The effects of priming on task specific training: Improvements in bimanual motor function in the BUMP randomized clinical trial

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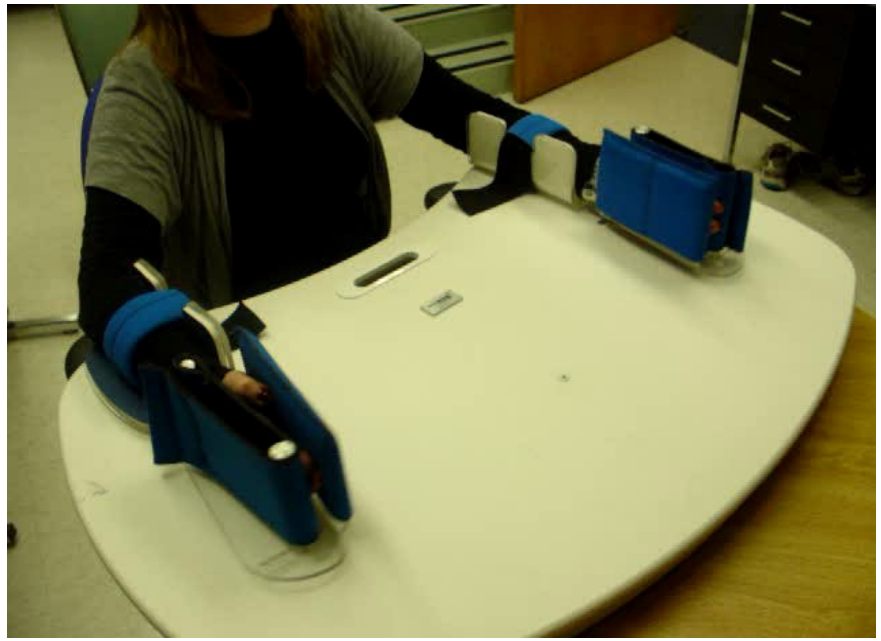
SE-26 Rehabilitation

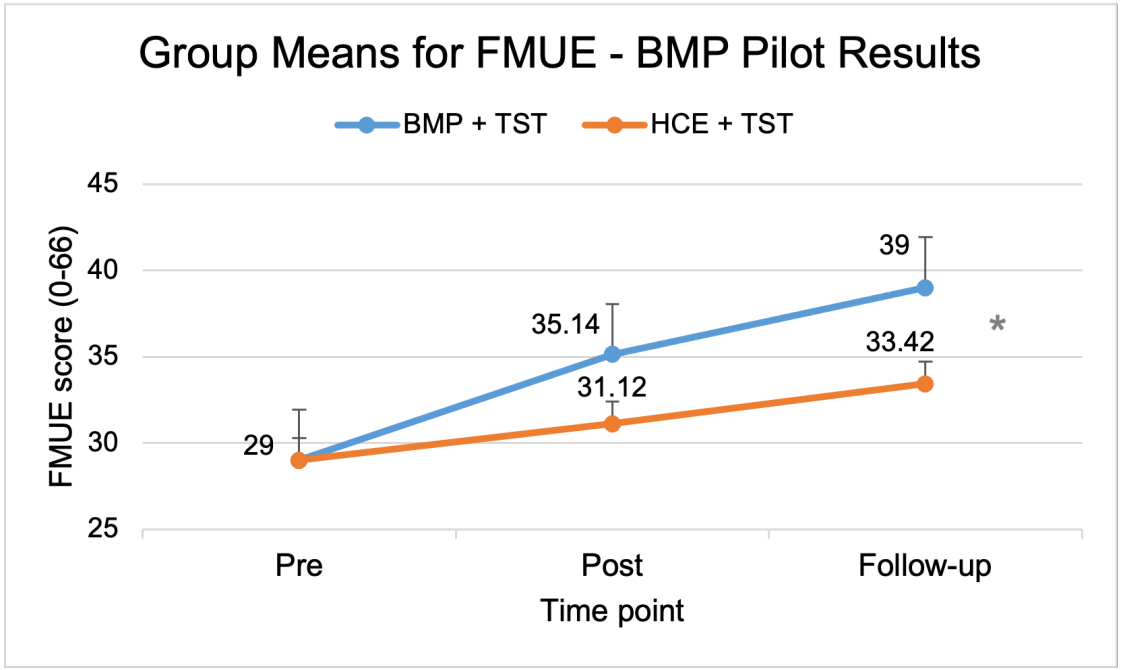
Disclosures and Overview

- **Disclosures**
- This work was funded by National Institute of Child Health and Human Development grant 5R01HD091492-05; National Institutes of Health grants and 1F31HD111318-01.

- **THIS RESEARCH IS IMPORTANT BECAUSE:**
- Few effective treatments for moderate–severe chronic hemiparesis
- Previous trials for individuals with moderate to severe upper limb hemiparesis have had small effect sizes (2 points on FMUE)

Background: Upper Limb Motor Priming Pilot





Bilateral Upper Limb Motor Priming (BUMP): a neuromodulatory technique which prepares the central nervous system to respond with greater efficacy to behavioral interventions. (Stoykov et. al, 2020)

- BUMP group exceeded the minimal clinically important difference (Stoykov et al, 2020)
- Significant between-group difference of 5.6 points
- Priming group continued to see gains
- Comparable results to Stinear et al., 2008.

Response to BUMP: Chedoke Arm & Hand Activity Index and Ipsilateral Silent Period

- **Stoykov et al., 2020**

- Bilateral priming continued to improve after post
- Control group improvement attenuated after post

Combined, results suggested:

- Priming may facilitate a “rebalancing” of corticomotor excitability
- Priming may contribute to more normalized inhibition in this population

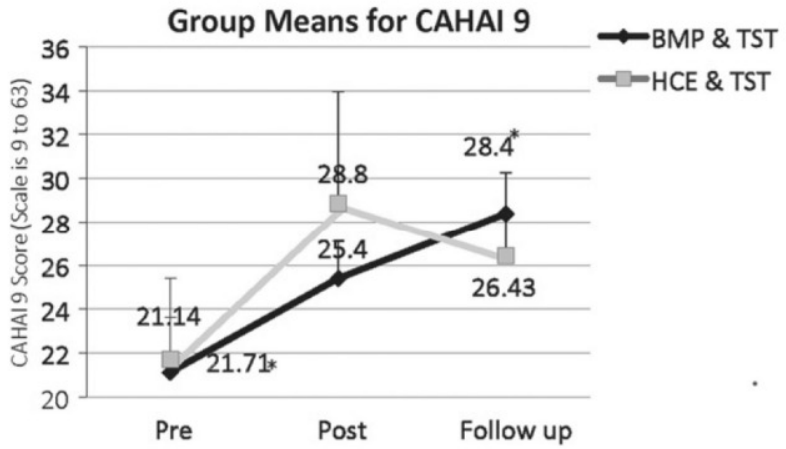
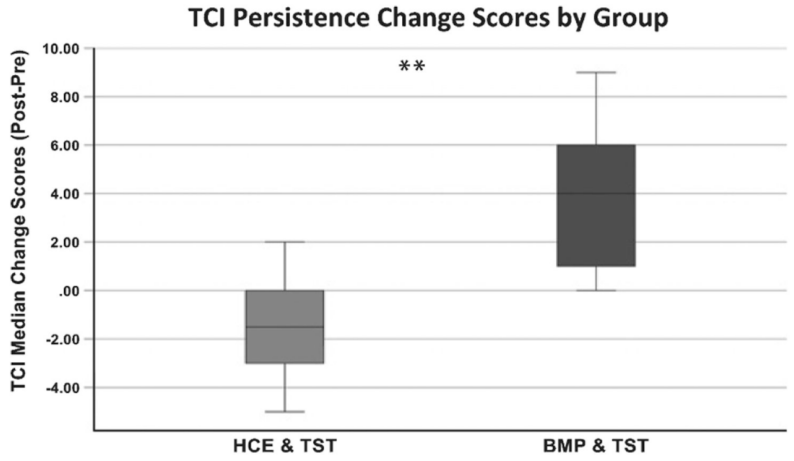


Fig. 3.
Group means and standard errors for the Chedoke Arm Hand Activity Index, Version 9 (CAHAI 9) scores at each time point for healthcare education (HCE) with task specific training and bilateral motor priming (BMP) with task specific training (TST). *=$p < 0.05$ within group significance for BMP group.



METHODS

Inclusion	Exclusion
6 mo. post-stroke	contraindications to TMS
Between 23-40 FMUE	MMSE < 21
Age 18 or above	

Stoykov et al, 2022, *Trials,* Jun 22;23(1):523.

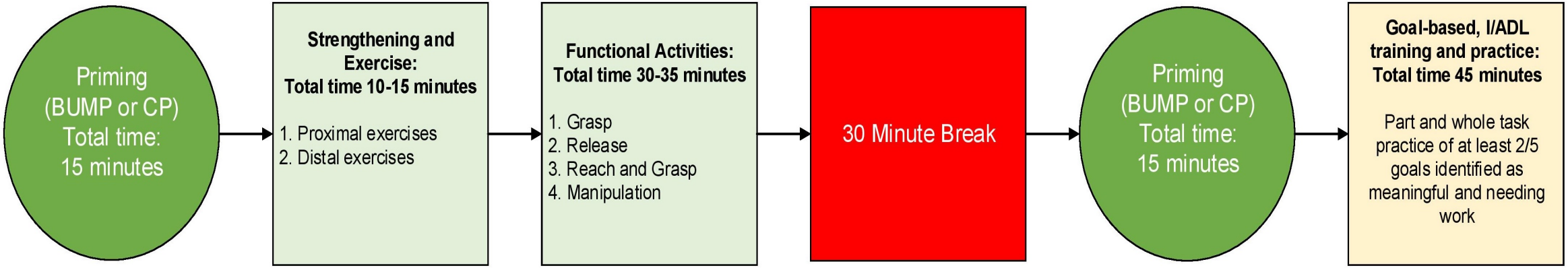
TREATMENT

OUTCOMES

ANALYSIS

METHODS: BUMP Clinical Trial

76 individuals with chronic stroke were recruited and randomized to receive experimental (BUMP) or control priming (CP) for dose matching. They received a total of 30 hours of priming + therapy over 6 weeks.



- Therapy consisted of
  - Occupation based task-specific training (TST) protocol delivered by an occupational therapist
  - Home activity program = 3-5 activities targeting active movement, range of motion and isometric activation, 10-15 minutes daily. (Stoykov et. al, 2022)

Task Specific Training – movement strategies in context of occupation-based activities

- **Part 1.**
- Practice of grasp, reach & grasp and release activities
- Start with the object- pliable
- Conform hand to object , stabilize
- Stabilize the object
- Mostly unilateral/some bilateral

- **Part 2.** Self selected activities identified **by COPM**
- Needed to have some involvement of the affected limb
- Quality of movement
- Many bilateral activities

METHODS: Chedoke Arm & Hand Activity Inventory (CAHAI-9)-secondary outcome

• Opening coffee jar	holds jar	turning lid
• Drawing a line	holds ruler	holds pen
• Dialing 911	receiver	dials phone
• Buttoning shirt	shirt	buttons
• **Wringing a washcloth**		
• Toothpaste /brush	holds paste	holds brush
• Pouring water	holds glass	pitcher
• Cuts putty w/knife	holds fork	holds knife
• Dries back	towel end	holds towel

Grading the CAHAI – FIM Scale is 1 through 7

IF affected hand is holding the jar

- **<u>Components</u> of arm mobility and hand manipulation**
- Reaches and grasps jar
- Lifts jar off the table
- Maintains grasp on jar
- Maintains jar off the table

If affected hand is manipulating lid

- **<u>Components</u> of arm mobility and hand manipulation**
- Turns and removes lid
- Maintains grasp on lid while it is turning

Analysis

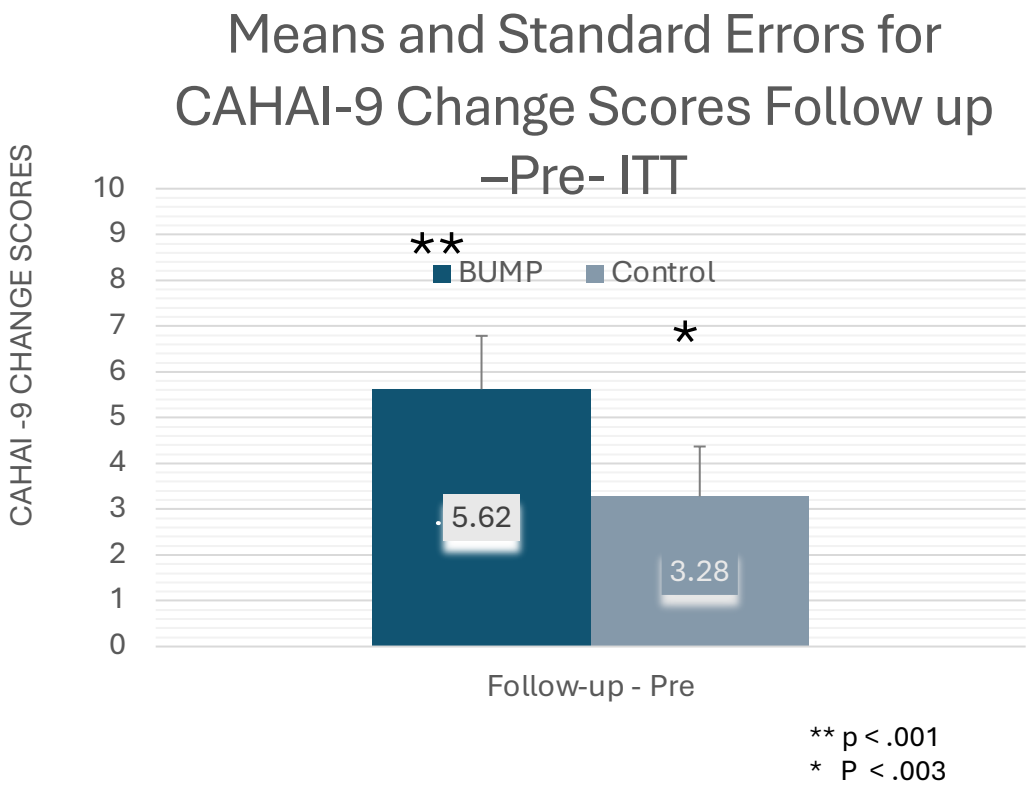
- ANCOVA for the FMUE and CAHAI separately (Follow up – Pre)
- **Responder: Number of participants with a clinically meaningful response -** (≥6 point improvement in FMUE from baseline to follow up (Follow-up - Pre) was treated as a binary variable and was analyzed using logistic regression with fixed effects for study arm and baseline FMUE score.

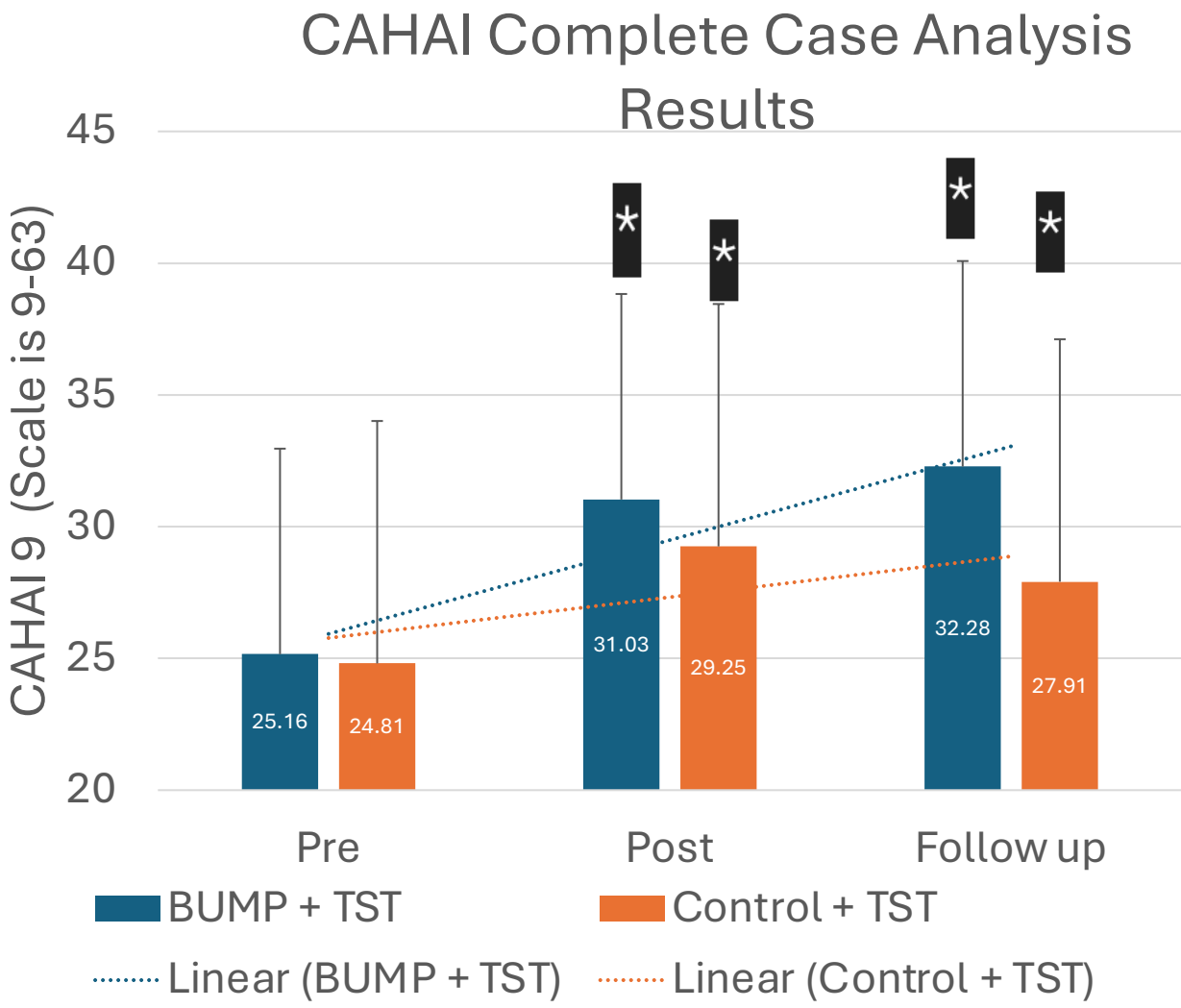
RESULTS

SECONDARY OUTCOME
PRIMARY OUTCOME
COPM activity

Results Secondary Outcome – Chedoke Arm & Hand Activity Index

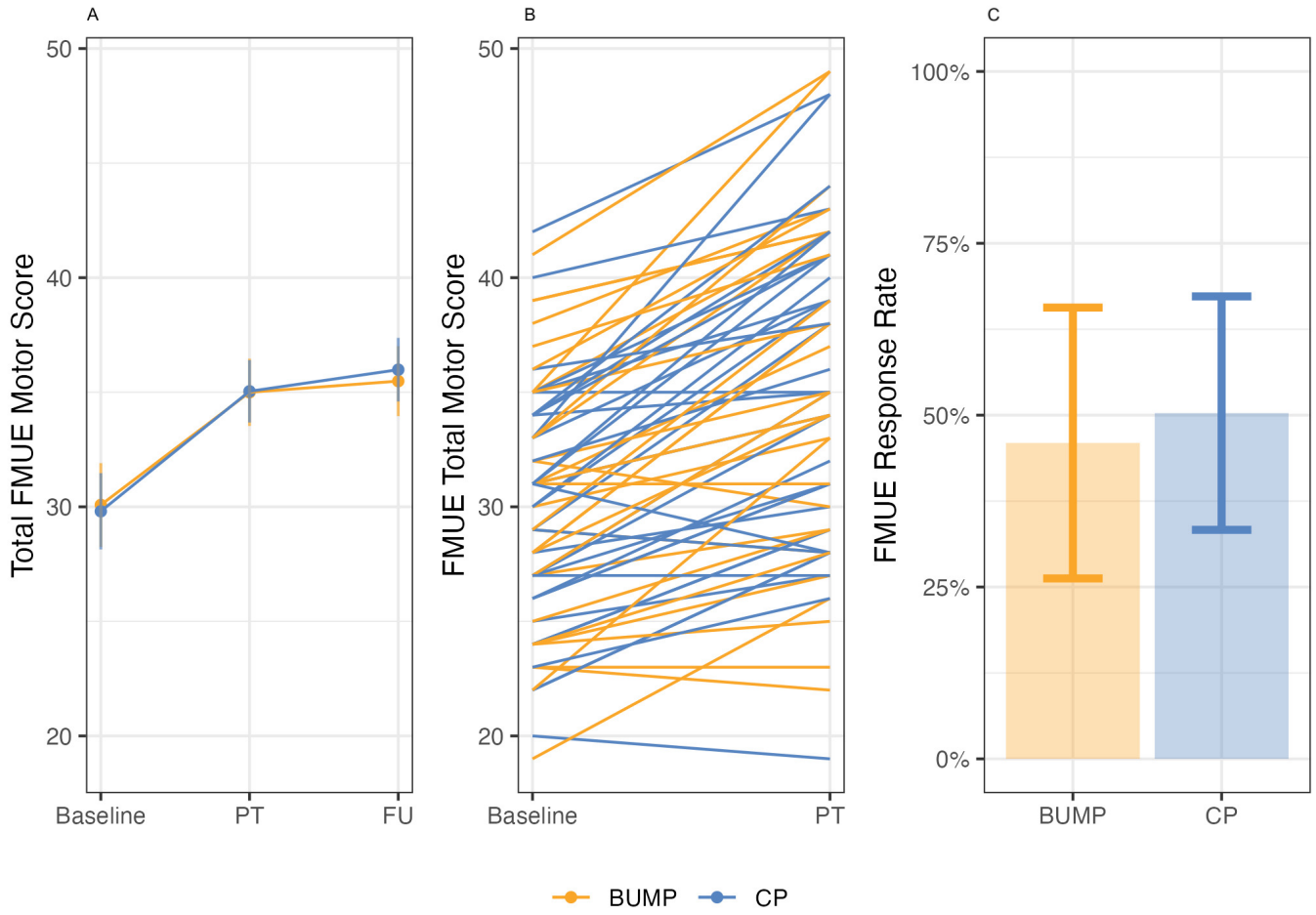
- Intention to Treat





Results for Primary Outcome

- No significant difference between treatment arms
- Both groups improved significantly
  - BUMP mean change of 5.68
    - (SE 0.76, p<0.001)
  - CP mean change 5.87
    - (SE 0.76, p<0.001)
- Responder: A response of ≥6 points
  - 46% in BUMP
  - 50% in CP



Source: King et al., 2025

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RESEARCH ARTICLE

Priming and task-specific training for arm weakness post stroke: A randomized controlled trial

Erin C. King[1], Jacob M. Schauer[2], Shyam Prabhakaran[3], Alexandra Wax[4], Sebastian Urday[5], Sangeetha Madhavan[6], Daniel M. Corcos[1] & Mary Ellen Stoykov[4,7]

COPM ACTIVITY

Summary and Interpretation

- No additional benefit of BUMP was observed in secondary or primary outcome contrasting with prior findings
- Larger change in secondary outcome in BUMP groups but this is not statistically significant.
- Both groups improved by ~5–6 points on the FMUE
- This is one of the largest UL rehabilitation trials in a severe and chronic population and the first to show this level of improvement with a clinically feasible intervention.

Interpretation

Without an invasive technique

- Careful consideration to the risk-benefit ratio for patients should be given before implementing more invasive strategies
- The only other technique with this magnitude of change at this timepoint is VNS

Questions?

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THANK YOU!

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