

A summary and overview of physiotherapy options when rehabilitating walking in early stroke

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Why walking in stroke

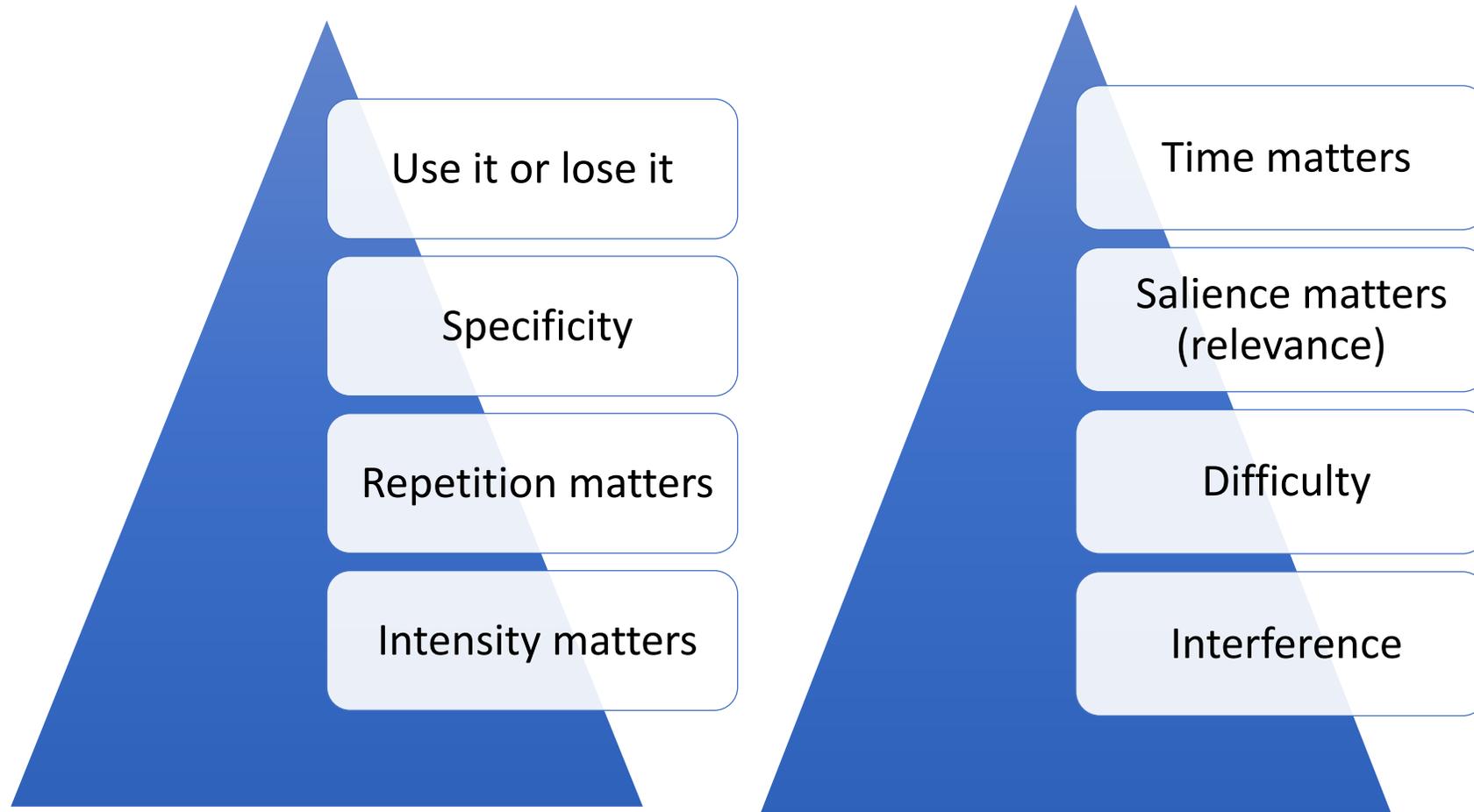
- The most pressing goal that patients want to achieve in rehabilitation (Mudge & Stott 2007)
- High proportion of stroke patients have limited walking ability impacting on their ability to access the community.
- Regaining the ability to walk at speed is one of the main goals of people post stroke. (Mehrholz 2018)

Physiotherapist's role in rehabilitation

- Rehabilitation is a process where the therapist aims to create an environment with appropriate behavioural demands that support the patient to re-learn motor skills.
- Motor re-learning is inextricably linked to experience dependent neuronal plasticity which augments functional recovery after stroke.
- Our understanding of the principles underpinning the optimal components required to support this learning process is developing.

(Levin 2014, Winstein 2015, Kleim and Jones 2012)

Clinical issues (Kleim and Jones 2012)



Kleim 2012

- The most powerful driver of plasticity is experience.

“Training a stroke patient to walk is like training a young healthy person for the Olympics”



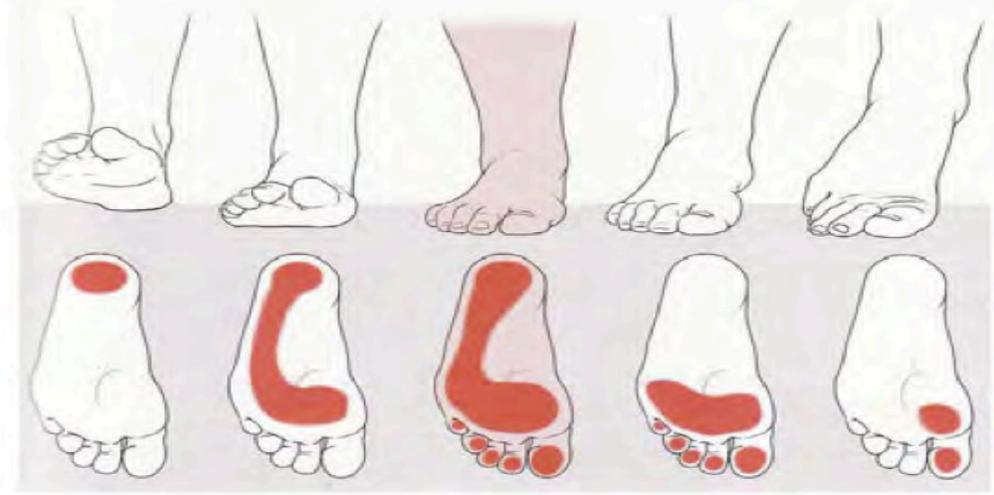
Principles of Motor Learning (Levin 2014, Winstein 2015)

Repetitive, varied practice of meaningful tasks.	Ensure challenging and meaningful
Progressive task difficulty according to users ability	Address interfering changeable impairments
Problem solving to engage cognitive and executive function	Preserve natural goal directness in movement organisation
Individual motivation	Ensure active patient involvement and opportunities for self direction
Sensory feedback that is related to the task.	Drive task specific self confidence through performance accomplishments
Positive feedback about task performance and task accomplishment	
Salient negative feedback	

How can orthotics support physiotherapists in creating an environment for motor learning in stroke:

- Early experience of standing up against gravity reducing degrees of freedom and providing a stable aligned base to build extensor activity.
- Joint protection allowing a therapist to work independently and carers to support early transfers and walking.
- Access to supported stance and swing phase in walking allowing practice in a variety of settings and with professionals and family.
- Patient engagement and mood allowing meaningful practice.

Considerations to explore in stroke patient:



The foot

- the entire neurophysiology and anatomical architecture of the foot are designed to support the complex task of bipedal postural control.
- not a rigid base of support supporting the ankle axis pendulum model but compliant active and sensitive to minute perturbations.
- 100 muscles requiring activation and stimulation through functional free standing, step and stance.
- Provides dynamic sensory feedback supporting the persons ability to build a sensory frame of reference for movement.

Does the creation of a fixed foot position in an orthotic/walking boot limit these roles?

How can we mitigate this?

Considerations to explore in stroke patient:

- Propulsion and active gastroc and soleus at terminal stance.
 - Power generation is an important element of functional walking impacting on speed and swing initiation.
 - Active soleus and gastrocnemius essential to forward propulsion, swing initiation and power generation in healthy walking.
- Sit to stand as a pre requisite to independent walking
 - An opportunity to functionally strengthen in rehabilitation.
 - Creates adaptive active lengthening of gastroc and soleus in function

Summary

- The use of orthotics as with any other clinical intervention needs to be clinically reasoned and individualized in its approach.
- Orthotics for people with stroke can support aspects of motor learning principles of
 - Practice
 - Repetition
 - Meaningful patient focused rehabilitation.
 - Patient involvement and motivation
- The use of a lower limb orthotic may interfere with the elements of motor learning principles including:
 - Addressing interfering impairments
 - Preserving goal directness of movement
 - Salient negative feedback
 - Sensory feedback that is related to the task
- Early use of soft and scotch walking boots supports the physiotherapist in making decisions around orthotics referral.
- Orthotics need to be considered as part of a package of rehabilitation one of the tools in our black box to be used in conjunction with other approaches. The prescription of an orthotic does not preclude the investigation of potential for free walking