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CME: QUFLAK

The Stroke Rehabilitation and Recovery Spectrum of Care

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Financial Disclosure

- No relevant financial conflicts of interest

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Learning Objectives

- Overview of stroke recovery timeline
- Review guidelines of stroke rehabilitation and recovery in the acute setting
- Multidisciplinary clinics and the Stroke Recovery Clinic
- Discuss selected post-stroke symptoms
- Review HRQOL in stroke

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Stroke Statistics

- In the US, 5th leading cause of death.
- A leading cause of disability worldwide (CDC, 2015)
  - ~800,000 new stroke per year (AHA)
  - ~80% stroke patients will have motor deficits
  - NINDS estimates 7 million stroke survivors
- 45-60% of all stroke patients will need rehabilitation.
- At 6 months, 60% do clinically well but 40% are significantly disabled (Abrams).

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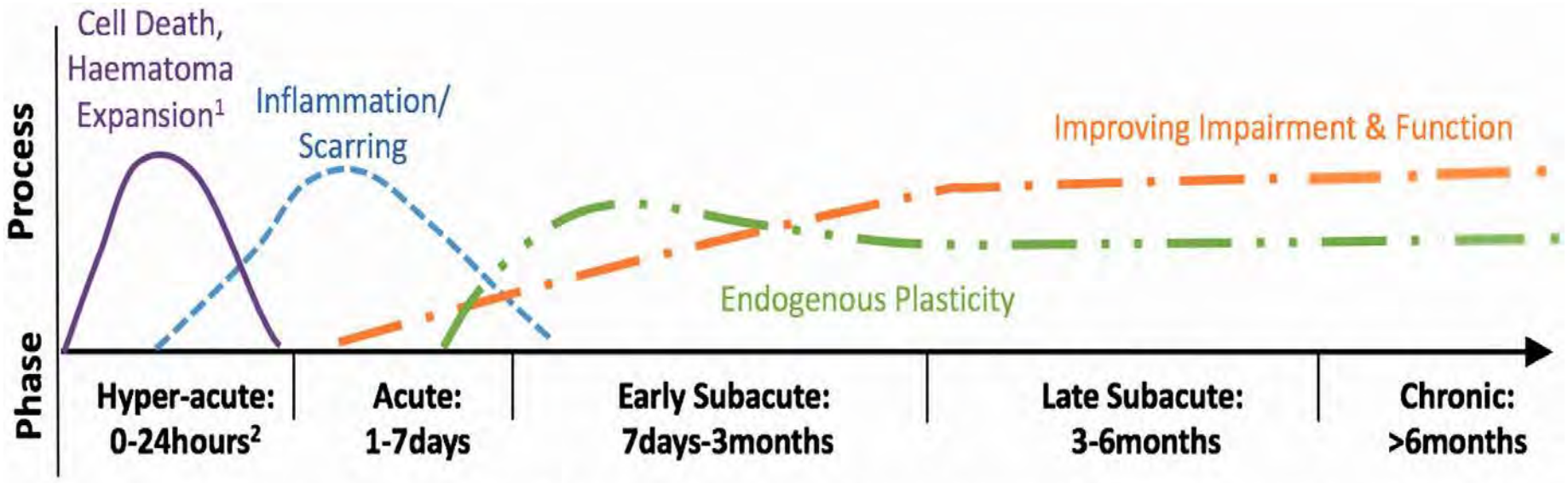
Neurobiology of motor recovery



[1] Haemorrhagic stroke specific. [2] Treatments extend to 24 hours to accommodate options for anterior and posterior circulation, as well as basilar occlusion.

Bernhardt J, Hayward KS, Kwakkel G, et al. Agreed definitions and a shared vision for new standards in stroke recovery research: The Stroke Recovery and Rehabilitation Roundtable taskforce. *International Journal of Stroke*. 2017;12(5):444-450. doi:10.1177/1747493017711816

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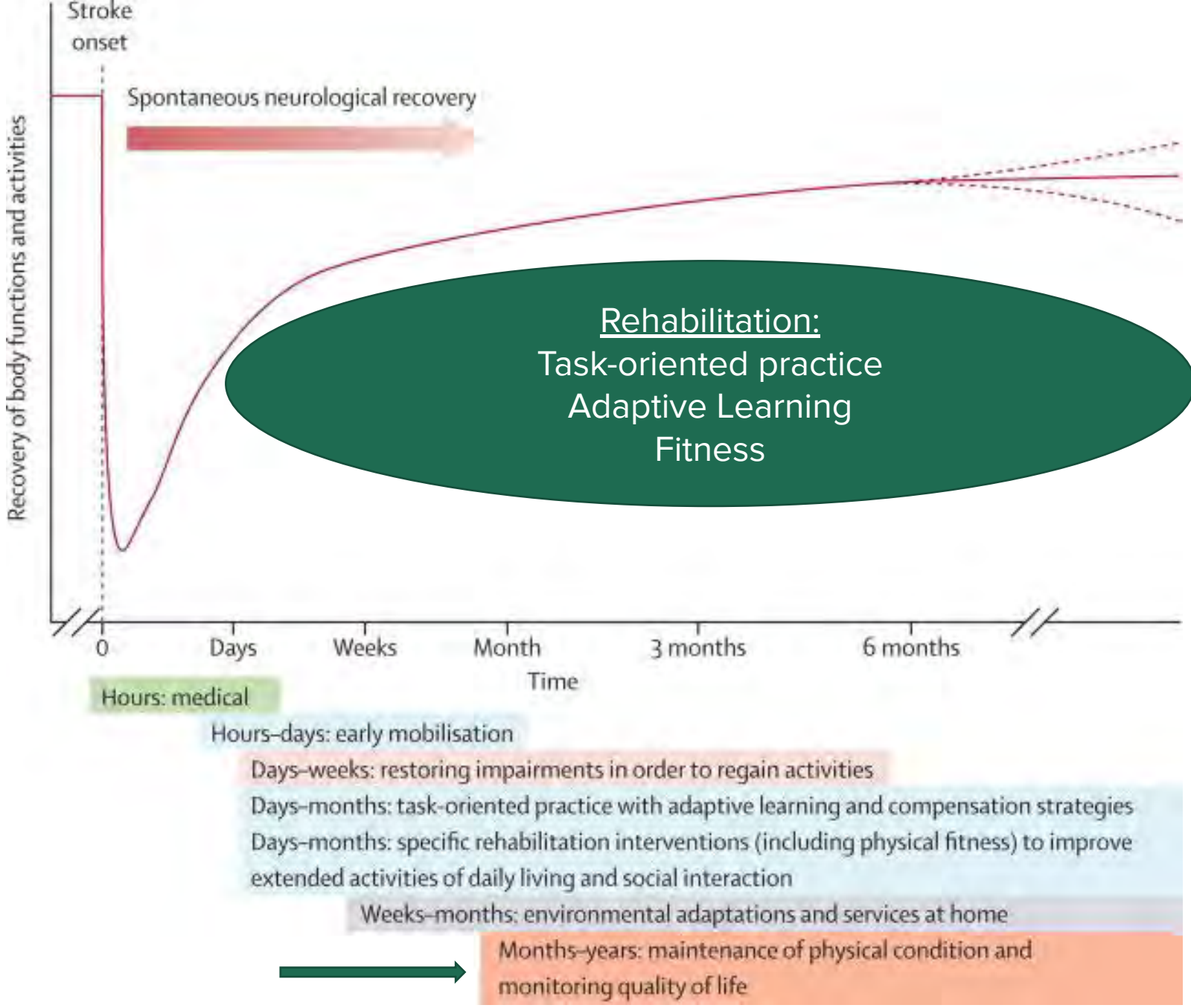

Langhorne, P. Stroke Rehabilitation. Lancet Neurology, 2011.

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AHA/ASA Guideline

Guidelines for Adult Stroke Rehabilitation and Recovery

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Endorsed by the American Academy of Physical Medicine and Rehabilitation and the American Society of Neurorehabilitation

The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists and the American Congress of Rehabilitation Medicine also affirms the educational value of these guidelines for its members

Carolee J. Winstein, PhD, PT, Chair; Joel Stein, MD, Vice Chair; Ross Arena, PhD, PT, FAHA; Barbara Bates, MD, MBA; Leora R. Cherney, PhD; Steven C. Cramer, MD; Frank Deruyter, PhD; Janice J. Eng, PhD, BSc; Beth Fisher, PhD, PT; Richard L. Harvey, MD; Catherine E. Lang, PhD, PT; Marilyn MacKay-Lyons, BSc, MScPT, PhD; Kenneth J. Ottenbacher, PhD, OTR; Sue Pugh, MSN, RN, CNS-BC, CRRN, CNRN, FAHA; Mathew J. Reeves, PhD, DVM, FAHA; Lorie G. Richards, PhD, OTR/L; William Stiers, PhD, ABPP (RP); Richard D. Zorowitz, MD; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Quality of Care and Outcomes Research

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Table 1. Applying Classification of Recommendations and Level of Evidence

ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT	SIZE OF TREATMENT EFFECT			
	CLASS I *Benefit >>> Risk* Procedure/Treatment **SHOULD** be performed/ administered	**CLASS IIa** *Benefit >> Risk* *Additional studies with focused objectives needed* **IT IS REASONABLE** to perform procedure/administer treatment	**CLASS IIb** *Benefit ≥ Risk* *Additional studies with broad objectives needed; additional registry data would be helpful* Procedure/Treatment **MAY BE CONSIDERED**	**CLASS III** *No Benefit* or **CLASS III** *Harm* Procedure/Test — Treatment COR III: No benefit — Not Helpful — No Proven Benefit COR III: Harm — Excess Cost w/o Benefit or Harmful — Harmful to Patients
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	■ Recommendation that procedure or treatment is useful/effective ■ Sufficient evidence from multiple randomized trials or meta-analyses	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Sufficient evidence from multiple randomized trials or meta-analyses
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is useful/effective ■ Evidence from single randomized trial or nonrandomized studies	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Evidence from single randomized trial or nonrandomized studies
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	■ Recommendation that procedure or treatment is useful/effective ■ Only expert opinion, case studies, or standard of care	■ Recommendation in favor of treatment or procedure being useful/effective ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation's usefulness/efficacy less well established ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Only expert opinion, case studies, or standard of care

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4.11. Rehabilitation

4.11. Rehabilitation	COR	LOE	New, Revised, or Unchanged
1. It is recommended that early rehabilitation for hospitalized stroke patients be provided in environments with organized, interprofessional stroke care.	I	A	Recommendation unchanged from 2016 Rehab Guidelines.
2. It is recommended that stroke survivors receive rehabilitation at an intensity commensurate with anticipated benefit and tolerance.	I	B-NR	Recommendation and Class unchanged from 2016 Rehab Guidelines. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.
3. High-dose, very early mobilization within 24 hours of stroke onset should not be performed because it can reduce the odds of a favorable outcome at 3 months.	III: Harm	B-R	Recommendation wording modified from 2016 Rehab Guidelines to match Class III stratifications. LOE revised. Class amended to conform with ACC/AHA 2015 Recommendation Classification System.
The AVERT RCT (A Very Early Rehabilitation Trial) compared high-dose, very early mobilization with standard-of-care mobility.[243] High-dose mobilization protocol interventions included the following: Mobilization was begun within 24 hours of stroke onset whereas usual care typically was 24 hours after the onset of stroke; there was a focus on sitting, standing, and walking activity; and there were at least 3 additional out-of-bed sessions compared with usual care. Favorable outcome at 3 months after stroke was defined as an mRS score of 0 to 2. A total of 2104 patients were randomly assigned (1:1). The results of the RCT showed that patients in the high-dose, very early mobilization group had less favorable outcomes (46% versus 50%) than those in the usual care group: 8% versus 7% of patients died in the very early mobilization group and 19% versus 20% had a nonfatal serious adverse event with high-dose, very early mobilization.			See Table LVIII in online Data Supplement 1.
4. It is recommended that all individuals with stroke be provided a formal assessment of their activities of daily living and instrumental activities of daily living, communication abilities, and functional mobility before discharge from acute care hospitalization and the findings be incorporated into the care transition and the discharge planning process.	I	B-NR	Recommendation and Class unchanged from 2016 Rehab Guidelines. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.
5. A functional assessment by a clinician with expertise in rehabilitation is recommended for patients with an acute stroke with residual functional deficits.	I	C-LD	Recommendation and Class unchanged from 2016 Rehab Guidelines. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.
6. The effectiveness of fluoxetine or other selective serotonin reuptake inhibitors to enhance motor recovery is not well established.	IIb	C-LD	Recommendation and Class unchanged from 2016 Rehab Guidelines. LOE revised from 2016 Rehab Guidelines.

American Heart Association | American Stroke Association

4.11. Rehabilitation

4.11. Rehabilitation	COR	LOE
1. It is recommended that early rehabilitation for hospitalized stroke patients be provided in environments with organized, interprofessional stroke care.	I	A
2. It is recommended that stroke survivors receive rehabilitation at an intensity commensurate with anticipated benefit and tolerance.	I	B-NR

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Is rehab important?

- Meta-analysis of 10 trials: 1586 pts randomized to multidisciplinary team rehab vs general medicine care:
  - 28% reduction in mortality at 4 month
  - 21% reduction in mortality at 1 year
  - Less need for SNF, fewer deaths, and less disability

- An extra 5 patients return home independent for every 100 patients receiving stroke rehab.

Langhorne et al, Lancet 1993
Duncan, Stroke 2001

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3. High-dose, very early mobilization within 24 hours of stroke onset should not be performed because it can reduce the odds of a favorable outcome at 3 months.	III: Harm	B-R

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AVERT: A Very Early Rehabilitation Trial

- Phase 3, Parallel-group, single-blind, RCT at 56 acute stroke units in five countries
- 2104 pts between 7/2006-10/2014
- Compared high-dose, very early mobilization with standard-of-care
- High-dose mobilization protocol: Mobilization was begun within 24 hours of stroke onset, focus on out of bed activities, and at least 3 additional out-of-bed sessions.
- Primary outcome: favorable mRS 0-2 at 3 months

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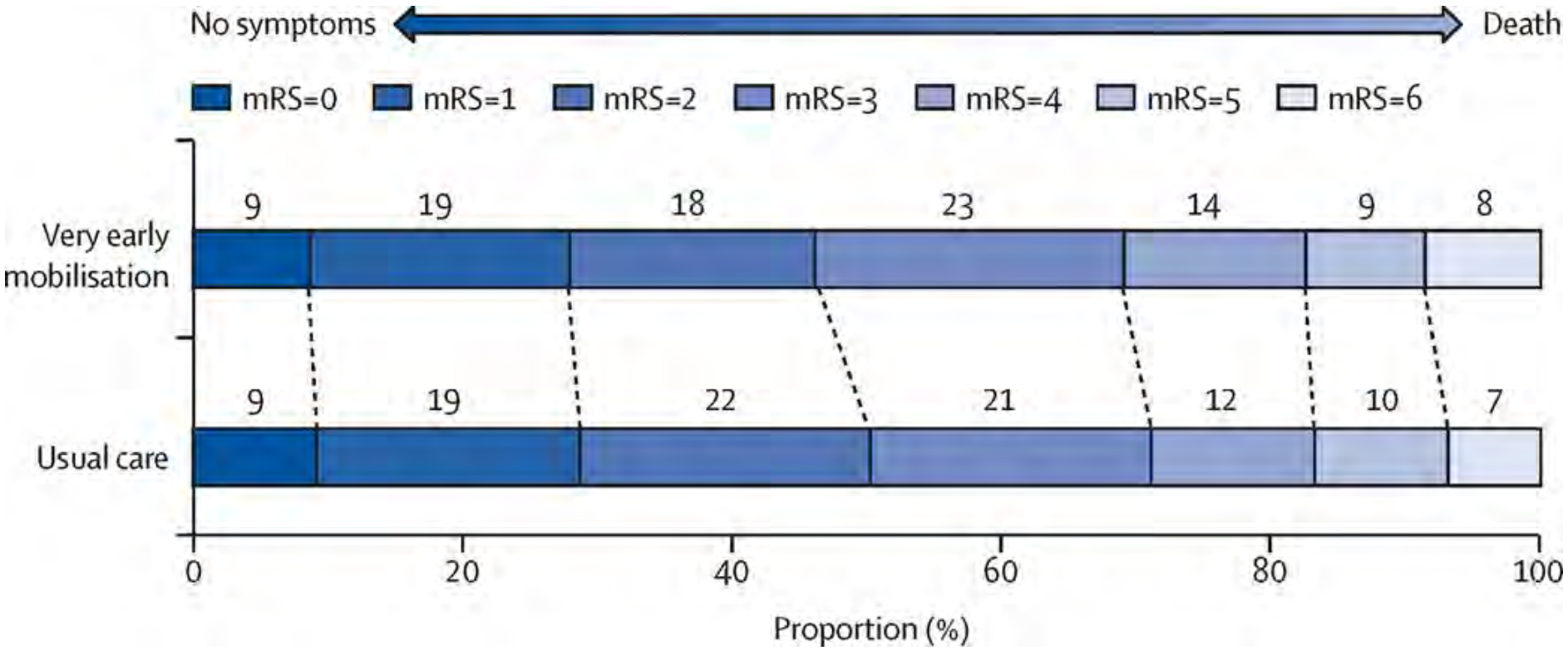
Primary Outcome



46% VEM vs 50% UC in favorable (mRS 0-2) outcome (adjusted odds ratio 0·73, 95% CI 0·59–0·90; p=0·004).
8% VEM vs 7% (OR 1·34, 95% CI 0·93–1·93, p=0·113) death

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Table 2: Intervention Summary

	Very early mobilisation (n=1054)	Usual care (n=1050)	p value	Median shift (95% CI)
Time to first mobilisation (h)	18·5 (12·8–22·3; n=1042*)	22·4 (16·5–29·3; n=1036*)	<0·0001	4·8 (4·1–5·7)
Frequency per person†	6·5 (4·0–9·5)	3 (2·0–4·5)	<0·0001	3 (3–3·5)
Daily amount per person (min)‡	31 (16·5–50·5)	10 (0–18)	<0·0001	21·0 (20–22·5)
Total amount per person (min)§	201·5 (108–340)	70 (32–130)	<0·0001	117 (107–128)

- Most Usual Care still within 24 hours
- No difference in complication rates
- Did not record LVOs (Used Oxfordshire class system)
- Focus on intensive out of bed therapy, and very early initiation
- We know intensive therapy trials have not been successful

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Approaches to therapy

- Constraint- Induced Movement Therapy (CIMT)- started in 1993 but used in multiple therapy trials including EXCITE by Wolf et al (IIa, A).
- Robotics- generally Class II recommendations. Shown to have some benefit. Largest US study VA Robotics Trial did not show significant difference with therapy (IIa, A).
- Neuromodulation: neuromuscular E-stim, sensory stimulation, VNS, and tDCS (IIa-III).

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Constraint-induced movement therapy (CIMT)

- Theory of “learned non-use”

- those with paretic (or sensory deprived) limb will “learn” not to use it.

- If intact limb constrained, movement in impaired limb improves.

- creatively “forcing” the use of a hemiparetic limb improves functional recovery.

Intervention: CIMT

Taub et al, Arch Phys Med Rehabil 1993

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CIMT

- 1st trial had 9 patients >1 year after initial stroke

  -Hemiparetic, 20˚ wrist ext and 10 ˚ finger ext

- Method:
  - Experimental group (4)- subjects forced to use weak arm, 6 hrs/day for 10days in rehab. Good arm restrained. 90% of waking hours x 2 wks.
  - Control group (5)- physical therapy and passive movement.
- Outcome: Functional use of paretic arm

Taub et al, Arch Phys Med Rehabil. 1993

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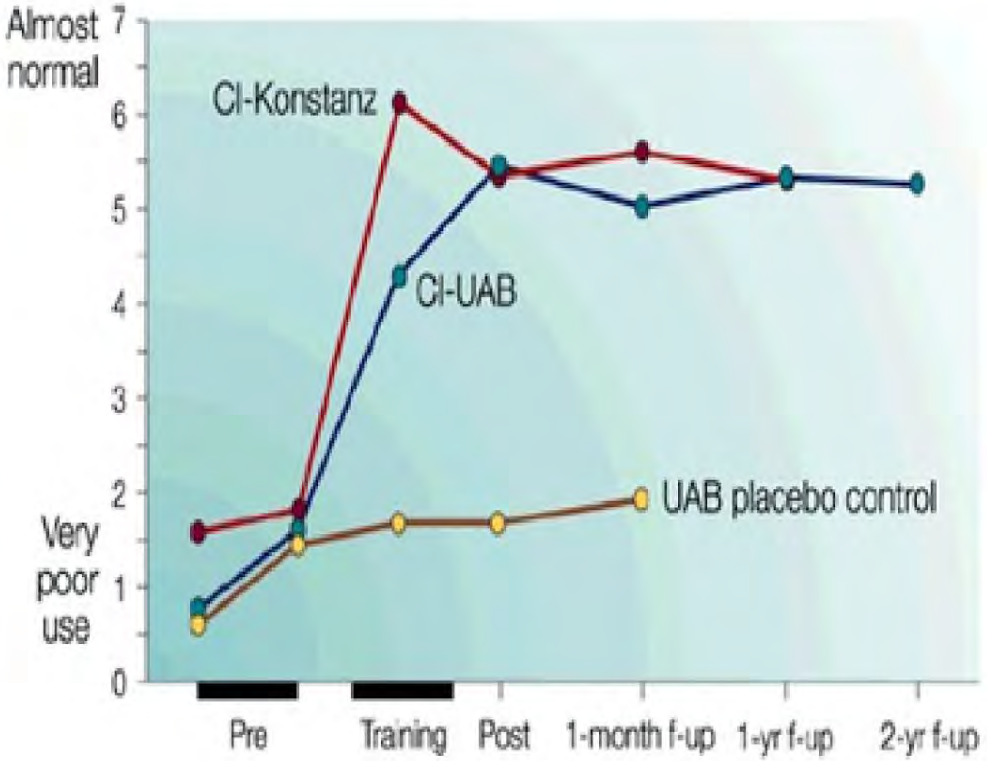

Taub et al, Nat Rev Neurosci. 2002

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SSRIs

6. The effectiveness of fluoxetine or other selective serotonin reuptake inhibitors to enhance motor recovery is not well established.	IIb	C-LD	Recommendation and Class unchanged from 2016 Rehab Guidelines. LOE revised from 2016 Rehab Guidelines.

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FLAME

Table 3

Fugl-Meyer motor scale (FMMS) scores

	Fluoxetine (n=57)	Placebo (n=56)	Difference between groups (95% CI)	p value
Day 90				
Total score				
Mean (SD)	53·7 (27·8)	35·1 (22)	18·6 (9·2 to 27·9)	..
Median (IQR)	59 (28 to 77)	29 (22 to 47·5)	..	0·0006*
Upper limb				
Mean (SD)	29·7 (22·2)	16·2 (16·6)	13·5 (6·2 to 20·8)	..
Median (IQR)	32 (6 to 50)	10 (4 to 24)	..	0·001*
Lower limb				
Mean (SD)	24 (7·9)	18·9 (8·2)	5·1 (2·1 to 8·1)	..
Median (IQR)	27 (19 to 31)	19 (13 to 25)	..	0·001*
Change from day 0 to day 90				
Total score				
Mean (SD)	36·4 (21·3)	21·9 (16·7)	14·5 (7·3 to 21·6)	..
Adjusted mean (95% CI)	34·0 (29·7 to 38·4)	24·3 (19·9 to 28·7)	9·8 (3·4 to 16·1)	0·003†
Upper limb				
Mean (SD)	24·2 (19·8)	11·8 (14·8)	12·4 (5·9 to 18·9)	..
Adjusted mean (95% CI)	22·9 (18·6 to 27·1)	13·1 (8·9 to 17·4)	9·7 (3·6 to 15·9)	0·002†
Lower limb				
Mean (SD)	12·2 (6·8)	10·1 (6·8)	2·1 (−0·4 to 4·6)	..
Adjusted mean (95% CI)	12·8 (11·1 to 14·5)	9·5 (7·8 to 11·2)	3·3 (0·8 to 5·7)	0·010†

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What does a 3 Point Change on Fugl-Meyer mean?
Severe-Moderate Impairment


Severe:
Lift paretic arm to wash axilla
Fugl-Meyer 11 to 14


Place arm into sleeve
Fugl-Meyer 19 to 22

Moderate:
Tuck shirt, hike pants
Fugl-Meyer 25 to 28


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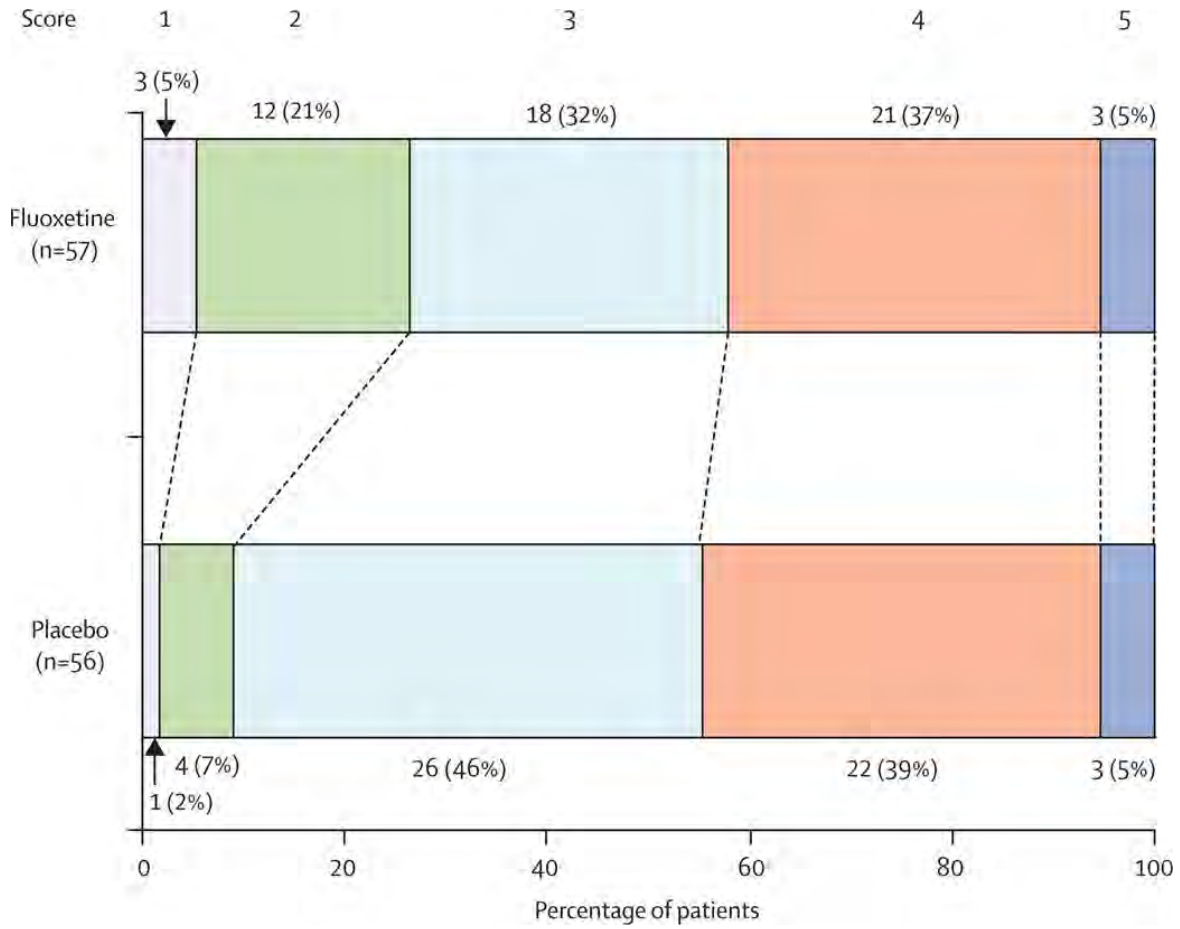
FLAME- modified Rankin Score



Chollet et al. Lancet Neurology, 2011.

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FOCUS, EFFECTS, and AFFINITY Trials

- 3 major Fluoxetine trials (20mg) within 2-15 days of ischemic stroke for 6 months
- FOCUS (2019): UK trial of 3127 pts (1564 fluoxetine vs 1563 placebo)
- EFFECTS (2020): Sweden, 1500 pts (750 fluoxetine vs 750 placebo)
- AFFINITY (2020): Australasia, 1280 pts (624 fluoxetine vs 632 placebo)
- Primary Outcome: modified Rankin Score at 6 months (ordinal)

Dennis M et al. Lancet, 2019
Lundstrom E et al. Lancet, 2020
Hankey GJ et al. Lancet, 2020

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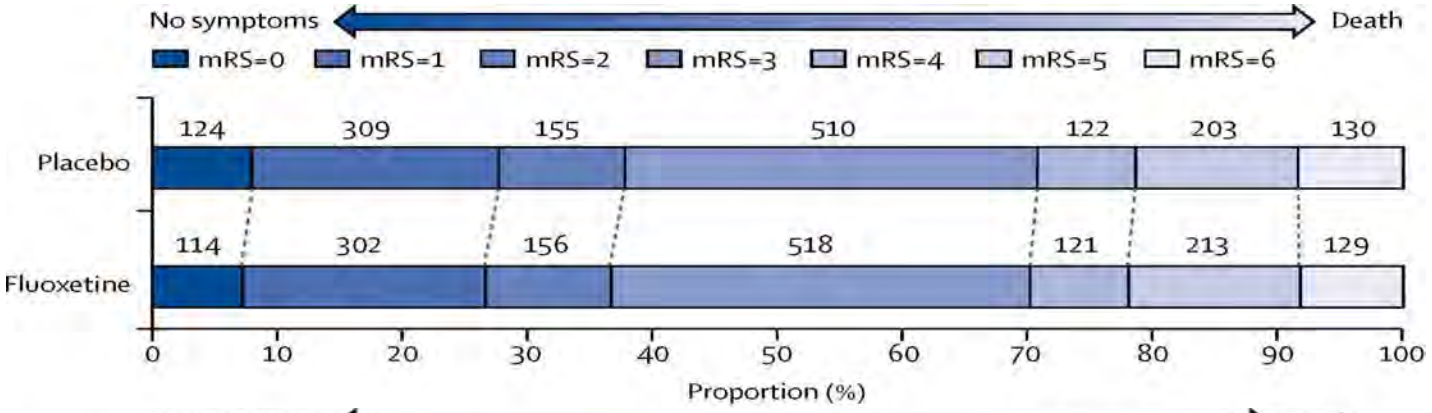
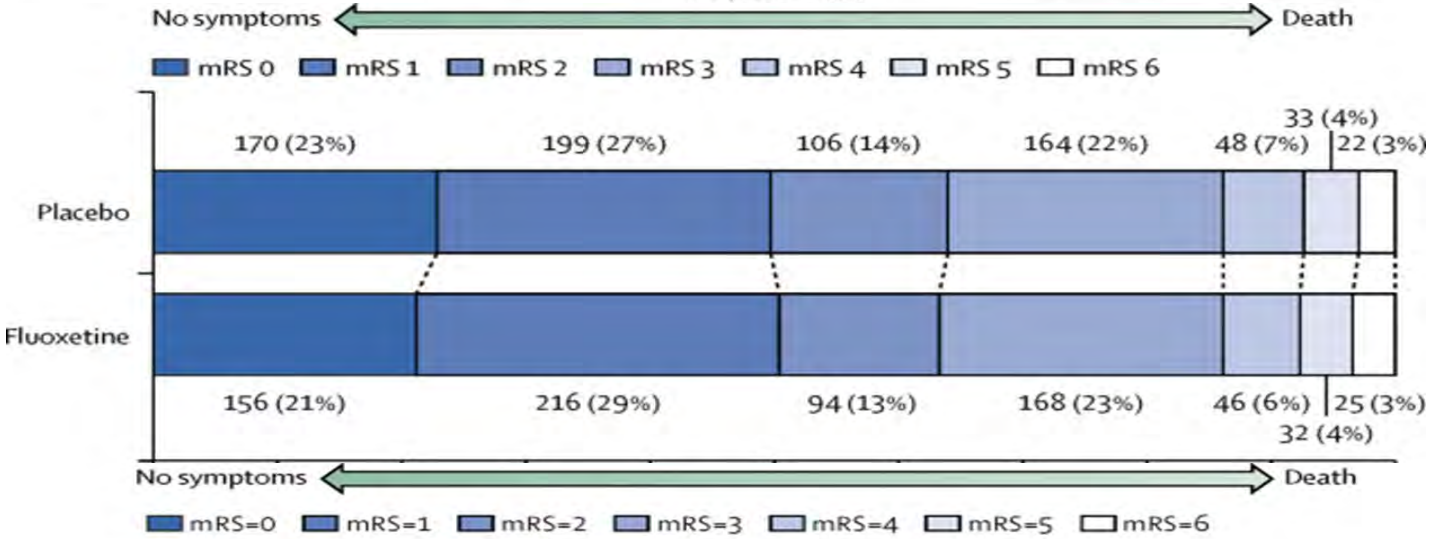
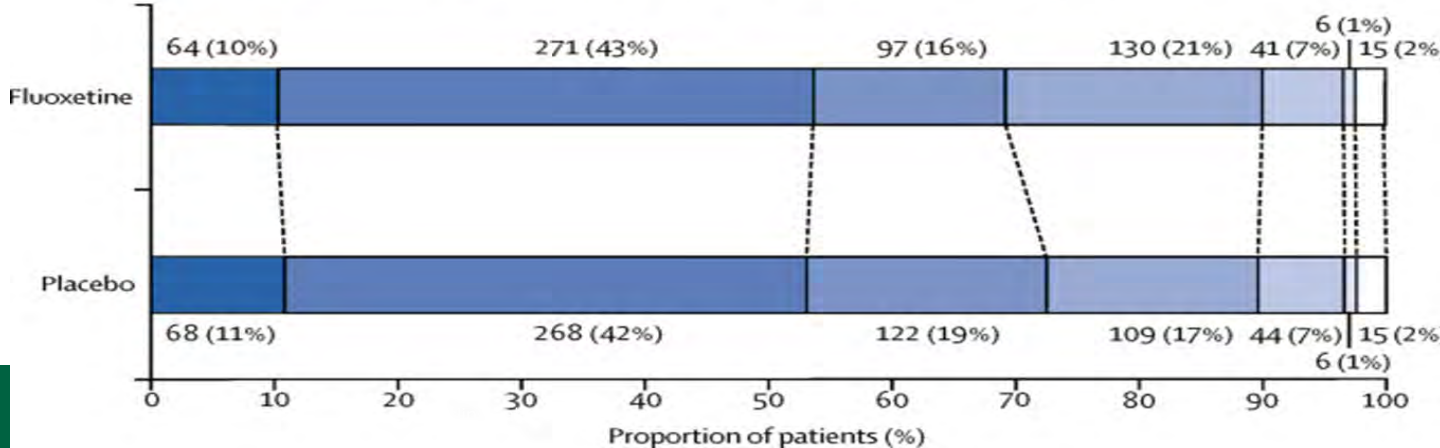
FOCUS



EFFECTS



AFFINITY



Takeaways from 3 large Fluoxetine trials

- Fluoxetine was associated with significantly more bone fractures in all 3 trials

  - SSRIs linked to reduced bone mineral density

- EFFECTs- hyponatremia; AFFINITY- falls, epileptic seizures.
- EFFECTS and FOCUS reported fewer cases of post-stroke depression (AFFINITY only one to publish depression analysis)

- Fluoxetine should NOT be routinely prescribed to improve general functional outcome

- Opinion: Consider for patients with confirmed depression +/- arm weakness

  - Consider the outcome: modified Rankin vs Fugl-Meyer (FLAME)

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Post-Stroke Depression

4.9. Depression Screening

4.9. Depression Screening	COR	LOE
1. Administration of a structured depression inventory is recommended to routinely screen for poststroke depression, but the optimal timing of screening is uncertain.	**I**	**B-NR**
A meta-analysis of studies assessing poststroke depression screening tools (24 studies, n=2907) found several inventories with high sensitivity for detecting poststroke depression.[241] However, further research is needed to determine the optimal screening method and timing to diagnose and treat poststroke depression.[242]		
2. Patients diagnosed with poststroke depression should be treated with antidepressants in the absence of contraindications and closely monitored to verify effectiveness.	**I**	**B-R**

- Prevalence: 20-80%, peak at 3-6 mo post-stroke
- Associated with increased mortality, greater cognitive impairment, worse functional outcome
- Early diagnosis and treatment improve outcomes
- No control studies but pharmaceutical is first line
- Nonpharmacological strategies less clear

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Outcome (at three-month F/U)	Unadjusted models			Adjusted models		
	Estimate	Standard error	p-Value	Estimate	Standard error	p-Value
Motricity arm	−2.46	0.85	0.00599	−1.99	0.75	0.01210
Motricity side	−1.26	0.57	0.03231	−0.82	0.34	0.02166
FM-UE	−1.14	0.54	0.04054	−0.77	0.38	0.04947
ARAT	−1.09	0.55	0.05458	−0.73	0.55	0.19780
NIHSS	0.14	0.09	0.12659	–	–	–
mRS	0.06	0.04	0.14752	–	–	–
Motricity leg	−0.57	0.45	0.20821	–	–	–
MOCA	0.24	0.24	0.32422	–	–	–

PHQ-9: Patient Health Questionnaire; mRS: modified Rankin Scale; NIHSS: National Institute of Health Stroke Scale; FM-UE: Fugl-Meyer Upper Extremity; ARAT: Action Research Arm Test; MOCA: Montreal Cognitive Assessment.

Table 3. Linear regression models with three-month F/U PHQ-9 as a predictor.

Lin et al. Int J Psych Med, 2020.

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Normal Depression screening process

TABLE 2

PHQ-2 Screening Instrument for Depression

Over the past two weeks, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	0	1	2	3
Feeling down, depressed, or hopeless	0	1	2	3

Scoring: A score of 3 or more is considered a positive result. The PHQ-9 (Table 3) or a clinical interview should be completed for patients who screen positive.

PHQ = Patient Health Questionnaire.

Adapted from Patient Health Questionnaire (PHQ) screeners. http://www.phqscreeners.com. Accessed February 8, 2018.

PHQ-2 Score = 4
PHQ-9 Score = 25

Consult has been sent to Social Worker.

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TABLE 3

PHQ-9 Screening Instrument for Depression

Over the past two weeks, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	0	1	2	3
Feeling down, depressed, or hopeless	0	1	2	3
Trouble falling or staying asleep, or sleeping too much	0	1	2	3
Feeling tired or having little energy	0	1	2	3
Poor appetite or overeating	0	1	2	3
Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
Moving or speaking so slowly that other people could have noticed; or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

Scoring: 1 to 4 points = minimal depression, 5 to 9 points = mild depression, 10 to 14 points = moderate depression, 15 to 19 points = moderately severe depression, 20 to 27 points = severe depression.

PHQ = Patient Health Questionnaire.

Adapted from Patient Health Questionnaire (PHQ) screeners. http://www.phqscreeners.com. Accessed February 8, 2018.

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Stroke Example 1

Depression Screen
Reason Unable To Assess PHQ-2 : Global aphasia

Stroke Example 2

Depression Screen
PHQ Little Interest : Not at all
PHQ Feeling Down, Depressed or Helpless : Not at all
PHQ-2 Score : 0

~~Neurologic:~~ ~~PERRL~~
On precedex for sedation. Intubated
PERRL
RUE: trace movements to pain
RLE: trace movements to pain
LUE, LLE: moving spontaneously
corneals+
cough+

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Post-stroke care

Recommendations: Organization of Poststroke Rehabilitation Care (Levels of Care)	Class	Level of Evidence
It is recommended that stroke patients who are candidates for postacute rehabilitation receive organized, coordinated, interprofessional care.	I	A
It is recommended that stroke survivors who qualify for and have access to IRF care receive treatment in an IRF in preference to a SNF.	I	B
Organized community-based and coordinated interprofessional rehabilitation care is recommended in the outpatient or home-based settings.	I	C
ESD services may be reasonable for people with mild to moderate disability.	IIb	B

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Multidisciplinary Clinics

HEALTH SYSTEMS
2020, VOL. 9, NO. 2, 95–118
https://doi.org/10.1080/20476965.2018.1436909

THE OPERATIONAL RESEARCH SOCIETY

Taylor & Francis

REVIEW ARTICLE

OPEN ACCESS

Multi-disciplinary planning in health care: a review

A. G. Leeftink[a], I. A. Bikker[a,b], I. M. H. Vliegen[c] and R. J. Boucherie[a]

[a]Center for Healthcare Operations Improvement and Research, University of Twente, Enschede, Netherlands; [b]Department of Healthcare Logistics, Sint Maartenskliniek, Nijmegen, Netherlands; [c]Department of Industrial Engineering & Innovation Sciences, Eindhoven University of Technology, Eindhoven, Netherlands

Open Access Research

BMJ Open

Elements of integrated care approaches for older people: a review of reviews

Andrew M Briggs,[1,2] Pim P Valentijn,[3,4,5] Jotheeswaran A Thiyagarajan, Islene Araujo de Carvalho[1]

- Benefits:
  - Standardization
  - Teamwork
  - Communication
  - Access
  - Satisfaction
  - Outcomes/QOL
  - Cost-effectiveness

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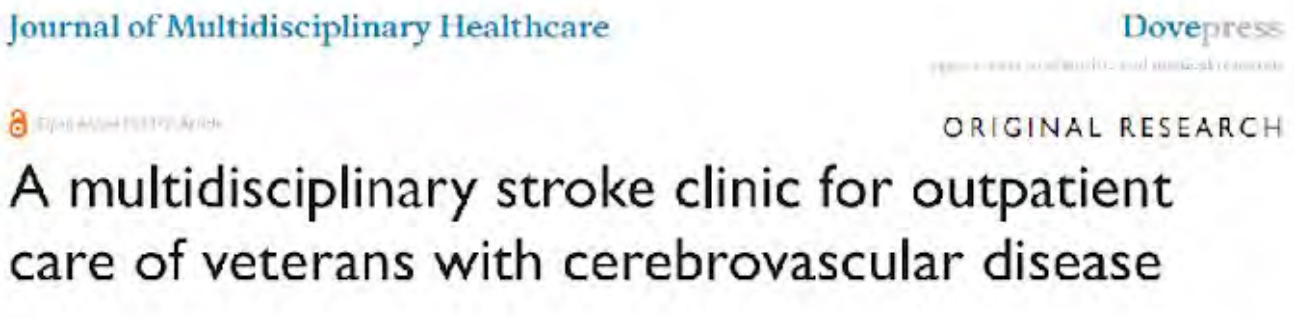
Stroke Multidisciplinary Care



Journal of Multidisciplinary Healthcare

Dovepress

ORIGINAL RESEARCH

A multidisciplinary stroke clinic for outpatient care of veterans with cerebrovascular disease

- Stroke mortality improving; patients living longer with disability and risk of further stroke
- Integrated care in other countries
- Pilot clinics in the US i.e. VA

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Disability and Rehabilitation

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/idre20

Benefits of an interdisciplinary stroke clinic: addressing a gap in physical therapy at post-stroke neurology follow-up

Nandakumar Nagaraja, Allison R. Kraus, Dorian K. Rose, Esther B. Olasoji, Anna Y. Khanna, Alexis N. Simpkins, Christina A. Wilson, Rondalyn R. Dickens, Vishnumurthy Shushrutha Hedna, Carolyn Geis, Teddy Youn & Michelle M. Musalo

- Vascular Neurologist + Physical Therapy
- 148 pts, with a significant number >6 months found to be appropriate for additional rehabilitation
- Worse walking performance and QOL associated with new referral for additional therapy

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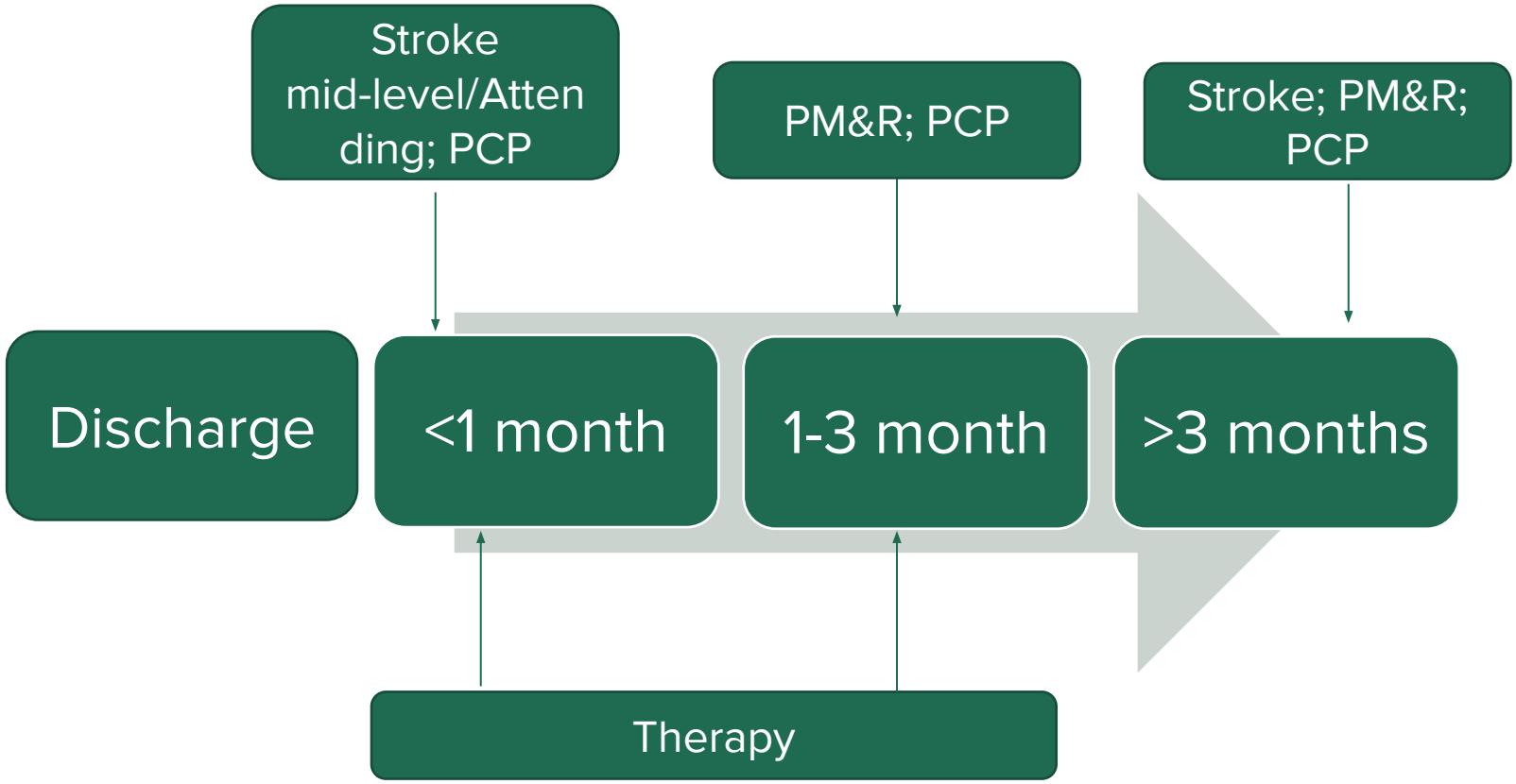
Traditional outpatient models



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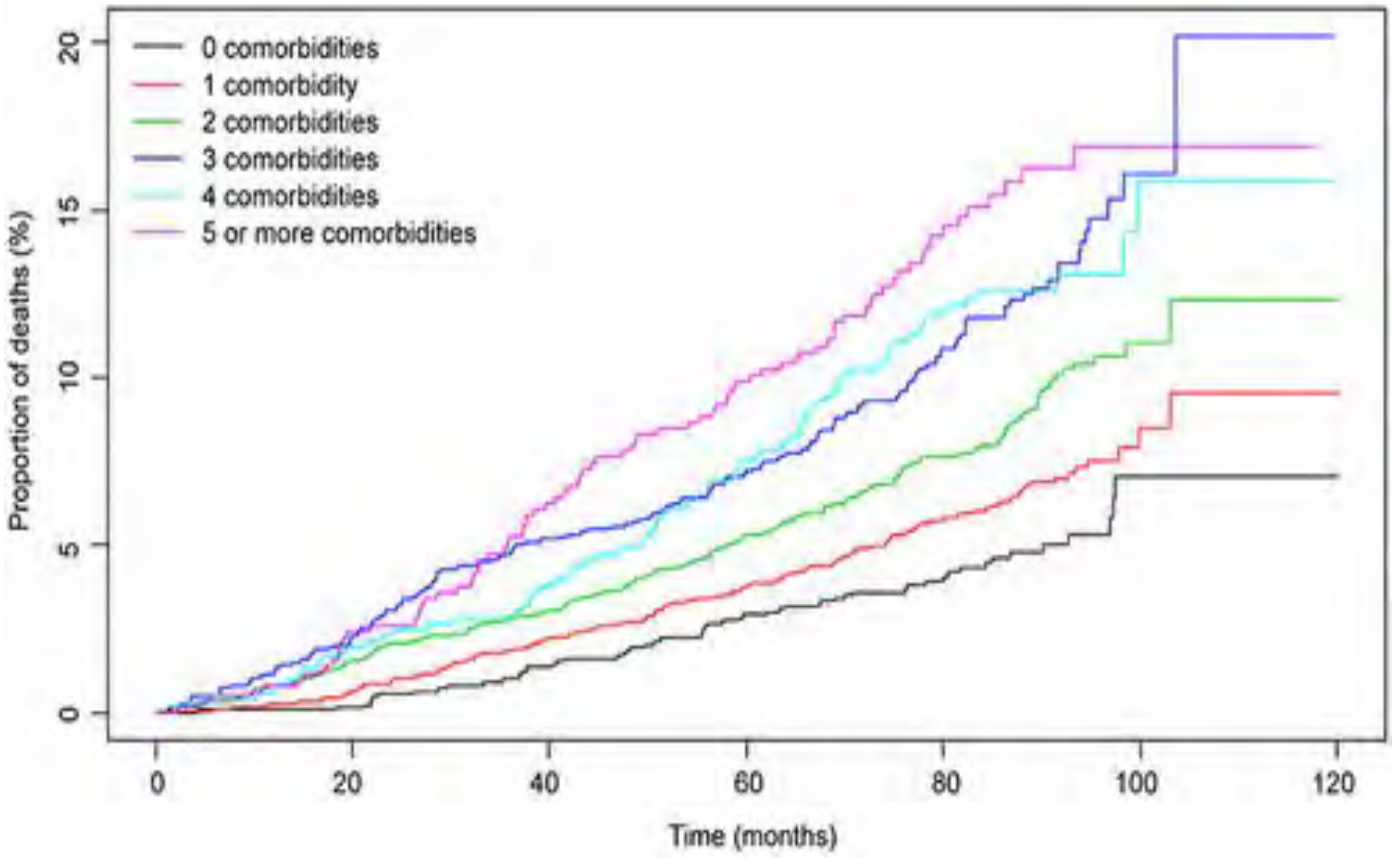
Why focus on the post-acute period?



Katie I. Gallacher. Stroke. Multimorbidity in Stroke, Volume: 50, Issue: 7, Pages: 1919-1926, DOI: (10.1161/STROKEAHA.118.020376)

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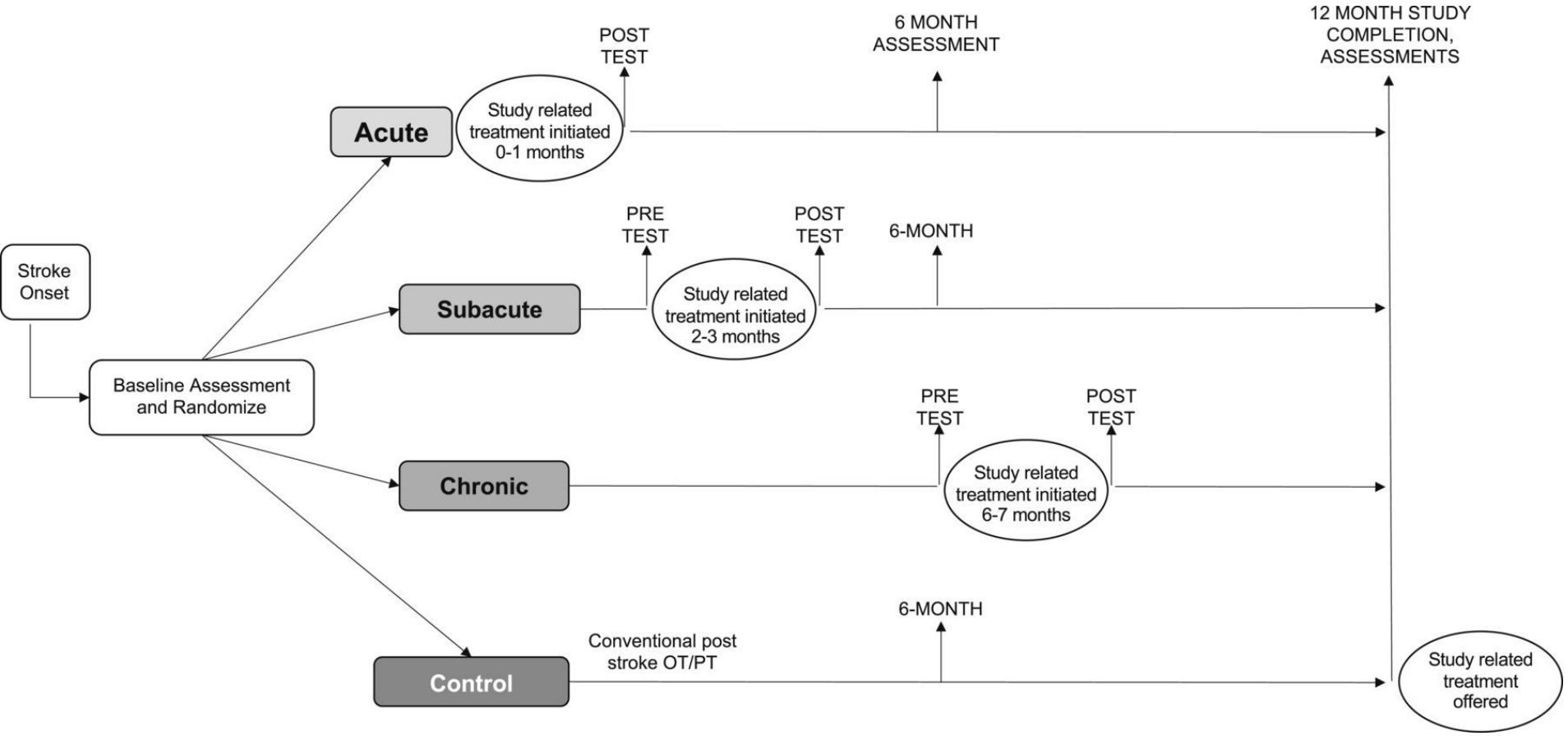
PNAS
Proceedings of the National Academy of Sciences of the United States of America

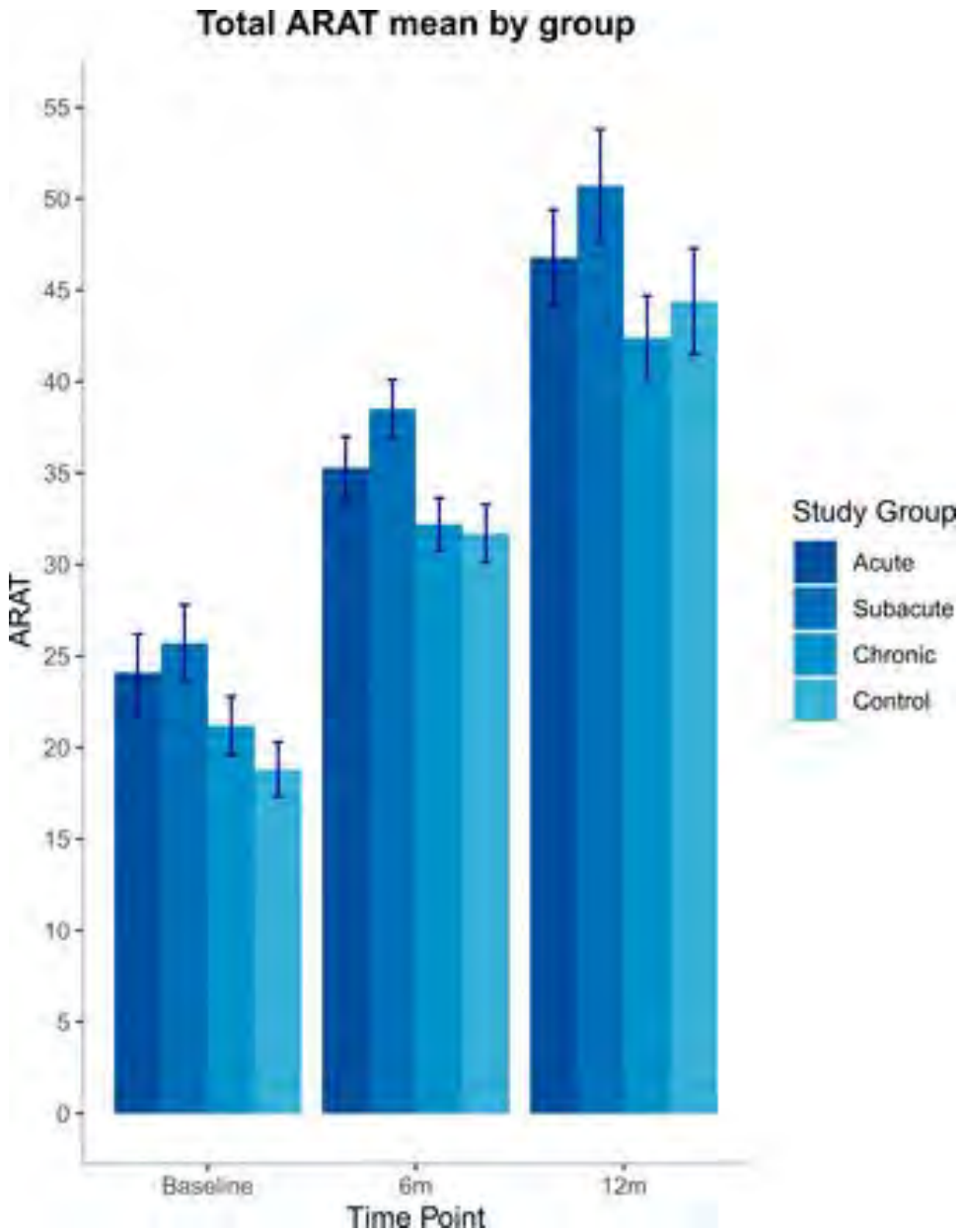
Institution: UNIV OF BIRMINGHAM
Keyword, Author, or

RESEARCH ARTICLE

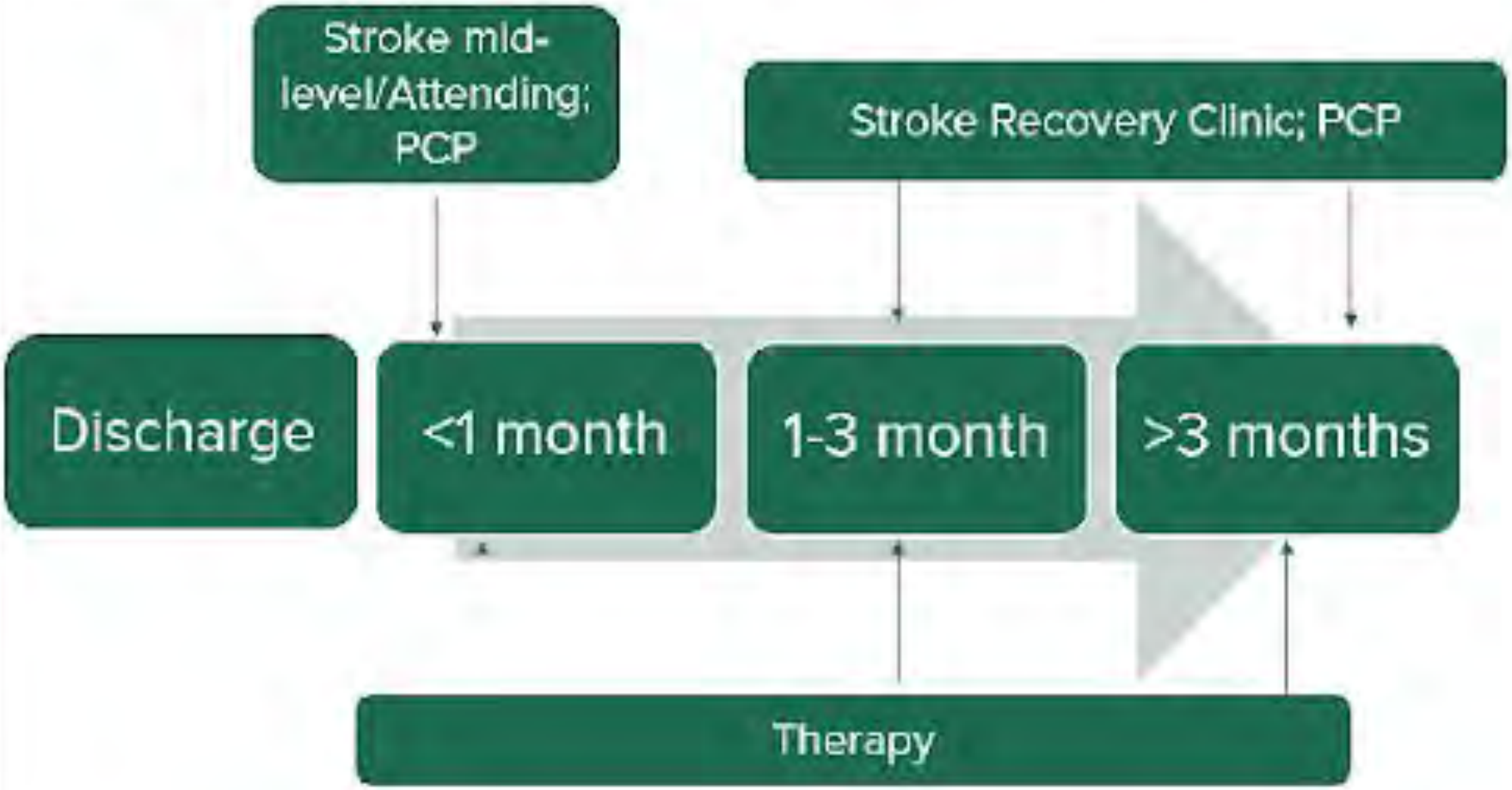
Critical Period After Stroke Study (CPASS): A phase II clinical trial testing an optimal time for motor recovery after stroke in humans

Alexander W. Dromerick, Shashwati Geed, Jessica Barth, Kathaleen Brady, Margot L. Giannetti, Abigail Mitchell, Matthew A. Edwardson, Ming T. Tan, Yizhao Zhou, Elissa L. Newport, and Dorothy F. Edwards


Stroke Onset
Baseline Assessment and Randomize
Acute
Subacute
Chronic
Control
Study related treatment initiated 0-1 months
Study related treatment initiated 2-3 months
Study related treatment initiated 6-7 months
Conventional post stroke OT/PT
POST TEST
PRE TEST
POST TEST
PRE TEST
POST TEST
6 MONTH ASSESSMENT
6-MONTH
6-MONTH
12 MONTH STUDY COMPLETION, ASSESSMENTS
Study related treatment offered


Total ARAT mean by group
ARAT
55
50
45
40
35
30
25
20
15
10
5
0
Baseline
6m
12m
Time Point
Study Group
Acute
Subacute
Chronic
Control

With Stroke Recovery Clinic



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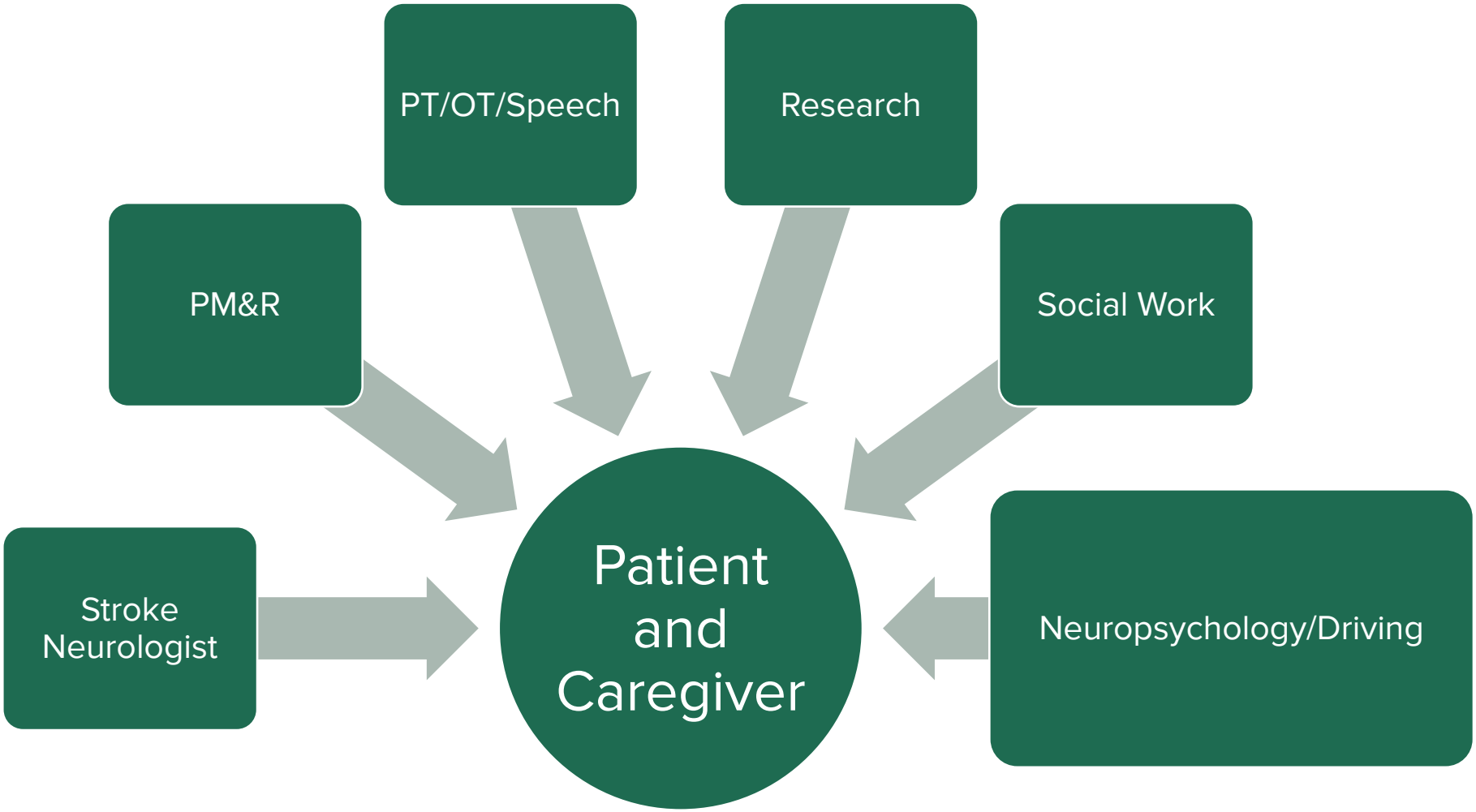
UAB Stroke Recovery Clinic



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UAB Stroke Recovery Clinic

HEALTH & MEDICINE

New UAB Medicine stroke rehab clinic offers unique one-stop shopping

by Bob Shepard

January 30, 2019 | Print | Email

The new UAB Medicine Stroke Recovery Clinic at the University of Alabama at Birmingham will provide a unique opportunity for those recovering from a stroke to wrap the entire outpatient experience into one package. The multidisciplinary clinic offers the combined expertise of stroke neurologists with rehabilitation physicians and therapists so patients can have all their medical and rehabilitation needs met at one time in one place. The combination clinic is one of only a very few across the country and the only one of its type in the Southeast.

Xiaohua Zhou, M.D., and Chen Lin, M.D.

"Alabama is in the heart of the stroke belt, the region throughout the Southeast with the highest incidence of stroke in the nation," said Chen Lin, M.D., assistant professor in the UAB Department of Neurology in the School of Medicine. "Only a fraction of stroke survivors receive any rehabilitation after leaving the hospital. The Stroke Recovery Clinic encompasses the two medical disciplines most involved with treating stroke: the Department of Neurology and the Department of Physical Medicine and Rehabilitation."

Email: clin@uabmc.edu

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Patient characteristics (n=29)	
Age, mean ± SD	62.7 ± 12.2
Sex	
Male	62.5%
Female	37.5%
Race	
White	45.8%
Black	50.0%
Unknown	4.2%
Impacted side	
Right	45.8%
Left	33.3%
Bilateral	4 (16.7%)
NIHSS, mean ± SD	6.9 ± 5.5
mRS, mean ± SD	3.1 ± 1.2
PHQ-9, mean ± SD	7.0 ± 4.6
Depression (PHQ-9 ≥5)	62.5%
Motricity index, mean ± SD	
Arm	65.3 ± 34.6
Leg	70.9 ± 30.3
Side	68.0 ± 29.8
MOCA, mean ± SD	17.8 ± 7.6
Hypertension	85.7%
Diabetes	53.3%

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Potential concerns

- Cognition
- Post-stroke activities: exercise, driving, return to work
- Speech
- Vision impairment
- Hearing loss and dizziness

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Specific Deficits

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Shoulder Pain

- Incidence to 22% in 1st year. Prevalence up to 80% of patients
- Usually presents during rehabilitation but injury most likely when flaccid and unstable
- Causes: Subdeltoid bursitis, supraspinatus tendinitis, brachial plexopathy, rotator cuff tears, subluxation of humeral head
- Avoid traction and torsion
- Education recommended including ROM and Positioning (I, C)
- Work with PM&R and Therapy on local pain control

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Spasticity

- Prevalence of 25-43% in 1st year.
- Incidence of UL in 1st 3 mo for rehab patients is 33%.
- Impairs function, ADLs, and QOL
- Botox ® FDA approved, shown to improve activity
- Does not improve <u>functional</u> use of limb

Recommendations: Spasticity	Class	Level of Evidence
Targeted injection of botulinum toxin into localized upper limb muscles is recommended to reduce spasticity, to improve passive or active range of motion, and to improve dressing, hygiene, and limb positioning.	I	A
Targeted injection of botulinum toxin into lower limb muscles is recommended to reduce spasticity that interferes with gait function.	I	A
Oral antispasticity agents can be useful for generalized spastic dystonia but may result in dose-limiting sedation or other side effects.	IIa	A
Physical modalities such as NMES or vibration applied to spastic muscles may be reasonable to improve spasticity temporarily as an adjunct to rehabilitation therapy.	IIb	A
Intrathecal baclofen therapy may be useful for severe spastic hypertonia that does not respond to other interventions.	IIb	A
Postural training and task-oriented therapy may be considered for rehabilitation of ataxia.	IIb	C
The use of splints and taping are not recommended for prevention of wrist and finger spasticity after stroke.	III	B

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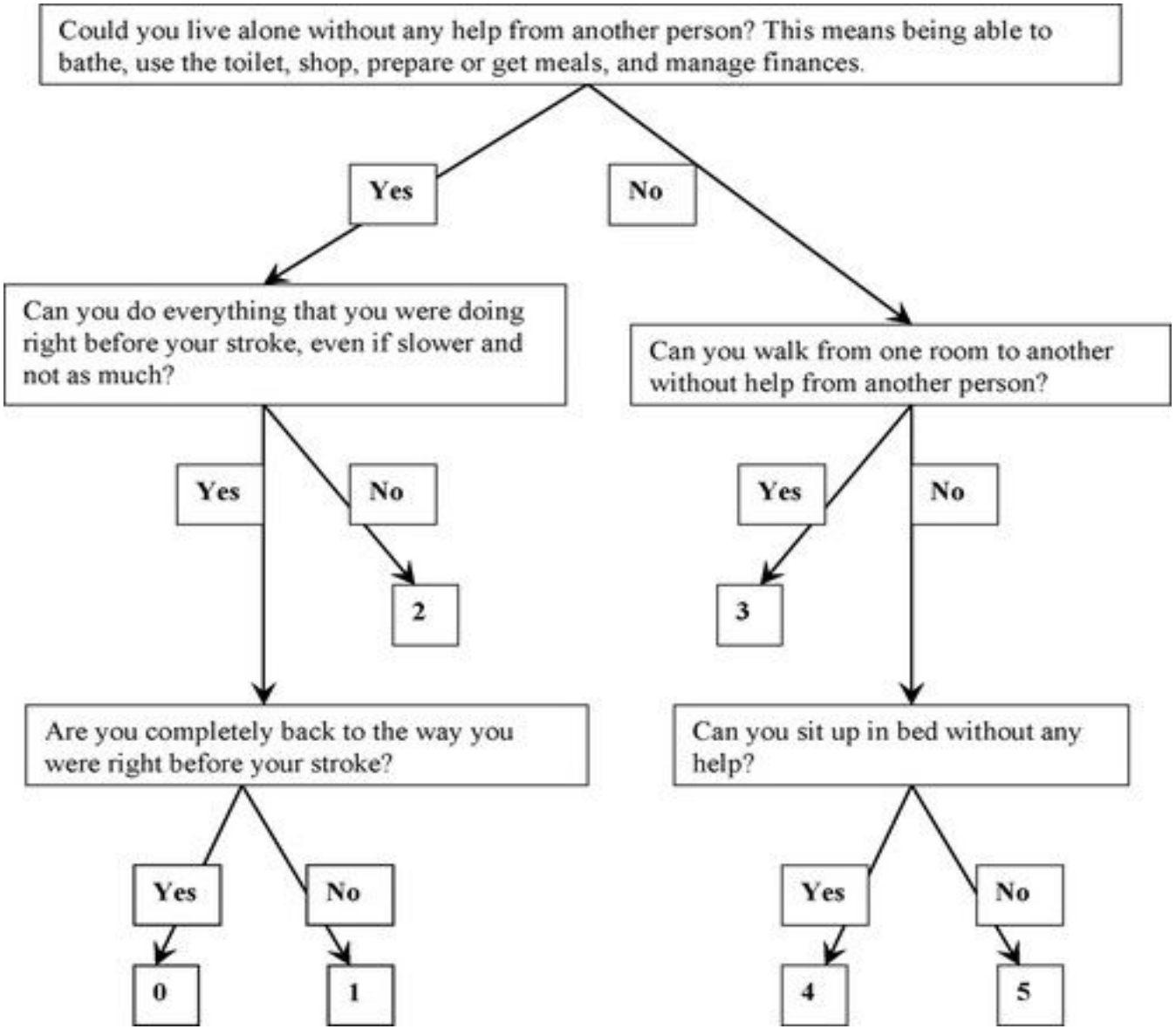
Modified Rankin Score



Bruno, Akinwunta, & Lin. Stroke. 2010.

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Health-Related Quality of Life

- Stroke outcomes have focused on functional status using disability scales ie mRS.
- HRQOL provide direct measure of patients' perspective on a given domain (depression, pain, function, etc.), without clinician interpretation (FDA)
- Patients' perspective of illness impacting their life's quality or function
- Ischemic stroke leads to impairment in QOL. (REGARDS study Haley, 2011; Tengs, 2001; Chang, 2016; SPS3 Dhamoon, 2014)
- Deficits in QOL exist despite having minimal or no functional post-stroke disability. (Lai, 2002)
- Even in mild stroke and TIA, impaired QOL can be seen in 36% of patients (Sangha, 2015)
- Women had worse QOL in multiple domains up to 12 mo after stroke (Bushnell, 2014).

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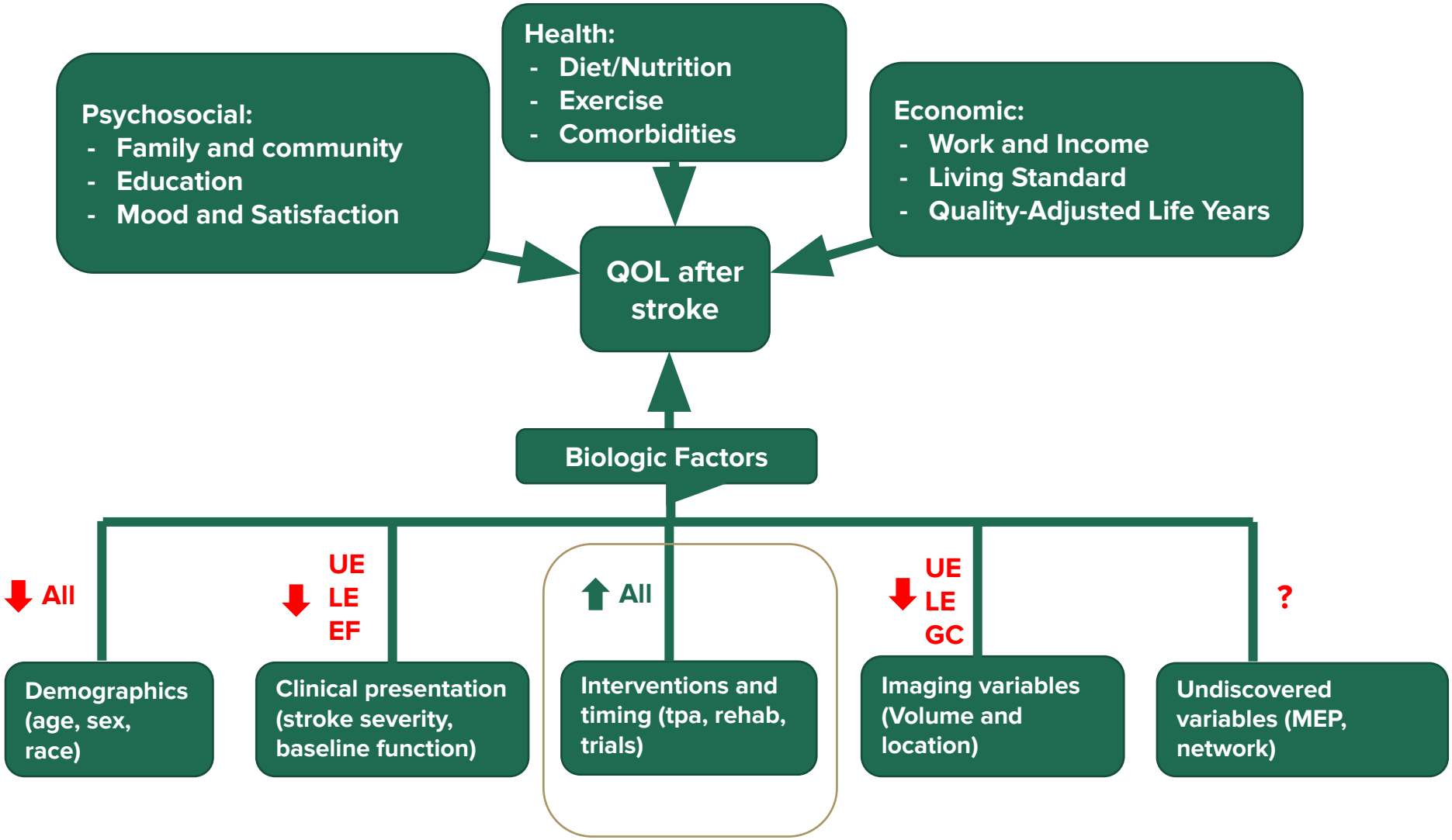
HRQOL Model in the hospital



2015 Major Thrombectomy Trials

Table 5: Quality of Life (EQ-5D) in Included RCTs

Author, Year	Intervention	Control	Effect Variable	Unadjusted Value (95% CI)	Adjusted Value (95% CI)
Berkhemer et al, 2015[27]	0.69 (0.33–0.85)[a]	0.66 (0.30–0.81)	Beta[b]	0.08 (0.00–0.15)	0.06 (–-0.01 to 0.13)
Goyal et al, 2015[29]	80 (60–90)[c]	65 (50–80)	Beta[b]	9.4 (3.5–15.2)	9.9 (3.8–16.0)
Jovin et al, 2015[30]	0.65 (0.21–0.79)[a]	0.32 (0.13–0.70)	Beta[b]	0.13 (0.03–0.23)	0.11 (0.02–0.21)

Abbreviations: CI, confidence interval; EQ-5D, EuroQoL Group 5-Dimension Self-Report Questionnaire; IQR, interquartile range; RCT, randomized controlled trial.

[a]EQ-5D index score presented as median (IQR).

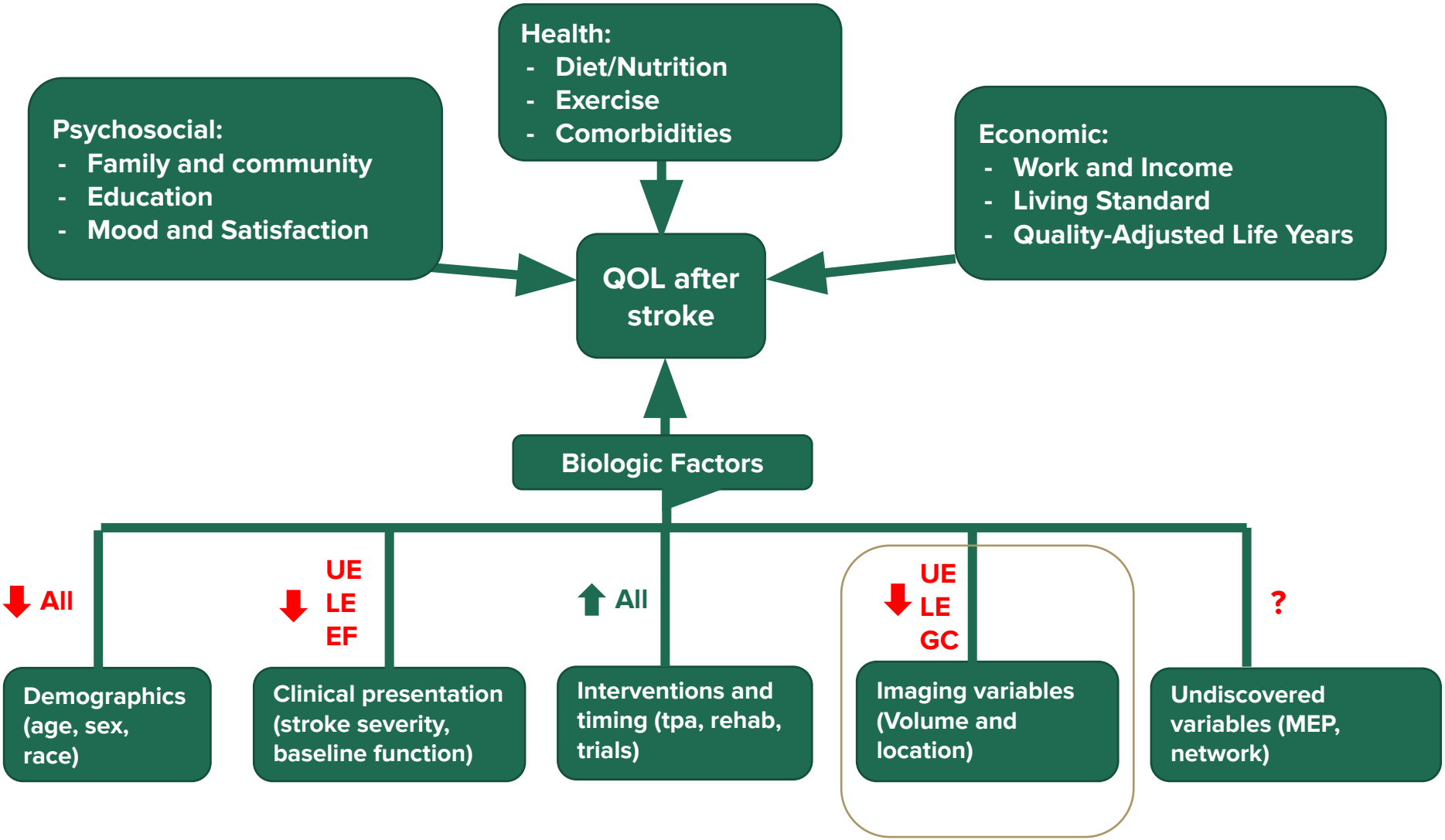
[b]Regression was used analyze the effect.

[c]EQ-5D visual-analogue scale score presented as median (IQR).

- MR Clean, ESCAPE, and REVASCAT used QOL as 2ndary endpoint
- All 3 showed higher QOL after thrombectomy, including ESCAPE reporting visual-analogue score
- Cannot pool outcomes as scores different and likely skewed

Health Quality Ontario. 2016

HRQOL Model


Health:
- Diet/Nutrition
- Exercise
- Comorbidities
Psychosocial:
- Family and community
- Education
- Mood and Satisfaction
Economic:
- Work and Income
- Living Standard
- Quality-Adjusted Life Years
QOL after stroke
Biologic Factors
All
UE
LE
EF
All
UE
LE
GC
?
Demographics (age, sex, race)
Clinical presentation (stroke severity, baseline function)
Interventions and timing (tpa, rehab, trials)
Imaging variables (Volume and location)
Undiscovered variables (MEP, network)

Stroke
Volume 48, Issue 7, July 2017; Pages 1925-1931
https://doi.org/10.1161/STROKEAHA.117.017094

ORIGINAL CONTRIBUTIONS

Predicting Domain-Specific Health-Related Quality of Life Using Acute Infarct Volume

Chen Lin, MD, Jungwha Lee, PhD, Neil Chatterjee, BS, Carlos Corado, BS, Timothy Carroll, PhD, Andrew Naidech, MD, MS, and Shyam Prabhakaran, MD, MS

Research

International Journal of Stroke WSO

Infarct location is associated with quality of life after mild ischemic stroke

Chen Lin[1], Rajbeer Sangha[1], Jungwha Lee[5], Carlos Corado[1], Anvesh Jalasutram[2], Neil Chatterjee[1], Carson Ingo[1,4], Timothy Carroll[3] and Shyam Prabhakaran[1]

International Journal of Stroke
2018, Vol. 13(8) 824-831
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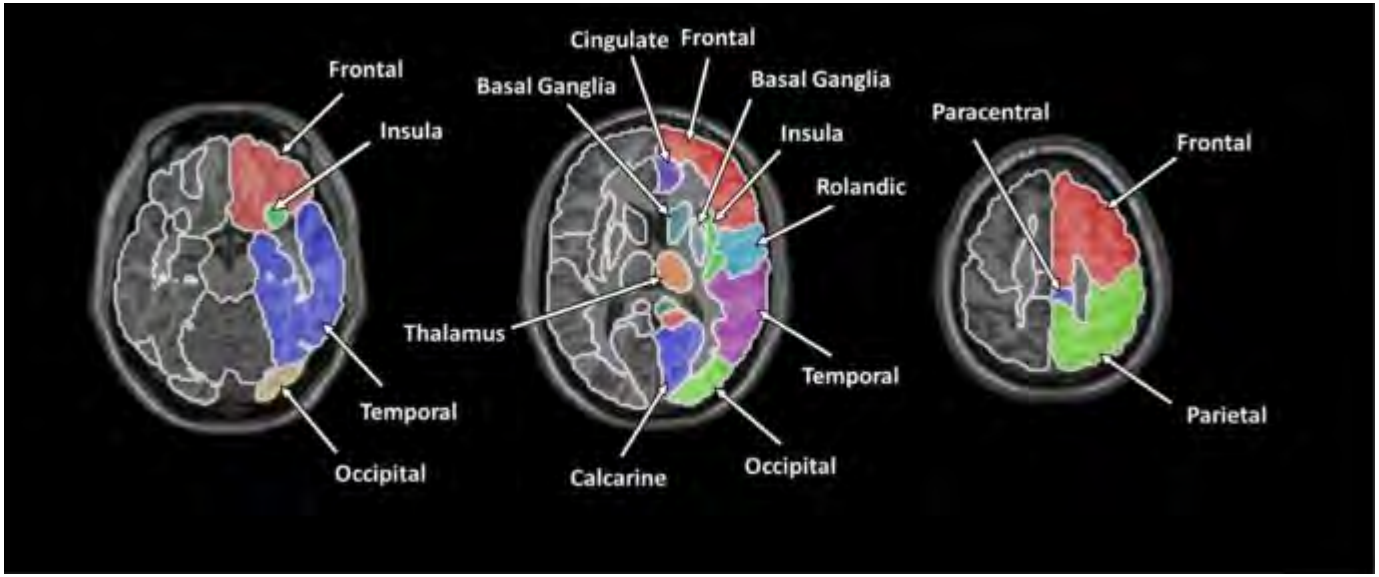

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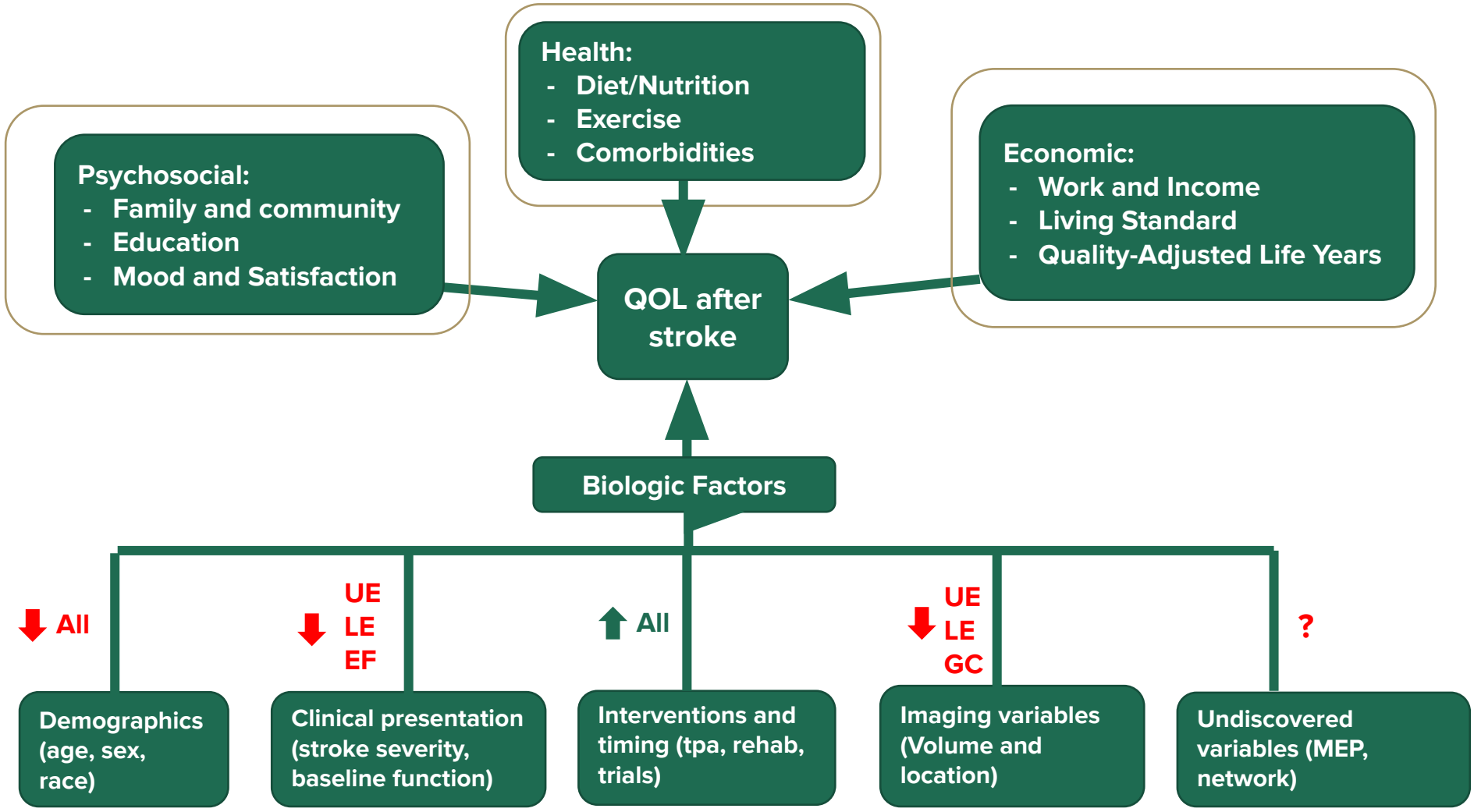
HRQOL Model in clinic

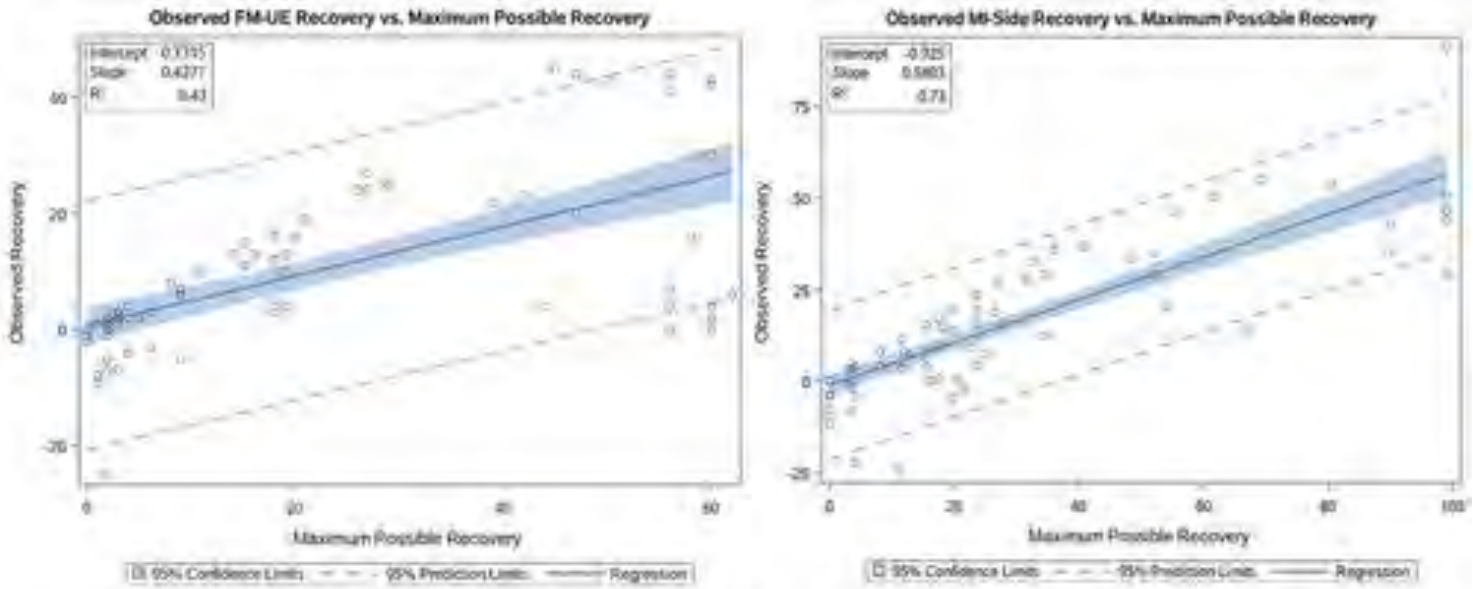


Stroke
Volume 52, Issue 9, September 2021. Pages 2968-2971
https://doi.org/10.1161/STROKEAHA.120.031672

BRIEF REPORTS

Association of Proportional Recovery After Stroke With Health-Related Quality of Life

Chen Lin, MD, Kimberly Martin, PhD, Yurany A. Arevalo, MD, Richard L. Harvey, MD, and Shyam Prabhakaran, MD, MS



Failure to meet the proportional recovery thresholds for the Fugl-Meyer Upper Extremity and Motricity Index measures were not associated with impairment in health-related quality of life. Patients can maintain un-impaired quality of life despite not meeting expected proportional recovery thresholds.

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Research and new findings

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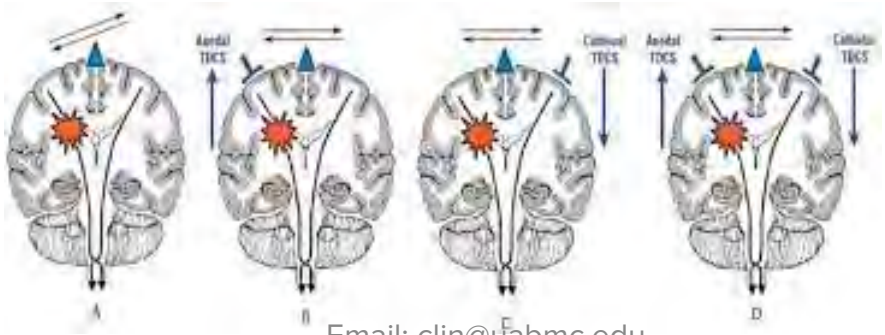
TRANSPORT2



FDA NEWS RELEASE

FDA Approves First-of-Its-Kind Stroke Rehabilitation System

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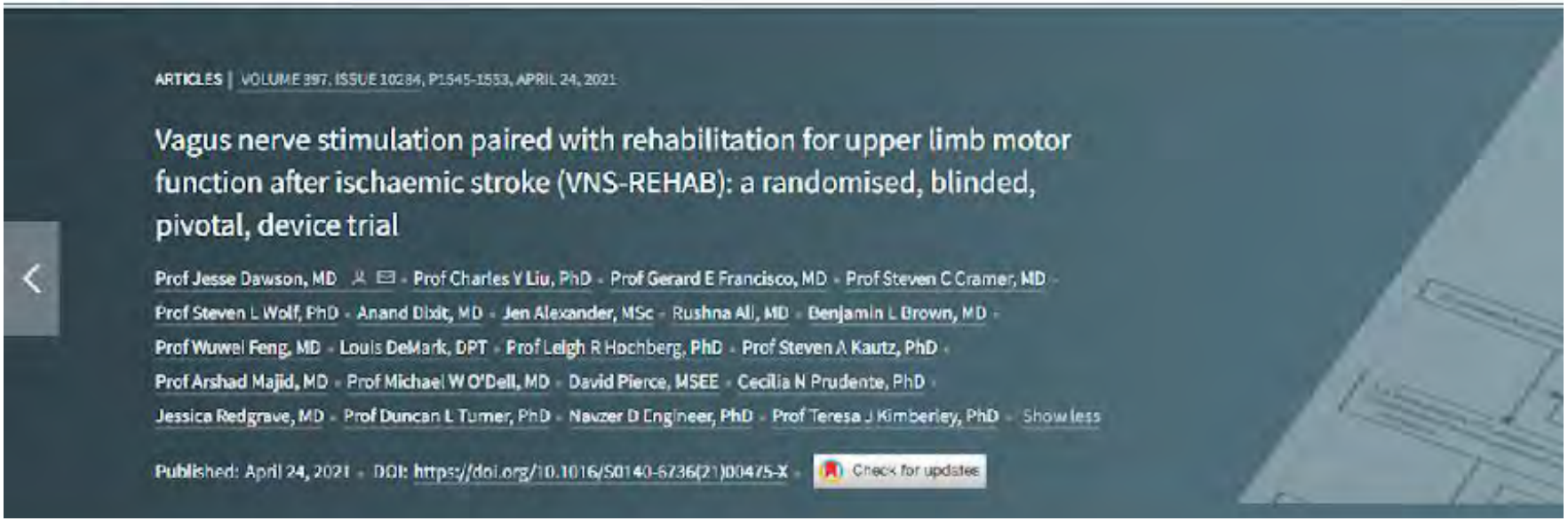
For Immediate Release: August 27, 2021

Español

The U.S. Food and Drug Administration today approved the MicroTransponder Vivistim Paired VNS System (Vivistim System), a first-of-its-kind, drug-free rehabilitation system intended to treat moderate to severe upper extremity motor deficits associated with chronic ischemic stroke—a stroke caused by a blockage of blood flow to the brain with long lasting symptoms using vagus nerve stimulation (VNS).

"People who have lost mobility in their hands and arms due to ischemic stroke are often limited in their treatment options for regaining motor function" said Christopher M. Loftus, M.D., acting director of the FDA's Center for Devices and Radiological Health's Office of Neurological and Physical Medicine Devices. "Today's approval of the Vivistim Paired VNS System offers the first stroke rehabilitation option using vagus nerve stimulation. Used alongside rehabilitative exercise, this device may offer benefit to those who have lost function in their upper limbs due to ischemic stroke."

THE LANCET

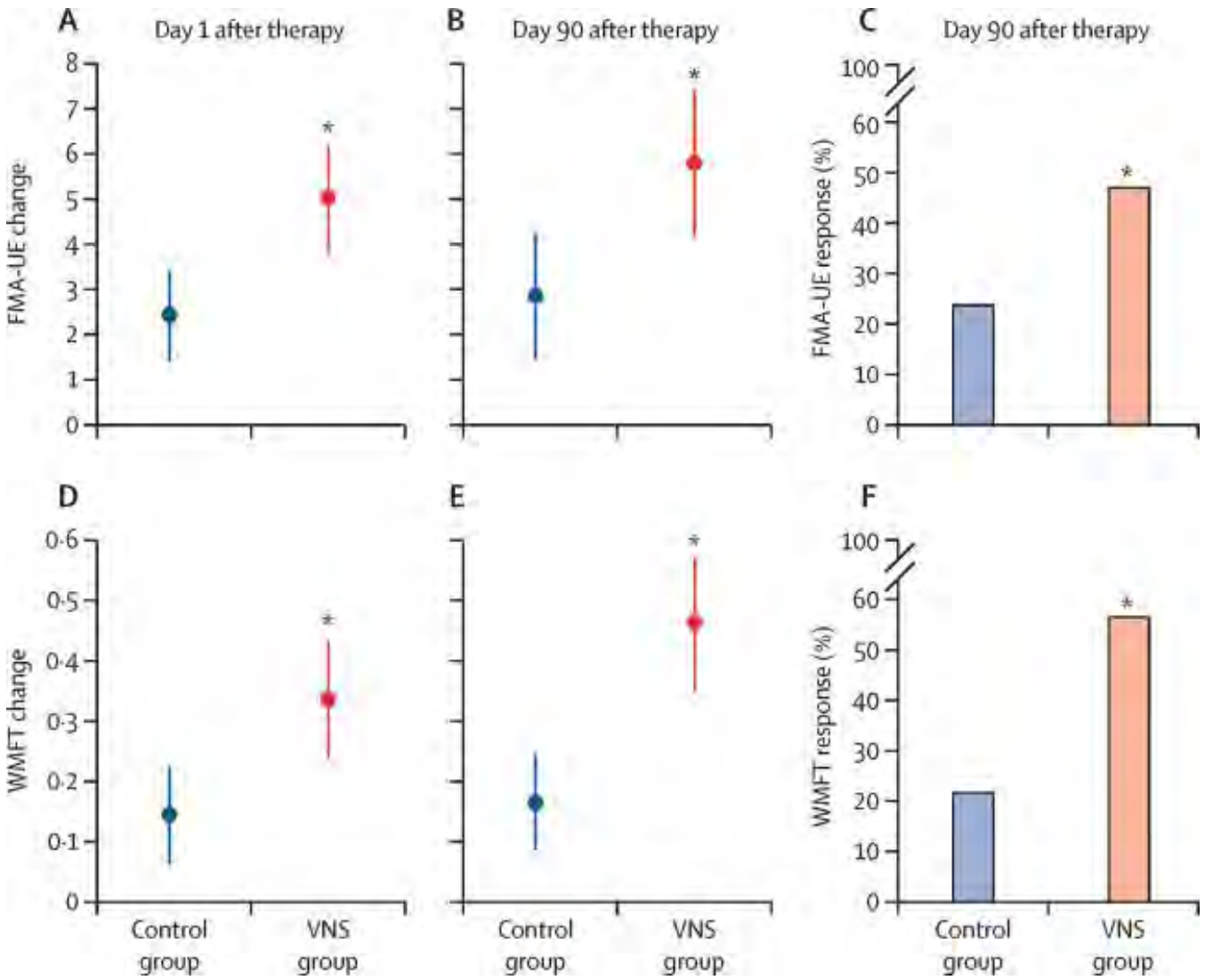


ARTICLES | VOLUME 397, ISSUE 10284, P1545-1553, APRIL 24, 2021

Vagus nerve stimulation paired with rehabilitation for upper limb motor function after ischaemic stroke (VNS-REHAB): a randomised, blinded, pivotal, device trial

Prof Jesse Dawson, MD · Prof Charles Y Liu, PhD · Prof Gerard E Francisco, MD · Prof Steven C Cramer, MD · Prof Steven L Wolf, PhD · Anand Dixit, MD · Jen Alexander, MSc · Rushna Ali, MD · Benjamin L Brown, MD · Prof Wuwei Feng, MD · Louis DeMark, DPT · Prof Leigh R Hochberg, PhD · Prof Steven A Kautz, PhD · Prof Arshad Majid, MD · Prof Michael W O'Dell, MD · David Pierce, MSEE · Cecilia N Prudente, PhD · Jessica Redgrave, MD · Prof Duncan L Turner, PhD · Navzer D Engineer, PhD · Prof Teresa J Kimberley, PhD · Show less

Published: April 24, 2021 · DOI: https://doi.org/10.1016/S0140-6736(21)00475-X · Check for updates


A
Day 1 after therapy
FMA-UE change
B
Day 90 after therapy
C
Day 90 after therapy
FMA-UE response (%)
D
WMFT change
E
F
WMFT response (%)
Control group
VNS group

Future Directions

- Integrating telehealth
- Continued longitudinal understanding of stroke recovery and HRQOL
- Multimodal intervention studies with the clinic:
  - repetitive reinforcement
  - focusing on appropriate outcome measure
- Treating comordities to improve stroke outcomes:
  - pain, mental health, cognition, sleep, etc.
- Neuromodulation

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Mansi Katkar

...and many others

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Thank you!