

# Outpatient and Home Advanced Rehabilitation Therapeutics Using Jintronix Virtual Reality Telerehabilitation System

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## INTRODUCTION

This study serves to evaluate the application of a telerehabilitation system to complement outpatient rehabilitation services and enhance home support. An online virtual reality platform called Jintronix ([www.jintronix.com](http://www.jintronix.com)) was used to deliver a clinic-to-home, caregiver-supervised, and individualized exercise programs for stroke outpatients.

## METHODS

**Study design:** Prospective open-label study

**Inclusion criteria:** 21-75 years old ; ≥3 months post-stroke medically stable ; require ≤minimal assistance; have a primary caregiver; able to participate in a 15 minutes screening trial

**Exclusion criteria:** seizure history; severe cognitive or perceptual deficits, or emotional or behavioral issues; pain (Visual Analogue Scale >5); pregnant/breastfeeding; known poor cardiac function (EF<30%); non-weight bearing status in either lower extremities; caregiver unable to meet competency requirements

**Jintronix:**

- Consists of activities and exercises targeting the upper limb, lower limb, trunk, balance and gait
- Uses Kinect camera for motion tracking
- Prescribed by clinicians

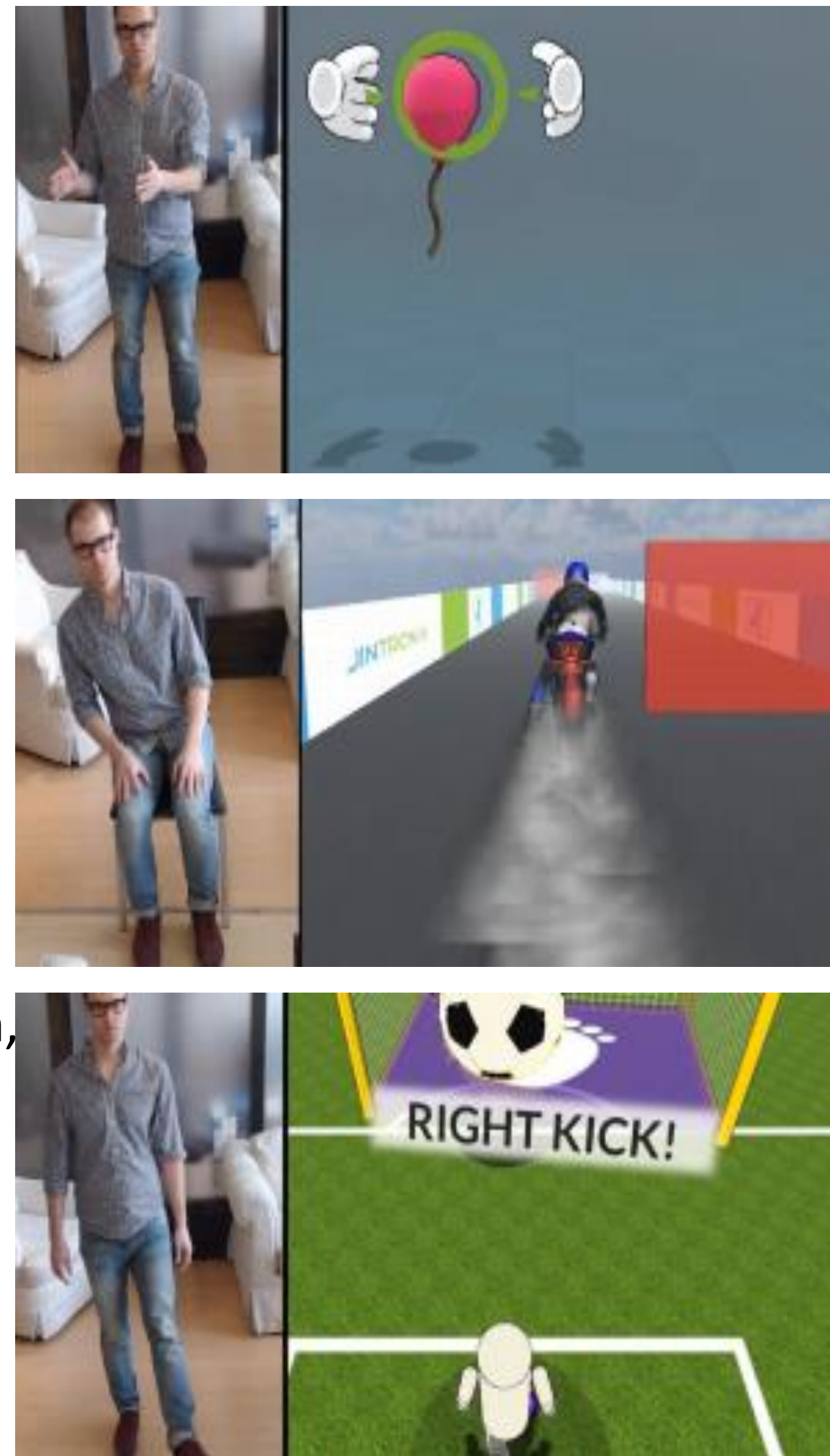
**Protocol:**

**Phase 1: Clinic-based training:** 9 sessions (3x/week) over 3 weeks, 45mins/session; Caregiver training

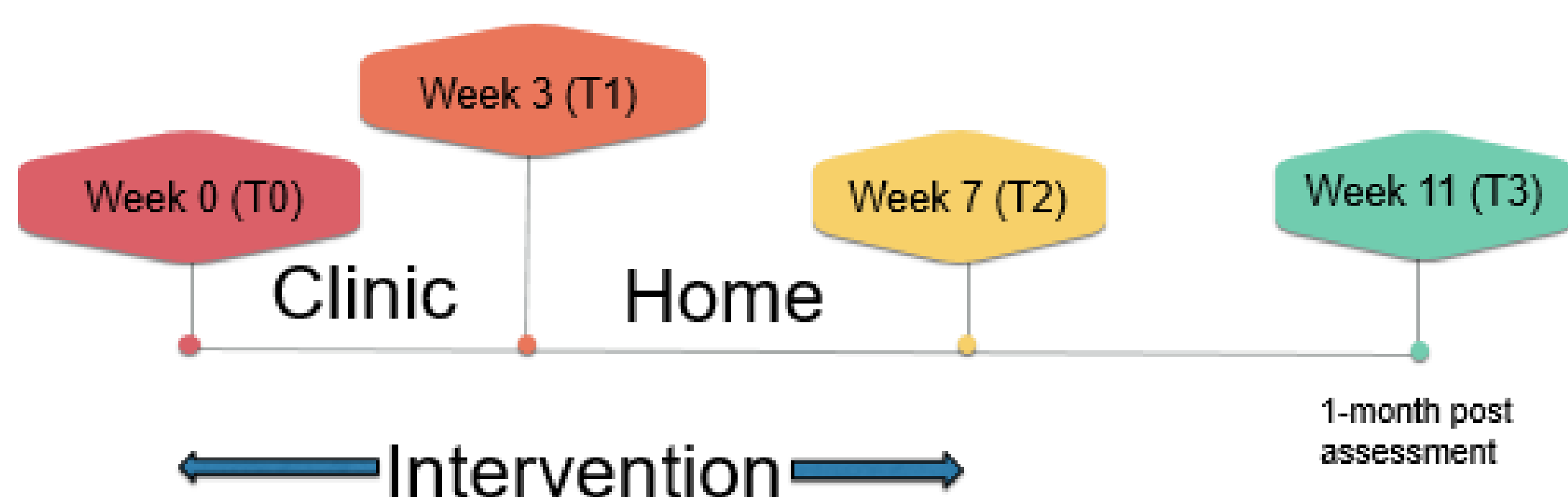
**Phase 2: Home-based training:** 20 sessions (5x/week) over 4 weeks, 45 mins/session;

Caregiver-supervised; Daily remote monitoring ; Exercise modification as needed

Daily remote monitoring: The therapist will log in to Jintronix daily at the end of the day to review each scheduled home-based training on its duration, and quality and consistency of performance. Each review may include adding or removing activities, or modifying game parameters to adjust level of challenge, in consideration of safety to both participants and caregivers.



## ASSESSMENT TIME POINTS



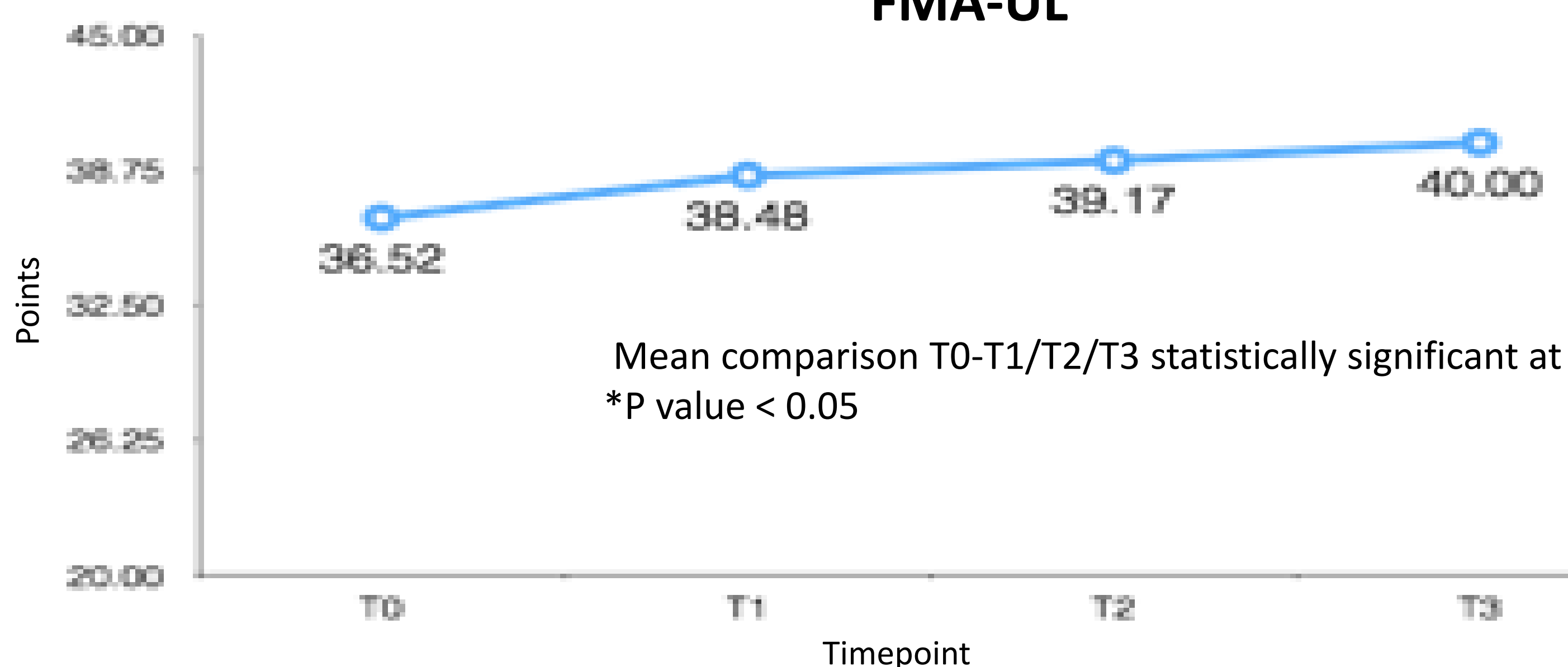
**Outcome measures:**

- Fugl-Meyer Upper Limb Motor Assessment (FMA-UL)
- Berg Balance Scale (BBS)
- 6 minutes Walk Test (6MWT)
- 10 metres Walk Test (10mWT)
- Pain Score
- Stroke Self-Efficacy Questionnaire (SSEQ)
- User Feedback

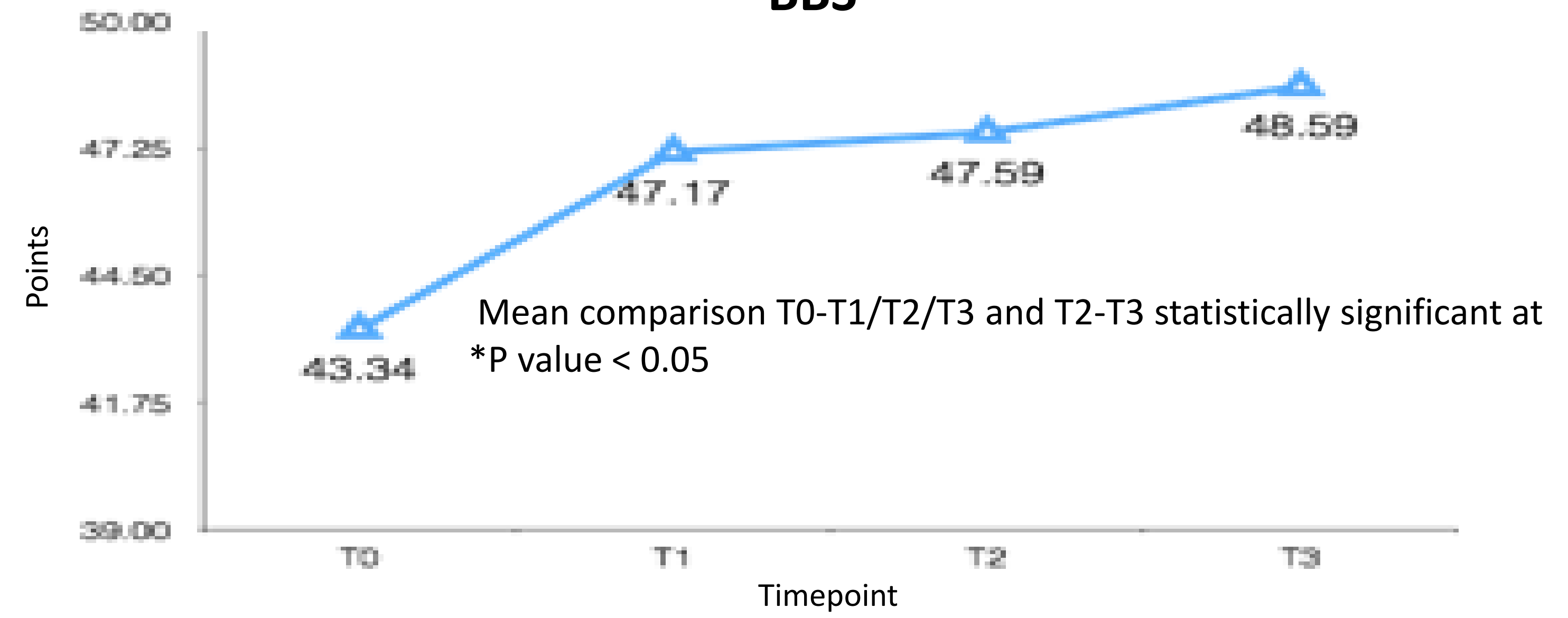
## RESULTS

Total recruited	n=35
Drop-out	3 (due to non-related medical issue, personal interest)
Age, mean(SD)	55.91 (11.36) years
Gender, n(%)	Male: 24 (68.6); Female:11 (31.4)
Ethnicity, n(%)	Chinese: 30 (85.7); Malay: 2 (5.7); Indian: 1 (2.9); Others: 2 (5.7)
Education, n(%)	Primary: 5 (14.3); Secondary: 3 (8.6); ITE: 3 (8.6); Polytechnic: 5 (14.3); Tertiary: 19 (54.3)
Post-stroke duration, median (IQR)	311.00 (633.00) days
Infarct, n(%)	14 (40.0)
Haemorrhage, n(%)	61 (60.00)
Gaming experience, n(%)	No: 13 (37.1); Yes: 22 (62.9)

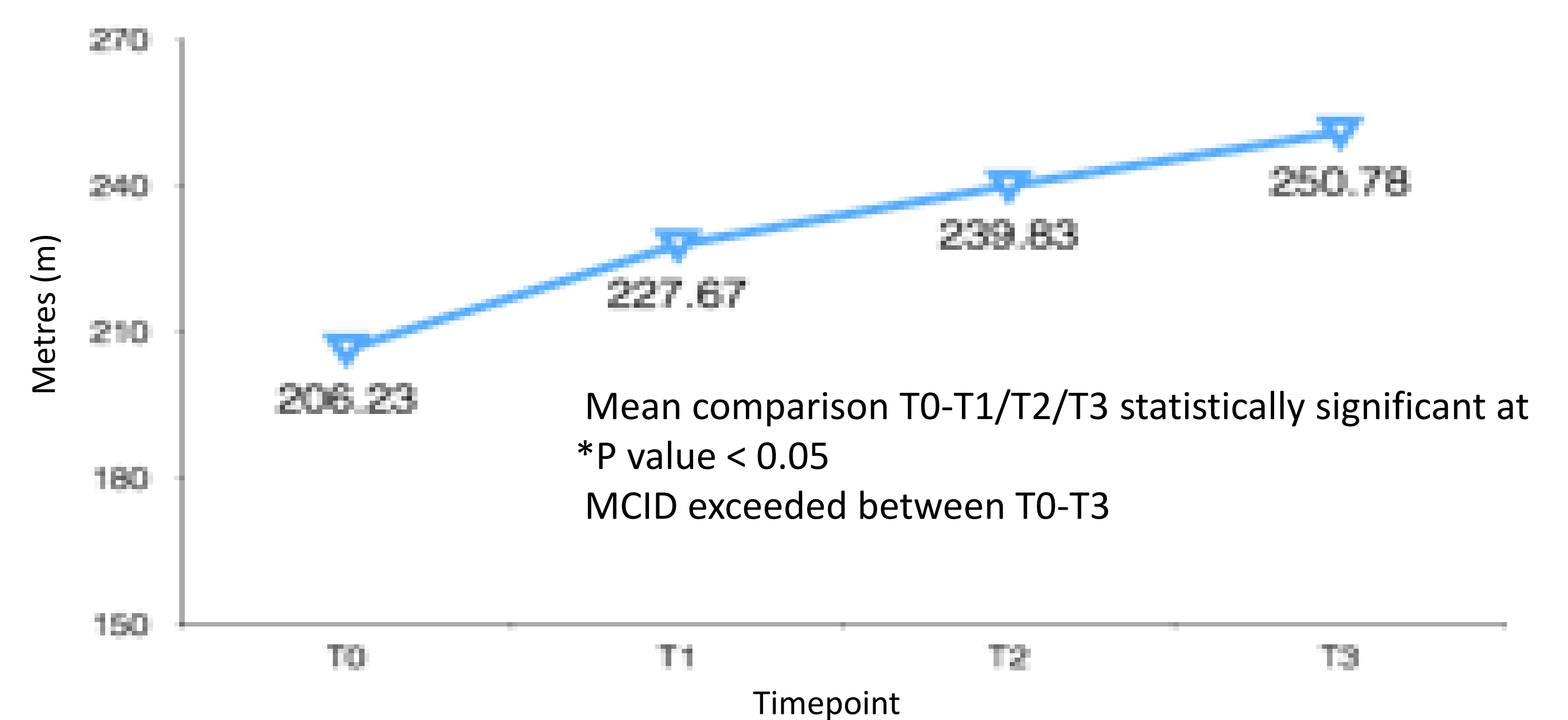
## FMA-UL



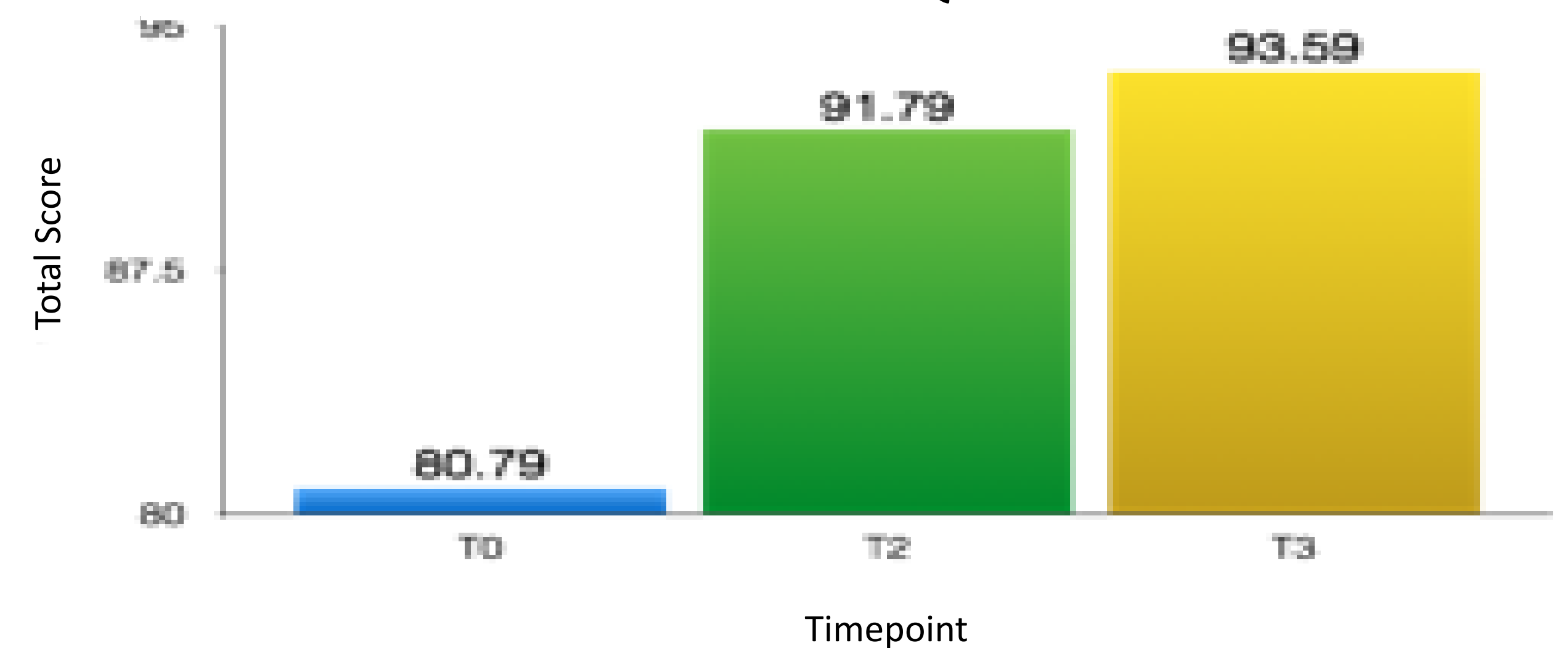
## BBS



## 6MWT



## SSEQ



Mean comparison T0-T2/T3 statistically significant at \*P value < 0.05

No significant difference between T2-T3

## User Feedback Week 7 (T3)



## DISCUSSION AND CONCLUSION

Virtual reality-based training system with remote home monitoring was well received. Based on 60mins duration of a clinic session, 573hours were saved during the home phase training based on reduced clinical time spent. 6MWT met Minimally Clinically Important Difference (MCID) of 34.4m; whilst no significant difference for 10mWT. Effects of intervention maintained post 1-month. Resources are required for Jintronix setup at home and managing technical issues.

Complementary VR telerehabilitation at home with Jintronix, with a trained caregiver and remote therapist monitoring, is a feasible and acceptable approach for post-stroke physical rehabilitation.

This approach can potentially lead to cost-savings for both patients and the healthcare institution.