

EFFECTIVENESS OF HIGH-INTENSITY GAIT TRAINING WITH VIRTUAL REALITY FOR CEREBELLAR AND PONTINE STROKE RECOVERY: A CASE SERIES

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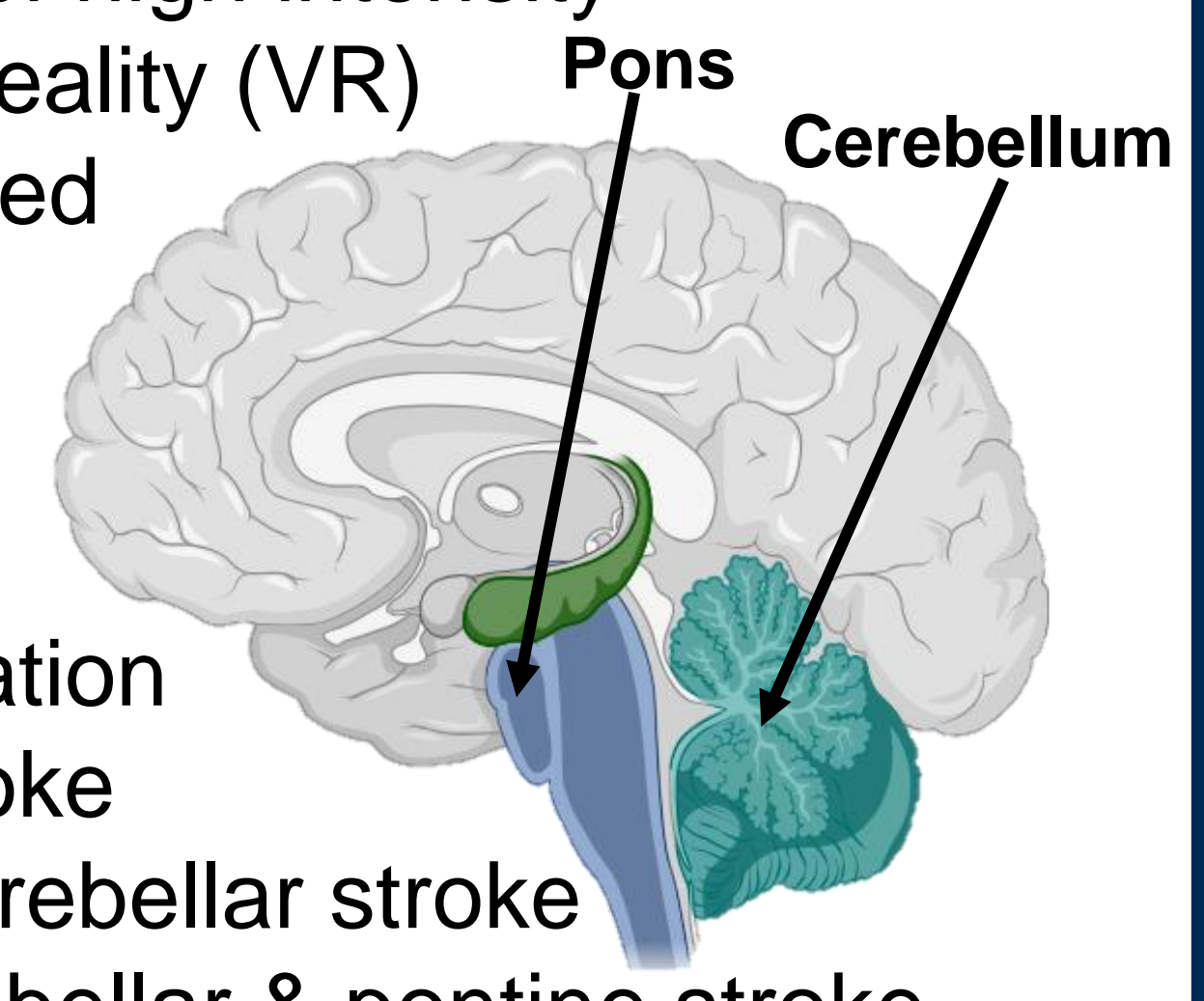
Background / Case

Background:

- Research supporting early therapeutic interventions in patients with acute posterior circulation stroke is limited
- The cerebellum controls balance, coordination, and gait¹
- The pons connects the cerebellum with the cerebral cortex helping to coordinate smooth, sequenced movements¹
- Damage to these areas impairs motor learning and disrupts regulation of coordinated movement¹
- Current research supports use of high intensity gait training (HIGT) and virtual reality (VR) within chronic stroke, but is limited within the acute phases

Case Description:

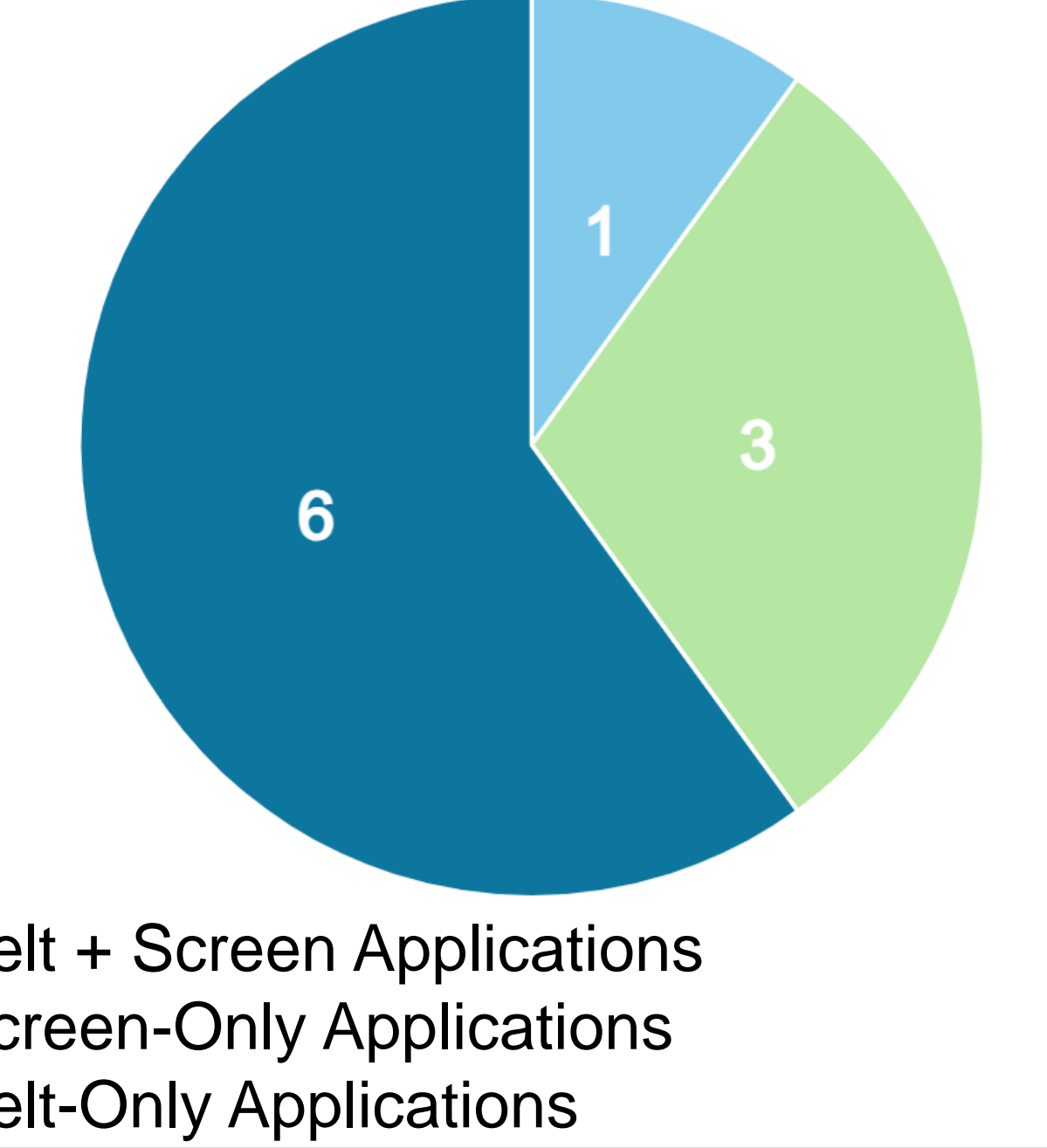
- Two patients receiving physical therapy in an inpatient rehabilitation facility (IRF) following acute stroke
 - Patient A: age 72, female, cerebellar stroke
 - Patient B: age 68, male, cerebellar & pontine stroke



Protocol

- Vitals were taken pre- and post-session
- Warm-up: 10 minutes on NuStep (seated aerobic stepper)
- Performed C-Mill activities that incorporated belt, front screen, and combined VR applications
- Rate of perceived exertion recorded after each activity
- If patients were not medically stable to participate in high intensity training, session was modified or eliminated (clinical judgment)

Frequency & Type of Activity



Outcomes

- Both patients demonstrated improvement in all outcome measures from pre-test to post-test with most scores meeting the Minimal Clinically Important Difference (MCID)

	MCID	Patient A	Patient B
Berg	7	×	✓
6MWT	0.16 m/s	✓	✓
10MWT	71 m	✓	✓

- Both patients were discharged home after IRF stay
 - Patient A improved from a minimal assistance level to an intermittent supervision level
 - Patient B improved from a contact guard level to a modified independence level
- Rate of perceived exertion averaged 14.4, indicating HIGT was effective for each patient



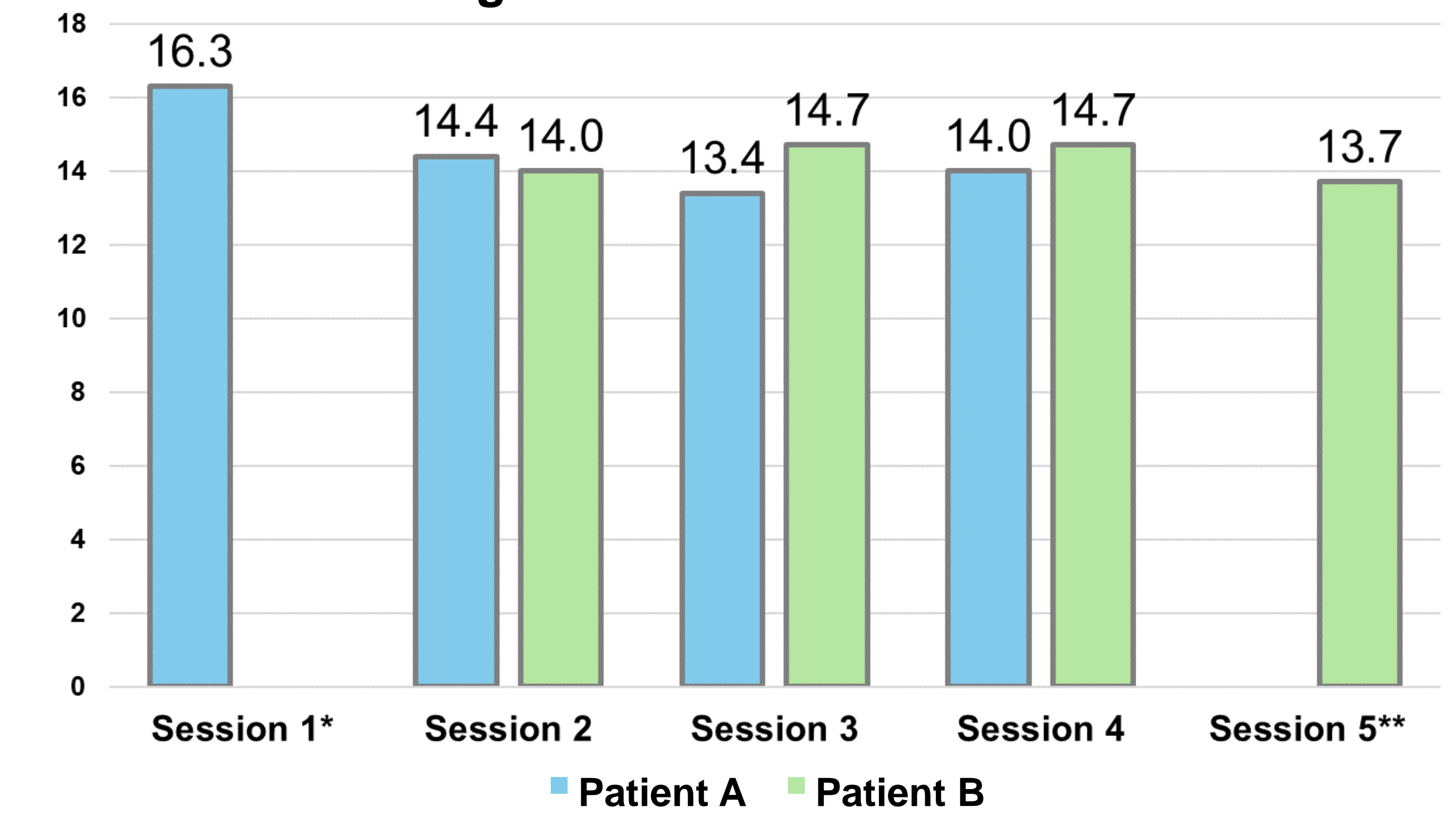
Primary Aim

This case report investigates the effectiveness of HIGT with VR on postural stability, ambulation endurance, and gait speed in individuals recovering from acute cerebellar and/or pontine stroke

Results

	Patient A		Patient B	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Berg	34/56	38/56	34/56	52/56
6MWT	120 m	190 m	137 m	274 m
10MWT	0.50 m/s	0.72 m/s	0.65 m/s	0.96 m/s

Average Rate of Perceived Exertion



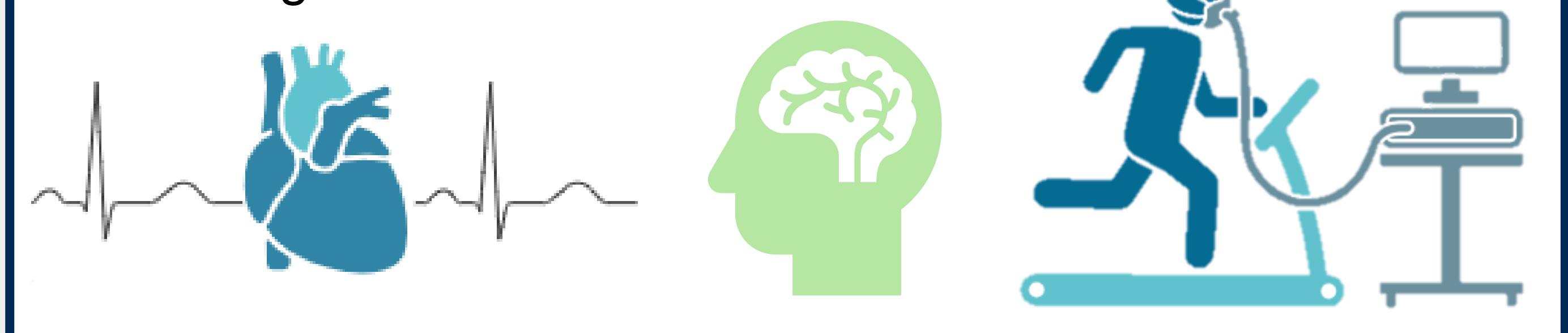
* No data due to elevated blood pressure (not medically safe to participate)
 ** No data due to inability to leave room because of droplet precautions

Primary Takeaway

Findings from this case report demonstrate that utilizing HIGT with VR is a feasible and effective intervention within the IRF setting that can enhance individuals' likelihood of recovering from an acute cerebellar and/or pontine stroke

Methods

- HIGT with VR activities were performed on Motek C-Mill VR+ while wearing a fall mitigation harness
- The protocol was conducted for 5 consecutive days, 1 session per day, lasting ~40 minutes per session
- Goal was for the patient to achieve a rate of perceived exertion between 14-17 on the Borg scale^{2,3}
- Polar Beat heart rate monitor was used on patient's left forearm to monitor heart rate during each session
- 10MWT (10-meter walk test), 6MWT (6-minute walk test), and Berg Balance Score (Berg) were evaluated 1 day prior to protocol initiation and re-evaluated 1 day before discharge



Discussion

- This is the first case utilizing the unique combination of HIGT + VR in patients with acute stroke as current published research only supports chronic stroke⁴
- Our protocol appeared to facilitate motor learning and neuroplastic changes toward recovery in our patients
- Using a C-Mill for HIGT with VR may serve as a powerful intervention tool
- However, barriers to this protocol include patient medical stability, staffing constraints, and access to resources
- Future studies should recruit larger cohorts, use longitudinal designs to evaluate long-term effects, and examine the impact of length of stay on outcomes



References

