EARLY MOBILITY AFTER THROMBOLYSIS: SAFETY, TIMING AND IMPACT ON OUTCOMES

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BENEFITS OF EARLY MOBILIZATION

MOBILIZATION ≠ AMBULATION

BENEFITS OF EARLY MOBILITY

GENERAL BENEFITS

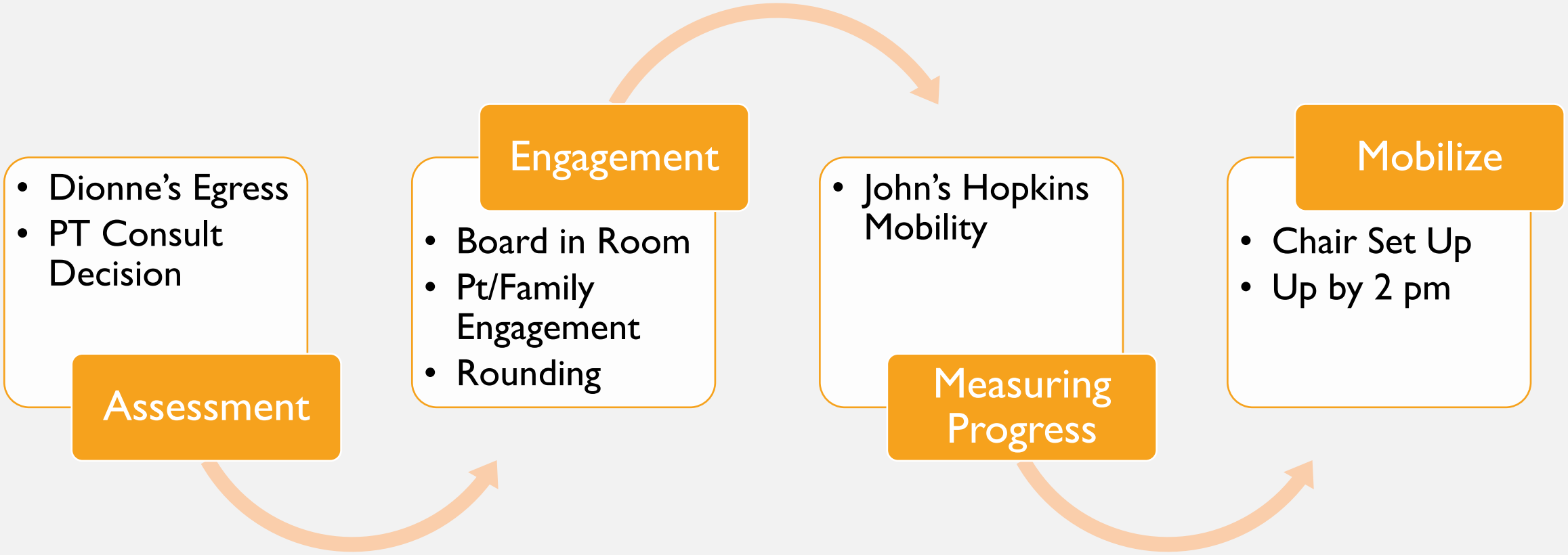
- Prevents blood clots
- Improves lung function
- Restores digestion
- Reduces risk of infection and wounds
- Promotes wound healing
- Prevents muscle weakness
- Boosts mood
- Faster discharge

NEUROLOGIC BENEFITS

- Increases cerebral blood flow
- Reduces ischemic necrosis of neurons in the penumbra
- Sensory impulses repeatedly introduced into the nervous system facilitate sprouting, transmission of latent pathways and synapses

- (Robertson, 2017)

BON SECOURS MERCY HEALTH EARLY MOBILITY BUNDLE



WHAT QUESTION ARE WE ASKING?

Meaningful Recovery?

Independent Function?

Motor Recovery?

ADLs/Cognitive Recovery?

EARLY MOBILITY SILVER, 2023

- Bedrest after ischemic stroke treatment – traditionally 24 hours
  - May happen on night shift
  - Practices vary
  - Implications for length of stay and outcomes

RESULTS

- 48 centers responded – 45 were Comprehensive Stroke Centers, 3 Primary Stroke Centers (10% of StrokeNet Hospitals – difficult to generalize results and may increase risk of responder bias)
- 60% had a formal bedrest policy post-thrombolysis
- 56% had a formal bedrest policy post-thrombectomy

RESULTS

THROMBOLYSIS AND THROMBECTOMY

- Bedrest ranged from 0-24 hrs
  - 35% = 24 hr minimum
    - Mean time to mobilization with PT was 59 hrs
  - 13% = 12 hr minimum
    - Mean time to mobilization with PT was 41 hrs
- First Mobilization
  - 52% by a nurse
  - 48% by a therapist

FACTORS ALTERING BED REST DURATION

- Medical stability/hemodynamic factors
  - Vasoactive medications for BP mgmt
- NIHSS
  - Longer duration if NIHSS>10 at presentation and 1 hour post-treatment
- Failure to wean from ventilation
- Concurrent cardiac dysfunction

DRAWBACKS TO EARLY MOBILIZATION

- Meta-analysis after all stroke found no statistically significant difference on outcomes of modified Rankin scale(mRS) score, mortality at three months and hospital complications – Zhang, 2018
- AVERT study found that intensive early mobilization had adverse effects on outcome
  - 2014 patients, RCT: High-dose mobilization within 24 hrs, ≥ 3 additional out of bed sessions (sitting, standing, walking) compared to usual care
    - 8% died in very early mobilization group vs 7% in usual care group
    - 20% had nonfatal serious adverse event in very early mobilization group vs 19% in usual care group
    - Showed no benefit in mRS (outcome goal of mRS 0-2) at 3 months – Avert Collab Grp, 2015

BENEFITS TO EARLY MOBILIZATION

- Early mobilization improves outcome after stroke – de Aquino, 2021
  - Optimal time to start is 24 hours – pending hemodynamic stability and safety
- Benefits include alleviating neurologic deficit, improving capacity for self-care, restoring self-efficacy, improving quality of life and social participation, reduce post-stroke fatigue – Zhang, 2021
- Bedrest protocol of 12 hours – patients had better discharge outcomes, lower rates of pneumonia, shorter durations of stay compared to 24 hours – Silver, 2020

2026 ASA GUIDELINES

"In patients with AIS, high-dose, very early mobilization within 24 hours of stroke onset is not recommended to improve the odds of a favorable outcome at 3 months and may be harmful"

IMPACT OF EARLY MOBILIZATION - HSIAO-CHING, 2024

Early mobility definition: task specific sitting out of bed, standing, and walking as soon as possible after stroke

Can boost neuronal plasticity, promote angiogenesis, inhibit acute inflammatory responses and neuronal apoptosis, and protect the blood brain barrier (Cramer, 2008; Zhang, 2015)

PURPOSE/HYPOTHESIS

To assess impact of early out-of-bed mobilization on functional outcomes in acute ischemic stroke patients treated with IV thrombolysis (rTPA) or mechanical thrombectomy

EM with duration and daily session frequency similar to standard of care would lead to greater early functional independence.

Also postulated that out-of-bed EM may have lower impact on the MT group considering MT showed great neurological improvements compared to IVT

METHODS

- Prospective, Randomized, Assessor-blinded
- For 3 months after stroke onset at National Taiwan Univ Hospital Stroke Center
- Total score on motor subscale of Functional Independence Measure, 1 month post CVA
- 30-minute duration of treatment, 5 days per week - for both groups

INCLUSION CRITERIA

- First ischemic stroke, treated with either IV thrombolysis (within 3 hours of onset) or mechanical thrombectomy (within 6 hours of onset)
- Independent with ADLs prior to CVA
- Age 20-85 years old
- Unilateral hemiparetic lesion confirmed on MRI or CT perfusion
- No other peripheral or CNS dysfunction
- No active inflammation or pathological changes in the joints
- No other active medical problems requiring bedrest
- SBP 120-160 mm Hg, SpO2 >92%, HR <130 bpm, Temp <38.5° C

INTERVENTION

EARLY MOBILITY

- Sitting on edge of bed minimum 5 minutes
  - Included reaching training
- Standing at side of bed minimum of 5 minutes
  - Included weight shifting
- Side walking and ambulation

STANDARD EARLY REHAB

- Within 24-72 hours – in bed activities
  - Joint ROM
  - Bridge exercises, straight leg raising
  - Functional Training – turning over, sitting supported at angles < 60 °
  - Bobath, Proprioceptive neuromuscular facilitation, Rood techniques

RESULTS IVT GROUP

Variables	Time	Treated with IVT				*P*-value (time × group interaction)	*P*-value (main group effect)	*P*-value (main time effect)
		EM (n = 30)		SER (n = 30)				
		Mean	SD	Mean	SD			
PASS	PASS baseline	5.80	0.66	5.10	1.37			
	2-wk post-stroke	34.23	4.61	30.33	8.34	.018*	.056	<.001*
	4-wk post-stroke	34.67	4.58	32.20	6.04			
	3-mo follow-up after stroke	34.83	4.40	33.33	4.87			
FIM-motor	FIM baseline	16.80	2.43	16.10	2.63			
	2-wk post-stroke	83.73	15.39	71.27	24.45	.007*	.041*	<.001*
	4-wk post-stroke	86.37	13.98	77.90	18.19			
	3-mo follow-up after stroke	88.13	13.49	82.47	15.72			

- **Table 2.** The Total Scores of the FIM-Motor and PASS Measures at Baseline and Each Follow-Up Assessment in Both Groups Treated With IVT.

RESULTS MT GROUP

Variables	Time	Treated with MT				*P* value (time × group interaction)	*P* value (main group effect)	*P* value (main time effect)
		EM (n = 31)		SER (n = 31)				
		Mean	SD	Mean	SD			
PASS	PASS baseline	5.81	1.99	5.17	1.26			
	2-wk post-stroke	33.10	6.60	33.00	4.89	.890	.832	<.001*
	4-wk post-stroke	34.06	5.13	33.97	3.34			
	3-mo follow-up after stroke	34.45	4.90	34.48	2.05			
FIM-motor	FIM baseline	16.32	2.50	15.80	2.62			
	2-wk post-stroke	76.06	20.72	70.97	21.92	.437	.557	<.001*
	4-wk post-stroke	83.16	15.68	81.29	15.02			
	3-mo follow-up after stroke	85.23	14.62	85.58	11.16			

- **Table 3.** The Total Scores of the FIM-Motor and PASS Measures at Baseline and Each Follow-Up Assessment in Both Groups Treated With MT.

REVASCULARIZATION (KHATRI, 2005) AND RECANALIZATION (SCHMITZ, 2016)

83% of participats with mTICI 3 reperfusion achieved favorable outcome (mRS 0-2 at 3 months)

43% of participants achieved favorable outcome after IVT with complete recanalization of the occlusion with distal flow

LIMITATIONS

- Small sample size
- Single center recruitment
- Excluded patients >85 years old (older age has increased severity of weakness and more negative outcomes) – may have introduced selection bias
- FIM score interpretation may be affected by extent of use of assistive devices (rather than exclusive enhancement in physical function)

DISCUSSION

Starting EM training within 24-72 hours is superior to >72 hours after the onset of acute ischemic CVA in patients who were treated with IVT with rTPA

QUESTIONS?

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