醫院管理局 HOSPITAL AUTHORITY

HONG KONG EAST CLUSTER 港島東醫院聯網

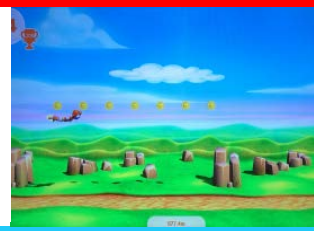
HA Convention 2018

Speed Presentation

Innovating Robotic Assisted Gait Therapy in HKEC Will Advance Technology Enhances Clinical Outcomes?





Liu KL[1,2], Tang YP[1,2], Wong CS[1,2], Cheng WK[1,2], Cheung HY[1,2], Or SK[1,3], Tong WH[1,4]

Physiotherapy Department[1], Tung Wah Eastern Hospital[2], Ruttonjee & Tang Shiu Kin Hospitals[3], Pamela Youde Nethersole Eastern Hospital[4]

東華三院 Tung Wah Group of Hospitals

TSKH

Stroke (Hong Kong)

Yearly 26000

Mortality 3000

4th Killer

3 months after stroke

20% WC bound
70% Walking Disability
10% Independent Walk
(Eich et, 2009)

Stroke Patients

Restoration of Walking
is highly relevant for
Community Reintegration
(Eich et al, 2009)

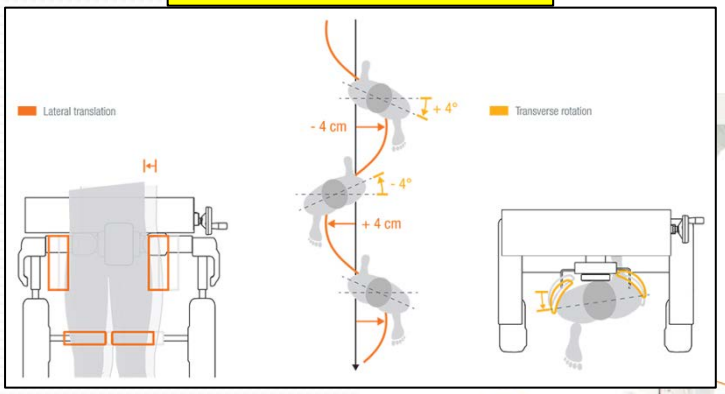
Gait Training

New (2015)

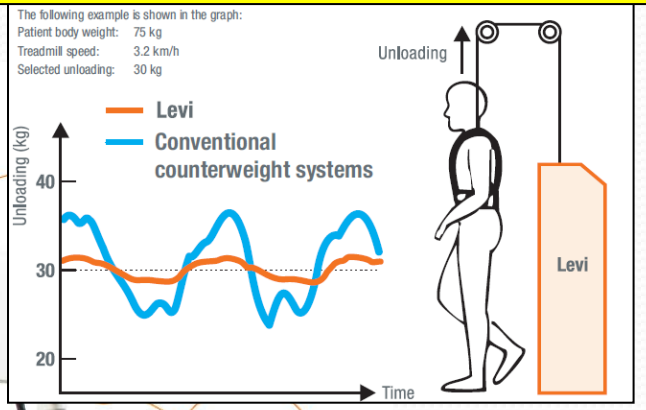
Robotic Assisted Gait Therapy (RAGT)

Robotic-assisted Gait Therapy (RAGT) System

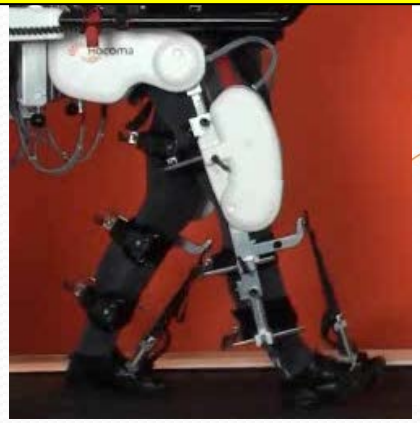
Free-D System

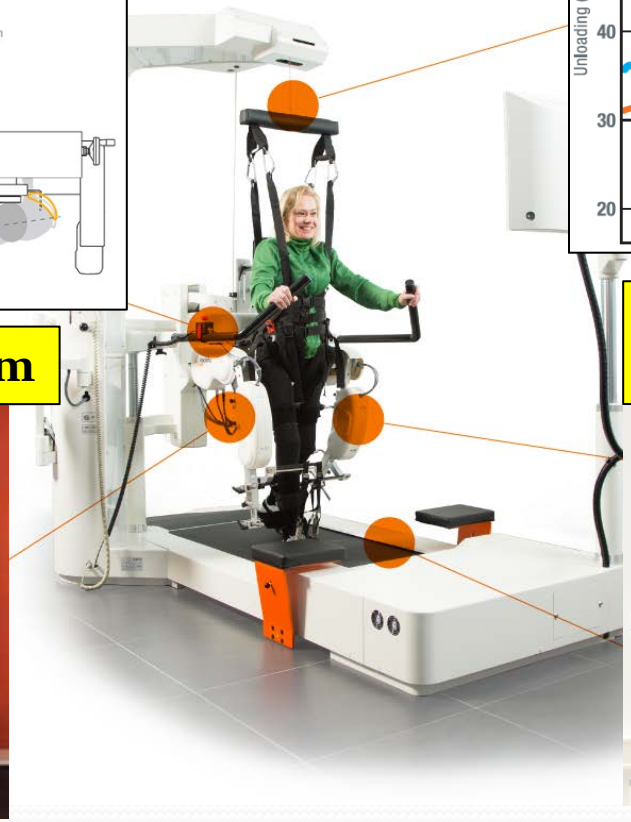


Dynamic Counterweight System



Joint Motion System





Augmented Performance Feedback System

Robotic-assisted Gait Therapy – Indications

- **Stroke**
- **Spinal Cord Injury (SCI)**
- Traumatic Brain Injury (TBI)
- Multiple Sclerosis (MS)
- Parkinson's Disease
- Cerebral Palsy (CP)
- Orthopedic problems

RAGT for Stroke

• RAGT ↑ *motor function* more than any other interventions	Level 1a
• RAGT for post stroke significantly ↓ *spasticity*	Level 1b
• RAGT had significant greater ↑ *aerobic capacity* than control associated with the cardiovascular fitness	Level 1b
• RAGT combination with PT ↑ *the chance of achieving independent walker* than people who receive gait training without these devices	Level 1a
• RAGT ↑ *walking speed* over the usual practice	Level 1b
• RAGT ↑ *activities of daily living* and *mobility* when compared to the usual therapy	Level 1b
• RAGT ↑ *muscle strength* than usual therapy	Level 1b
• RAGT ↑ *mobility* than control	Level 1a
• RAGT ↑ *balance* than control	Level 1a

Physiotherapy Evidence Database (PEDro)

RAGT for Spinal Cord Injury	
• RAGT ↑*walking ability*	**Level 1a**
• RAGT ↑*walking speed* than therapist-assisted interventions	**Level 1b**
• RAGT ↑*motor score* when compared to overground mobility	**Level 1b**
• RAGT ↑ *kinematic and kinetic parameters* better than control	**Level 1b**
RAGT for Parkinson's disease	
• RAGT ↑ *walking function* (velocity, step length and stride length) as compared to treadmill	**Level 1b**
• RAGT ↑ *balance* and *functional mobility*	**Level 1b**
RAGT for Multiple Sclerosis	
• RAGT ↑ *walking speed*	**Level 1b**
• RAGT ↑ *balance*	**Level 1b**
• RAGT ↑ *quality of life*	**Level 1b**

Physiotherapy Evidence Database (PEDro)

RAGT in HKEC

Clinical Service

Preparation

Data Collection & Analysis

Maintenance & New Software

Installation → Training → Start Service → Advanced Training → New User Training

HKEC Work Base Training

4 New PT Certified Users

Dec 2015

Jan 2016

Feb 2016

Feb 2017

Apr-Sep 2017

2015 | 2016 | 2017

Clinical Effectiveness

Objective

- To evaluate the additional clinical benefits for neurological patients who received combined RAGT and conventional physiotherapy.

Conventional Physiotherapy **vs** **RAGT** + **Conventional Physiotherapy**

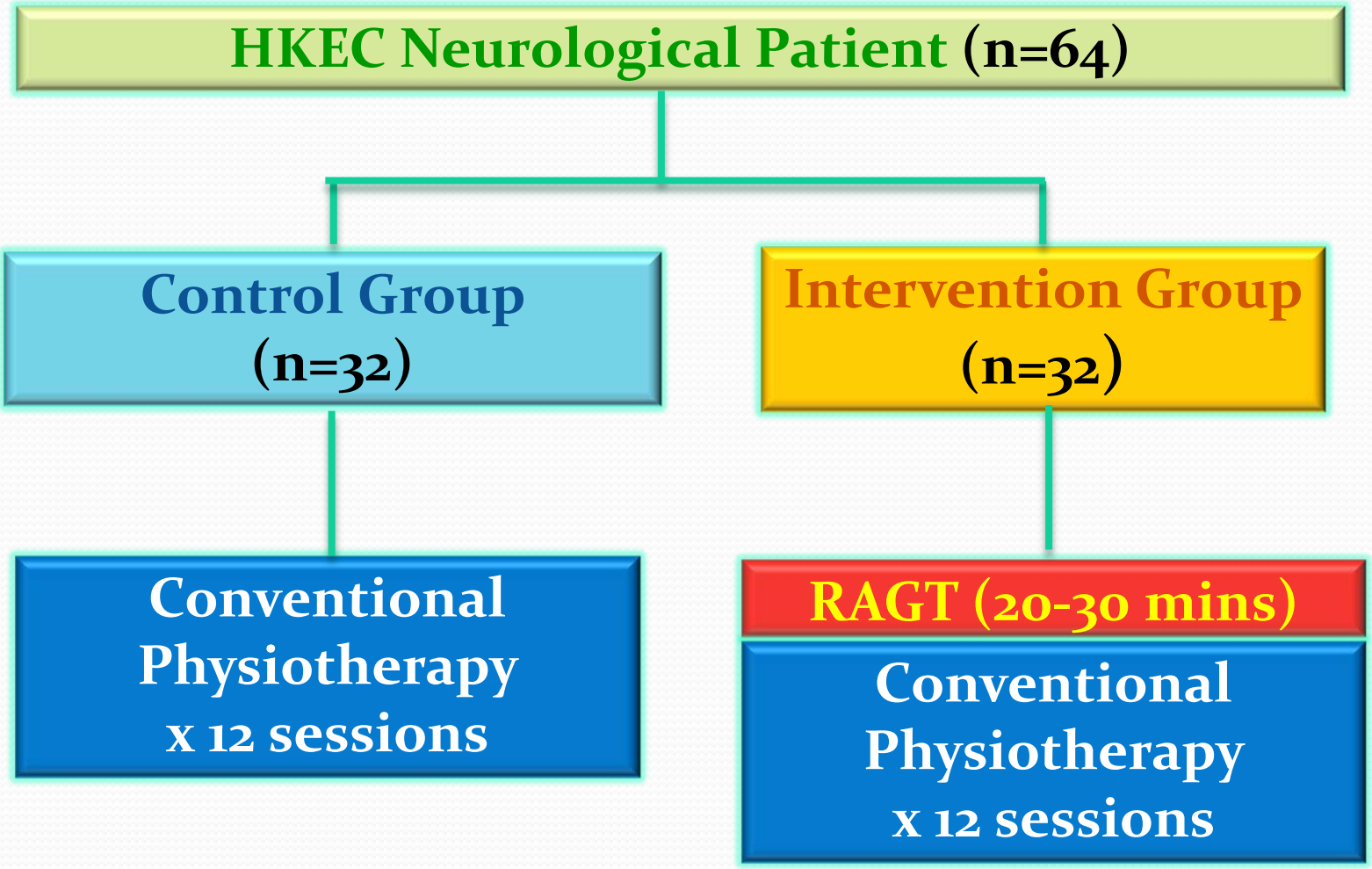
Objective

- To evaluate the additional clinical benefits for neurological patients who received combined RAGT and conventional physiotherapy.

Study Design

- Pre-test and post-test study design ☑
- Between group study design ☑

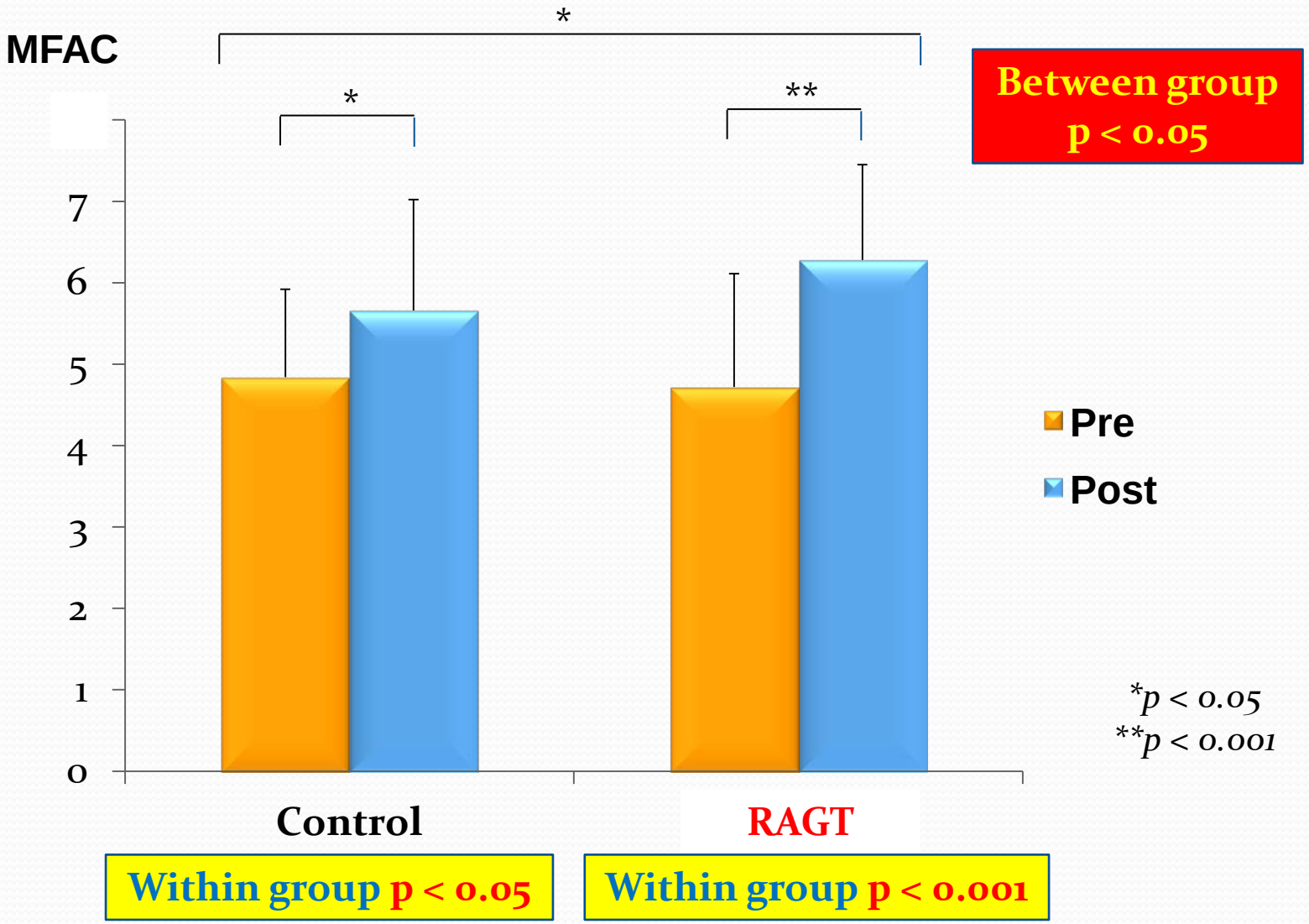
Methodology



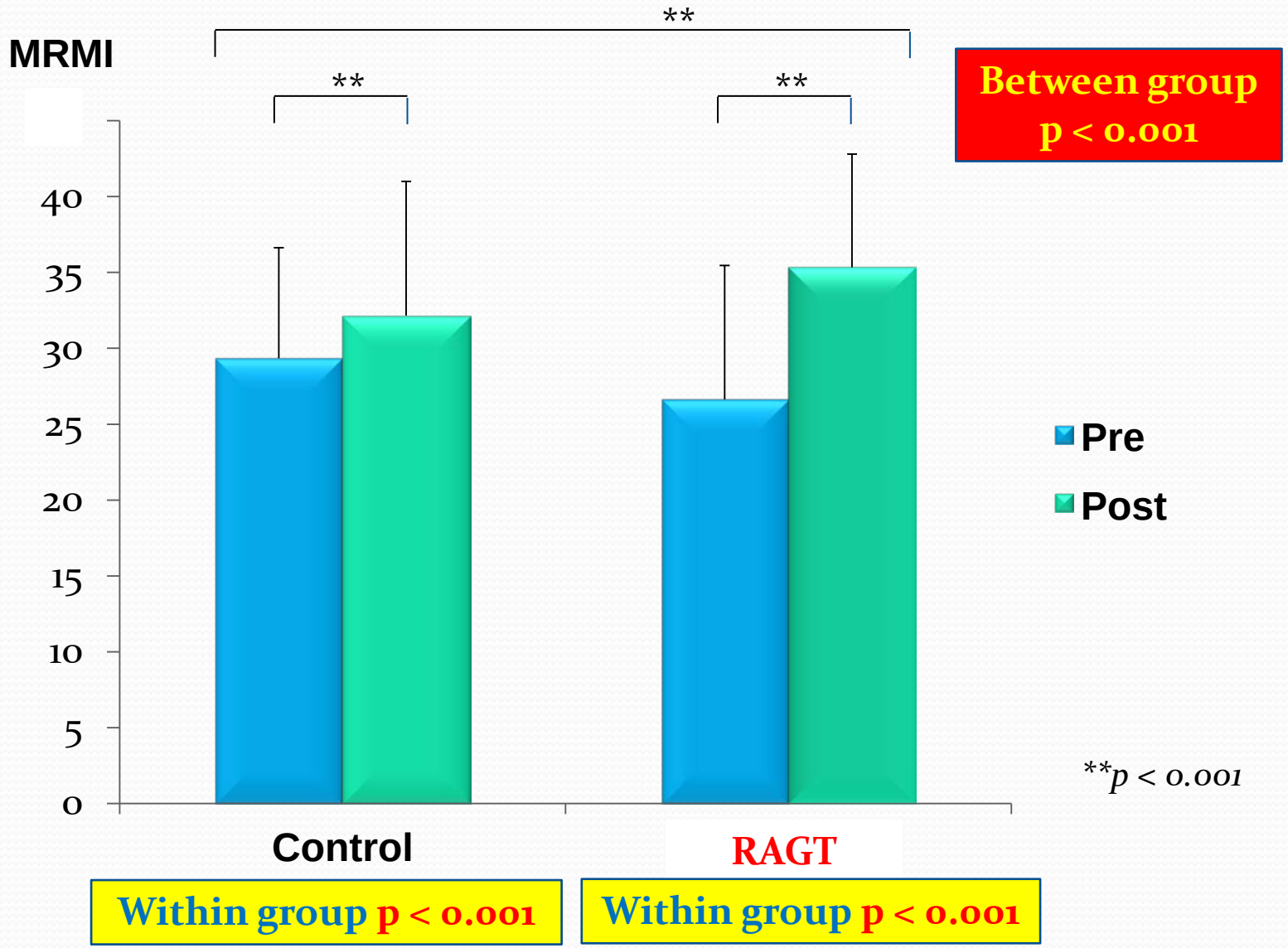
Outcome measurement

1. **Modified Functional Ambulation Classification (MFAC)**
   - Ambulatory Level (1 - 7)
2. **Modified Rivermead Mobility Index (MRMI)**
   - Motor Function (0 - 40)
3. **Berg Balance Score (BBS)**
   - Balance Ability (0- 56)
4. **Functional Independence Measure (FIM)**
   - Functional Level (1 - 7)
     - Transfer
     - Walking
     - Stair Climbing

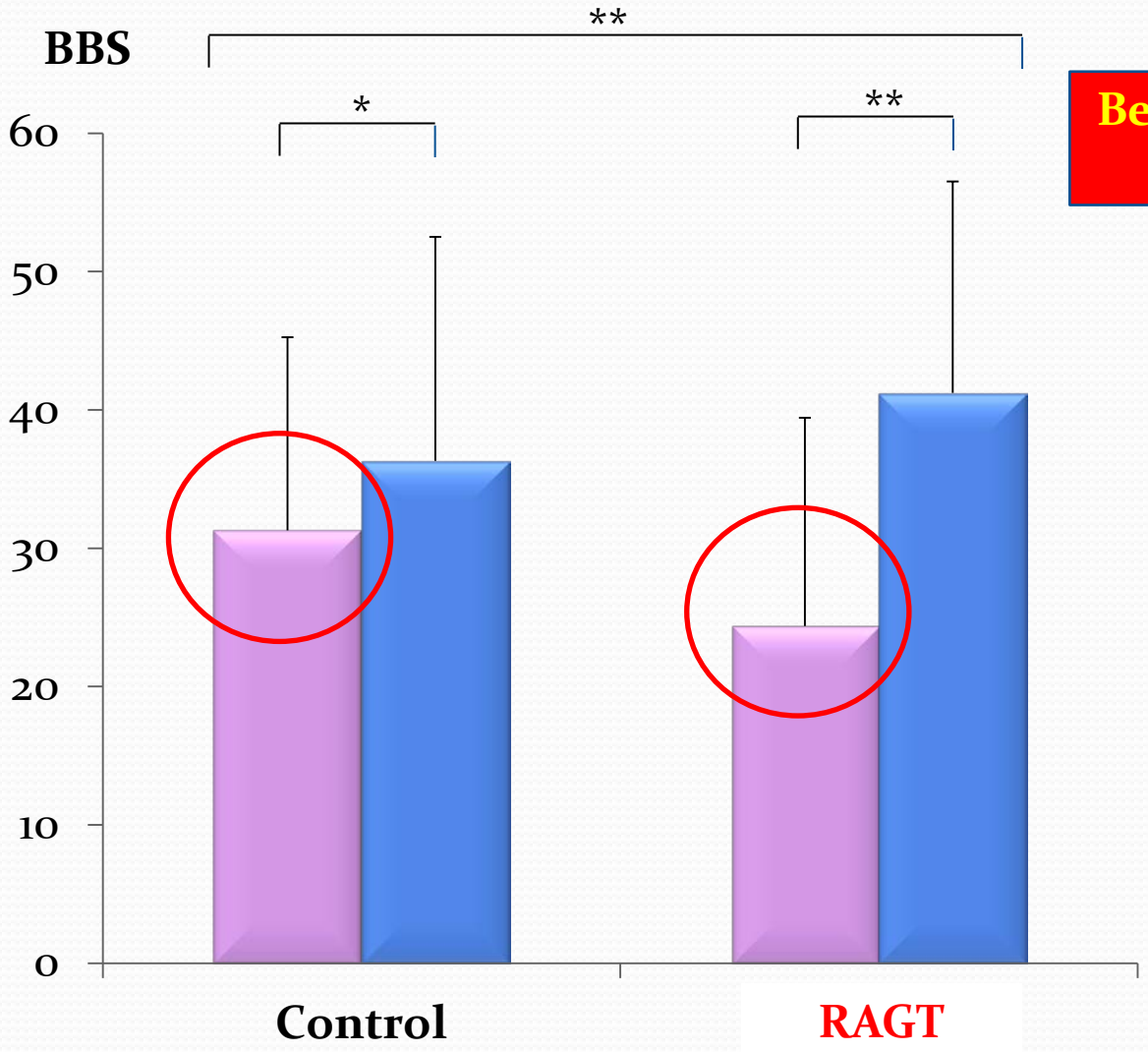
Outcome- MFAC (Ambulatory Level)



Outcome- MRMI (Motor Function)



Outcome- BBS (Balance Ability)



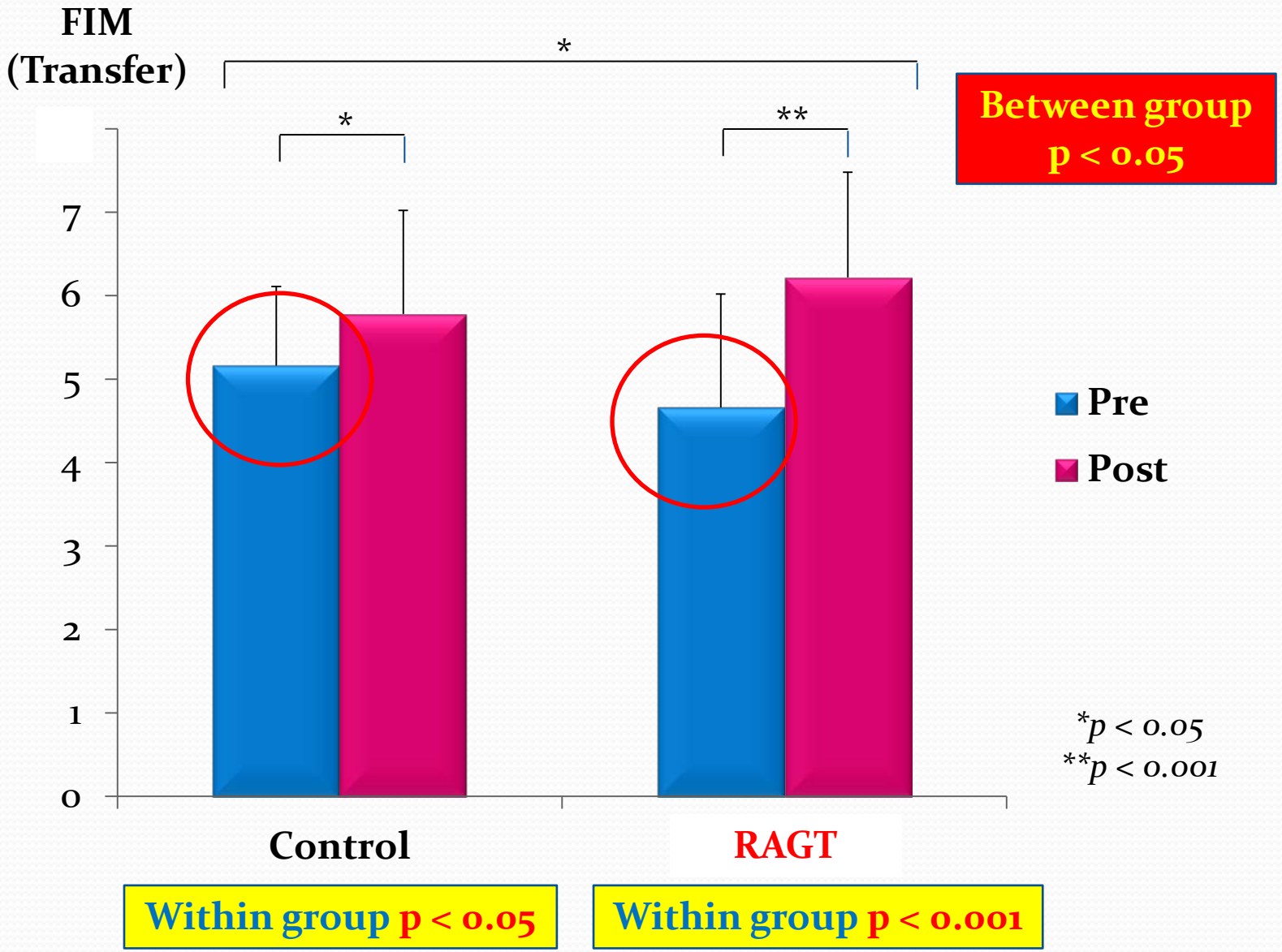
Between group p < 0.001

*$p < 0.05$
**$p < 0.001$

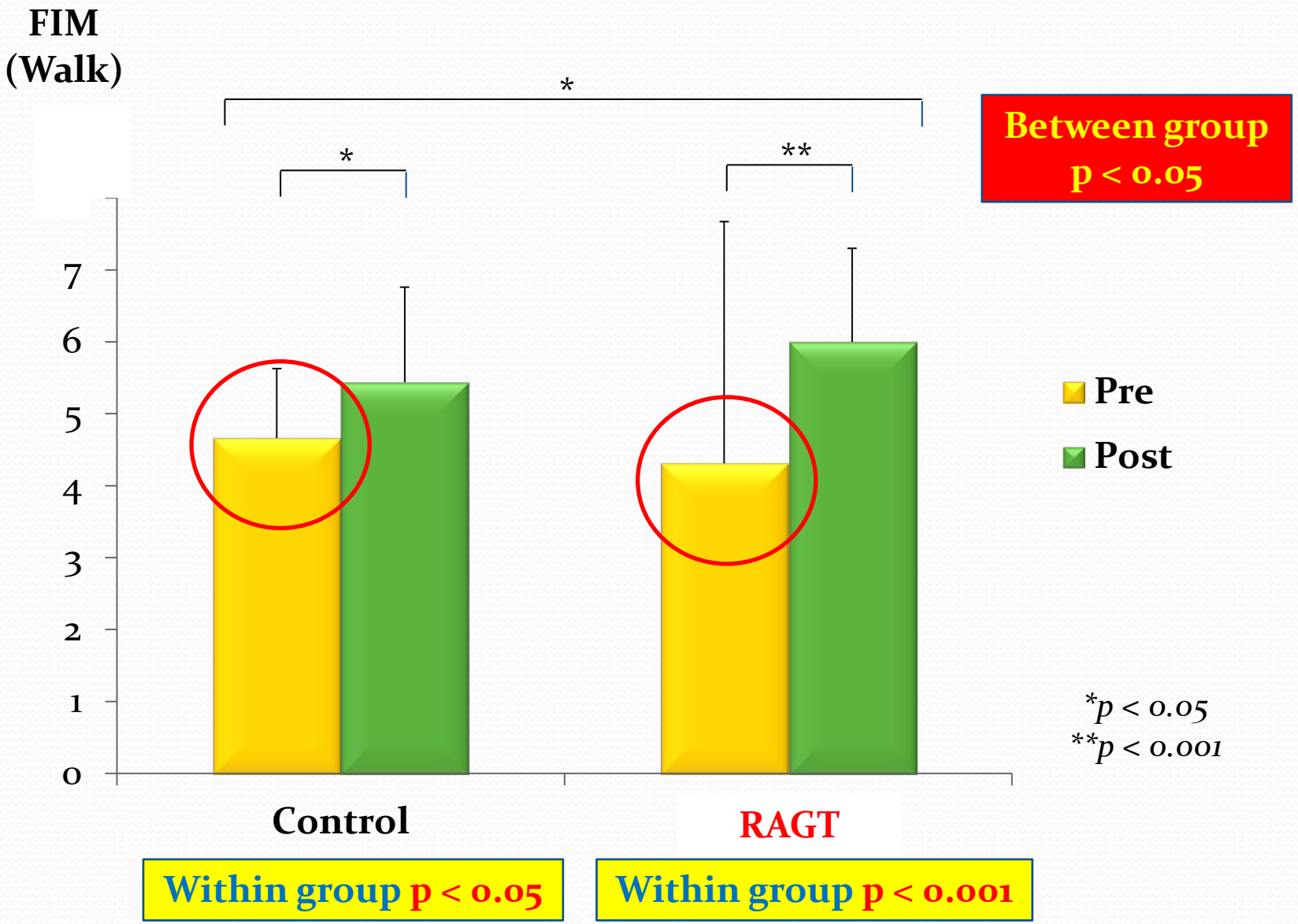
Within group p < 0.05

Within group p < 0.001

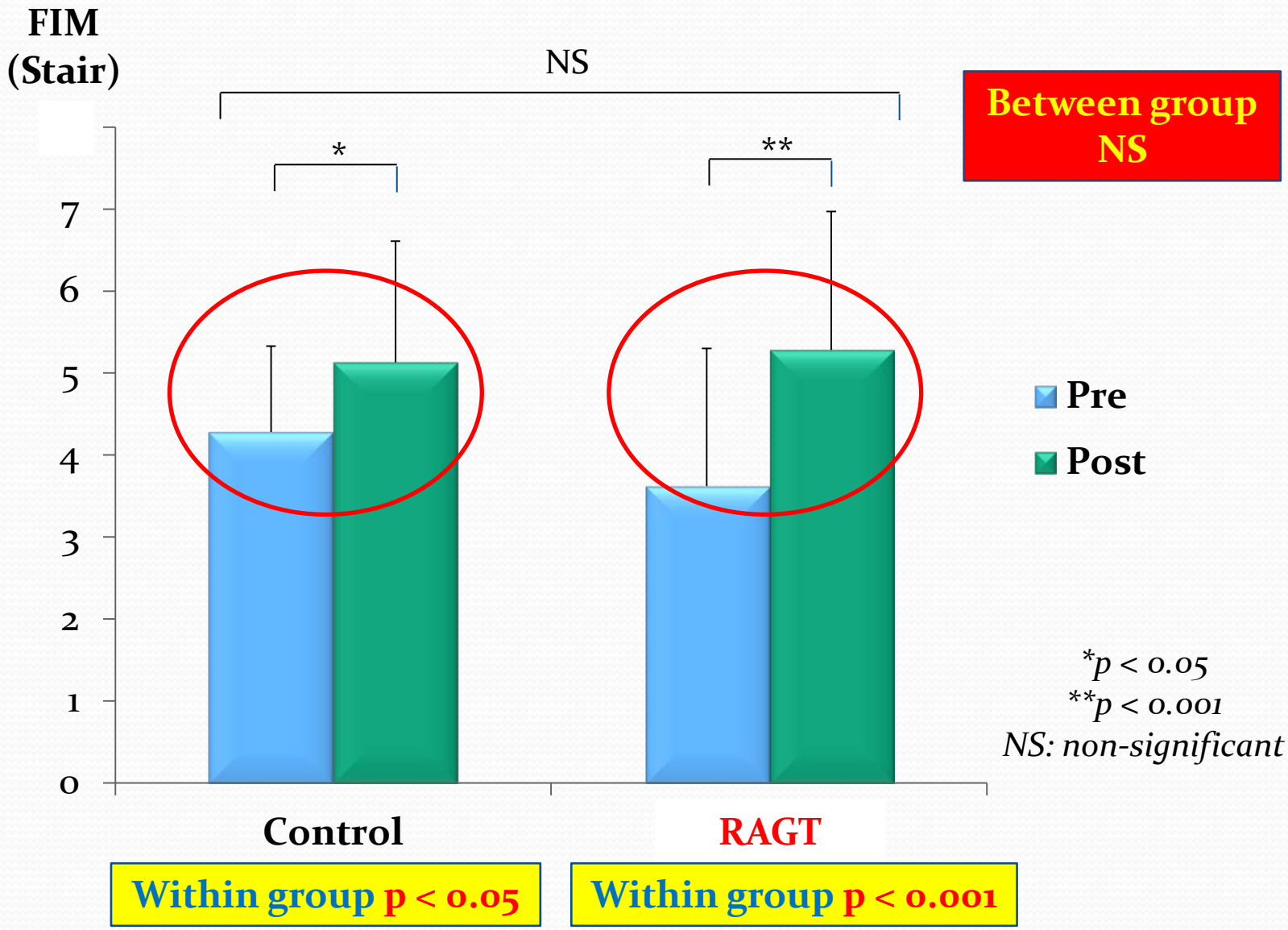
Outcome- FIM (Transfer)



Outcome- FIM (Walk)



Outcome- FIM (Stair Climbing)



Qualitative Outcome

Satisfaction Survey

RAGT group

>95% patients

- Part A – **Improvement** of gait performance
  - pattern, endurance, speed, stability

100% patients

- Part B – Satisfaction of **service**
  - duration, frequency, safety, staff's instructions

Conclusion

Clinical Service

Innovative Technology

- Frees therapists from "mechanical work"
- Longer & more intensive training
- More physiologic gait pattern
- Early mobilization
- Safe environment

Clinical Effectiveness

RAGT + Conventional PT

- Additional improvement

Significant Improvement in

- Ambulatory ability (MFAC)
- Motor function (MRMI)
- Balance ability (BBS)
- Functional ability (FIM)

Recommendation

- **Clinical service**: **New certified PT** support

- **Further study**:
  - Larger **sample size**
  - Other **patient groups**
    - Different **disease group: SCI, PD**
    - Different **walking status**
  - Further **analysis**

Acknowledgement

醫院管理局 HOSPITAL AUTHORITY

HONG KONG EAST CLUSTER 港島東醫院聯網

東華三院 Tung Wah Group of Hospitals

TSKH