Clinical usability of a stability-based package using visualisation: a retrospective analysis

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Introduction: The utility of a new clinical system and user interaction, are important given that these may influence clinical use and incorporation into routine practice, as well as patient experience and engagement. As a result, rehabilitative outcome will be affected [1]. The stability-based package was designed and developed as a hybrid tool to enhance rehabilitative outcomes and experience using a game-development approach. By incorporating optoelectronic cameras for accurate motion tracking, a cluster-based model, pointer calibration and visualisation software for a simplified user-interface and real-time feedback, the package focused on addressing complexity and time efficiency to create more clinically appropriate motion analysis system. The feasibility and efficacy of the package has already been reported [2]. This study aimed to retrospectively analyse the usability of the package with respect to time efficiency. A retrospective analysis was completed to eliminate bias of completing training quickly, which would have shifted central attention away from the participant. This aimed to achieve an unbiased representation of the system usability for clinical practice.

Methods: The stability-based package has previously been described in Forsyth et al. [2]. From the 250 testing and training sessions completed (25 participants x 10 sessions each) data available for analysis was identified. This included the number of sessions where appointment start time was recorded in a diary (n=97), as well as participant preparation (duration from appointment start time to being ready to undergo assessment/training) (n=72), calibration (duration from starting calibration to streaming of live kinematic data) (n=135), and recording time (n=224). From these the total session time could be estimated (n=97). Missing data resulted from unknown appointment start times, calibration files overwritten with new participants, or session data, training files, or first and last training exercise not being recorded. In addition, the calibration time was compared to the functional calibration method by Meng et al. [3]. From the data the recording times for functional calibration completion were used to approximate the calibration time.

Results & Discussion: The estimated session length for the study duration was 31±6 minutes, just exceeding the 30-minute limit for clinical practice proposed in previous research [4,5]. Preparation time took, on average, 11±5 minutes. As approximately one third of the total session duration, with an expectation to decrease should this become a routine procedure for patients [5], this could be realistic for clinical implementation. The variation of the preparation time across participants was due to the type of session (assessment or training), whether start time was adhered to (did participant arrive early or late), and session greeting. The preparation time included participant calibration which averaged 1±0.4 minutes. The calibration time using the functional calibration method in Meng and colleague's [3] study averaged 3±0.4 minutes.

Conclusion: If a new system cannot be used appropriately in a time-constrained environment, then the success of its use on rehabilitative outcomes would be questionable. The overall session durations for the stability-based package, including the time for preparation and calibration, are comparable to that of appointment times in previous literature. This positively presents the use of visualisation for clinical practice as the system could be used without requiring additional time with the patient, which is already constrained. Further testing is required to assess the ease of use and satisfaction of the cluster and calibration protocol by clinicians themselves. This will inform further co-design developments of the stability-based package.

References

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