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Synchronous Home-Based Telerehabilitation of the Upper Extremity Following Stroke

A Pyramid Review

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Feb 11, 2026

Disclosure of Conflict of Interest

I have a relationship with a not-for-profit organization to disclose.

Nature of relationship(s)	Name of the not-for-profit organization(s)	Description of relationship
Any direct financial payments including receipt of honoraria		
Membership on advisory boards or speakers' bureaus		
Funded grants or clinical trials	Federal Ministry of Education and Research (BMBF) [03FHP179]	Funded grant for my PhD „Zukunft FH-Prof“
Patents on a drug, product or device		
All other investments or relationships that could be seen by a reasonable, well-informed participant as having the potential to influence the content of the educational activity		

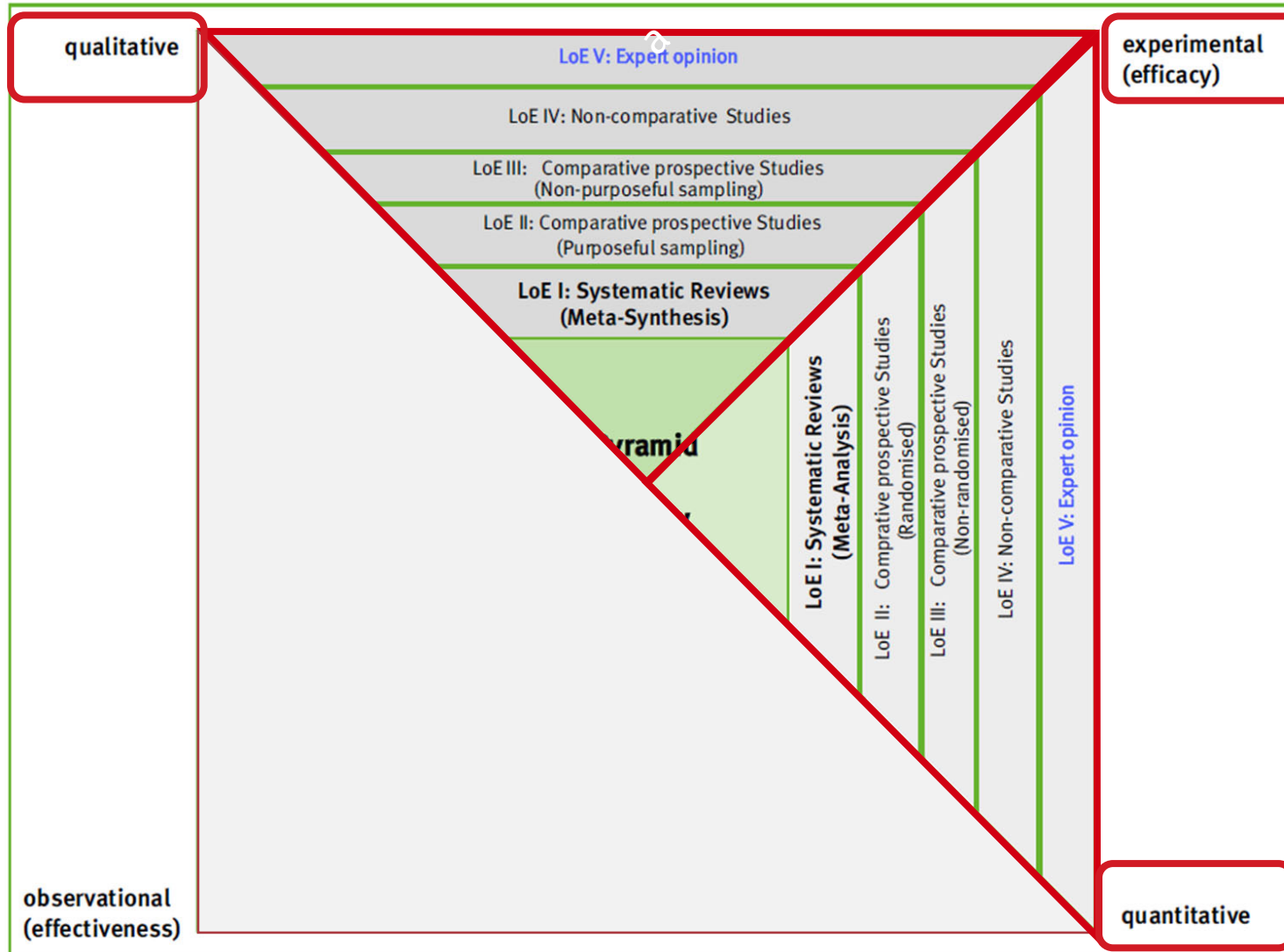
Stroke & Telerehabilitation

- Stroke is a leading cause of long-term disability
- Traditional rehab faces barriers: geographic access, cost, capacity
- Telerehabilitation offers a potential solution

Telerehabilitation is the application of information and communications technology (ICT) to deliver rehabilitation services (see Cochrane definition of rehabilitation) over a distance by linking rehabilitation provider to a beneficiary, caregiver, or any person(s) responsible for delivering care to the beneficiary, for the purposes of screening, assessment, intervention, consultation/coaching and/or supervision/monitoring. Telerehabilitation encompasses **synchronous** (real-time delivery) or asynchronous (delayed delivery) formats or a combination of these formats (hybrid).

Int J Telerehabil. 2025 Jun 12;17(1):6708. doi: [10.63144/ijt.2025.6708](https://doi.org/10.63144/ijt.2025.6708)

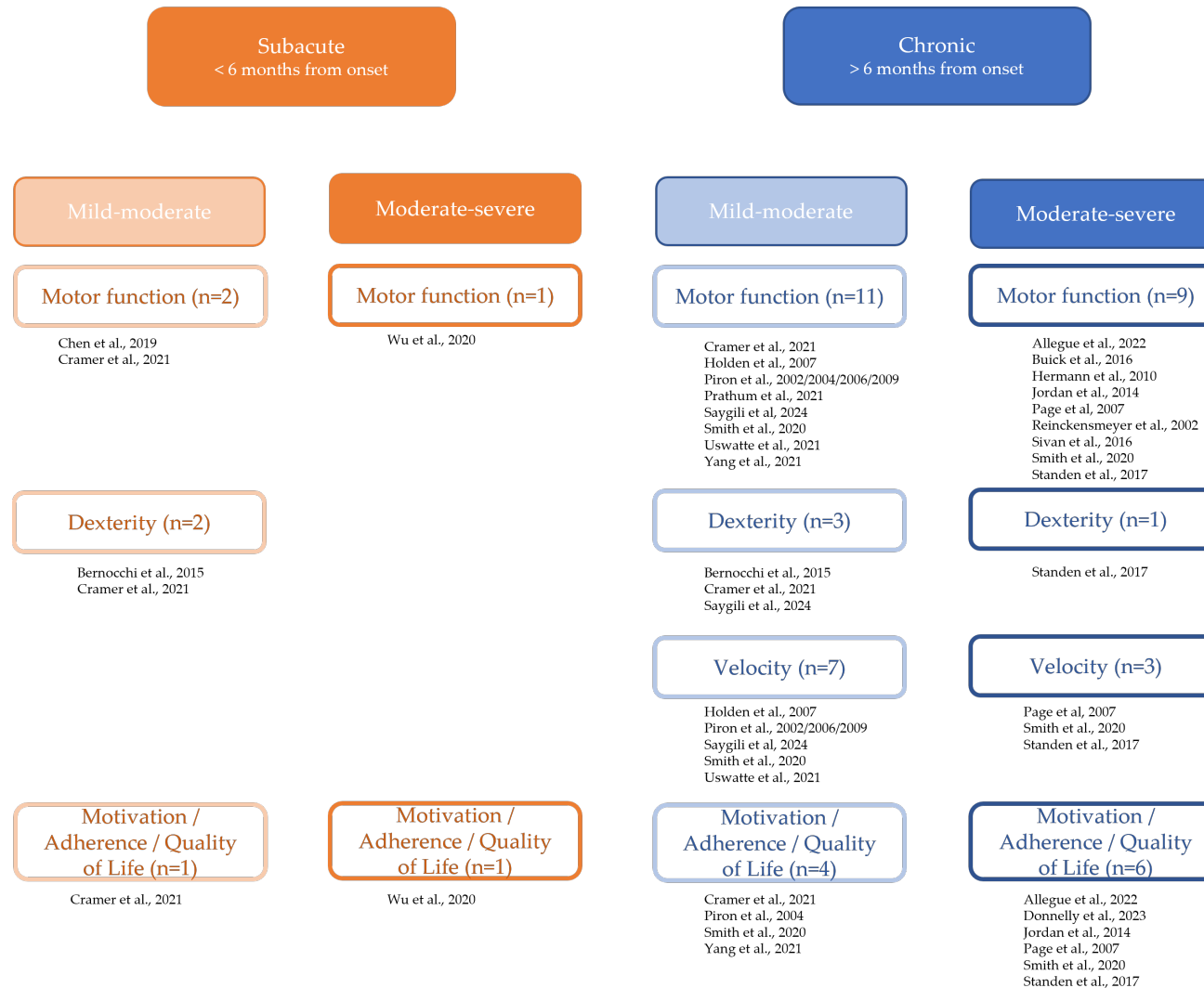
The Pyramid Review



B. Borgetto, Systematic Pyramid Reviews – A new method of evidence synthesis from different research approaches for routine health care decision making and practice (2024). doi:[10.31222/osf.io/z4kas](https://doi.org/10.31222/osf.io/z4kas).

Borgetto et al. (2021)
LoE = Level of Evidence

Categories & Concepts



Key Findings: What works in subacute patients (motor function & dexterity)?

	Bernocchi, 2015	Cramer, 2021	Wu, 2020 (IG)
n	13	8	30
months since stroke; mean (SD)	3.73 (1.3)	2.7 (1.6)	< 6
Degree of Impairment	-	moderate-mild	severe
Intervention	Transition of an inpatient rehabilitation protocol to the home environment with an image-based home monitoring and rehabilitation (HBTR) program.	Complex approach to rehabilitation care: 15min of functional games, at least 15min of exercises, and 5min of stroke education using a Jeopardy style game.	Transition of an early in-hospital rehabilitation program to a home-based setting through the implementation of a collaborative remote rehabilitation nursing model
Dose of Intervention	12 weeks; 3x/week	12 weeks; 6x60 min/week + free play	12 weeks; 2x/week
Effects: Cohens d	dexterity (1.22)	motor function (0.19) dexterity (4.63)	motor function (1.29)
Level of Evidence	Quality of Conduct: IV ; Quality of Results: III	Quality of Conduct: IV ; Quality of Results: IV	Quality of Conduct: IV ; Quality of Results: III

Key Findings: CIMT in chronic patients (motor function)

	Page, 2007	Smith, 2020	Uswatte, 2021 (IG)	Saygili, 2024 (IG)
n	4	28	10	10
months since stroke; mean (SD)	69.25 (61.4)	37.2 (4.8)	31.2 (21.12)	9.54 (10.9)
Degree of Impairment	moderate-severe	n = 15: moderate-mild; n = 13: moderate-severe	moderate-mild	moderate-mild
Intervention	mCITE: 30 minutes structured functional practice sessions	iCIMT: group sessions + individual sessions	tele AutoCITE: motor training at the working station + education for behavioral change	mCITE: 3-5 ADL activities (shaping + task practice) + self administered training of 10 basic exercises
Dose of Intervention	15h/10 weeks	6 weeks: 21h/6 weeks	35h/2 weeks	22.5h/3 weeks
Effects (Cohens d)	amount of use (9.56); quality of use (11.24)	amount of use(0.78/1.16); quality of use (0.7/1.06);	amount of use (12.5); Quality of use (--)	amount of use (2.29); quality of use (2.24);
Level of Evidence	Quality of Conduct: IV ; Quality of Results: IV	Quality of Conduct: IV ; Quality of Results: IV	Quality of Conduct: IV ; Quality of Results: III	Quality of Conduct: IV ; Quality of Results: IV

Qualitative Results

Perceived improvement in motivation and adherence in **subacute** patients:

- Convenience and Accessibility
- Social Support
- positive user experience

Perceived improvement in motivation and adherence in **chronic** patients:

- Feedback and meaningful use
- Gamification
- Performance / score tracking
- community and peer approval


Structured therapy sessions + active therapist involvement = enhanced physical abilities

Take Home Message

Home-based telerehabilitation shows promise for improving upper extremity function in stroke patients.

However,

- heterogeneity in intervention designs and outcomes limits definitive conclusions.
- To optimize telerehabilitation approaches for stroke recovery future research should focus on
 - larger trials,
 - observational studies,
 - standardized outcome measures,
 - and long-term follow-up,
 - qualitative studies with focus on perceived effectiveness

► [Healthcare \(Basel\)](#). 2025 Jan 6;13(1):90. doi: [10.3390/healthcare13010090](https://doi.org/10.3390/healthcare13010090) 

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Questions and Feedback!?

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