person assessment requirements for wheelchair equipment provision, Aergo Health has developed a clinician web portal that connects therapists to their client's Aergo PS seating systems. The web portal is designed to facilitate collaborative postural management between wheelchair users, carers and their therapists. The Aergo Clinician web portal provides a unique conference call facility that not only uses video call features to capture a user's seating position and feedback, but also visually displays the user's real-time pressure data to inform the sitting position and comfort of the user. A user-friendly control panel is included to enable real-time adjustments of individual air supports within the client's Aergo PS.

Result and Testing

Observational studies have been conducted between therapists and wheelchair users to evaluate the usability and stability of the Aergo Clinician web portal. The result demonstrated ease of use and effectiveness in fine-tuning a user's postural support system to ensure the equipment set up continues to support the client comfortably.

Standards/Guidelines

IEC 62304 Medical device software
IEC 62366-1:2015 Medical devices

Discussion

Although observational studies have demonstrated promising potential of digital postural management by enabling remote control of the Aergo PS system through the web portal, there are still limitations particularly with initial equipment set-up and body measurements for clients with complex seating needs. Initial feedback has suggested the key benefit of the web portal in clinical practice is the ability to track adherence and make minor adjustments to the equipment quickly and frequently, whilst avoiding the need to travel for a physical meeting. Aergo Health will expand the data points for therapists to accurately conduct remote assessment and rehabilitation. Future development could include diagnostic tools using AR body mapping and integrated high fidelity pressure mapping to better inform the user's sitting position.

References

Chantal Camden & Mindy Silva (2021) *Pediatric Telehealth: Opportunities Created by the COVID-19 and Suggestions to Sustain Its Use to Support Families of Children with Disabilities*, Physical & Occupational Therapy In Paediatrics, 41:1, 1-17, DOI: 10.1080/01942638.2020.1825032
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