Thierry Lejeune

EBM dans la rééducation de la locomotion
Accident Vasculaire Cérébral

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Article de synthèse

Acta Neurologica Belgica
https://doi.org/10.1007/s13760-020-01320-7

REVIEW ARTICLE

Gait rehabilitation after stroke: review of the evidence of predictors, clinical outcomes and timing for interventions

Clara Selves[1,2] · Gaëtan Stoquart[1,2] · Thierry Lejeune[1,2]

Stroke 2022

TOPICAL REVIEW

Section Editors: Julie Bernhardt, PhD, and Pam Duncan, PhD

Walk the Talk: Current Evidence for Walking Recovery After Stroke, Future Pathways and a Mission for Research and Clinical Practice

Sarah A. Moore, PhD; Pierce Boyne, PhD; George Fulk, PhD; Geert Verheyden, PhD; Natalie A. Fini, PhD

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Plan

- Introduction
- Recommandations de bonne pratique
- Pronostic
- Rééducation de la marche: principes généraux
- Rééducation de la marche: méthodes spécifiques
- Conclusion

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Introduction: Définition

Locomotion

« Fonction des êtres vivants, et principalement des animaux, par laquelle ils assurent activement le déplacement de leur organisme tout entier »

Larousse

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Introduction: Définition

ICF Browser

- ICF
  - b FONCTIONS ORGANIQUES
  - s STRUCTURES ANATOMIQUES
  - d ACTIVITÉS ET PARTICIPATION
    - d1 CHAPITRE 1 APPRENTISSAGE ET APPLICATION DES CONNAISSANCES
    - d2 CHAPITRE 2 TACHES ET EXIGENCES GÉNÉRALES
    - d3 CHAPITRE 3 COMMUNICATION
    - d4 CHAPITRE 4 MOBILITÉ
      - d410-d429 CHANGER ET MAINTENIR LA POSITION DU CORPS (d410-d429)
      - d430-d449 PORTER, DÉPLACER ET MANIPULER DES OBJETS (d430-d449)
      - d450-d469 MARCHER ET SE DÉPLACER (d450-d469)
        - d450 Marcher
          - d4500 Marcher sur de courtes distances
          - d4501 Marcher sur de longues distances
          - d4502 Marcher sur différentes surfaces
          - d4503 Contourner des obstacles

Locomotion

http://apps.who.int/classifications/icfbrowser/

D4500
Avancer à pied, sur une distance de moins d'un kilomètre, comme marcher dans sa chambre ou dans le couloir, dans un bâtiment ou sur de courtes distances à l'extérieur.

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Introduction: Contexte

Locomotion & AVC

80% des patients présentent des déficiences motrices

80% des patients présentent une incapacité de marche

30% des patients sont incapables de marcher > 3 mois

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Introduction: Contexte

Locomotion & AVC

= déterminant des limitations d'activité à long terme

= déterminant de la dépendance et des coûts soins de santé

= objectif principal en réadaptation

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Introduction: Contexte

Locomotion & AVC

TOPICS IN STROKE REHABILITATION
2021, VOL. 28, NO. 2, 153–158
https://doi.org/10.1080/10749357.2020.1789829

Taylor & Francis
Taylor & Francis Group

ARTICLE

OPEN ACCESS Check for updates

Stroke survivors' priorities for research related to life after stroke

Ann-Sofie Rudberg[a,b], Eivind Berge[c,d†], Ann-Charlotte Laska[e], Stina Jutterström[e], Per Näsman[f], Katharina S Sunnerhagen[g], and Erik Lundström[h]

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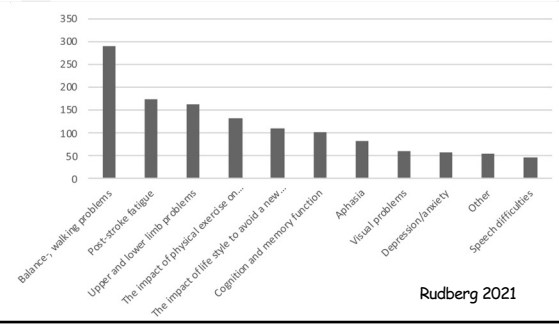
Introduction: Contexte

Locomotion & AVC



Rudberg 2021

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Introduction: EBM

AVC: délai, bilan fonctionnel

P atients
I ntervention
C omparaison
O utcome
T ime

Méthodes de rééducation

Que fait le groupe contrôle ?
Temps et intensité de thérapie

Quel résultat est évalué ?
Indépendance à la marche
Vitesse de marche
Périmètre de marche
Capacité vs Performance

Moment des interventions et évaluations

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Introduction: EBM

RCT

www.pedro.org.au
rehabilitation.cochrane.org

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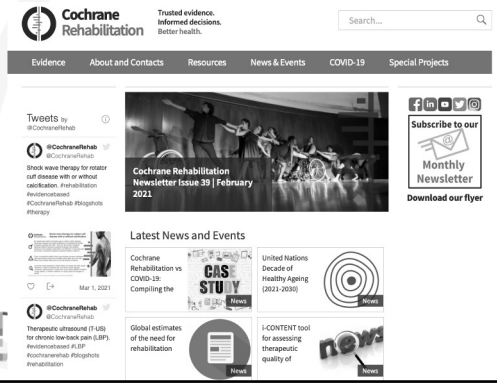
Introduction: EBM



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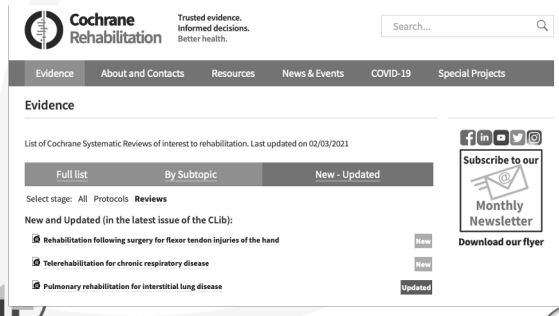
Introduction: EBM

https://rehabilitation.cochrane.org/evidence



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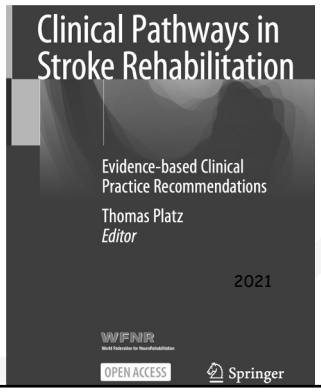
Introduction: EBM



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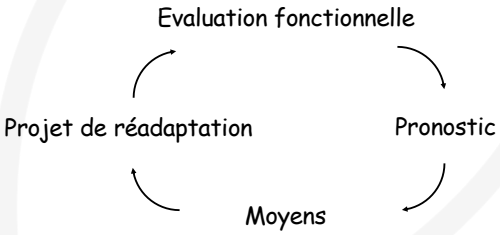
Introduction: Démarche



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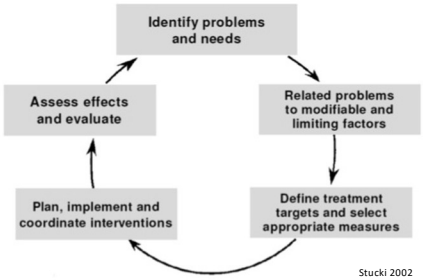
Introduction: Démarche



Stucki 2002

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Evaluation des capacités de marche

Domain ICF level		(H)AR	VR	LR	RC
Walking and walking-related functions and activities					
Functions:					
MI for lower extremity	muscle strength	●		●	●
10MWT comfortable (FAC ≥ 3)	walking speed	●		●	●
FMA for lower extremity	selective movements	●		●	●
10MWT maximum (FAC ≥ 3)	walking speed	●		●	●
6MWT (whether or not combined with Borg RPE) (FAC ≥ 3)	walking distance, functional endurance	●		●	●
Activities:					
TCT	trunk activity	●		●	●
BBS	sitting and standing balance	●		●	●
FAC	walking ability	●		●	●
TIS	sitting balance	●		●	●
TUG (FAC ≥ 3)	walking ability	●		●	●

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Evaluation des capacités de marche

RÉCUPÉRATION MOTRICE ET FONCTIONNELLE APRÈS UN AVC: MESURER, C'EST SAVOIR, CAR DEVINER, C'EST SE TROMPER

Geert Verheyden
PhD
Professeur de revalidation neurologique, KU Leuven

L'applicabilité et la pertinence des instruments pour la pratique clinique sont abordées plus en détail sur la base de modèles prédictifs, dans lesquels les informations recueillies au cours des deux premières semaines ou lors de l'admission au centre de revalidation donnent des indications claires quant à la récupération de la fonction du membre supérieur touché et à la capacité/l'incapacité à marcher ou à exécuter des tâches simples du quotidien de manière autonome 3 ou 6 mois après l'AVC ou à la sortie du centre de revalidation. Bien que les modèles prédictifs ne soient qu'indicatifs et n'aient généralement pas fait l'objet d'une validation croisée dans un nouveau cadre international, cela démontre l'exploitabilité de différents instruments de mesure et la pertinence de leur utilisation à des moments convenus. De cette manière, la revalidation motrice et fonctionnelle peut être adaptée au patient, des indications relatives à la récupération peuvent être données à un stade précoce au patient et à sa famille, et les perspectives d'avenir du patient peuvent être évoquées de manière raisonnable dans le cadre d'une concertation interdisciplinaire.

2021

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Evaluation des capacités de marche

frontiers in Neurology

ORIGINAL RESEARCH
published: 02 September 2020
doi: 10.3389/fneur.2020.00875

Consensus-Based Core Set of Outcome Measures for Clinical Motor Rehabilitation After Stroke—A Delphi Study

Johannes Pohl[1,2], Jeremia Philipp Oskar Held[1], Geert Verheyden[2], Margit Alt Murphy[3], Stefan Engelter[4,5], Agnes Flöel[6,7], Thierry Keller[8], Gert Kwakkel[9,10], Tobias Nef[11,12], Nick Ward[13,14], Andreas Rüdiger Luft[1,15] and Janne Marieke Veerbeek[1*]*

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Evaluation des capacités de marche

TABLE 2 | Core set of outcome measures for clinical motor rehabilitation after stroke.

	Body functions	Activities	Participation
Upper extremity	FMA	ARAT	SIS
Lower extremity	FMMA & 10MWT	TUG & BBS	SIS
ADL/ stroke-specific	NIHSS	BI/ FIM	SIS

**Measure only required for patients with a Functional Ambulation Categories score of ≥3/5.*

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Evaluation des capacités de marche

www.sralab.org/rehabilitation-measures

Shirley Ryan AbilityLab

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Rehabilitation Measures Database

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Sources Principales: AHA/ASA

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

Carolee J. Winstein and coll. *Stroke* **June 2016**

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Sources Principales: AHA/ASA

	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**
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

Carolee J. Winstein and coll. *Stroke* **June 2016**

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Sources Principales: AHA/ASA

Table 2. Definition of Classes and Levels of Evidence Used in AHA/ASA Recommendations

Class I	Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective
Class II	Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment
Class IIa	The weight of evidence or opinion is in favor of the procedure or treatment
Class IIb	Usefulness/efficacy is less well established by evidence or opinion

Carolee J. Winstein and coll. *Stroke* June 2016

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Sources Principales: KNGF

de Fysiotherapeut
Royal Dutch Society for Physical Therapy

KNGF Guideline
Stroke

Veerbeek and coll.

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Sources Principales: KNGF

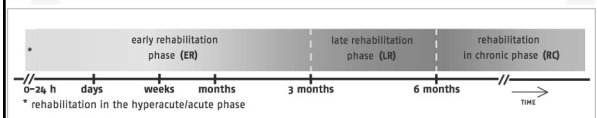

Figure 1. Timeline (non-linear) showing the various phases after a stroke.

Veerbeek and coll.

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Sources Principales: KNGF

- outcome measure(s) at the body function level and at the activities and participation levels of the ICF;
- outcome measure(s) at the body function level of the ICF;
- outcome measure(s) at the activities and participation levels of the ICF;

Veerbeek and coll.

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Sources Principales: KNGF

- ✓ phase for which the intervention was studied (with favorable effect);
- × phase for which the intervention was studied (with adverse effect);
- = phase for which the intervention was studied (no added value / added value unclear).

Tabel 2. Categorization of research findings according to level of evidence for interventional studies.

A1	Systematic reviews based on at least a few RCTs of A2 level, with consistent findings across individual studies.
A2	RCTs of sound methodological quality and sufficient size and consistency (PEDRO scores of 4 points or more).
B	RCTs of lower methodological quality and quasi-experimental studies (PEDRO scores of 3 points or less).
C	Non-comparative studies; pre-experimental studies.
D	Not supported by research studies. Expert opinion.

Veerbeek and coll.

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Pronostic capacité de marche

Predicting activities after stroke: what is clinically relevant?

G. Kwakkel[1,2,3]* and B. J. Kollen[4]

International Journal of Stroke © 2012

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Pronostic capacité de marche

Predicting activities after stroke: what is clinically relevant?

G. Kwakkel[1,2,3]* and B. J. Kollen[4]

International Journal of Stroke © 2012

« …many evidence-based therapies are heavily dependent on an appropriate selection of stroke patients that may benefit most from a particular intervention. »
e.g. CIMT

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Pronostic capacité de marche

Predicting activities after stroke: what is clinically relevant?

G. Kwakkel[1,2,3]* and B. J. Kollen[4]

International Journal of Stroke © 2012

« Hence, the establishment of an adequate prognosis by a stroke rehabilitation team will increase the efficiency of stroke services and reduce costs. »

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Pronostic capacité de marche

Predicting activities after stroke: what is clinically relevant?

G. Kwakkel[1,2,3]* and B. J. Kollen[4]

International Journal of Stroke © 2012

« From a patient's perspective, effective prognostics enable health care professionals to provide correct information to patients and their families. »

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Pronostic capacité de marche

Importance de:

- déficiences neurologiques initiales
- l'évolution au cours des premiers jours
- l'âge

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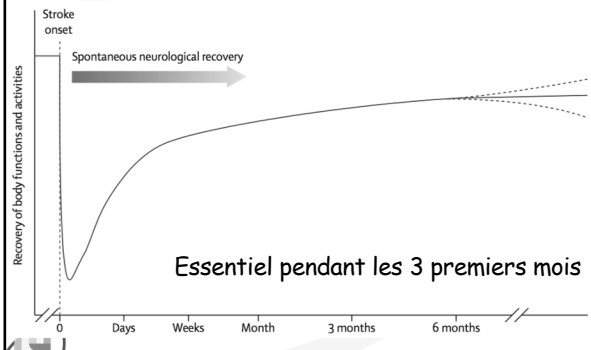
Pronostic capacité de marche



Essentiel pendant les 3 premiers mois

Langhorne, Lancet, 2011

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Pronostic capacité de marche

Domain	Determinants
walking ability	sitting balance
	motor function of leg
	initial ADL skills
	age
	homonymous hemianopia
	urinary incontinence
	premorbid walking ability
	premorbid ADL skills

Veerbeek and coll.

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Pronostic capacité de marche

Prognosis for walking ability 6 months after the stroke *16, 17*

It has been demonstrated that establishing an estimated prognosis for the patient's walking ability 6 months after the stroke requires their sitting balance (assessed with the sitting balance item of the Trunk Control Test) and the motor function of the leg (assessed with the Motricity Index) to be recorded as soon as possible, but preferably on day 2 after the stroke. (Level 1)

Veerbeek and coll.

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Pronostic capacité de marche

Trunk Control Test

TRUNK CONTROL ASSESSMENT		
TESTS (On bed)		SCORING
1 Rolling to weak side		0 – Unable to
2 Rolling to strong side		12 – Able to do with non-muscular help
3 Balance in sitting position		25 – Normal
4 Sitting up from lying down		
TRUNK SCORE [1 + 2 + 3 + 4] =		

Collin & Wade *Journal of Neurology, Neurosurgery, and Psychiatry* 1990;

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Pronostic capacité de marche

Motricity Index

Leg	Muscle Grading[a]
Ankle dorsiflexion From plantar-flexed position	0 = No movement 9 = Palpable contraction in muscle but no movement
Knee extension From 90° flexion of knee	14 = Movement seen but not full range against gravity 19 = Full range against gravity, not against resistance
Hip flexion From 90° flexion at hip	25 = Movement against resistance but weaker than other side 33 = Normal power

The scores for each limb have a maximum value of 99 + 1 = 100 points. The index is scored with patient in sitting position.

Collin & Wade *Journal of Neurology, Neurosurgery, and Psychiatry* 1990;

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Pronostic capacité de marche

80% de patients remarche > 3 mois

Evaluation précoce

- Équilibre assis
  Trunk Control Test - Sitting balance ≥ 25/100
- Parésie membre inférieur
  Motricity Index ≥ 25/100
  Fugl-Meyer Moteur Membre inférieur ≥ 19/34

Veerbeek and coll.

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Pronostic capacité de marche

The TWIST Algorithm Predicts Time to Walking Independently After Stroke

Marie-Claire Smith, BHSc[1], P. Alan Barber, Phd[1,2], and Cathy M. Stinear, PhD[1*]

Neurorehabilitation and Neural Repair 2017

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Pronostic capacité de marche

Table 1. Demographic and Clinical Characteristics.

Demographic Characteristics (n = 41)	n (%)
Age (years)	
Median age (range)	72 (43-96)
Stroke severity (NIHSS)	
NIHSS median (range)	8 (1-21)
Mild (NIHSS <5)	7 (17)
Moderate-Severe (NIHSS ≥5)	34 (83)
Stroke type	
Motor (M)	13 (32)
Motor-sensory (MS)	19 (46)
Motor-sensory-hemianopia (MSH)	9 (22)
Baseline FAC score (0-5)	
FAC median (range)	0 (0-2)
Nonambulatory (FAC = 0)	33 (80)
Dependent ambulation FAC (1, 2, 3)	8 (20)

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Pronostic capacité de marche

Evaluation à J3, Semaine 6, Semaine 12

Prédiction:
- Indépendance à la marche (FAC ≥ 4)
- Quand cette indépendance est acquise

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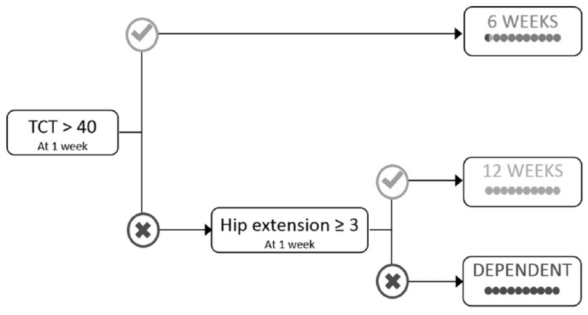
Pronostic capacité de marche



Neurorehabilitation and Neural Repair 2017

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Pronostic capacité de marche

Table 3. Sensitivity and Specificity of Time to Walk Independently after Stroke (TWIST) Algorithm.

	Independent by 6 Weeks	Independent by 12 Weeks	Dependent at 12 Weeks
Sensitivity, % (95% CI)	100 (84-100)	80 (28-99)	93 (68-100)
Specificity, % (95% CI)	90 (68-99)	100 (90-100)	100 (87-100)
PPV,[a] % (95% CI)	91 (73-98)	100 (40-100)	100 (77-100)
NPV,[b] % (95% CI)	100 (100-100)	97 (86-100)	96 (81-100)
Overall accuracy 95%	91% (21/23)	100% (4/4)	100% (14/14)

Neurorehabilitation and Neural Repair 2017

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Pronostic capacité de marche

Cerebrovascular disease

Original research | *J Neurol Neurosurg Psychiatry* 2021

Factors associated with time to independent walking recovery post-stroke

Caitlin Kennedy ,[1] Julie Bernhardt ,[2,3] Leonid Churilov ,[1] Janice M Collier ,[2] Fiona Ellery ,[2] Venesha Rethnam ,[2] Lilian B Carvalho ,[2,3] Geoffrey A Donnan ,[4,5] Kathryn S Hayward [2,3,6]

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Pronostic capacité de marche

Etude AVERT
2104 patients

Délai pour être capable de marcher 50 m sans aide
Suivi 3 mois

Kennedy, 2021

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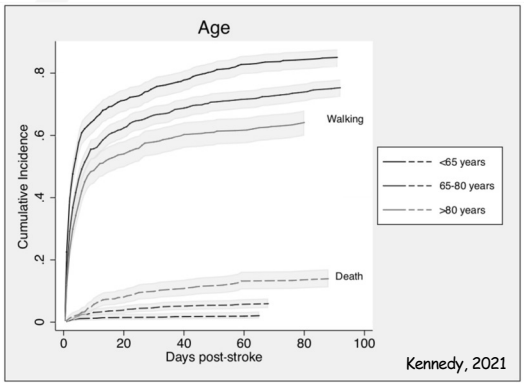
Pronostic capacité de marche



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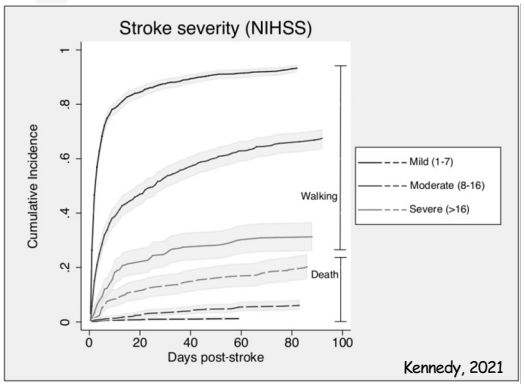
Pronostic capacité de marche



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Guidelines: principes généraux

Intensity of exercise training *5*

◐ It has been demonstrated that increasing the intensity of therapy (in terms of more hours of exercise) for patients with a stroke, compared to less intensive exercising, results in more rapid recovery of *selective movements*, *comfortable walking speed*, *maximum walking speed*, *walking distance*, *muscle tone*, *sitting and standing balance*, performance of *basic activities of daily living*, and *severity of depression and anxiety*. (Level 1)
Studied for ER (✓), LR (✓), RC (✓).

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Guidelines: principes généraux

Task specificity of training effects *6*

It has been demonstrated that training specific skills, such as exercising balance while standing and reaching to grasp objects, has a favorable effect on the specific skill being trained by stroke patients, in all phases of rehabilitation. Transfer to other skills, which were not specifically trained during the therapy, has however hardly been demonstrated. (Level 1)

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Guidelines: principes généraux

Context specificity of training effects *7*

It has been demonstrated that training stroke patients in a functional context has a favorable effect on learning specific movements or skills, regardless of the patient's rehabilitation phase. If possible, patients with a stroke should preferably be rehabilitated in their own domestic and community environment. (Level 1)

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Guidelines: principes généraux

Neurological exercise methods or treatment concepts (NDT/Bobath) *8*

- It has been demonstrated that neurological exercise methods or treatment concepts (NDT/Bobath) are no more effective for patients with a stroke at the body functions and activities levels than other treatment methods. (Level 1) Studied for ER (=), LR (=), RC (=).

Veerbeek and coll.

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Guidelines: principes généraux

Bobath – Brunnström - PNF

None of these so-called neurofacilitation approaches has been able to show better effect on motor performance after stroke than any other treatment method, and permanent improvements in walking performance are lacking.

Meyer and coll. *Stroke* **June 2015**

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Guidelines: principes généraux

Recommendations: Mobility	Class	Level of Evidence
Intensive, repetitive, mobility- task training is recommended for all individuals with gait limitations after stroke.	I	A

- Difficulté adaptée
- Variabilité
- Feedback
- Orientée vers la tâche
- Contexte fonctionnel

Carolee J. Winstein and coll. *Stroke* **June 2016**

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Guidelines: Tapis roulant +/- décharge

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Guidelines: Tapis roulant avec décharge

Intensité (# pas)
Mise en charge
Séance 20-30 min, par période de 5 min

Décharge < 40%
Vitesse 0.1-0.3 m s^{-1}
Adaptation progressive

FAC ≤ 3

Pénible pour les rééducateurs

Veerbeek and coll.

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Guidelines: Tapis roulant avec décharge

Body-weight supported treadmill training *49, 50*

◖ It has been demonstrated that body-weight supported treadmill training improves the *comfortable walking speed* and *walking distance* of patients with a stroke. (Level 1)
Studied for ER (✓) and RC (✓).

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Guidelines: Tapis roulant sans décharge

Intensité (# pas)
Mise en charge
Séance 20-30 min, par période de 5 min

Adaptation progressive

FAC ≥ 3

Aisé pour les rééducateurs

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Guidelines: Tapis roulant sans décharge

Treadmill training without body-weight support *53*

◖ It has been demonstrated that treadmill training without body-weight support is more effective in increasing *maximum walking speed* and *width of gait* than conventional gait training for patients with a stroke. (Level 1)
Studied for ER (✓), LR (✓) and RC (✓).

Veerbeek and coll. © 2014 Royal Dutch Society for Physical Therapy 63

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63

Guidelines: Tapis roulant +/- décharge

Recommendations: Mobility	Class	Level of Evidence
Practice walking with either a treadmill (with or without body-weight support) or overground walking exercise training combined with conventional rehabilitation may be reasonable for recovery of walking function.	IIb	A

Carolee J. Winstein and coll. *Stroke* June 2016

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Guidelines: Tapis roulant +/- décharge

Cochrane Library

Cochrane Database of Systematic Reviews

Treadmill training and body weight support for walking after stroke (Review)

Mehrholz J, Thomas S, Elsner B

2017 The Cochrane Collaboration

Cliniques universitaires Saint-Luc – Thierry Lejeune 65

65

Guidelines: Tapis roulant +/- décharge

56 RCT – 3105 sujets

Bien toléré

Augmente la vitesse et le périmètre de marche.
0.09 ms^{-1} - 20 m < MDC & MCID

N'augmente pas la capacité de marche.

Cliniques universitaires Saint-Luc – Thierry Lejeune 66

66

Guidelines: Robot

68

Guidelines: Robot

Confortable pour les rééducateurs

Intensité

Coût

FAC ≤ 3

69

Guidelines: Robot

Robot-assisted gait training *51, 52*

◐ It has been demonstrated that robot-assisted gait training for stroke patients who are unable to walk independently improves their *comfortable walking speed, maximum walking speed, walking distance, heart rate, sitting and standing balance, walking ability* and performance of *basic activities of daily living*, compared to conventional therapy (including overground walking). (Level 1)

70

Guidelines: Robot

Recommendations: Mobility	Class	Level of Evidence
Robot-assisted movement training to improve motor function and mobility after stroke in combination with conventional therapy may be considered.	IIb	A

71

Guidelines: Robot

Cochrane Library

Cochrane Database of Systematic Reviews

Electromechanical-assisted training for walking after stroke (Review)

Mehrholz J, Thomas S, Werner C, Kugler J, Pohl M, Elsner B

Cochrane Database of Systematic Reviews 2020, Issue 10.

72

Guidelines: Robot

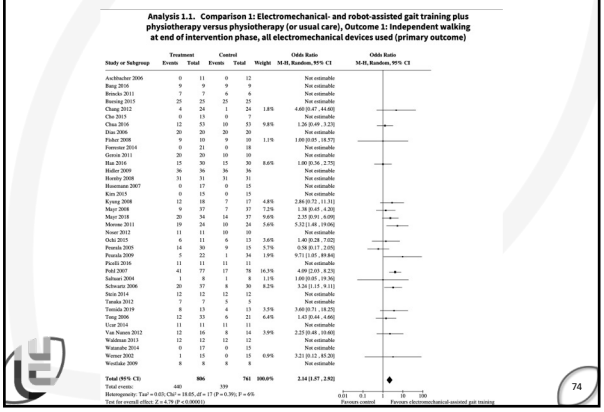
2017: 36 RCT – 1472 sujets
2020: 62 RCT – 2440 sujets

Bien toléré

73

Guidelines: Robot

Analysis 1.1. Comparison 1: Electromechanical- and robot-assisted gait training plus physiotherapy versus physiotherapy (or usual care), Outcome 1: Independent walking at end of intervention phase, all electromechanical devices used (primary outcome)

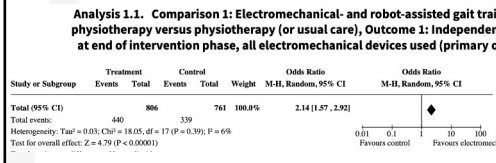


74

74

Guidelines: Robot

Analysis 1.1. Comparison 1: Electromechanical- and robot-assisted gait training plus physiotherapy versus physiotherapy (or usual care), Outcome 1: Independent walking at end of intervention phase, all electromechanical devices used (primary outcome)

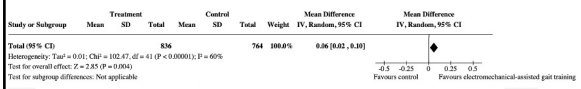


Augmente la capacité de marche (robot & rééducation).
NNT 8

75

Guidelines: Robot

Analysis 1.3. Comparison 1: Electromechanical- and robot-assisted gait training plus physiotherapy versus physiotherapy (or usual care), Outcome 3: Walking velocity (metres per second) at end of intervention phase

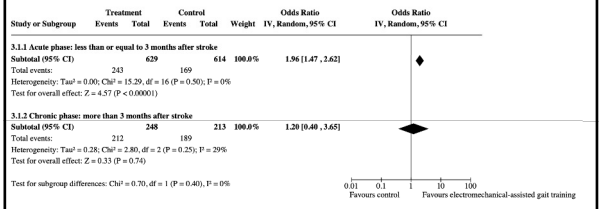


N'augmente que peu la vitesse et le périmètre de marche.

76

Guidelines: Robot

Analysis 3.1. Comparison 3: Subgroup analysis comparing participants in acute and chronic phases of stroke, Outcome 1: Independent walking at end of intervention phase, all electromechanical devices used



Phase aiguë et subaiguë

77

Guidelines: Robot

Review
2020

Effects of robotic gait training after stroke: A meta-analysis☆

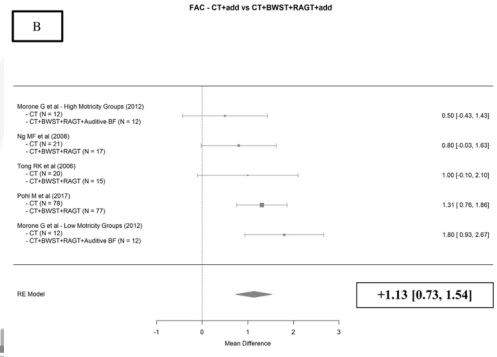
Geoffroy Moucheboeuf [a,b], Romain Griffier [c], David Gasq [d,e], Bertrand Glize [a,b], Laurent Bouyer [f], Patrick Dehail [a,b], Helene Cassoudesalle [a,b,*]

[a] Service de Médecine Physique et Réadaptation, Pôle de neurosciences cliniques, Centre Hospitalier Universitaire de Bordeaux, Bordeaux, France
[b] HACS team-U1219 INSERM Bordeaux Population Health & University of Bordeaux, Bordeaux, France
[c] Department of Public Health, Faculty of medicine, University of Bordeaux, Bordeaux, France
[d] Toulouse NeuroImaging Center (ToNIC), Université de Toulouse & Inserm, Toulouse, France
[e] Department of Functional Physiological Explorations, University Hospital of Toulouse, Toulouse, France
[f] Department of Rehabilitation, Faculty of Medicine, Université Laval, Québec, Canada

78

Guidelines: Robot

FAC - CT+add vs CT+BWST+RAGT+add



Level of heterogeneity I²=19.45%, r = 0

79

Guidelines: Robot

These present findings suggest that the use of RAGT associated with CT and BWST would improve the efficiency of walking rehabilitation after stroke, with significant gait speed, FAC and BBS improvements.

RAGT seems more relevant for the most dependent patients, especially those walking under 0.20 $m.s^{-1}$ (self-selected walking speed) and who need human assistance to walk.

80

Guidelines: Robot

Augmente l'indépendance à la marche en phase subaiguë
N'augmente pas la vitesse de marche

Quid du groupe contrôle?
Effet similaire si intensité équivalente?

Type de robot ?
Pas d'argument en faveur d'un dispositif

81

Guidelines: Réalité virtuelle

82

Guidelines: Réalité virtuelle

Mobility training in virtual reality *58*

- It remains unclear whether virtual reality mobility training is more effective than other interventions for patients with a stroke in terms of *comfortable and maximum walking speed*, *spatiotemporal gait parameters* and *walking ability.* (Level 1) Studied for RC (=).

Veerbeek and coll.

83

Guidelines: Réalité virtuelle

Research Report

Effect of Virtual Reality Training on Balance and Gait Ability in Patients With Stroke: Systematic Review and Meta-Analysis

Ilona J.M. de Rooij, Ingrid G.L. van de Port, Jan-Willem G. Meijer

Physical Therapy Volume 96 Number 12 December 2016

84

Guidelines: Réalité virtuelle

21 RCT - 516 sujets

8 tapis roulant
13 exercices debout

85

Guidelines: Réalité virtuelle

Immersive ou non
Jeu
Répétition
Tâche spécifique
Motivation
Challenge
Adaptation

Adhérence

86

Guidelines: Réalité virtuelle

Ratio # patients / # rééducateurs

Feedback: intrinsèque et extrinsèque

Feedback augmenté:
concurrent pendant l'exercice
sur la performance à la fin de l'exercice

87

Guidelines: Réalité virtuelle

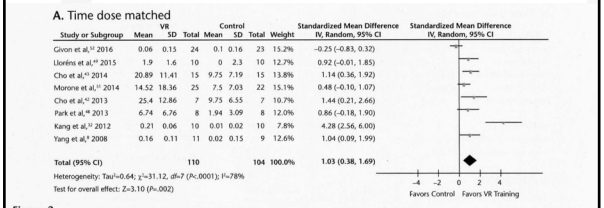


Figure 2.
Forest plot of the pooled results of the effect of VR training on gait speed in (A) time dose–matched studies (n=214) and (B) studies in which VR was additional to conventional therapy (n=24). VR=virtual reality, IV=inverse variance, CI=confidence interval.

Augmente la vitesse de marche.

88

Guidelines: Réalité virtuelle

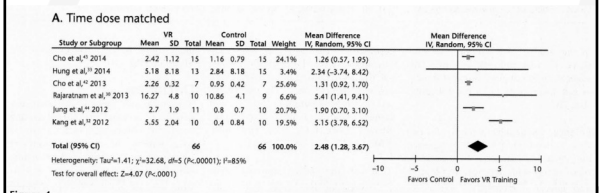


Figure 4.
Forest plot of the pooled results for the effect of VR training on Timed "Up & Go" Test in (A) time dose–matched studies (n=132) and (B) studies in which VR was additional to conventional therapy (n=20). VR=virtual reality, IV=inverse variance, CI=confidence interval.

Augmente la capacité de marche.

89

Guidelines: Réalité virtuelle

Cochrane Library
Cochrane Database of Systematic Reviews

Virtual reality for stroke rehabilitation (Review)

Laver KE, Lange B, George S, Deutsch JE, Saposnik G, Crotty M

2017

90

Guidelines: Réalité virtuelle

Réalité virtuelle et jeu vidéo interactif

72 RCT - 2470 sujets

Critère de jugement principal : membre supérieur

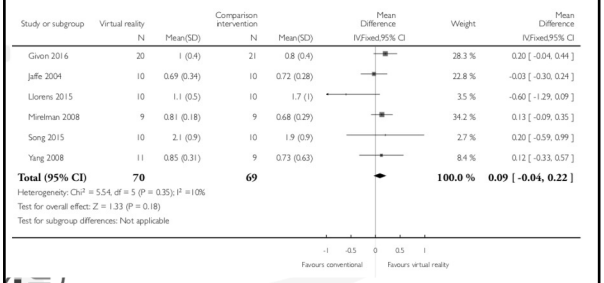
Peu de données, de faible qualité

2017

91

Guidelines: Réalité virtuelle

Vitesse de marche



92

Guidelines: entraînement en circuit & atelier

93

Guidelines: entraînement en circuit & atelier

5 min par station

1 rééducateur / 3 patients

Effet groupe - interaction

FAC ≥ 3

Veerbeek and coll.

94

Guidelines: entraînement en circuit & atelier

Circuit class training for walking and other mobility-related functions and activities *59*

◐ It has been demonstrated that circuit class training (CCT) for walking and other mobility-related functions and activities improves walking *distance/speed*, *sitting and standing balance* and *walking ability*, and *reduces inactivity* in patients with a stroke. (Level 1)
Walking distance/speed studied for ER (✓), LR (✓) and RC (✓), sitting and standing balance for ER (✓), LR (✓) and RC (✓), walking ability for ER (✓), LR (✓), and RC (✓), and inactivity for LR (✓) and RC (✓).

95

Guidelines: entraînement en circuit & atelier

Recommendations: Mobility	Class	Level of Evidence
Group therapy with circuit training is a reasonable approach to improve walking.	IIa	A

Carolee J. Winstein and coll. *Stroke* **June 2016**

96

Guidelines: entraînement en circuit & atelier

Cochrane Library

Cochrane Database of Systematic Reviews

Circuit class therapy for improving mobility after stroke (Review)

English C, Hillier SL, Lynch EA **2017 The Cochrane Collaboration**

97

Guidelines: entraînement en circuit & atelier

17 RCT – 1297 sujets

Bien toléré
Pas de risque de chute supérieur
(RD 0.03, 95% CI -0.02 to 0.08, GRADE: very low).

98

Guidelines: entraînement en circuit & atelier

Intensité – répétitif
Niveau de difficulté adapté progressivement
Orienté vers la tâche

Ratio # patients / # rééducateurs

Effet groupe – relation sociale

99

Guidelines: entraînement en circuit & atelier

Comparison 1. Circuit class therapy versus other

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 6mWT early and late	10	835	Mean Difference (IV, Fixed, 95% CI)	60.86 [44.55, 77.17]
1.1 Early	4	487	Mean Difference (IV, Fixed, 95% CI)	46.56 [21.35, 71.77]
1.2 Late	6	348	Mean Difference (IV, Fixed, 95% CI)	71.15 [49.76, 92.54]
2 Gait speed early and late	8	744	Mean Difference (IV, Fixed, 95% CI)	0.15 [0.10, 0.19]
2.1 Early	2	437	Mean Difference (IV, Fixed, 95% CI)	0.17 [0.10, 0.25]
2.2 Late	6	307	Mean Difference (IV, Fixed, 95% CI)	0.13 [0.07, 0.19]
3 Cadence	2	50	Mean Difference (IV, Random, 95% CI)	13.57 [7.52, 19.62]
4 Timed Up and Go	5	488	Mean Difference (IV, Fixed, 95% CI)	-3.62 [-6.09, -1.16]
5 Rivermead Mobility Index	2	296	Mean Difference (IV, Fixed, 95% CI)	0.56 [0.17, 0.95]
6 Functional Ambulation Classification	3	469	Odds Ratio (M-H, Random, 95% CI)	1.91 [1.01, 3.60]

Augmente le périmètre, la vitesse et la capacité de marche.
Phase chronique

100

Guidelines: entraînement en circuit & atelier

Comparison 1. Circuit class therapy versus other

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
11 VO2 peak	2	103	Mean Difference (IV, Fixed, 95% CI)	2.81 [0.90, 4.72]
12 Steps per day	2	206	Mean Difference (IV, Fixed, 95% CI)	1325.66 [411.09, 2240.22]

Augmente l'activité physique et la condition physique.

101

Guidelines: autorééducation

Walking and other mobility-related functions and activities exercised under the supervision of an informal caregiver *60*

◖ It has been demonstrated that exercising walking and other mobility-related functions and activities under the supervision of an informal caregiver improves the performance of *basic activities of daily living* for the patient with a stroke, and reduces the *perceived burden of care for the informal caregiver.* (Level 1)
Studied for ER (✓).

Veerbeek and coll.

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Guidelines: autorééducation

Review Article

ASNR AMERICAN SOCIETY OF NEURORREHABILITATION

Neurorehabilitation and Neural Repair
2021, Vol. 35(12) 1043–1058

DOI: 10.1177/15459683211048773
journals.sagepub.com/home/nnr
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Self-Rehabilitation for Post-Stroke Motor Function and Activity–A Systematic Review and Meta-Analysis

Gauthier Everard, MSc[1,2], Alexandre Luc, MSc[1], Ioannis Doumas, MD[1,2,3], Khawla Ajana, MSc[4], Gaëtan Stoquart, PhD[1,2,3], Martin Gareth Edwards, PhD[2,4], and Thierry Lejeune, PhD[1,2,3]

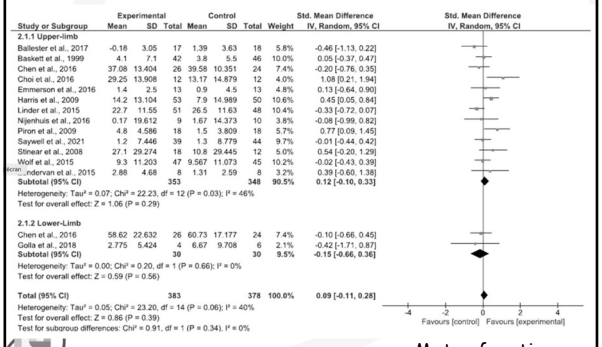
103

Guidelines: autorééducation

In this review, we define self-rehabilitation as a tailored therapy program where for most of the time, the patient performs rehabilitation exercises independently to the presence of a clinician.

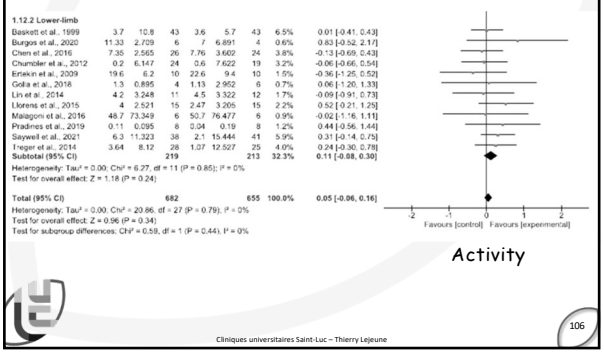
104

Guidelines: autorééducation



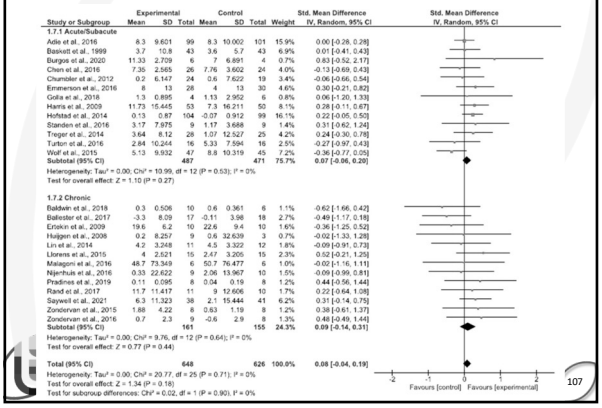
105

Guidelines: autorééducation



106

Guidelines: autorééducation



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Guidelines: autorééducation

Review Article

ASNR AMERICAN SOCIETY OF NEURORADIOLOGY

Neurorehabilitation and Neural Repair
2021, Vol. 35(12) 1043–1058
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Self-Rehabilitation for Post-Stroke Motor Function and Activity–A Systematic Review and Meta-Analysis

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This meta-analysis showed low to moderate evidence that self-rehabilitation and conventional therapy efficacy was equally valuable for post-stroke motor function and activity.

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Plan

- Introduction
- Recommandations de bonne pratique
- Pronostic
- Rééducation de la marche: principes généraux
- Rééducation de la marche: méthodes spécifiques
- Conclusion

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Conclusion

Non exhaustif

Nombre de RCT augmente
Qualité des RCT augmente ⟶ RS & Meta-Analyses

Possibilité de prédire la récupération

Efficacité de la rééducation à la marche après un AVC

Approche fonctionnelle, intensive, variabilité, feedback
Nouvelles technologies (Robot, RV)
Nouvelles approches (Groupes & Atelier)

110

Cliniques universitaires SAINT-LUC UCL BRUXELLES

UCL Université catholique de Louvain

Thierry Lejeune

EBM dans la rééducation de la locomotion
Accident Vasculaire Cérébral

Questions ?

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