The Effect of Virtual Reality-based Vestibular Rehabilitation Program for Patients with Vestibular Hypofunctions

LEUNG PY, POON MWY
Physiotherapy Department,
Hong Kong Buddhist Hospital

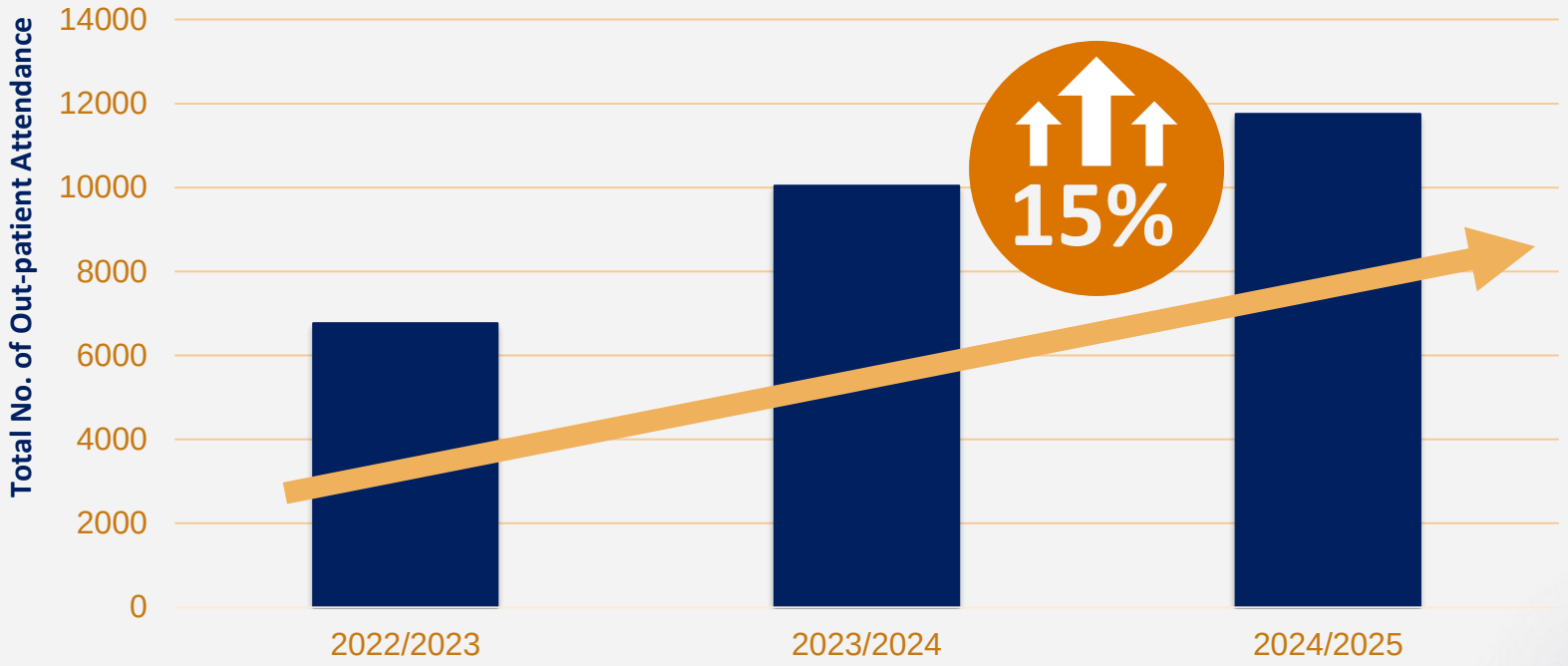
九龍中醫院聯網
Kowloon Central Cluster

香港佛教醫院
Hong Kong Buddhist Hospital

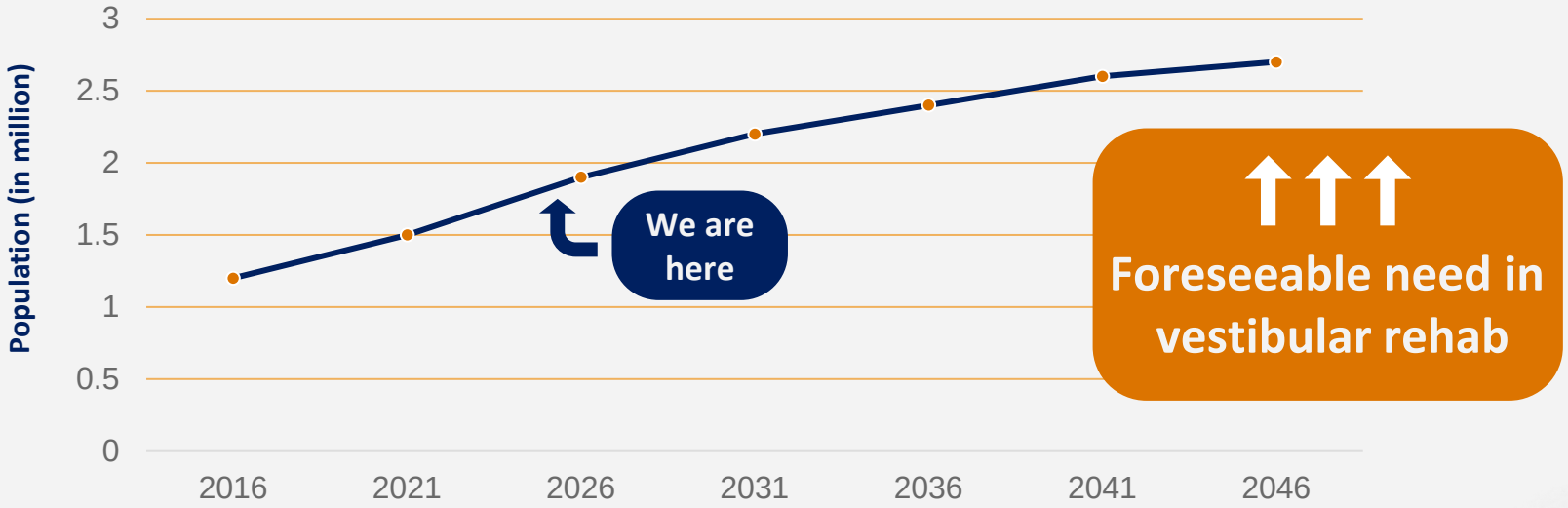
Background

- Affects **35% of adults** **over 40 years old** (McDonnell & Hillier,2015)
- Risk factors (Yetiser, 2020)
  - **Aging**
  - **Head trauma**
  - **Autoimmune diseases**

PT out-patient throughput in HA for patients with vestibular conditions



Projection of Hong Kong's population for individuals aged over 65



Aging population

↑26% by 2036

(Census and Statistics Department, 2022)

Patient suffering from…

Nausea/ Vomiting

Social Withdrawal

Tinnitus

Disequilibrium

Gait disturbance

Anxi

Fear of fall

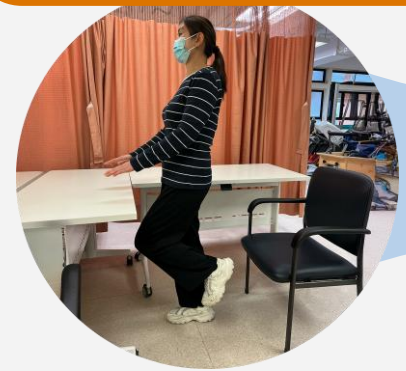
⬇ *Quality of Life*

Oculomotor Assessment

Nystagmus Screening

Vestibular Ocular Reflex Assessment

Physiotherapy Assessment

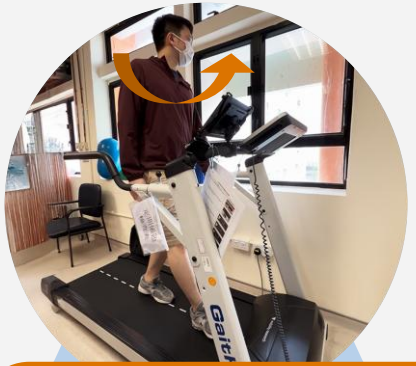


Balance Assessment

Benign Paroxysmal Positional Vertigo (BPPV) Screening

Adaptation Exercise

Habituation Exercise



Balance Training

Education Pamphlet

Physiotherapy Treatment

Substitution Exercise

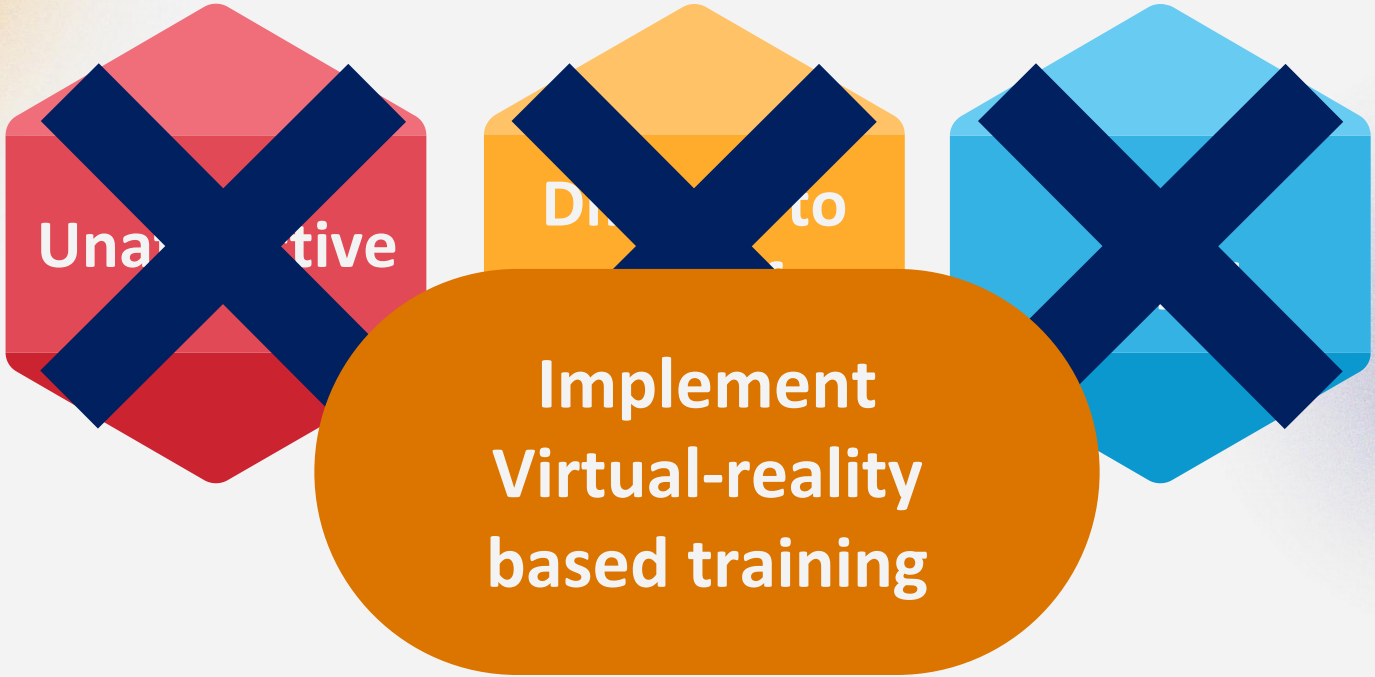
Repositioning Manuver

Fall Prevention

Limitations of Traditional Vestibular Rehabilitation

How to tackle these problems?

Limitations of Traditional Vestibular Rehabilitation



Bertec Balance Advantage®

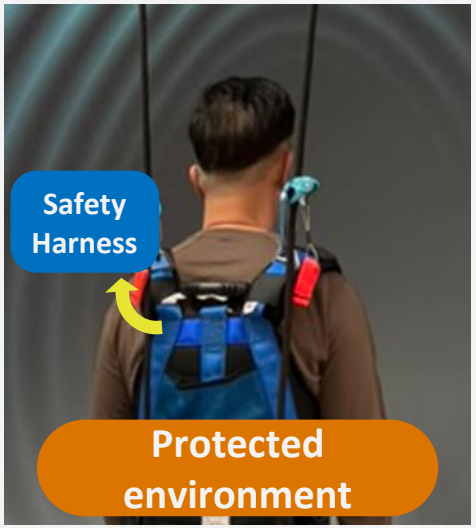
Comprehensive

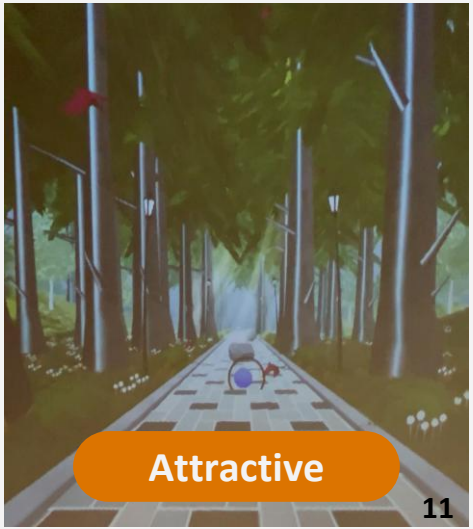
Immersive

Customizable

Virtual Reality-based Training

- **Significantly improves** in **self-perceived handicap** (Heffernan, Abdelmalek, & Nunez, 2021)
- **Protected** environment
- **Standardized** treatment (Meldrum et al., 2012)
- **More enjoyable** (Meldrum et al., 2015)





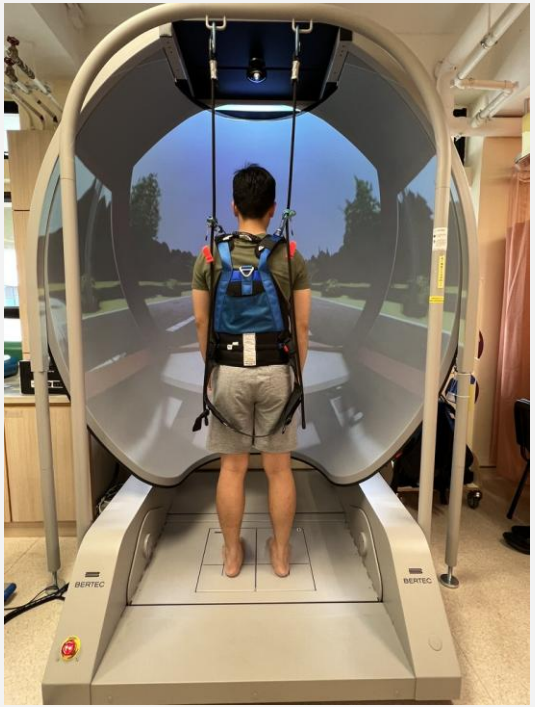
Objective

To evaluate the effects of virtual reality-based vestibular rehabilitation program for **managing dizziness/vertigo symptoms, balance control, self-perceived impacts** on daily activities amongst people with vestibular hypofunction

VR based vestibular rehabilitation

Park Walking

Street Walking

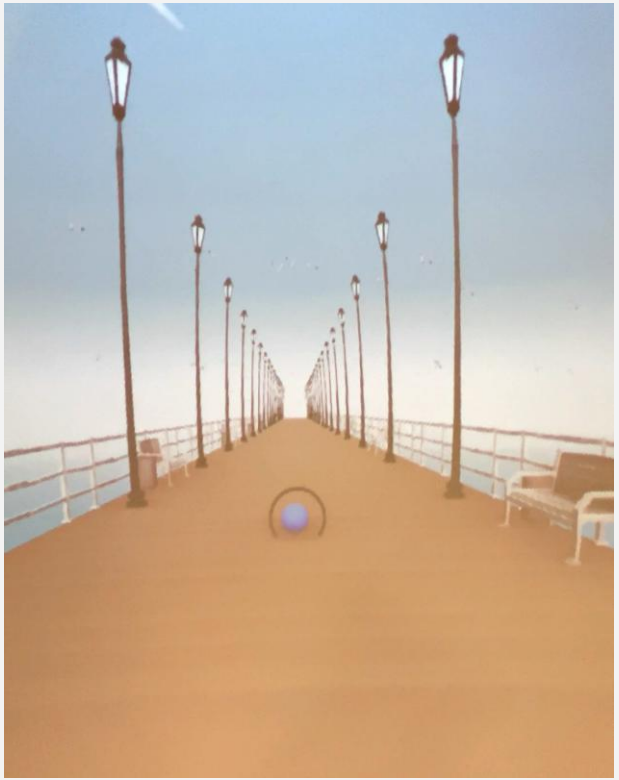


Driving

Grocery Shopping

Progression of training

Basic training



1. ↑ Challenge on *visual input*
2. ↑ Challenge on *dual-task capability*

Advanced training

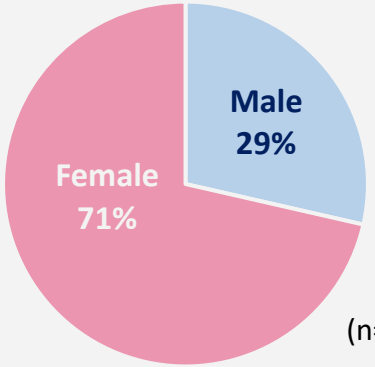
Outcome measures

Self Perceived Symptoms	Postural Control	Impact of Dizziness on ADL	Self Confidence	Overall Improvement
Visual Analog Scale of Dizziness	Sensory Organization Test	Dizziness Handicap Inventory	Activities-Specific Balance Confidence Scale	Numeric Global Rate of Change Scale

Patient Demographics

Study Period: *Jul – Dec 2024*

Gender



(n=7)

Duration of Onset of Dizziness

10 months

↓

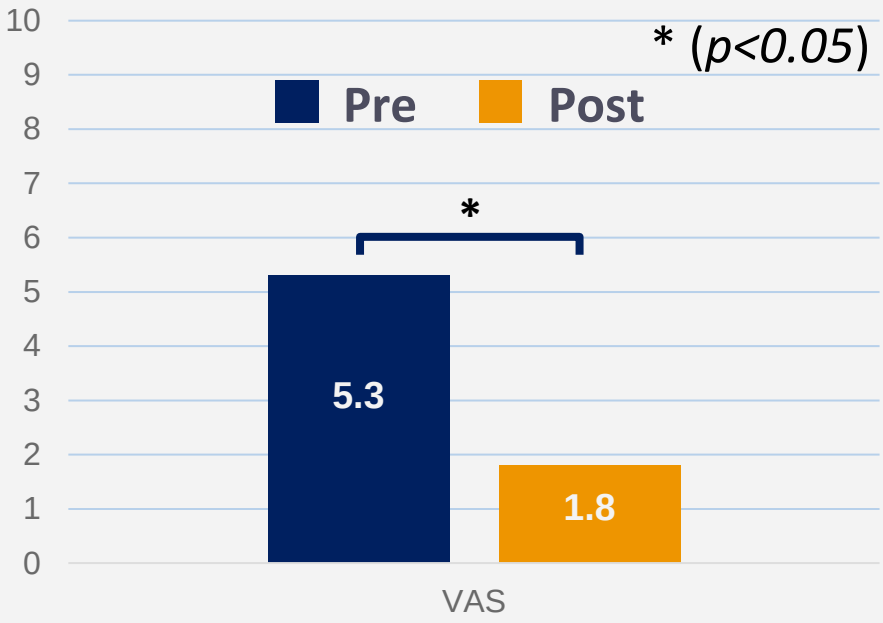
10 years!!!

Age 58 - 85

No. of sessions Mean = 13.2 sessions

Self Perceived Symptoms

Visual Analog Scale (VAS)



Perceived dizziness/ vertigo

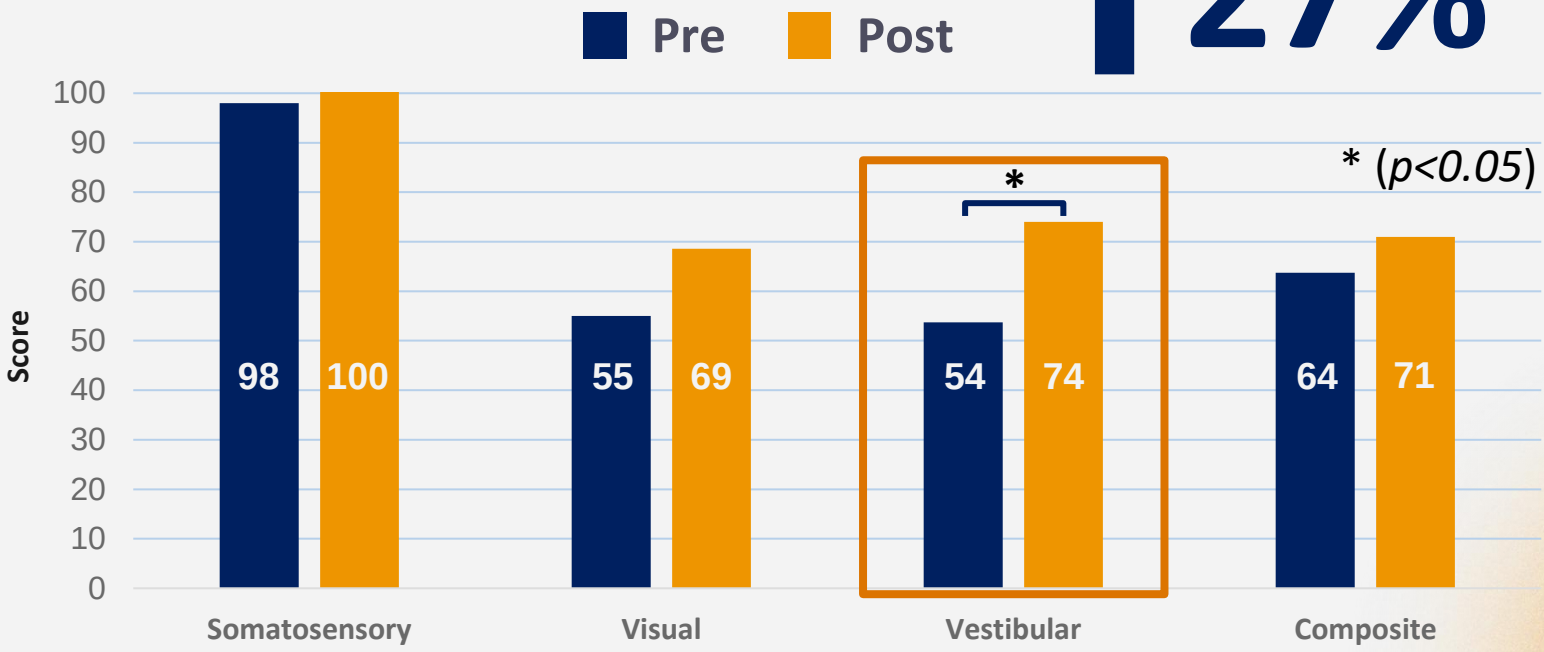
↓ 66%

Postural Control

Vestibular Component

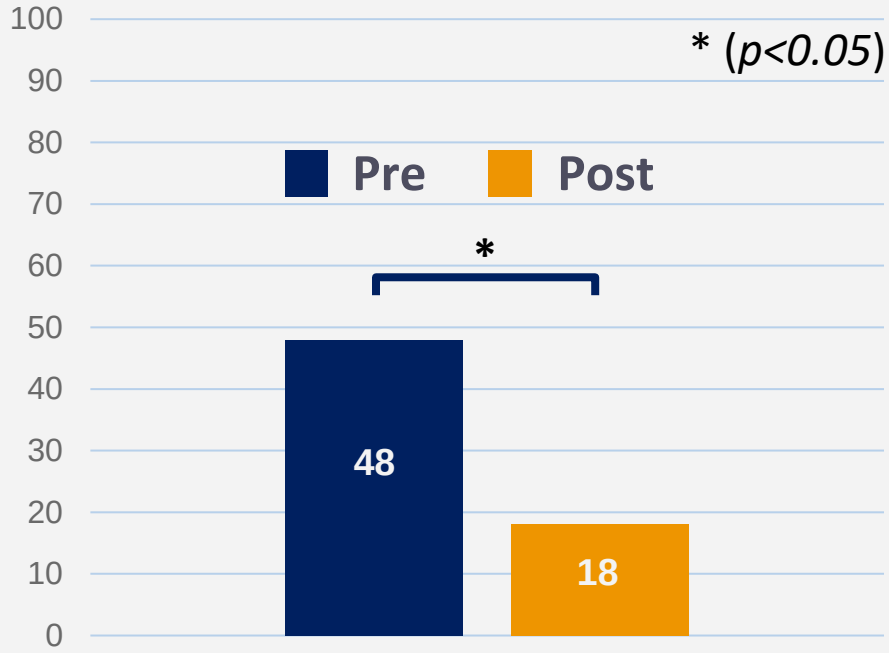
Sensory Organization Test (SOT)

27%



Impact on ADL

Chinese-Dizziness Handicap Inventory (C-DHI)



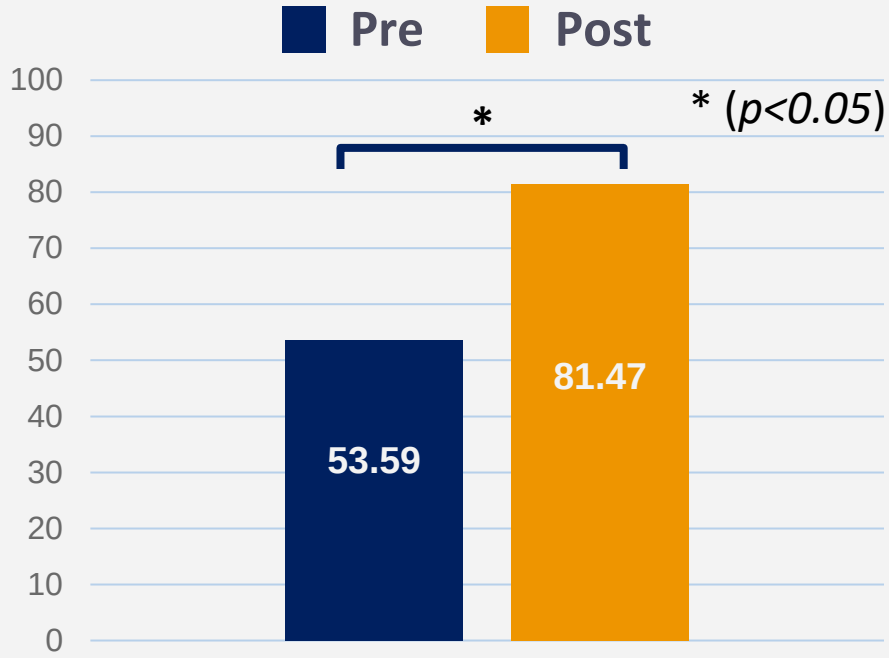
63%

Impact on ADL tasks

Improvement in daily tasks

Self Confidence to balance

Activities-Specific Balance Confidence Scale (C-ABC)

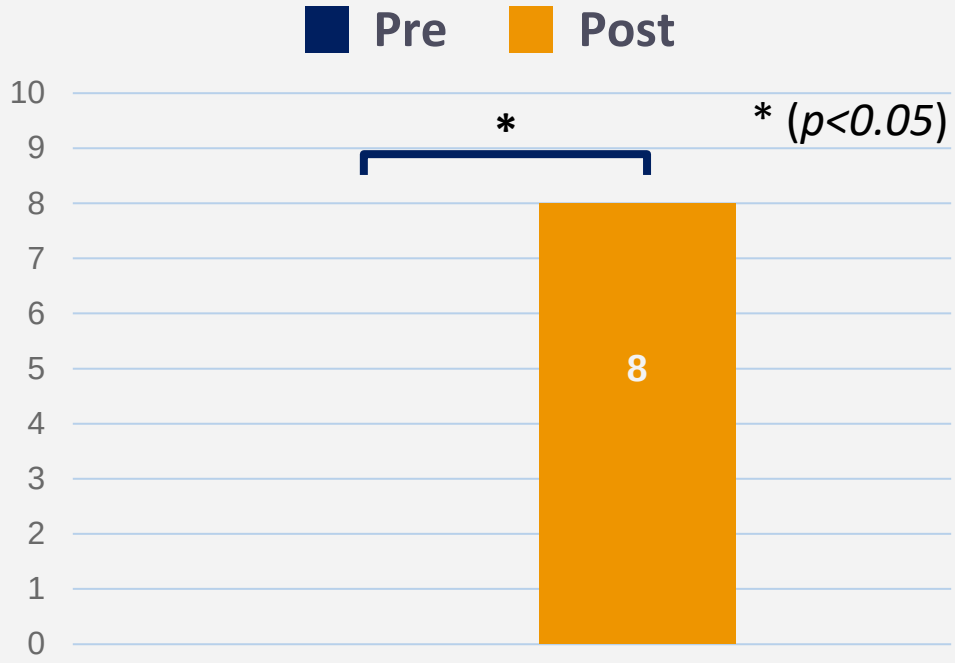


Self Confidence

37%

Overall Improvement

Numeric Global Rate of Change Scale (NGRCS)



Overall improvement

80%

Patients' feedback

「以前頭暈嘅時候呢，邊度都唔敢去。」

"Back when I was experiencing dizziness,
I couldn't step out of my house"

「自從用左部機之後，而家我已經可以
開始周圍去旅行, 周圍去吓啦!!
生活好好多!!!」

"Since I started training, I can now resume traveling
and life is getting better"

Discussion

Virtual reality demonstrated to be:

1 Clinically effective to improve QoL

- All results have **significantly improved**

2 Better patient engagement

- Attractive → **More FUN!!!**
- Provide a **protected environment** during training
- Simulate **real-life** scenarios

Way Forward

1. To explore **further implementation** of virtual reality-based training for **other conditions/ disease groups**
   - Such as fall prevention, post-operative conditions

2. To explore the **development of tailored VR scenarios**
   - Software upgrade to cover **more varieties** of ADL tasks (i.e. MTR/ ferry rides)
   - Home-based VR gadgets are blooming → **feasibility as home exercise**

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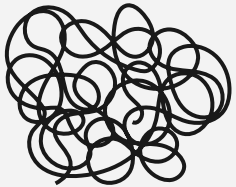


Thank you!

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