Evidence-based on advanced therapy

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Trusted evidence.
Informed decisions.
Better health.

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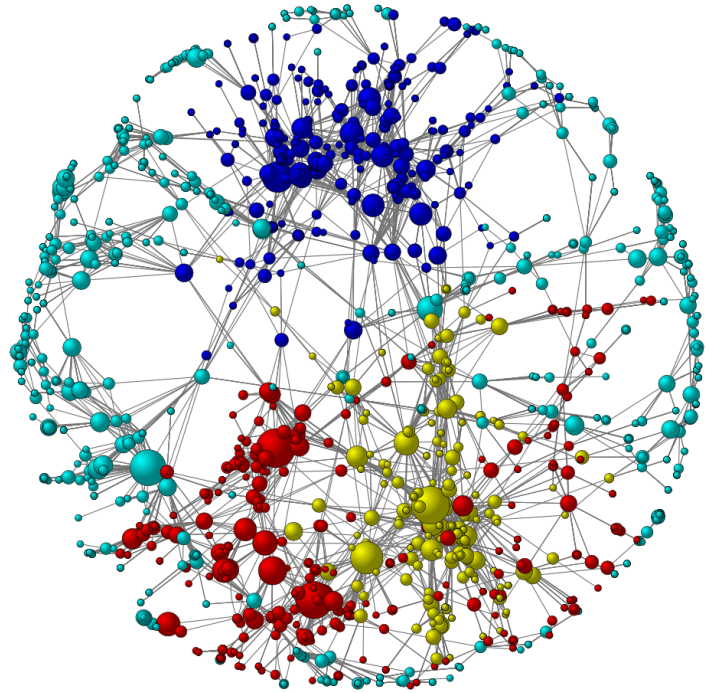

12 Cochrane Fields and Networks

1. Cochrane Child Health
2. Cochrane Complementary Medicine
3. Cochrane Consumer Network
4. Cochrane Global Ageing
5. Cochrane Global Mental Health
6. Cochrane Insurance Medicine
7. Cochrane Neurosciences
8. Cochrane Nursing Care
9. Cochrane Nutrition
10. Cochrane Pre-hospital and Emergency Care
11. Cochrane Primary Care
12. Cochrane Rehabilitation

Vision

All rehabilitation professionals can apply Evidence Based Clinical Practice

Decision makers will be able to take decisions according to the best and most appropriate evidence

Mission

Allow all rehabilitation professionals to combine the best available evidence as gathered by high quality Cochrane systematic reviews, with their own clinical expertise and the values of patients

Improve the methods for evidence synthesis, to make them coherent with the needs of disabled people and daily clinical practice in rehabilitation.

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Goals

1. To connect stakeholders and individuals involved in production, dissemination, and implementation of evidence based clinical practice in rehabilitation, creating a global network
2. To undertake knowledge translation for Cochrane on reviews relevant to rehabilitation, with dissemination to stakeholders, in line with Cochrane's knowledge translation strategy
3. To develop a register of Cochrane and non-Cochrane systematic reviews relevant to rehabilitation

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Goals

4. To promote Evidence Based Clinical Practice and provide education and training on it and on systematic review methods to stakeholders
5. To review and strengthen methodology relevant to Evidence Based Clinical Practice to inform both rehabilitation and other Cochrane work related to rehabilitation and stimulating methodological developments in other Cochrane groups
6. To promote and advocate for Evidence Based Clinical Practice in rehabilitation to other Cochrane groups and wider rehabilitation stakeholders

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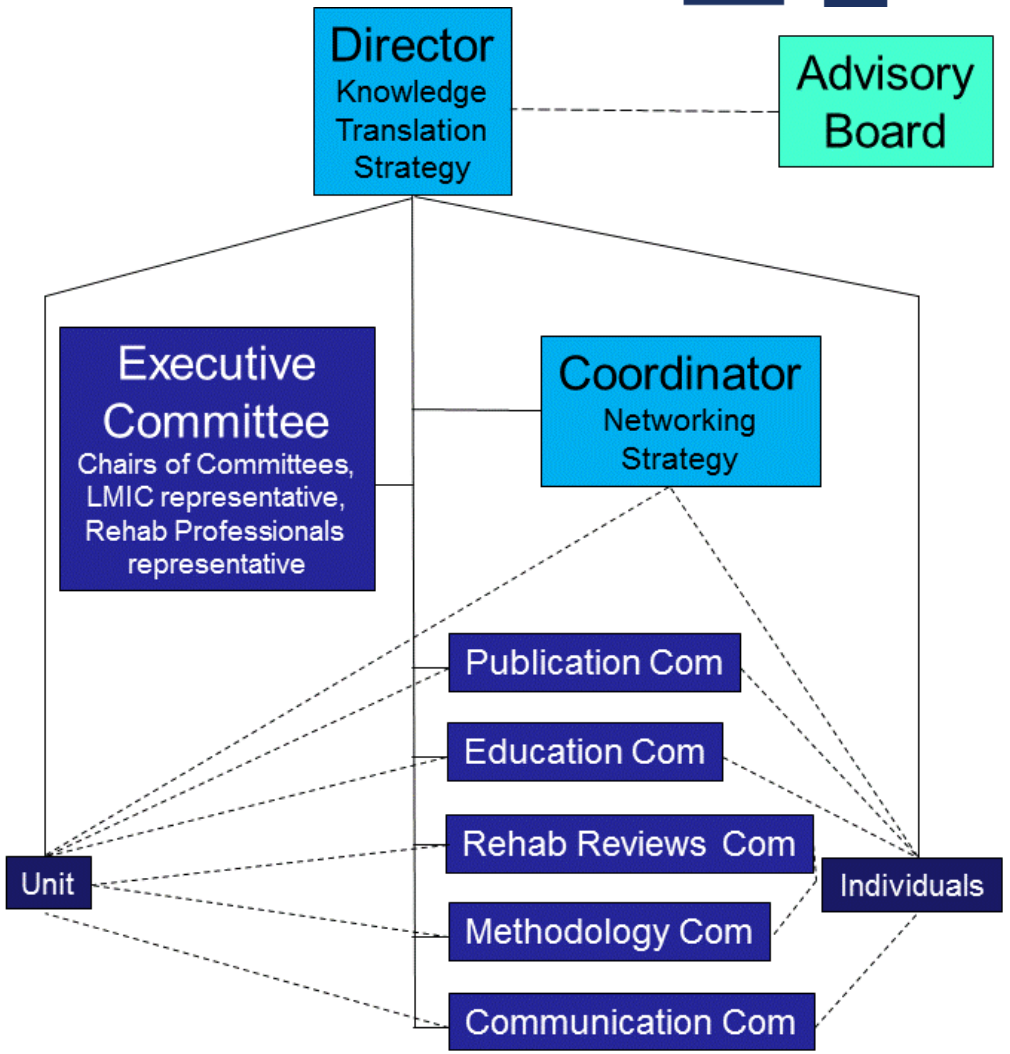
Cochrane Rehabilitation Internal organization



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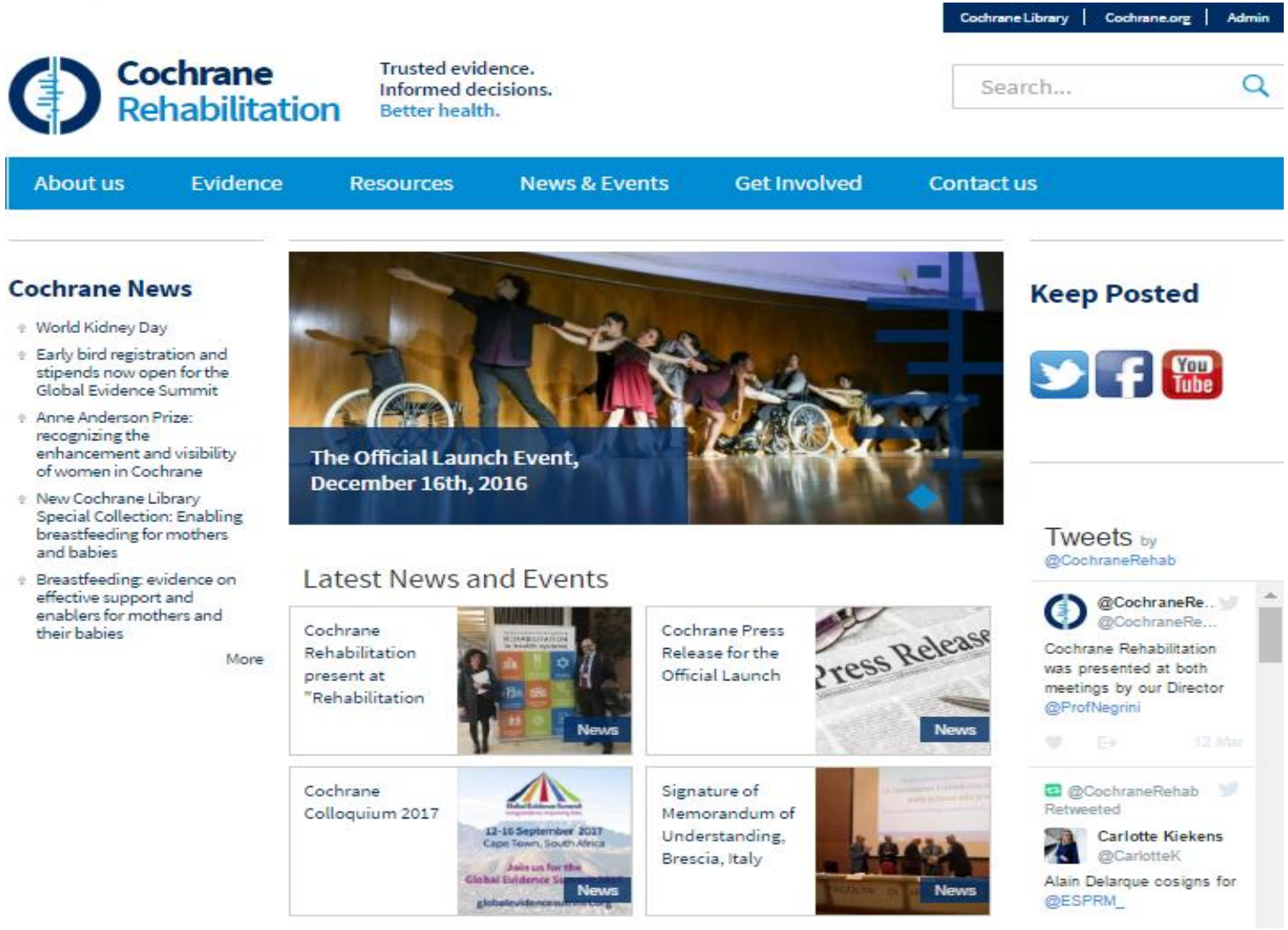
Website



EBM Cycle

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Evidence-based on advanced therapy

There is a decision to make…

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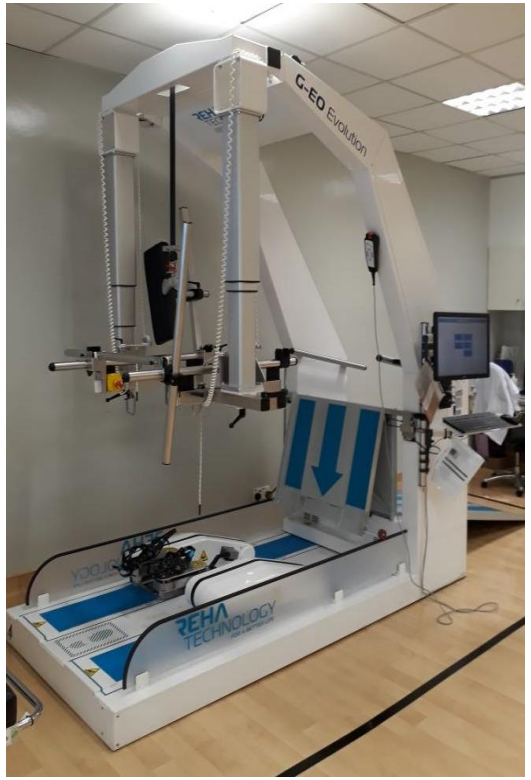


Locomotor training

Step training

- Train them how to step well
- Coordinated step, adequate speed
- Provide sensory input specific to waking

Overground training

- Patient stands and walks on level surfaces

Community training

Locomotor training

Role of spinal cord in the control of walking

Intense repetitive training can lead to coordinated stepping response

Provide sensory experience of walking – the right way of walking

(compared to gait training)

Activity-based therapy

Aim is independent community walking without aids or compensatory movements

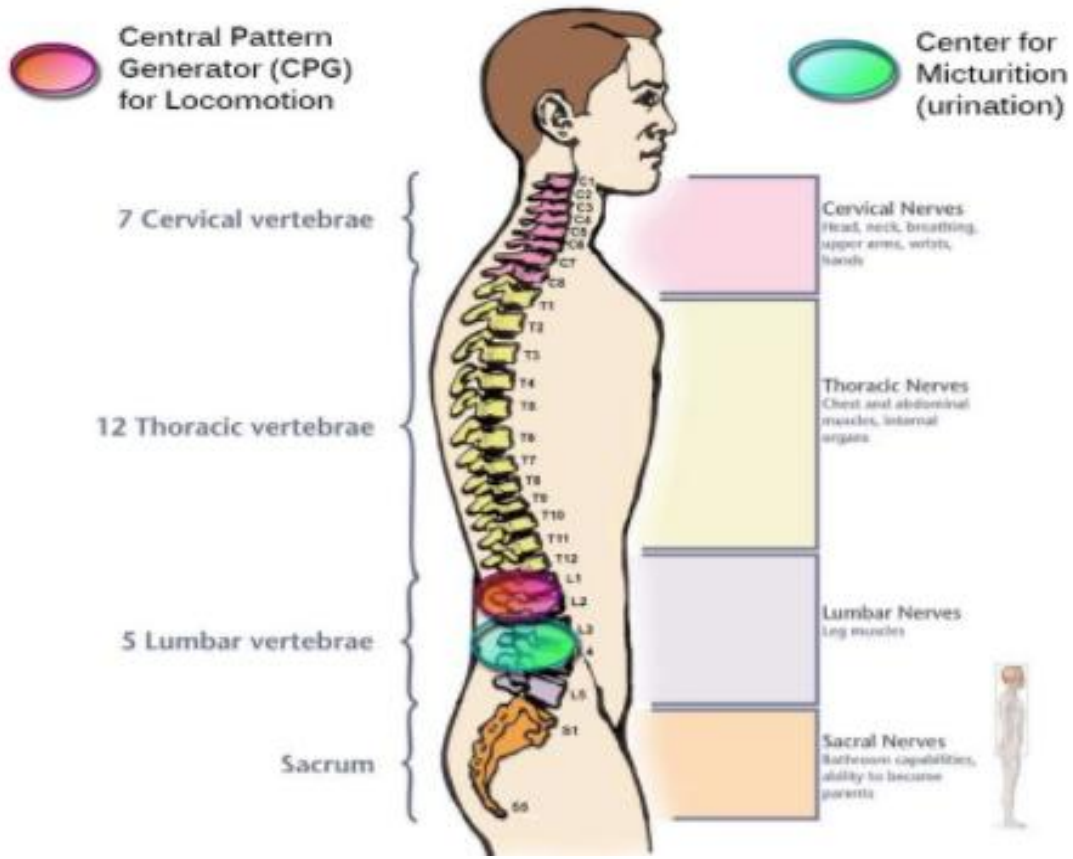
Physiological basis of locomotor training

Focuses on retraining the motor function via plastic change

Enhances the afferent input to the spinal cord an activates the central pattern generators (CPGs) embedded within the lumbosacral spinal cord

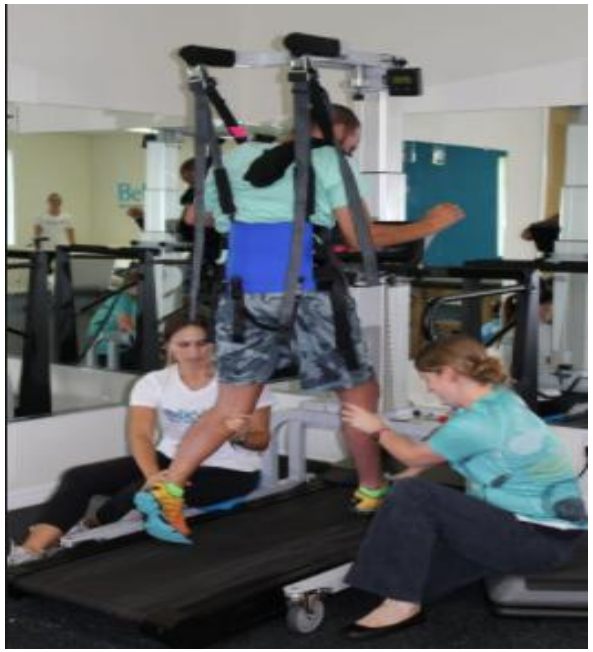
Plastic changes in the spinal cord and sensory motor cortex

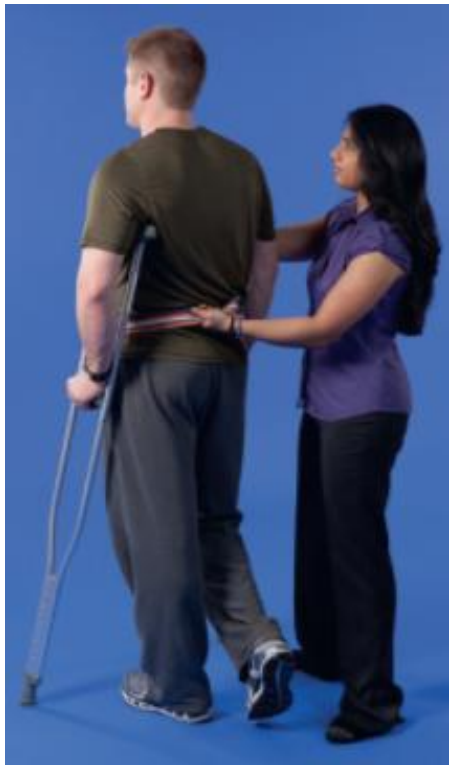
Only in incomplete injury



Hubli & Dietz, The Physiological basis of neurorehabilitation locomotor training after SCI 2013

Other forms of therapy





Advantages & disadvantages of robotics locomotor training

Early initiation in severely dependent persons

Able to increase the intensity and duration of training while maintaining a physiological gait pattern

Biofeedback system

Reduces personnel cost

Expensive to buy

Expensive to maintain (software licensing / updates)

Trained personnel

Space

Access

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Finding the evidence

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P - Persons with SCI

I – Robotics Gait Training

C – Other forms of physiotherapy

O – Impairment (strength), Activity (walking Speed, distance, safety)

Methods

- Developed search strategy
  - Search terms & databases
  - (Locomotor, gait, walking, ambulat*, Robotics – paraplegia, SCI, paralysis)
- Published systematic reviews of locomotor therapy in person with SCI

Study ID/ year	Population	Intervention	Comparison	Outcome(s)
Mehrholz et al 2017	Any age ,gender type of traumatic SCI, time post injury, level of initial walking ability	BWSTT and robotic gait training	Overground gait training and any other forms of physiotherapy	Walking speed and walking distance
Nam et al 2017	Acute & chronic, Traumatic & non-traumatic, non progressive, Incomplete spinal cord injury (AIS B,C,D), Variable walking ability	RAGT (Lokomat)	Other exercise / physiotherapy (BWS gait training or no treatment)	Gait distance (2 and 6min) Gait velocity (m/s), LEMS FIM-L, WISCI, spasticity & TUG
Tefertiller et al. 2011	Adults with stroke, SCI, TBI, MS and PD	Robotic locomotor training (Lokomat , Lokohelp Gait trainer)	Overground training, FES	Walking speed (10MWT, 5MWT , 25FWT) Walking endurance (capacity to cover a distance in a defined time) 6MWT, 2MWT Time measures of functional mobility TUG (Timed Up and Go) Level of independence • SCIM • WISCI • WISCI II

Study ID	N studies	N participants	Treatment protocol	Robotics intervention	Treatment duration
Mehrholz 2017	5 studies RCTs (3 studies)	344 (141)	varies	Varies	Varies
Nam et al 2017	10 studies RCTs	502	30-60mins; 3-5X per week	Lokomat	varies
Tefertiller et al. 2011	13 studies **2 RCTs** and 11 non-RCTs (3 CR, 4 CS, 2PP, 1CC & 1 cohort)	51	45 mins, 5x week	Lokomat	12 weeks

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Tefertiller et al. 2011

Table 6.
Spinal cord injury studies: Characteristics of randomized controlled trials (RCTs).

Article	Study Type	PEDro Rating	Sample Size	Device Type	Daily Intensity & Weekly Frequency	Treatment Duration	Total No. of Sessions
Field-Fote et al., 2005 [1]	RCT	4	27	Lokomat	45 min, 5×/wk	12 wk	44.5 (mean)
Nooijen et al., 2009 [2]	RCT	4	51	Lokomat	45 min, 5×/wk	12 wk	50.0 ± 6.6

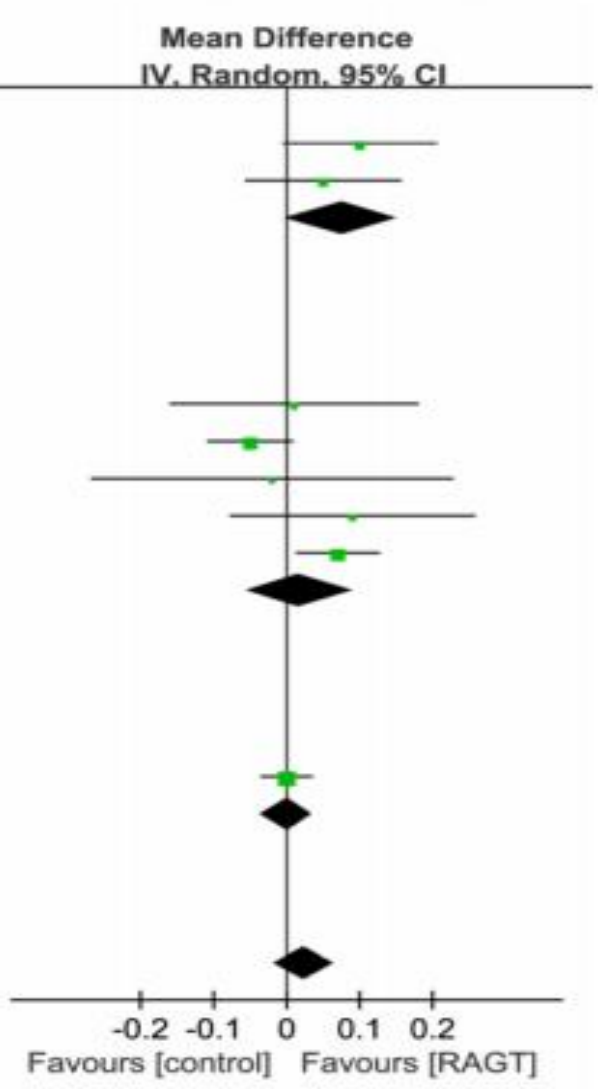
Table 10.
Spinal cord injury (SCI) studies: Outcomes.

Article	Intervention	Gait Outcomes	Other Outcomes	Results
Field-Fote et al., 2005 [1]	TM, TM + FES, OG + FES, LR	6MWT, 2MWT	Step length, step ratio	Significant ↑ in walking speed across all subjects; differences between groups not statistically significant; 85% ↑ in speed with slower initial walking speed (<0.1 m/s); Only 9% ↑ in faster walking speed group (>0.1 m/s); Step length increased in all groups except LR; LR had greatest ↑ in symmetry.
Nooijen et al., 2009 [2]	TM, TM + FES, OG + FES, LR	Gait Rite: Cadence, step length, stride length, SI	Intralimb coordination, knee extension onset with hip cycle	↑ gait quality in all groups after training; no significant between-group differences found for any parameters; interaction effect showing least amount of step and stride length changes in LR group.

NAM et al. 2017 – Gait velocity with time since injury

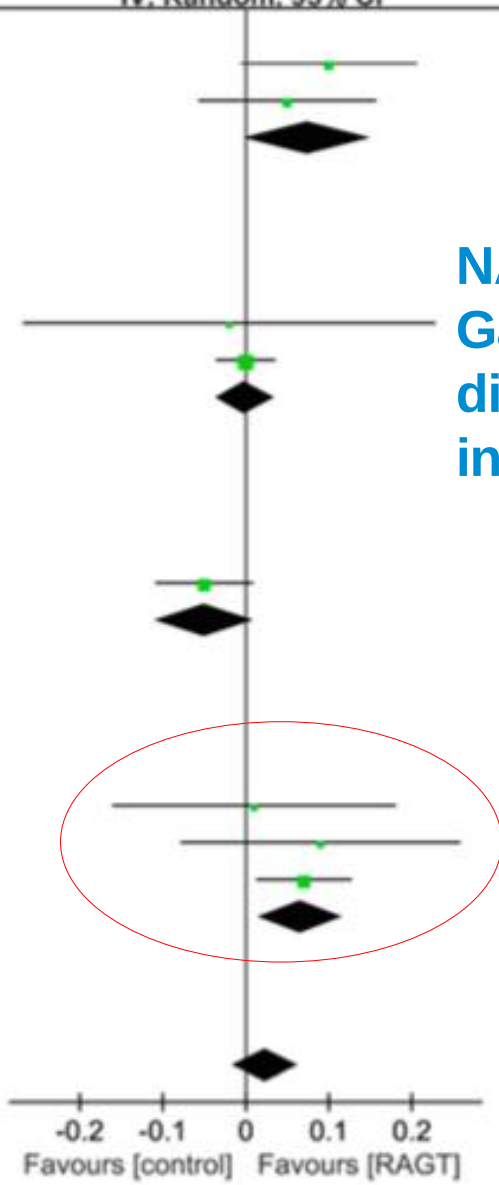
a

Study or Subgroup	RAGT Mean	RAGT SD	RAGT Total	Control Mean	Control SD	Control Total	Weight	Mean Difference IV, Random, 95% CI
2.1.1 <6months								
Alcobendas-Maestro 2012	0.1	0.22	28	0	0.19	30	10.3%	0.10 [-0.01, 0.21]
Esclarin-Ruz 2014	0.16	0.2	36	0.11	0.26	36	10.2%	0.05 [-0.06, 0.16]
Subtotal (95% CI)			**64**			**66**	**20.4%**	**0.08 [-0.00, 0.15]**
Heterogeneity: Tau² = 0.00; Chi² = 0.42, df = 1 (P = 0.52); I² = 0%								
Test for overall effect: Z = 1.96 (P = 0.05)								
2.1.2 >12months								
Duffell 2015	0.07	0.33	27	0.06	0.31	27	4.9%	0.01 [-0.16, 0.18]
Field-Fote 2011	0.01	0.08	14	0.06	0.15	50	19.9%	-0.05 [-0.11, 0.01]
Labruyere 2014	0.04	0.21	5	0.06	0.17	4	2.5%	-0.02 [-0.27, 0.23]
Niu 2014	0.08	0.3	20	-0.01	0.24	20	5.0%	0.09 [-0.08, 0.26]
Varoqui 2014	0.08	0.07	15	0.01	0.09	15	20.3%	0.07 [0.01, 0.13]
Subtotal (95% CI)			**81**			**116**	**52.5%**	**0.02 [-0.05, 0.09]**
Heterogeneity: Tau² = 0.00; Chi² = 8.99, df = 4 (P = 0.06); I² = 56%								
Test for overall effect: Z = 0.50 (P = 0.62)								
2.1.3 Unknown								
Tang 2014	0.01	0.05	15	0.01	0.05	15	27.0%	0.00 [-0.04, 0.04]
Subtotal (95% CI)			**15**			**15**	**27.0%**	**0.00 [-0.04, 0.04]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 0.00 (P = 1.00)								
Total (95% CI)			**160**			**197**	**100.0%**	**0.02 [-0.02, 0.06]**
Heterogeneity: Tau² = 0.00; Chi² = 12.53, df = 7 (P = 0.08); I² = 44%								
Test for overall effect: Z = 1.16 (P = 0.25)								
Test for subgroup differences: Chi² = 3.13, df = 2 (P = 0.21), I² = 36.2%								



b

Study or Subgroup	RAGT Mean	RAGT SD	RAGT Total	Control Mean	Control SD	Control Total	Weight	Mean Difference IV, Random, 95% CI
3.1.1 OGT								
Alcobendas-Maestro 2012	0.1	0.22	28	0	0.19	30	10.3%	0.10 [-0.01, 0.21]
Esclarin-Ruz 2014	0.16	0.2	36	0.11	0.26	36	10.2%	0.05 [-0.06, 0.16]
Subtotal (95% CI)			64			66	20.4%	**0.08 [-0.00, 0.15]**
Heterogeneity: Tau² = 0.00; Chi² = 0.42, df = 1 (P = 0.52); I² = 0%								
Test for overall effect: Z = 1.96 (P = 0.05)								
3.1.2 Strength								
Labruyere 2014	0.04	0.21	5	0.06	0.17	4	2.5%	-0.02 [-0.27, 0.23]
Tang 2014	0.01	0.05	15	0.01	0.05	15	27.0%	0.00 [-0.04, 0.04]
Subtotal (95% CI)			20			19	29.5%	**-0.00 [-0.04, 0.04]**
Heterogeneity: Tau² = 0.00; Chi² = 0.02, df = 1 (P = 0.88); I² = 0%								
Test for overall effect: Z = 0.02 (P = 0.98)								
3.1.3 BWS								
Field-Fote 2011	0.01	0.08	14	0.06	0.15	50	19.9%	-0.05 [-0.11, 0.01]
Subtotal (95% CI)			14			50	19.9%	**-0.05 [-0.11, 0.01]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 1.66 (P = 0.10)								
3.1.4 No intervention								
Duffell 2015	0.07	0.33	27	0.06	0.31	27	4.9%	0.01 [-0.16, 0.18]
Niu 2014	0.08	0.3	20	-0.01	0.24	20	5.0%	0.09 [-0.08, 0.26]
Varoqui 2014	0.08	0.07	15	0.01	0.09	15	20.3%	0.07 [0.01, 0.13]
Subtotal (95% CI)			62			62	30.1%	**0.07 [0.01, 0.12]**
Heterogeneity: Tau² = 0.00; Chi² = 0.51, df = 2 (P = 0.78); I² = 0%								
Test for overall effect: Z = 2.50 (P = 0.01)								
Total (95% CI)			160			197	100.0%	**0.02 [-0.02, 0.06]**
Heterogeneity: Tau² = 0.00; Chi² = 12.53, df = 7 (P = 0.08); I² = 44%								
Test for overall effect: Z = 1.16 (P = 0.25)								
Test for subgroup differences: Chi² = 11.58, df = 3 (P = 0.009), I² = 74.1%								



NAM et al. 2017 – Gait velocity with different interventions

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NAM et al.
2017 – Gait distance

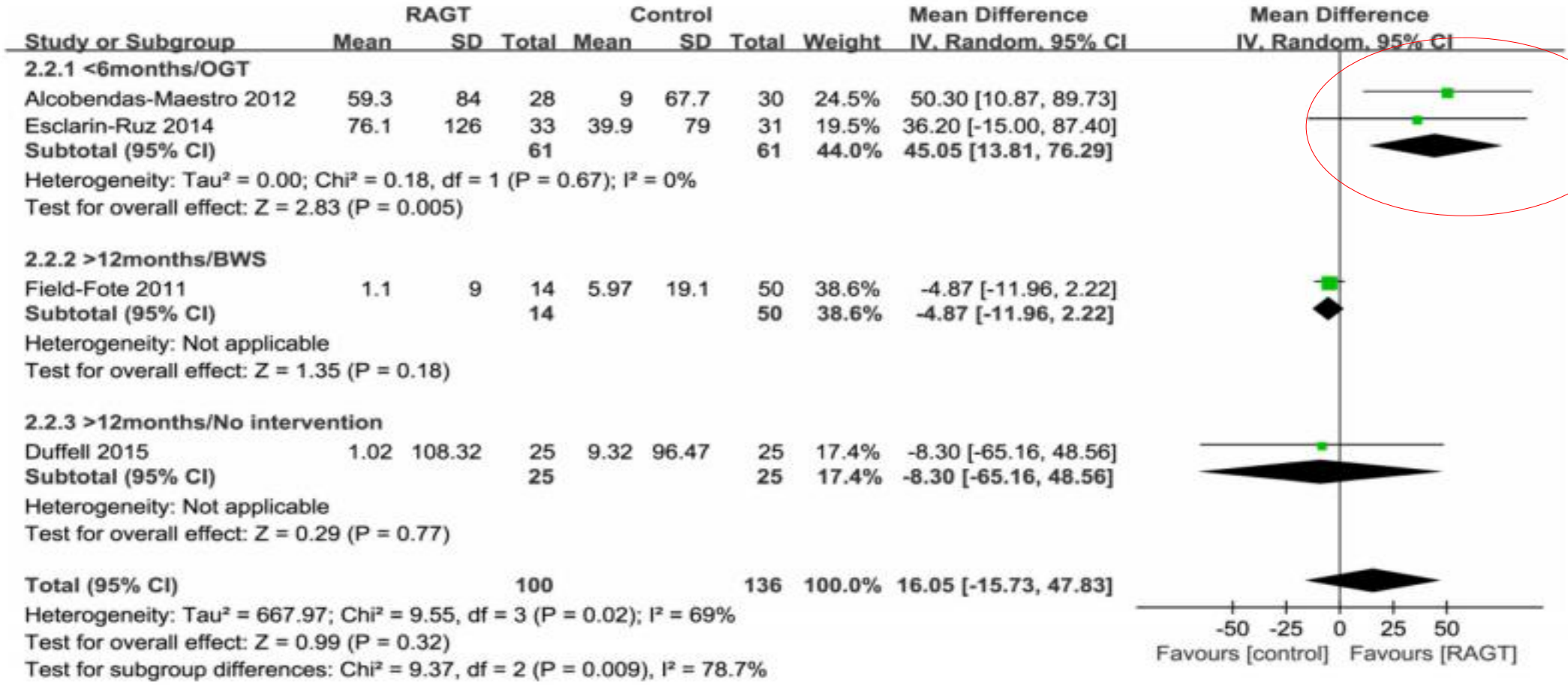

Fig. 3 Weighted mean difference (95% CI) of the effect of RAGT compared with control on gait distance by pooling data from 4 trials ($n = 298$) with subgroup analysis by time since injury (acute < 6 months, chronic > 12 months) and type of intervention (BWS, OGT, and no intervention) in people with SCI

Mehrholz et al

RAGT – 5 RCTs and 344 participants

Walking speed: 3 trials with 141 participants

Walking distance: 3 trials with 141 participants

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Mehrholz et al. 2017

Table 3 Details of the interventions and outcomes from each trial included in the meta-analysis for comparison no. 2 comparing robotic-assisted gait training with overground training and other forms of physiotherapy (Figures 4 and 5)

Study	*Robotic group*	*Overground group*	*Outcomes*
Esclarin-ruz *et al.*[15]	Robotic-assisted gait training and overground training	Overground gait training	Walking speed Walking capacity
Field-fote and Roach[18]	Robotic-assisted gait training with BWSTT	Overground gait training with FES and BWS	Walking speed Walking capacity
Hornby *et al.*[20]	Robotic-assisted gait training on a treadmill	Overground gait training with FES	Walking speed Walking capacity
Shin *et al.*[26]	Robotic-assisted gait training	Overground gait training	No useable data[a]
Labruyere *et al.*[21]	Robotic-assisted gait training	Strength training of lower limbs (without gait training)	No useable data[b]

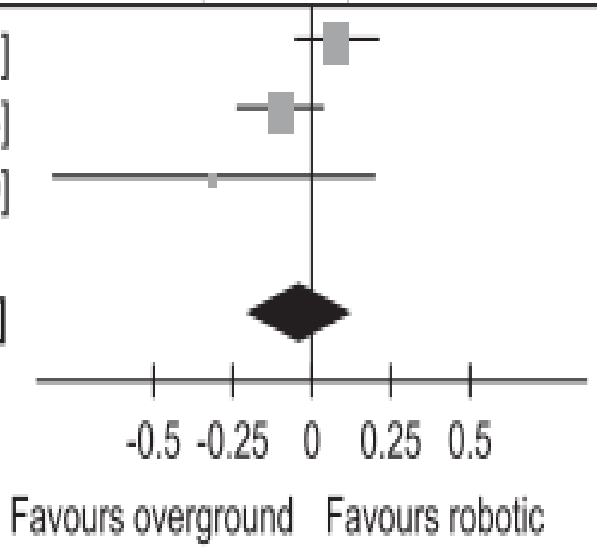
Abbreviations: BWS, body-weight support; BWSTT, body-weight-supported treadmill training; FES, functional electrical stimulation.
[a]This study did not include measures of walking speed or walking capacity.
[b]This study was a cross-over trial but did not provide the data from the first period only. The data provided in the study were therefore not useable.

Mehrholz et al.
2017 – Walking speed

Study or Subgroup	Robotics Mean	SD	Total	Overground Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI	Risk of Bias A B C
Esclarin-Ruz 2014	0.5	0.28	44	0.42	0.36	44	45.7%	0.08 [-0.05, 0.21]	+ + +
Field-Fote 2011	0.18	0.1	15	0.28	0.28	18	44.9%	-0.10 [-0.24, 0.04]	? ? +
Hornby 2007	0.51	0.65	10	0.82	0.507	10	9.4%	-0.31 [-0.82, 0.20]	? ? ?
Total (95% CI)			**69**			**72**	**100.0%**	**-0.04 [-0.21, 0.13]**	

Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 4.63$, df = 2 (P = 0.10); $I^2 = 57\%$

Test for overall effect: Z = 0.43 (P = 0.66)



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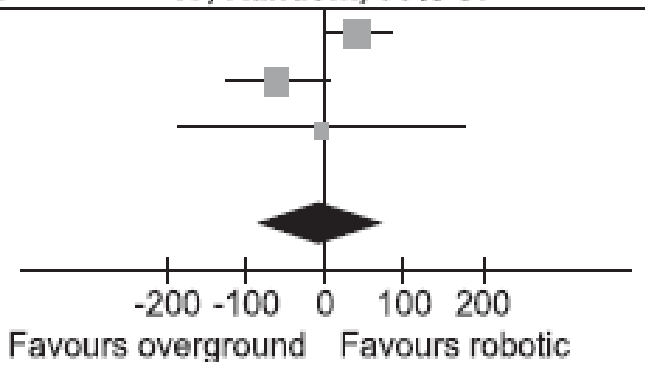
Mehrholz et al. 2017 – Walking distance

	Robotics			Overground				Mean Difference	Mean Difference	Risk of Bias
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI	A B C
Esclarin-Ruz 2014	172.51	96.65	44	132.52	107.2	44	46.6%	39.99 [-2.66, 82.64]		+ + +
Field-Fote 2011	53.7	35.7	15	114.9	138.3	18	39.2%	-61.20 [-127.60, 5.20]		? ? +
Hornby 2007	245	246.82	10	250.67	158.67	10	14.2%	-5.67 [-187.53, 176.19]		? ? ?
Total (95% CI)			**69**			**72**	**100.0%**	**-6.14 [-85.92, 73.63]**		

Heterogeneity: Tau² = 3079.47; Chi² = 6.35, df = 2 (P = 0.04); I² = 68%

Test for overall effect: Z = 0.15 (P = 0.88)



Improvement in the walking speed

- 0.07m/s (Nam et al)

Improvement in distance covered

- 45m (Nam et al) (Acute SCI)

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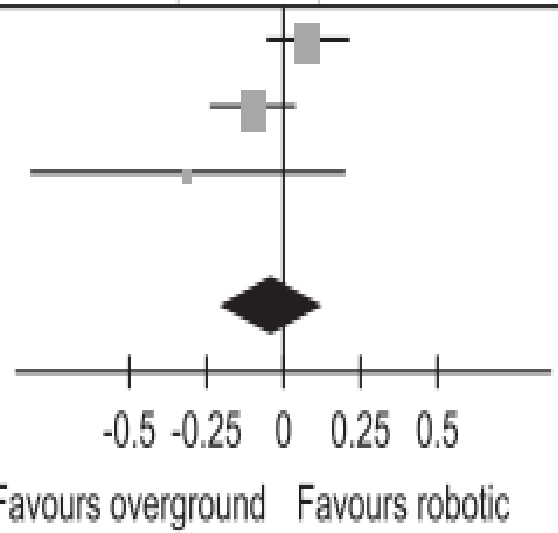
Possible improvements

	Robotics			Overground				Mean Difference	Mean Difference	Risk of Bias
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI	A B C
Esclarin-Ruz 2014	0.5	0.28	44	0.42	0.36	44	45.7%	0.08 [-0.05, 0.21]		+ + +
Field-Fote 2011	0.18	0.1	15	0.28	0.28	18	44.9%	-0.10 [-0.24, 0.04]		? ? +
Hornby 2007	0.51	0.65	10	0.82	0.507	10	9.4%	-0.31 [-0.82, 0.20]		? ? ?
Total (95% CI)			**69**			**72**	**100.0%**	**-0.04 [-0.21, 0.13]**		

Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 4.63$, df = 2 (P = 0.10); $I^2 = 57\%$

Test for overall effect: Z = 0.43 (P = 0.66)



Possible increase in walking speed (0.13m/s) with Robotics compared to OGT

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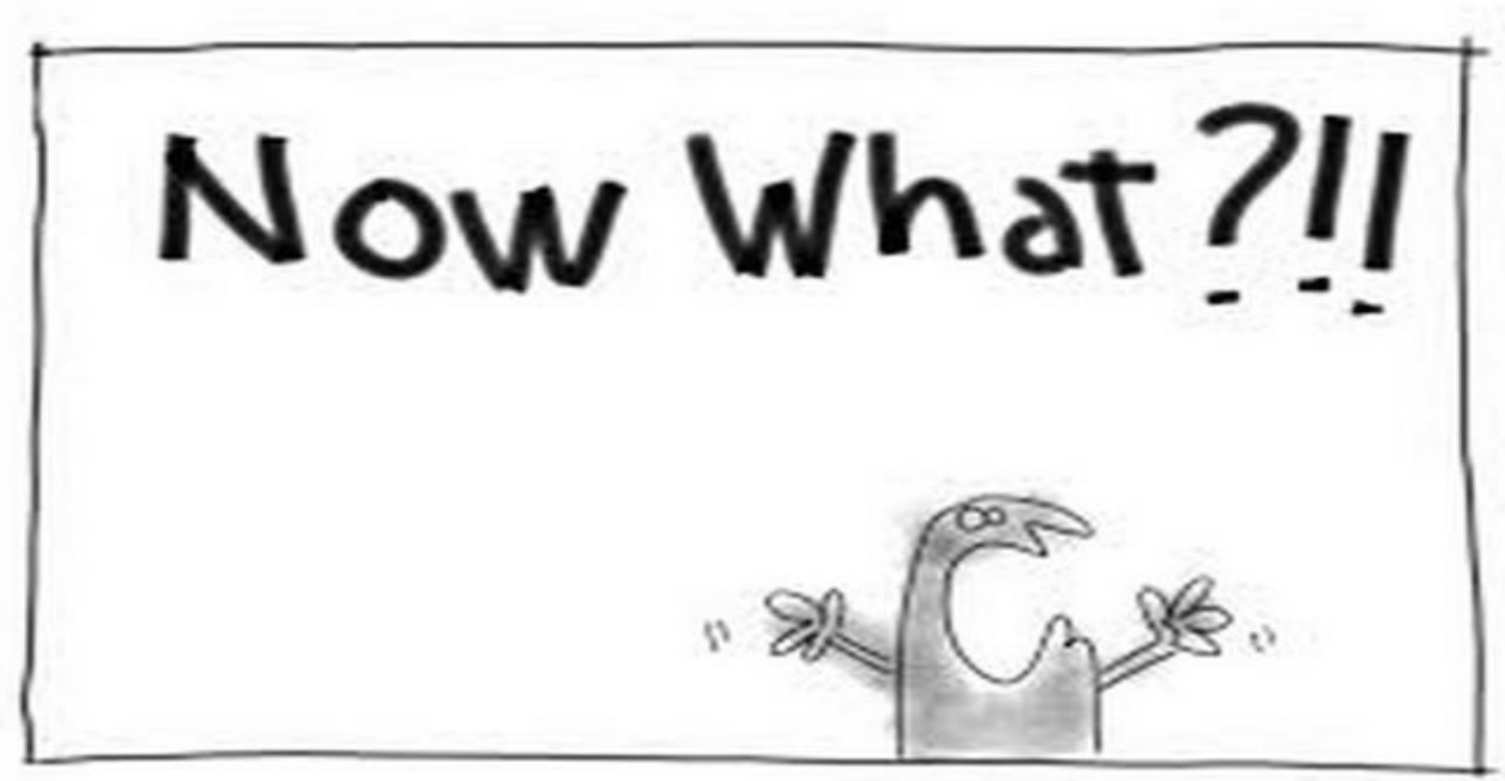

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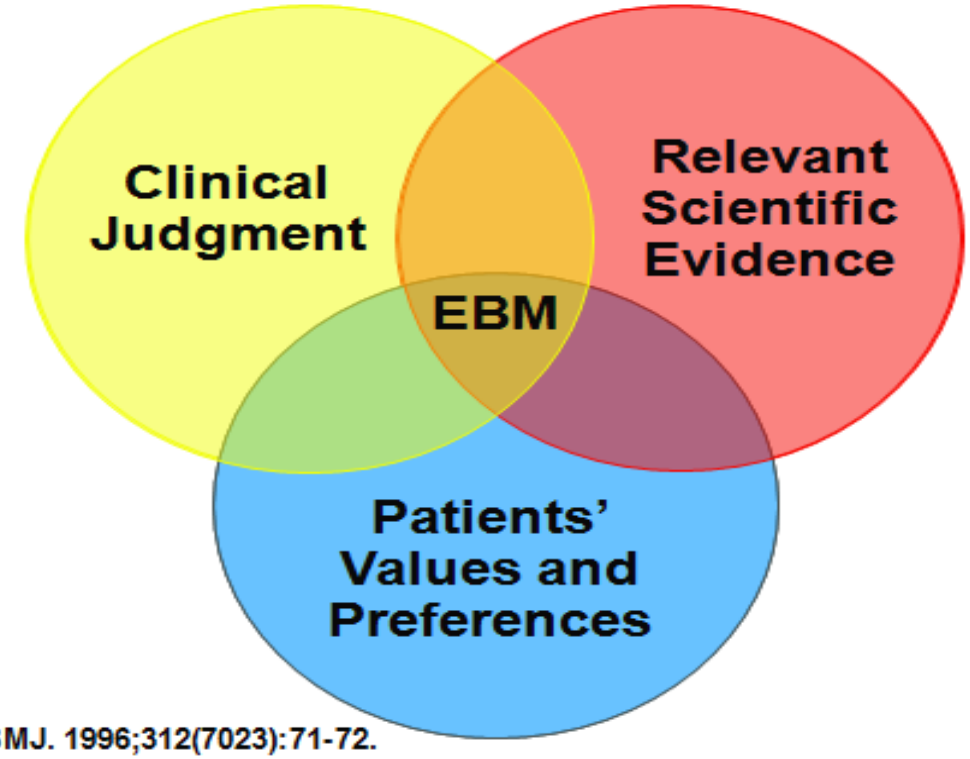
What Is Evidence-Based Medicine?



Sackett DL, et al. BMJ. 1996;312(7023):71-72.

Your clinical judgement

Local context

Patient preferences and values

The differences in the outcome

What does 0.13 m/s improvement mean?

What does USD3,000 means to them?

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THANK YOU

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