

SCHOUDERPIJN NA CVA

Tips, tricks and pitfalls

Anke Van Bladel – SNV - 2024

CONTENT

DEEL 1 : Specifieke problemen BL en schouder na CVA

DEEL 2 : Belangrijke componenten voor de preventie en behandeling van de hemiplegische schouder(pijn)



- **85%** of all persons after stroke experience UL impairments
- **5-20%** show functional recovery by 6 months post-stroke
- **33-60%** show little to no recovery by 6 months post-stroke



- **75%** of persons post-stroke can walk independently by 6 months post-stroke



BL BEPERKINGEN MET EFFECT OP DE SCHOUDER

Paresis: combination of muscle weakness and impaired coordination and timing of muscle activation.

Selective movements: Reduced ability to perform different movements in the joints of one limb.

Changes in muscle tone

Hypotonia

Hypertonia

Somatosensory deficits (primary or secondary)



BL BEPERKINGEN MET EFFECT OP DE SCHOUDER

Paresis: combination of muscle weakness and impaired coordination and timing of muscle activation.

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Essential to perform a movement



BL BEPERKINGEN MET EFFECT OP DE SCHOUDER

Paresis: combination of muscle weakness and impaired coordination and timing of muscle activation.

Selective movements: Reduced ability to perform different movements in the joints of one limb.



Acuut < 7 dagen	Subacuut < 4.5 maanden	Chronisch > 6 maanden
Schouder abductie + Vinger extensie (MRC; 0-10)	Fugl Meyer BL (0-66)	Fugl Meyer BL (0-66)
Ernstig: 0-4 Gemiddeld: 5-7 Mild: > 7	Ernstig: 0-22 Gemiddeld: 23-50 Mild: 50-66	Ernstig: 0-28 Gemiddeld: 29-42 Mild: 43-66



BL BEPERKINGEN MET EFFECT OP DE SCHOUDER

Changes in muscle tone

Hypotonia

Hypertonia

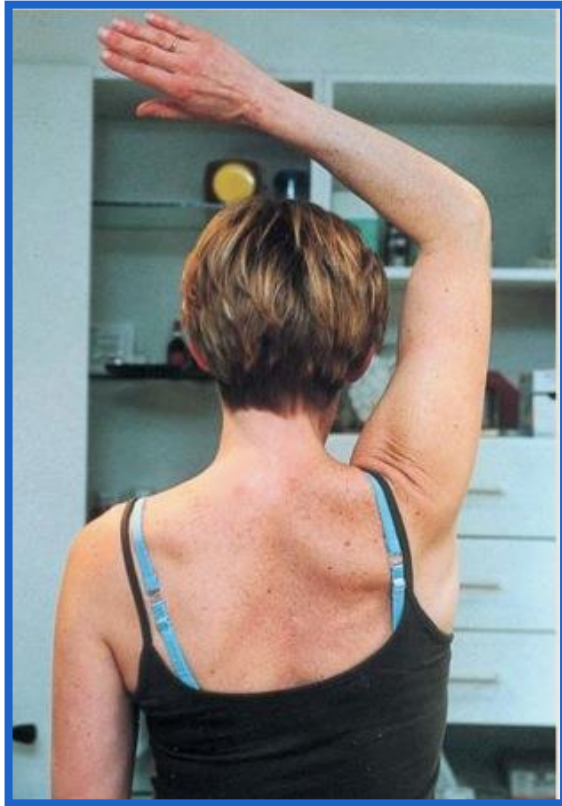
Somatosensory deficits (primary or secondary)



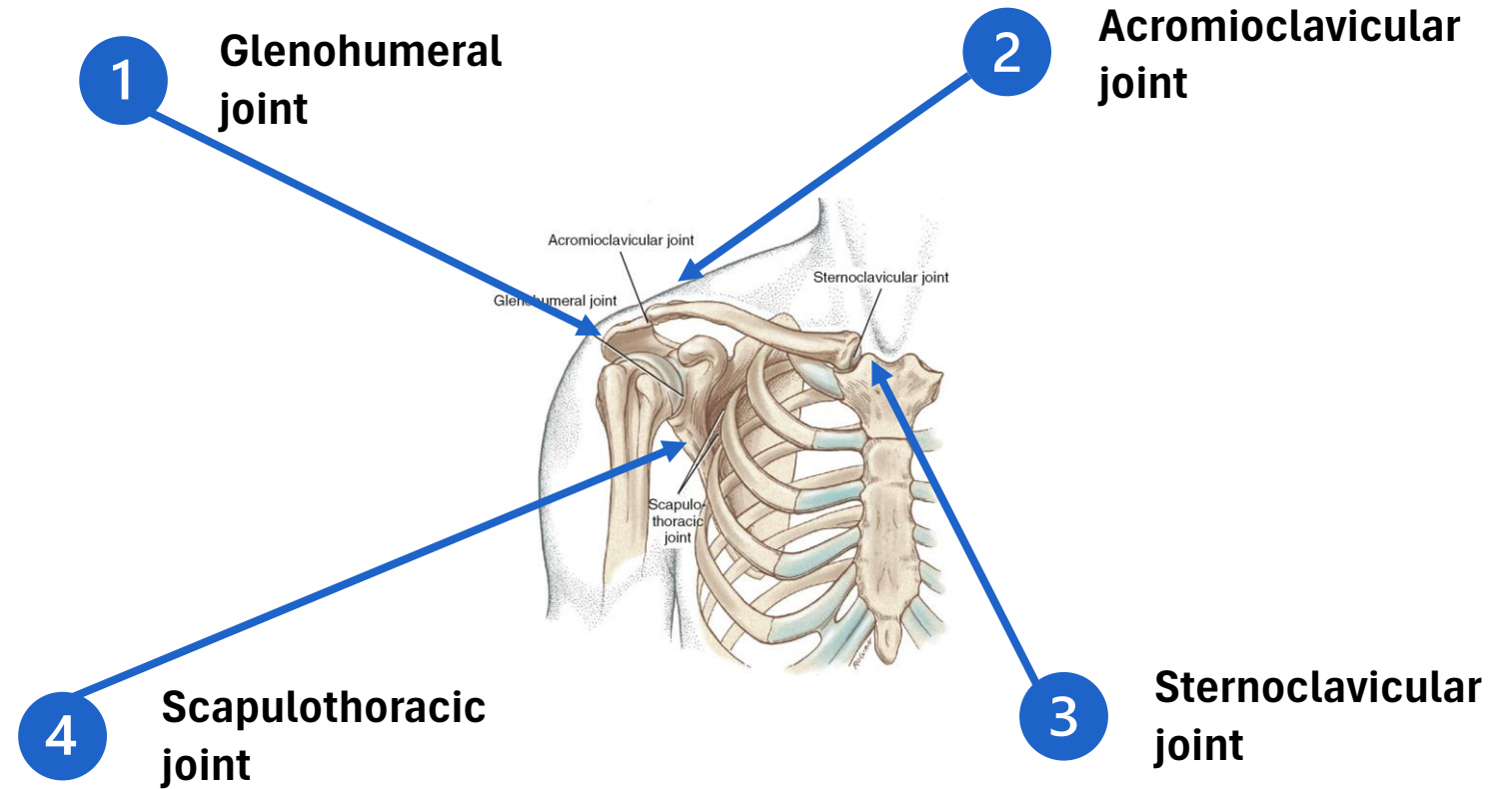
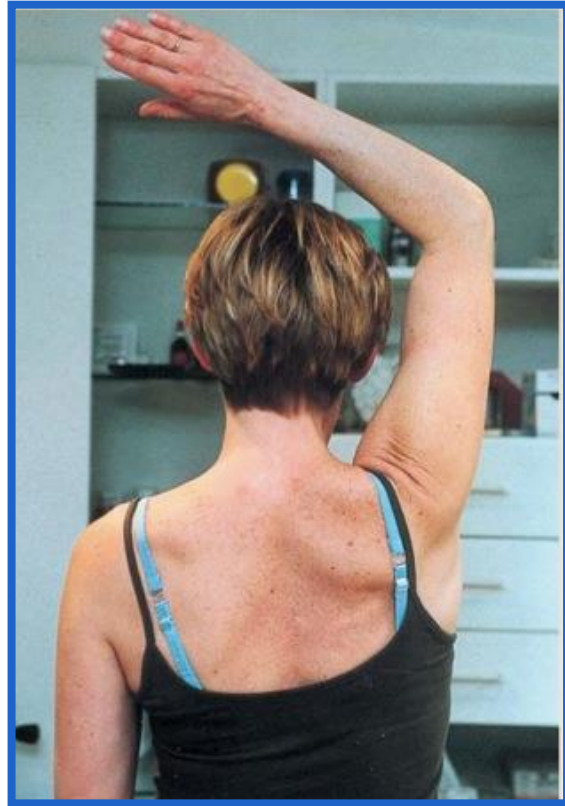
Important to decide how you offer
your therapy



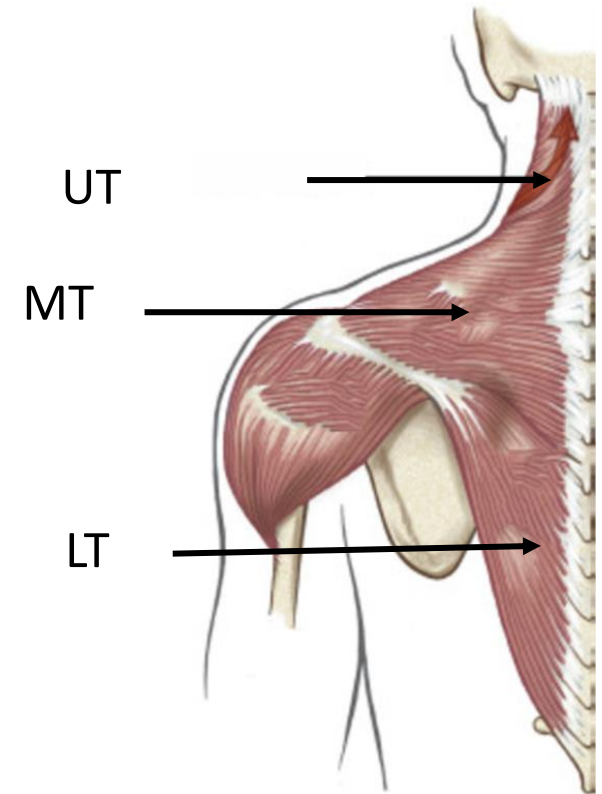
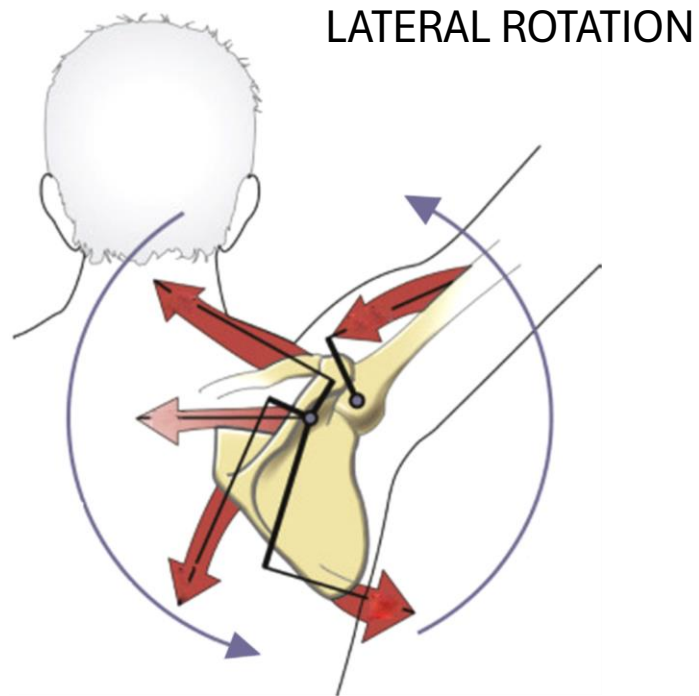
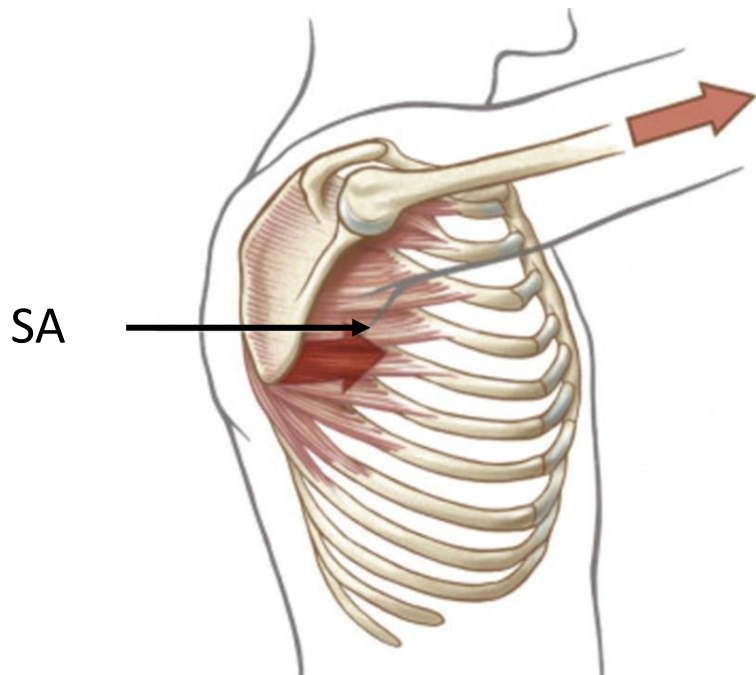
A smooth and coordinated movement in the entire **shoulder joint** is needed to move the UL



A smooth and coordinated movement in the entire **shoulder joint** is needed to move the UL

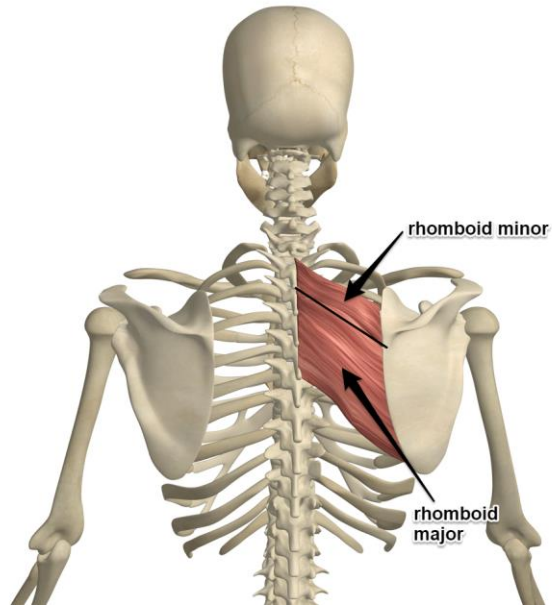


Muscles that provide **DYNAMIC STABILITY**

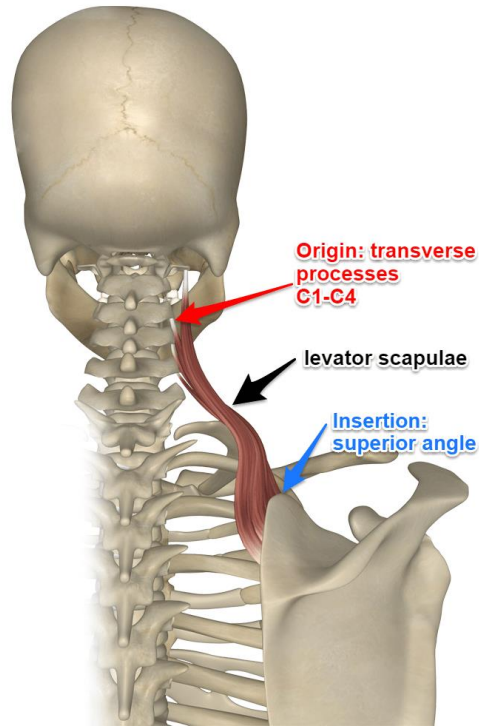


SERRATUS ANTERIOR
LOWER TRAPEZIUS
UPPER TRAPEZIUS

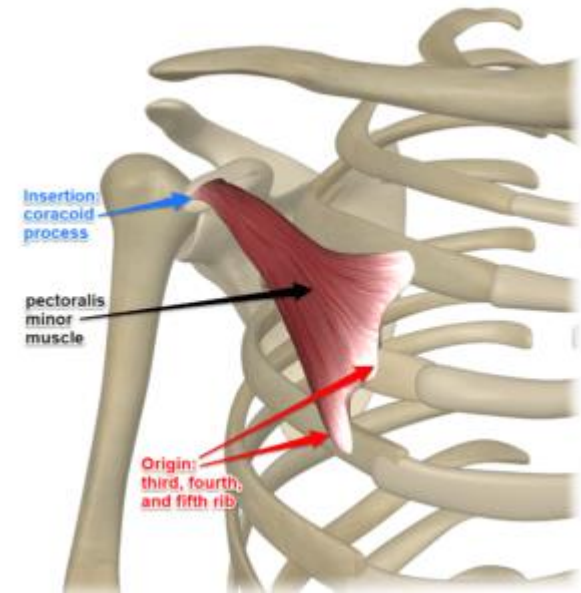
DEEPER SCAPULOTHORACIC MUSCLES



RHOMBOID MAJOR AND MINOR



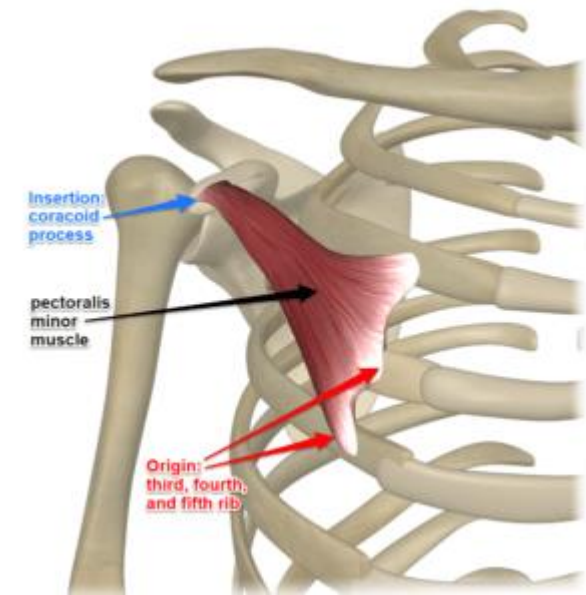
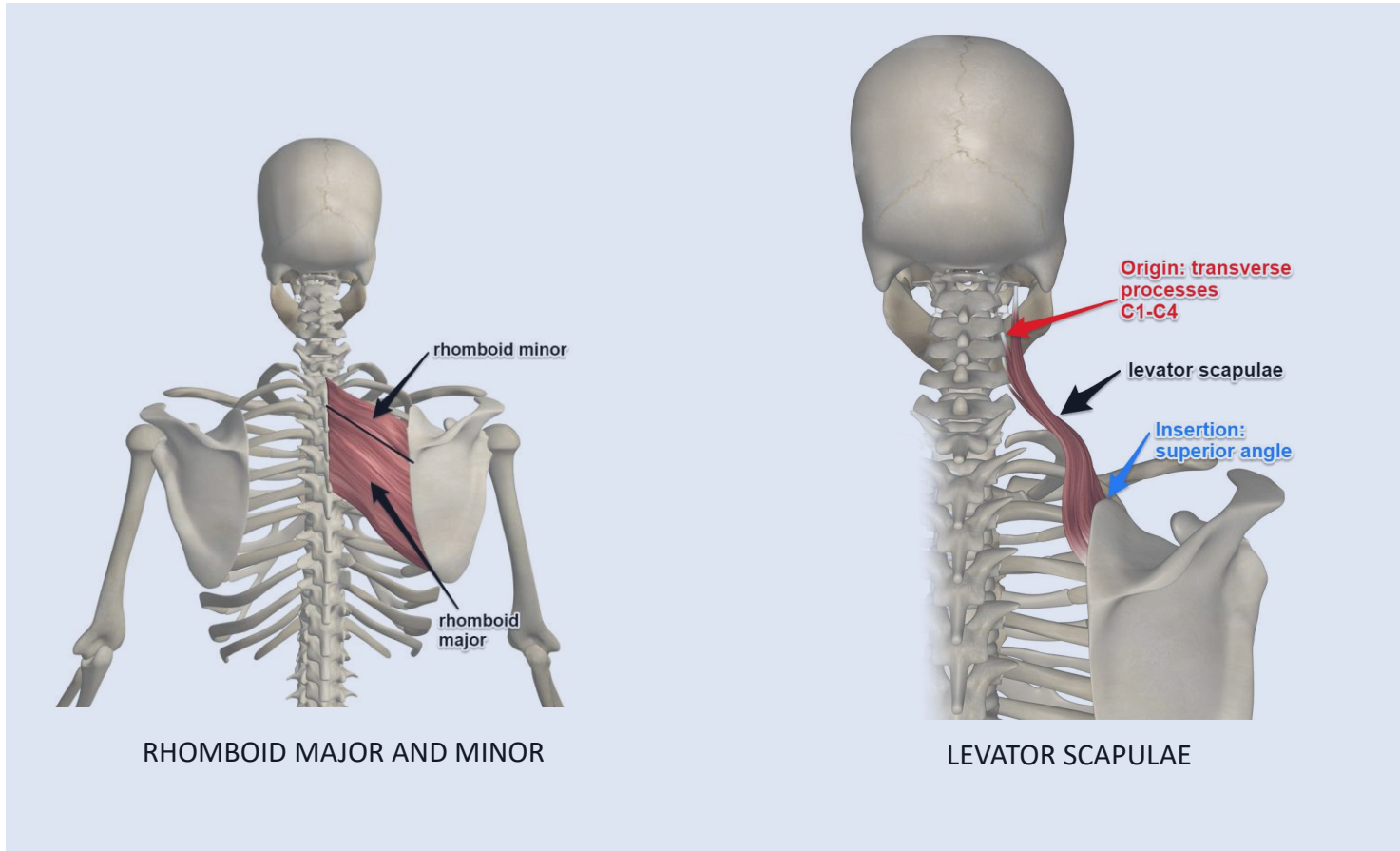
LEVATOR SCAPULAE



PECTORALIS MINOR

Prone to tightness > muscular imbalance > impeding optimal function of SA and TRAP muscles

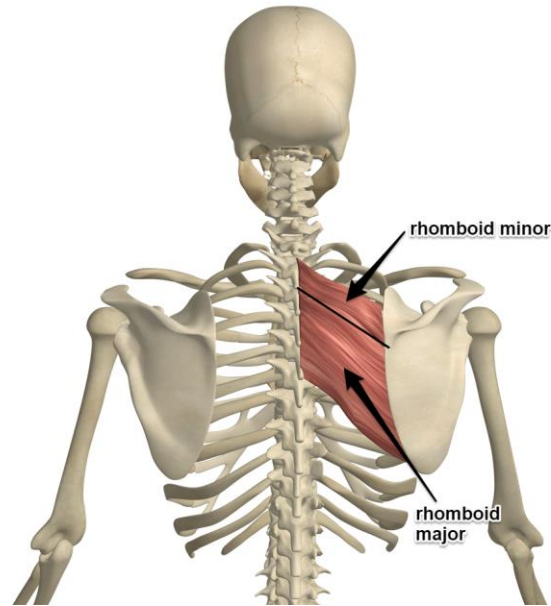
DEEPER SCAPULOTHORACIC MUSCLES



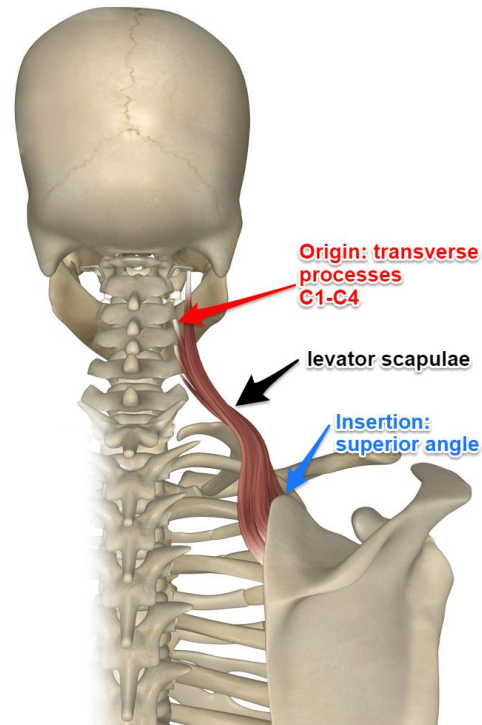
Medial rotation of the scapula

> **impedes the laterale rotatie** that is necessary to perform glenohumeral movements

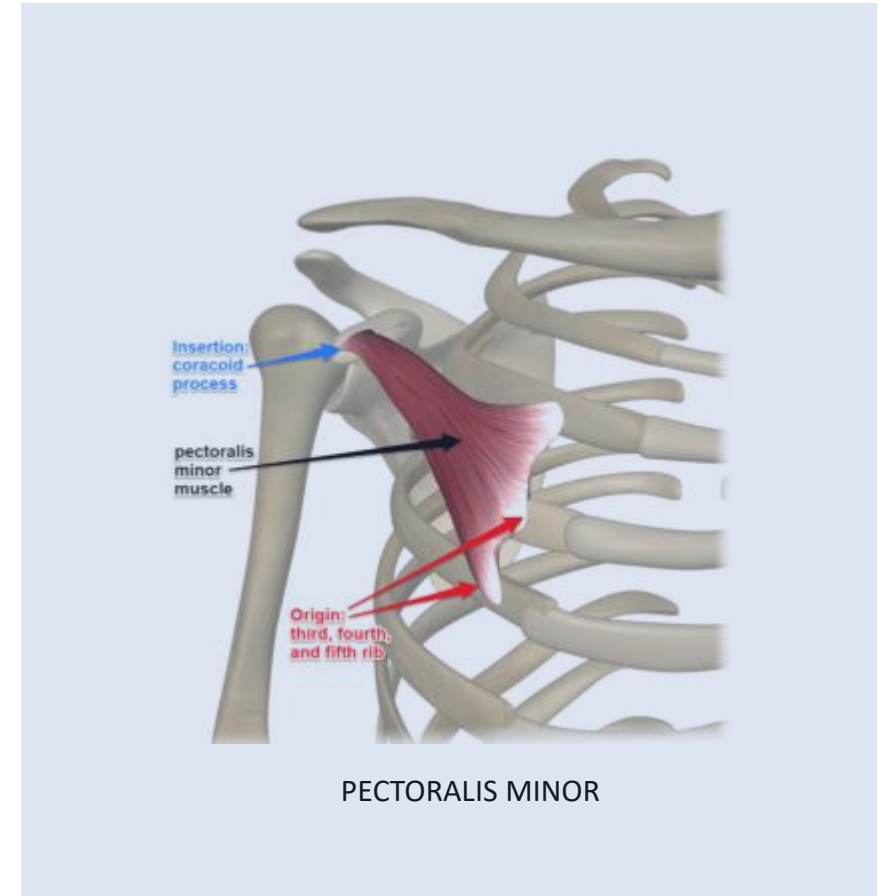
DEEPER SCAPULOTHORACIC MUSCLES



RHOMBOID MAJOR AND MINOR



LEVATOR SCAPULAE



PECTORALIS MINOR

Overactive when SA working is inhibited + potential influence of trunk flexion > **anterior tilt scapula**
instead of posterior tilt which is necessary for optimal glenohumeral congruence during movements



MULTIFACTORIAL AND COMPLEX ETHIOLOGY

Pathophysiology

**Psychological
factors**

Comorbidities

**Social
factors**

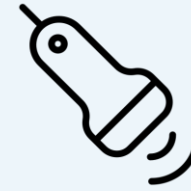
PATHOPHYSIOLOGY



Glenohumeral subluxation

Subacromial pain syndrome (RC tears,
bursitis, SSP tendinopathy, Biceps tendonitis)

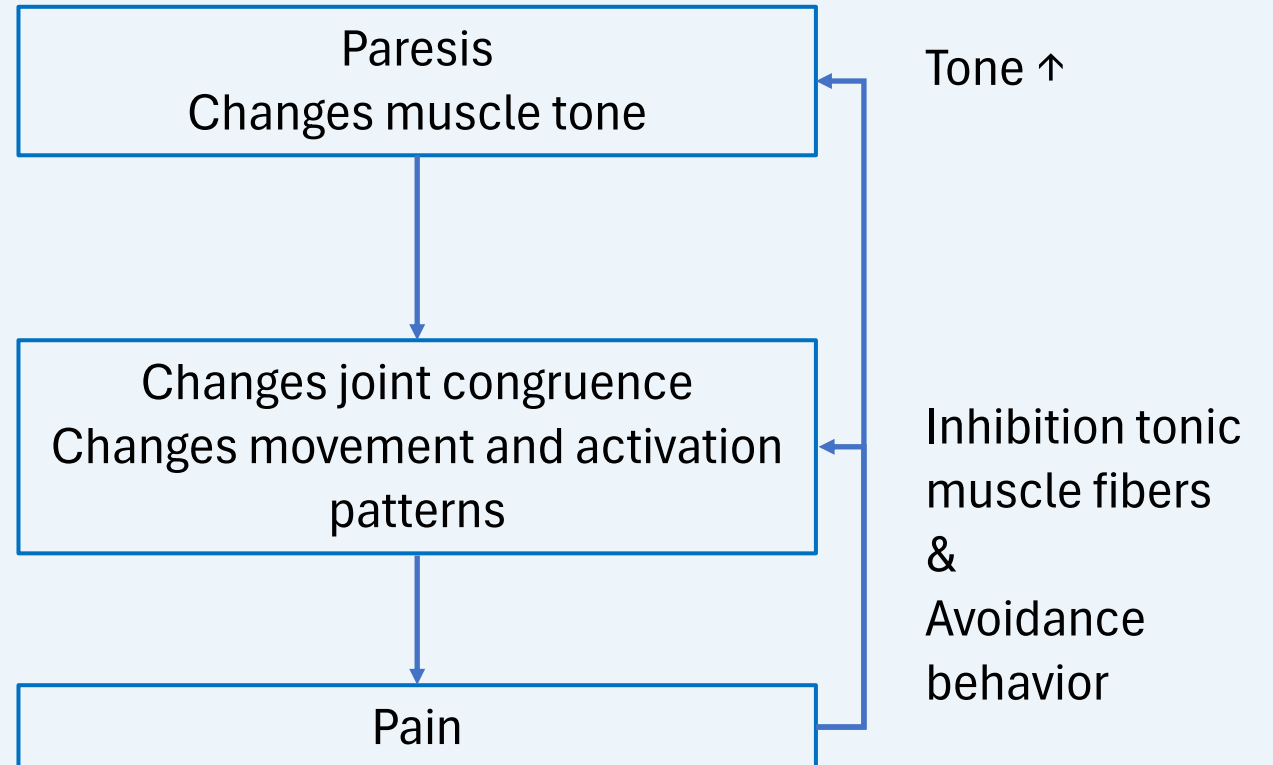
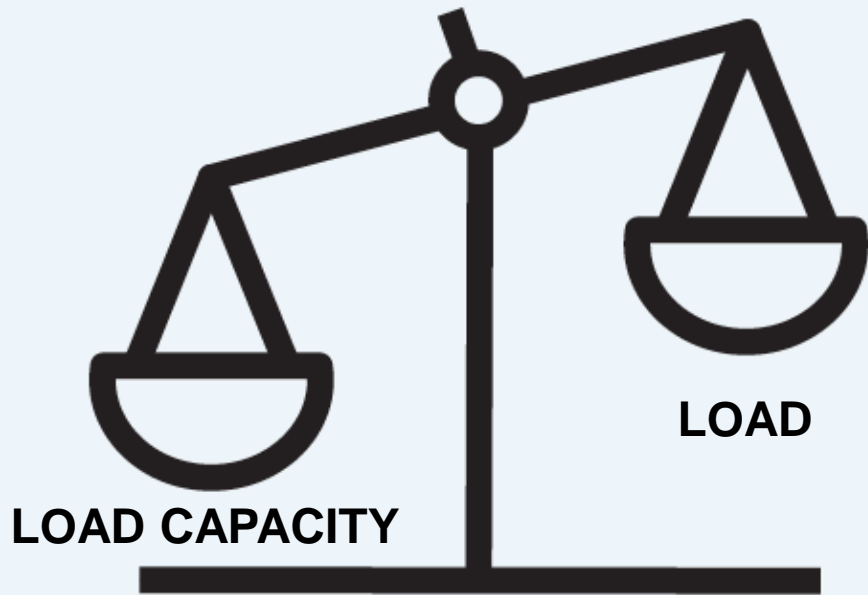
Frozen shoulder



- 1 Biceps long head tendon (tendinopathy, peritendinous effusion, 41.4%)
- 2 SSP tendon (tendinopathy – partial thickness tear, 33.2%)
- 3 Subdeltoid bursa (29.3%)
- 4 Acromioclavicular joint
- 5 Subscapularis tendon

- No causal relationship
- Increased incidence could not be associated with UL motor function

PATHOPHYSIOLOGY



MULTIFACTORIAL AND COMPLEX ETHIOLOGY

Pathophysiology

**Psychological
factors**

Comorbidities

**Social
factors**

PSYCHOLOGICAL FACTORS

Psychological factors are associated with the outcome of physiotherapy for people with shoulder pain: a multicentre longitudinal cohort study

Rachel Chester,^{1,2} Christina Jerosch-Herold,¹ Jeremy Lewis,³ Lee Shepstone⁴

Self-efficacy and **expectations** towards recovery predicted the outcome at 6 weeks and 6 months after start of treatment in not-stroke patients.

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Factors Influencing Paretic Upper Limb Use During First 4 Weeks After Stroke

A Cross-Sectional Accelerometry Study

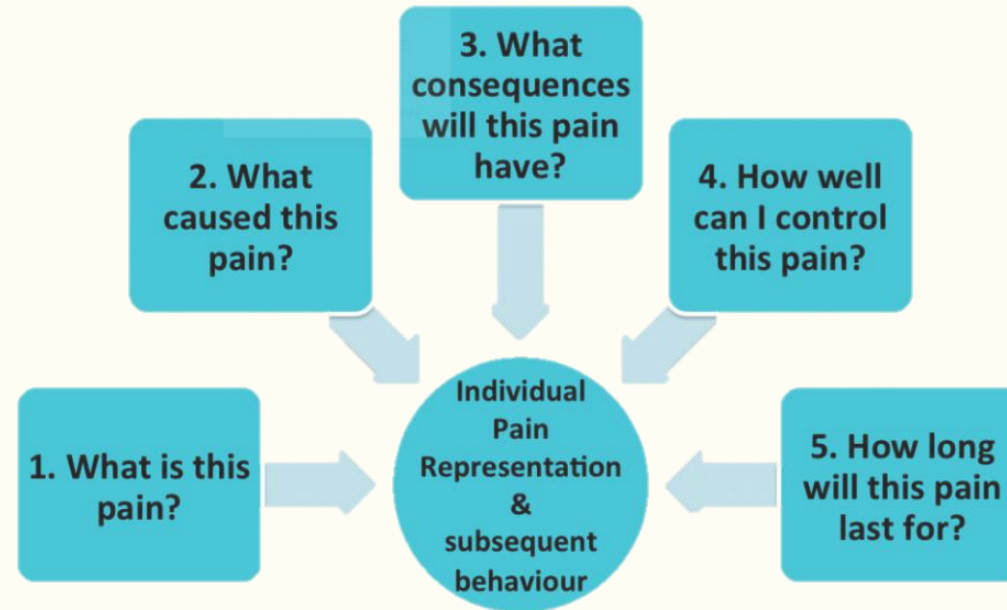
Lay Fong Chin, MPhty, Kathryn S. Hayward, PhD, and Sandra G. Brauer, PhD

Self-Efficacy and Reach Performance in Individuals with Mild Motor Impairment Due to Stroke

Jill Campbell Stewart, PhD, PT¹, Rebecca Lewthwaite, PhD^{2,3}, Janelle Rocktaschel, MS¹, and Carolee J. Winstein, PhD, PT, FAPTA^{3,4}

PSYCHOLOGICAL FACTORS

Therapeutic implications: education – goal setting – shared decision making



MULTIFACTORIAL AND COMPLEX ETHIOLOGY

Pathophysiology

**Psychological
factors**

Comorbidities

**Social
factors**

COMORBIDITIES

Sleep, smoking, stress, physical inactivity, overweight

Associations of metabolic factors and adipokines with pain in incipient upper extremity soft tissue disorders: a cross-sectional study

Martti Rechartt,^{1,2} Rahman Shiri,^{1,2} Harri Lindholm,¹ Jaro Karppinen,^{1,3}
Eira Viikari-Juntura²

Conclusions: Abdominal obesity and lipids may have an impact on **pain intensity** in UESTDs. They may intensify pain **through proinflammatory pain-modifying molecular pathways or by causing soft tissue pathology and dysfunction of their supplying arteries**. Of four adipokines studied only one (visfatin) was associated with pain intensity. In the future, further studies are required to better understand the relationship between metabolic factors and UESTDs.

Need for general **aerobic exercises** in stroke rehabilitation

Important when evaluating pain intensity

MULTIFACTORIAL AND COMPLEX ETHIOLOGY

Pathophysiology

**Psychological
factors**

Comorbidities

**Social
factors**

SOCIAL FACTORS



Social support

Wrong handling

Less active

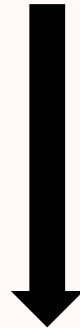
SOCIAL FACTORS



Social support

Wrong handling

Less active



Social support

Stroke survivors take more risks

Increased risk to overload the shoulder joint

Social factors



Social support

Wrong handling

Less active



Social support

Stroke survivors take more risks

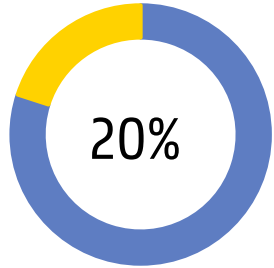
Increased risk to overload the shoulder joint

EDUCATION!

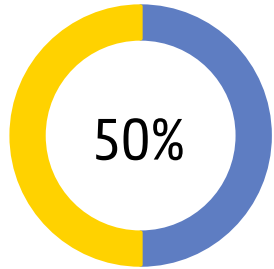
HEMIPLEGIC SHOULDER PAIN



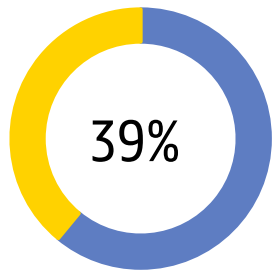
HEMIPLEGIC SHOULDER PAIN



ALL STROKE PATIENTS



REHABILITATION SETTING



CHRONIC PHASE

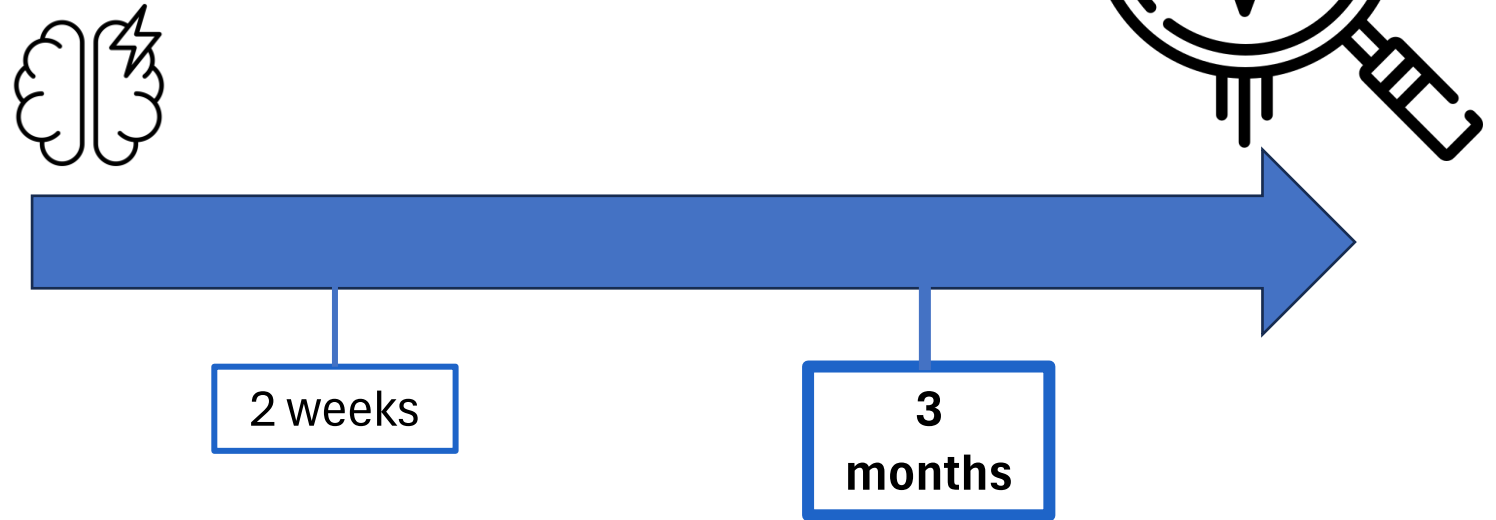
HEMIPLEGIC SHOULDER PAIN



2 weeks



HEMIPLEGIC SHOULDER PAIN



HEMIPLEGIC SHOULDER PAIN



2 weeks

3 months

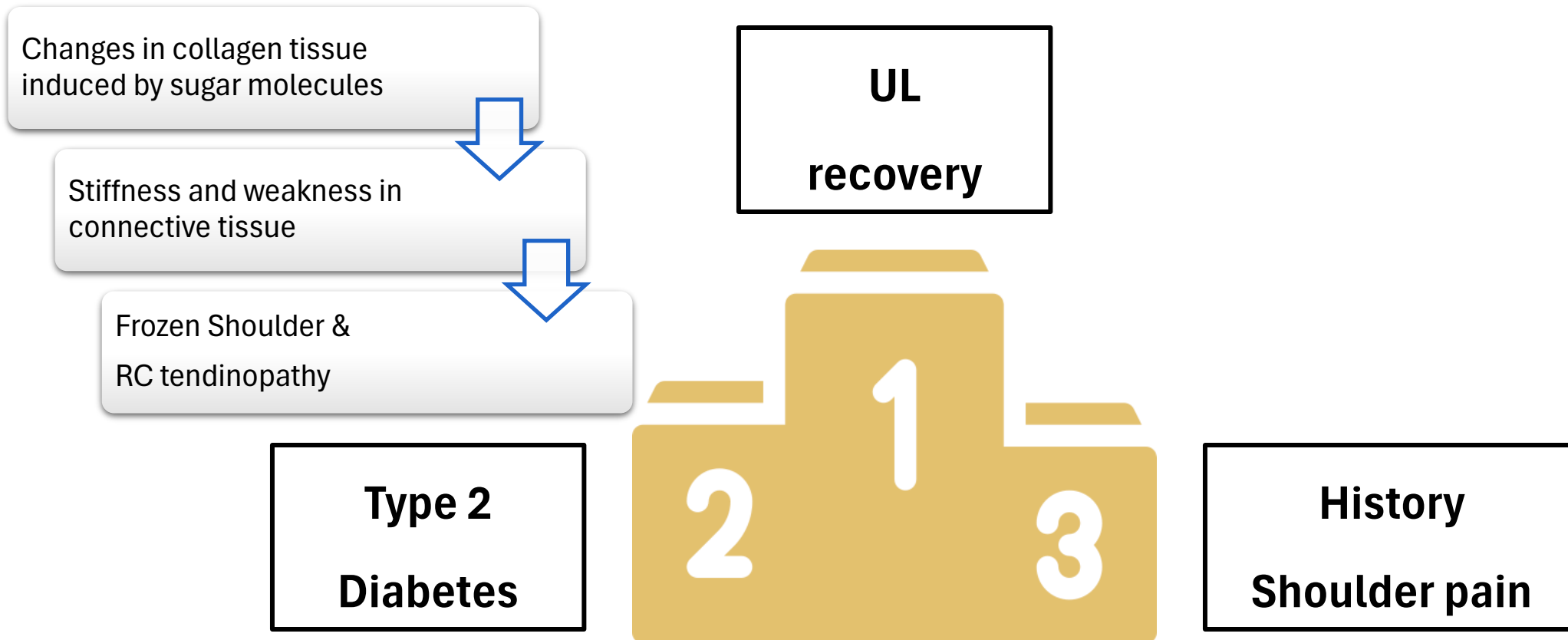


Outcome after
rehabilitation
Active UL movements
Quality of life



Hospital stay

RISK FACTORS



CONTRIBUTING FACTORS

- 1 Limited PROM paretic shoulder
- 2 Spasticity

CONTRIBUTING FACTORS

1 Limited PROM paretic shoulder

2 Spasticity

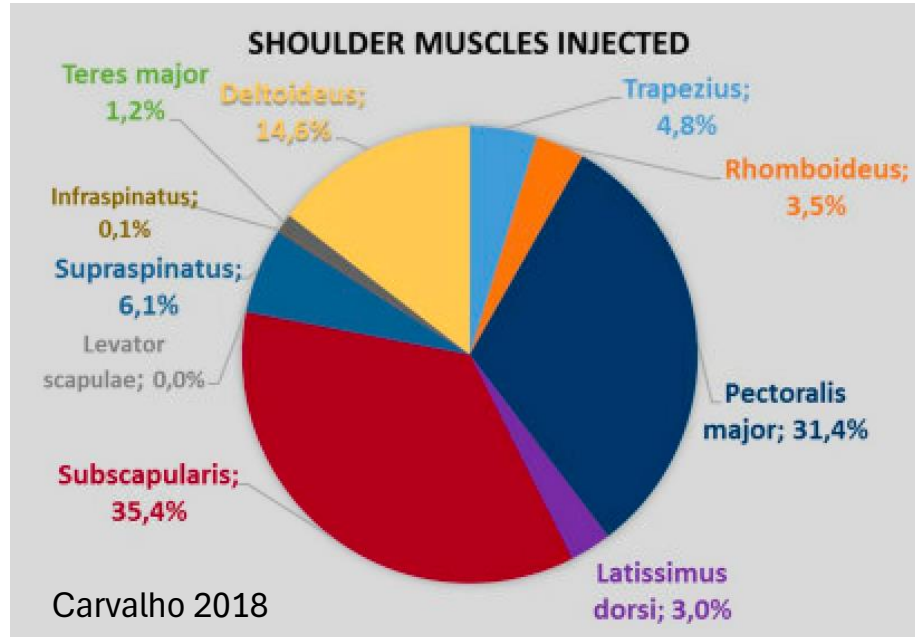


TABLE 1 Relationship of shoulder muscles with upper limb spasticity patterns for identifying candidate shoulder muscles for BoNT-A injection.

Recommendation	Shoulder spasticity pattern	
	A: Adduction, elevation, flexion, and internal rotation of shoulder	B: Abduction or adduction, extension, and internal rotation of shoulder
Inject in most cases/ first injection cycle	Pectoralis major	Posterior part of deltoid ^a
	Teres major	Teres major ^b Latissimus dorsi ^b
Inject in some cases/second-line injection	Subscapularis	Subscapularis
	Latissimus dorsi	Long head of triceps brachii
	Long head of biceps brachii	

^aInject in most cases for patients with abduction and extension (combined with injection to the intermediate deltoid), but not in patients with internal rotation; inject in some cases for patients with adduction, extension and internal rotation.

^bInject if adduction, extension and internal rotation are present.

BoNT-A, botulinum neurotoxin type A.

CONTRIBUTING FACTORS

1 Limited PROM paretic shoulder

2 Spasticity

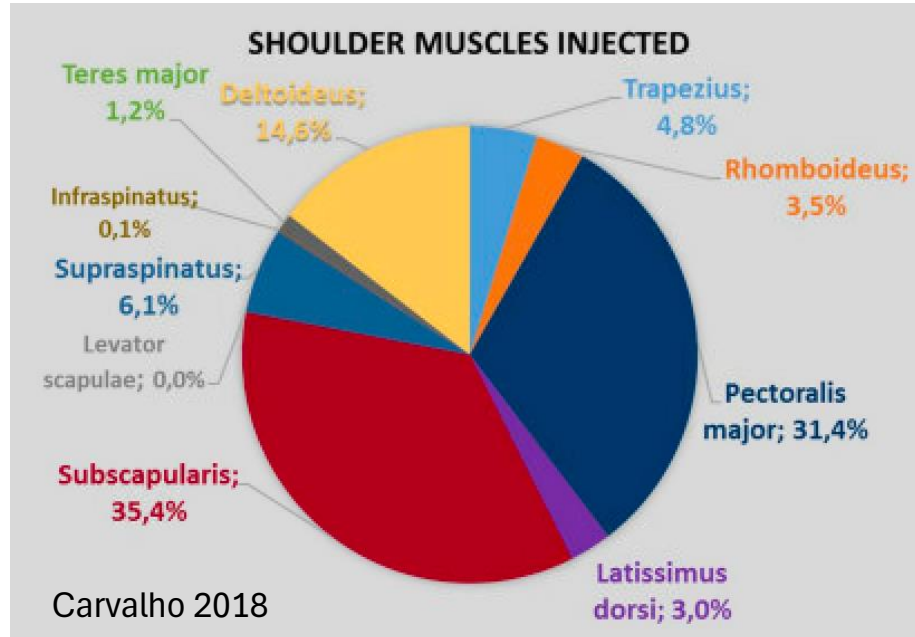


Table 2. Advised approach of BTA intervention in spastic HSP.

- Use a structured and standardized format in the patient record specifying:
 - o Type of BTA
 - o Total dose
 - o Dilution
 - o Dose per muscle
 - o Number of injections per muscle
- Early intervention
- US guided
- In case of inconclusive muscle selection: consider muscle block
- Muscles to consider:
 - m. pectoralis major
 - m. latissimus dorsi
 - m. teres major
 - m. subscapularis
- In case of inconclusive muscle selection: consider muscle block

Struyf 2023

CONTRIBUTING FACTORS

- 1 Limited PROM paretic shoulder
- 2 Spasticity

Side paresis?

Glenohumeral subluxation?

TAKE HOME MESSAGES – PART 1

- Difficult to define the exact ethiology.
- Different possible causes at the same time or sequential.
- Multiple contributing factors.
- No consensus on best treatment.



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GOAL ↓ **Load** + ↑ **Load capacity**

↓ Load + ↑ Load capacity



EDUCATION
POSITIONING



MAINTAINING
PROM



ACTIVE
EXERCISES



UL recovery & time post-stroke



EDUCATION – POSITIONING



Avoid too much internal shoulder rotation and elbow flexion



Active involvement of the UL
Communication/education



We need muscle activity!

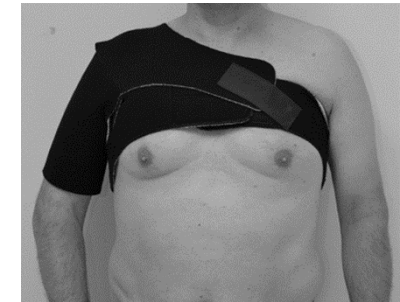
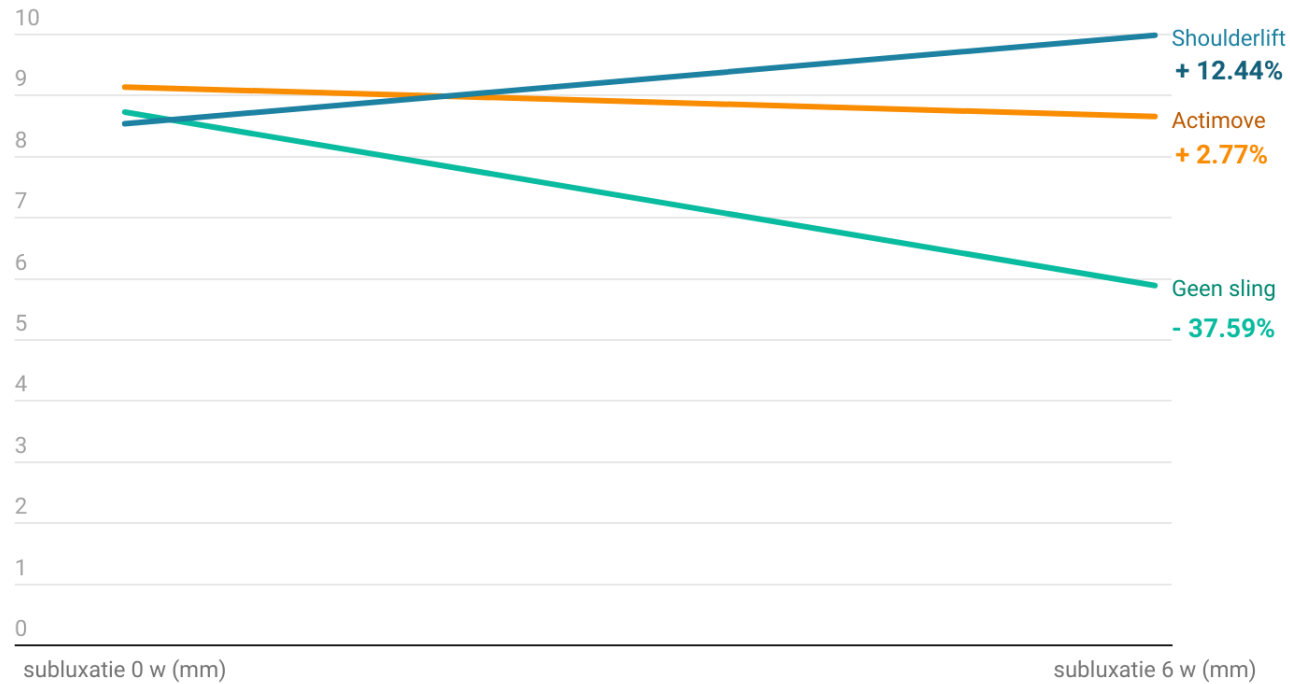


EDUCATION – POSITIONING

A randomized controlled trial on the immediate and long-term effects of arm slings on shoulder subluxation in stroke patients

Anke van BLADEL^{1,2,*}, Gert LAMBRECHT^{1,2}, Kristine M. OOSTRA²,
Guy VANDERSTRAETEN^{1,2}, Dirk CAMBIER¹

No evidence of a positive effect on subluxation.

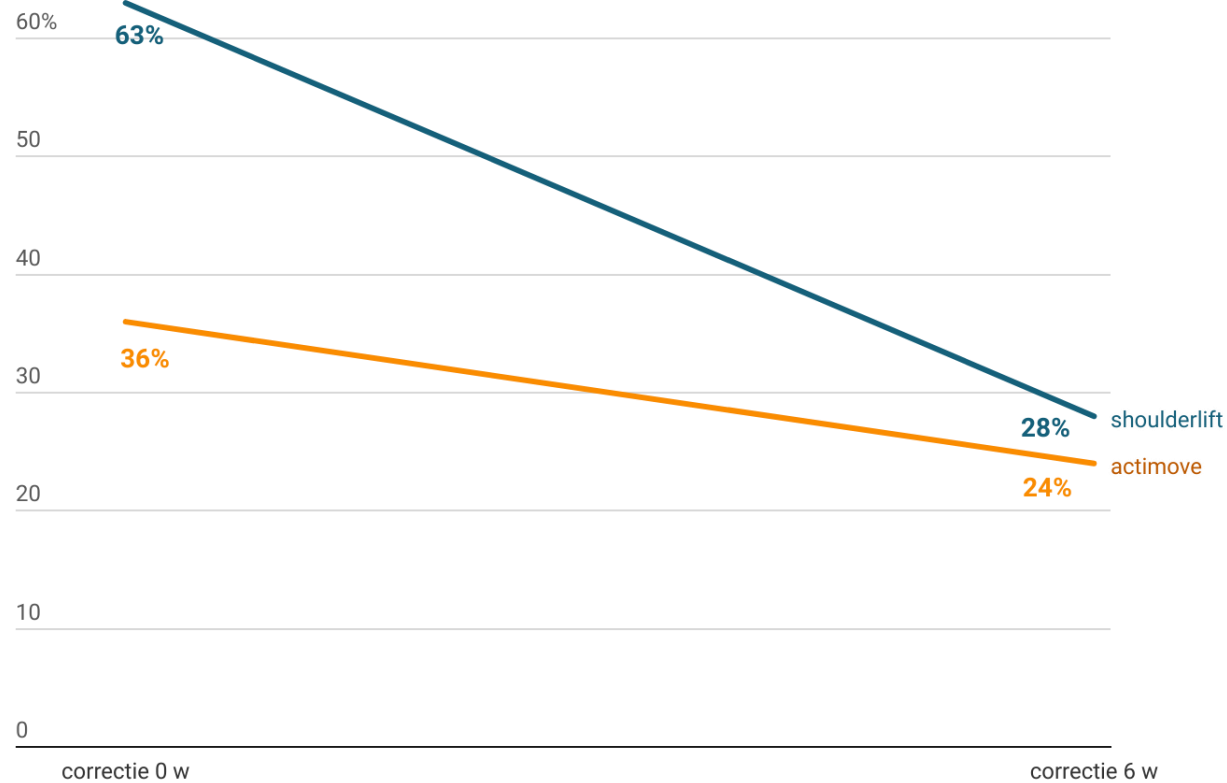




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Loss of elasticity over time!



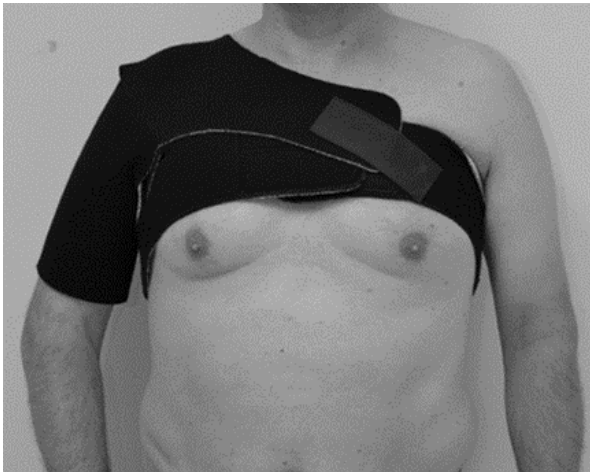
Regular reevaluation if the sling is still working!



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Abduction =
External rotation -1°



Abduction -6°
External rotation -12°

Loss of PROM



Contributing factor to
develop shoulder pain



EDUCATION – POSITIONING

Who does need an arm sling?

Cognitive/language impairments

Severe neglect

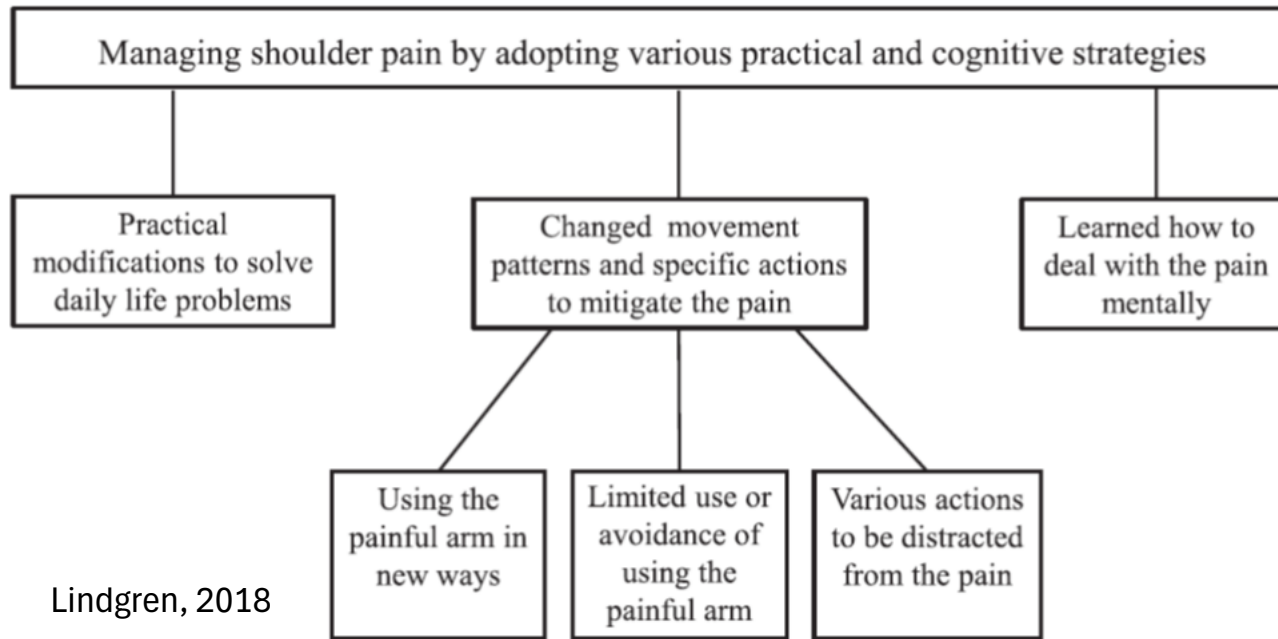
Painful subluxation

Always combined with active exercises – Self-management programs – Education

Regular reevaluation if still needed and still working



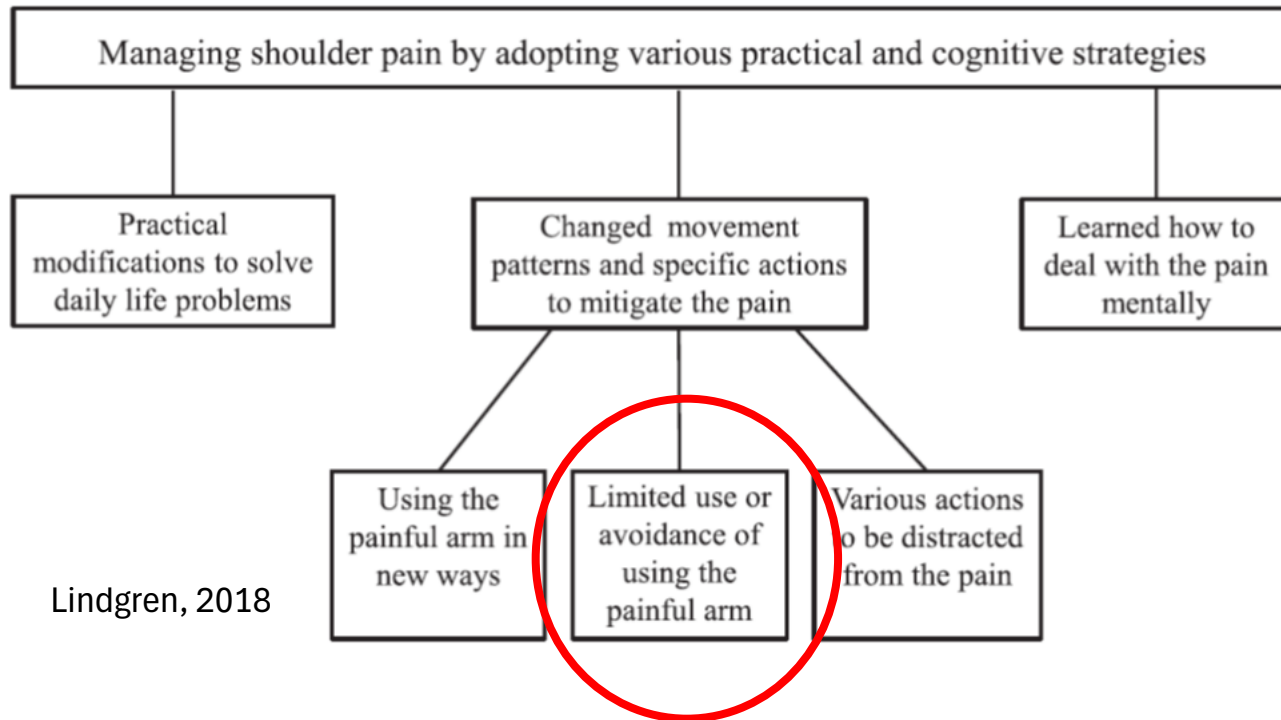
EDUCATION – POSITIONING



Lindgren, 2018



EDUCATION – POSITIONING



Attention !

1. Explain what to expect
2. Make sure they keep moving the UL
3. Make sure they keep active
4. Advice on UL load

↓ **Load** + ↑ **Load capacity**



**EDUCATION
POSITIONING**



**MAINTAINING
PROM**



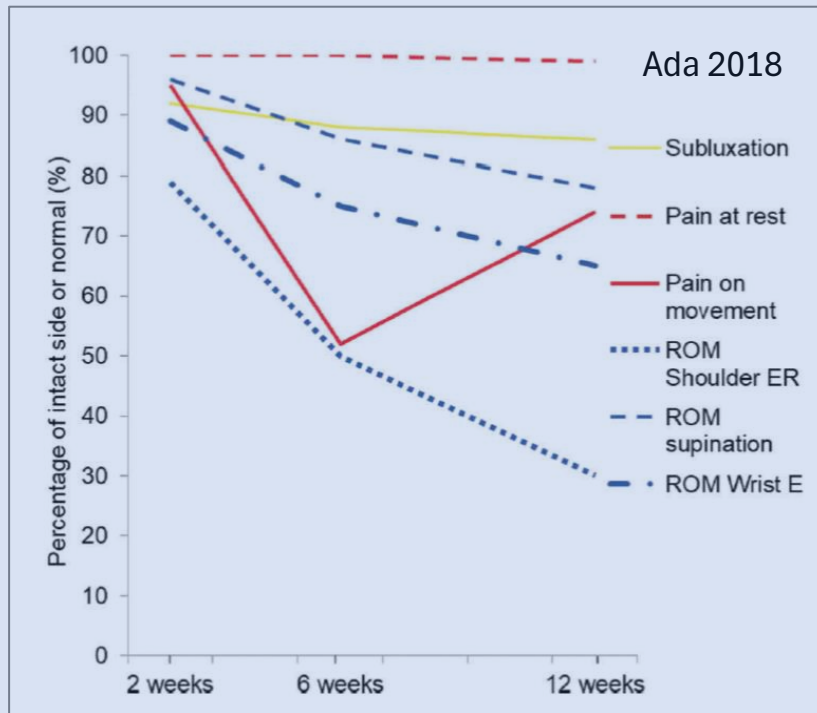
**ACTIVE
EXERCISES**



UL recovery & time post-stroke



MAINTAINING PROM

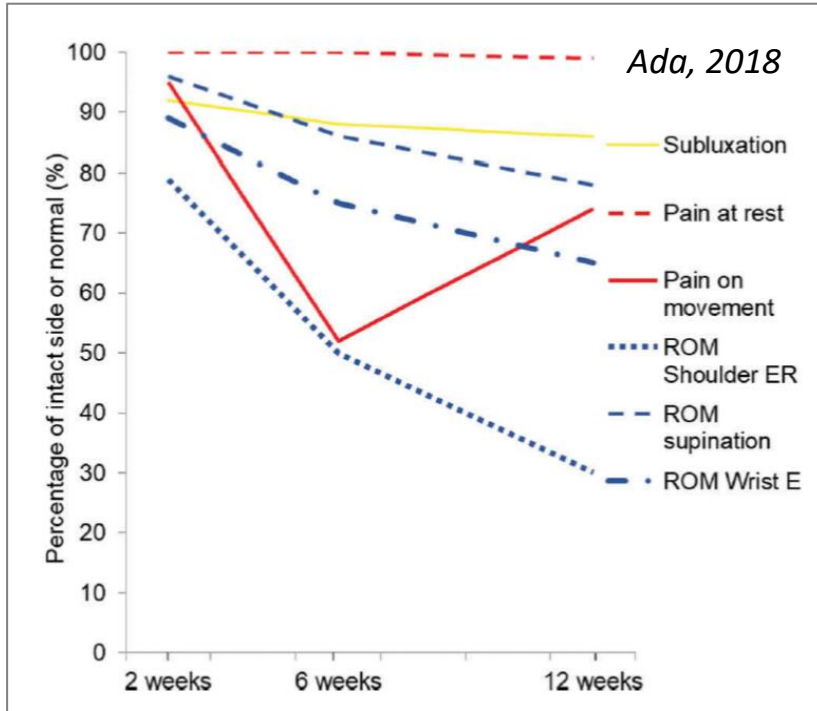


Reduces from two weeks post-stroke



MAINTAINING PROM

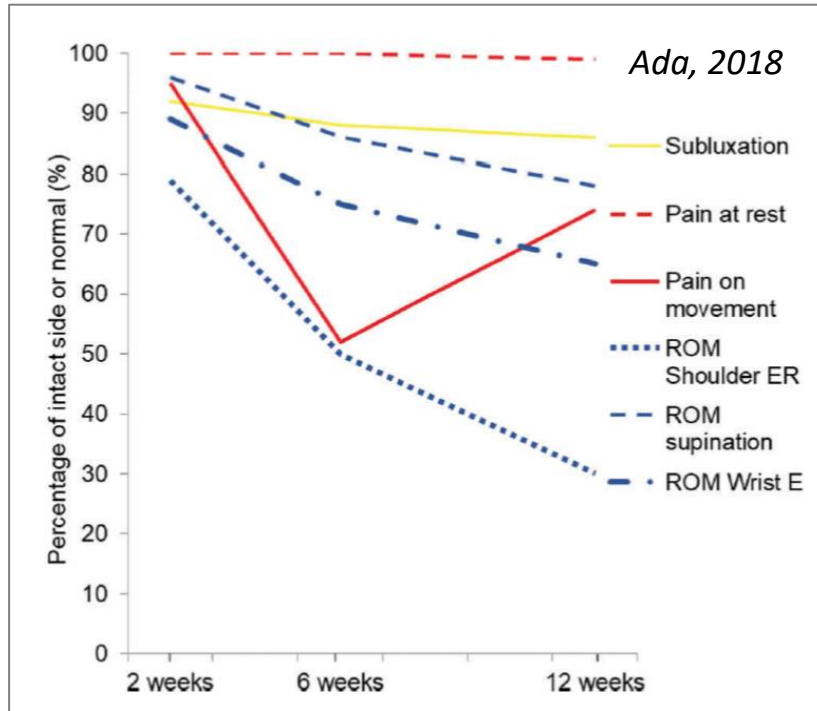
Contributing factor to develop shoulder pain



Reduces from two weeks post-stroke

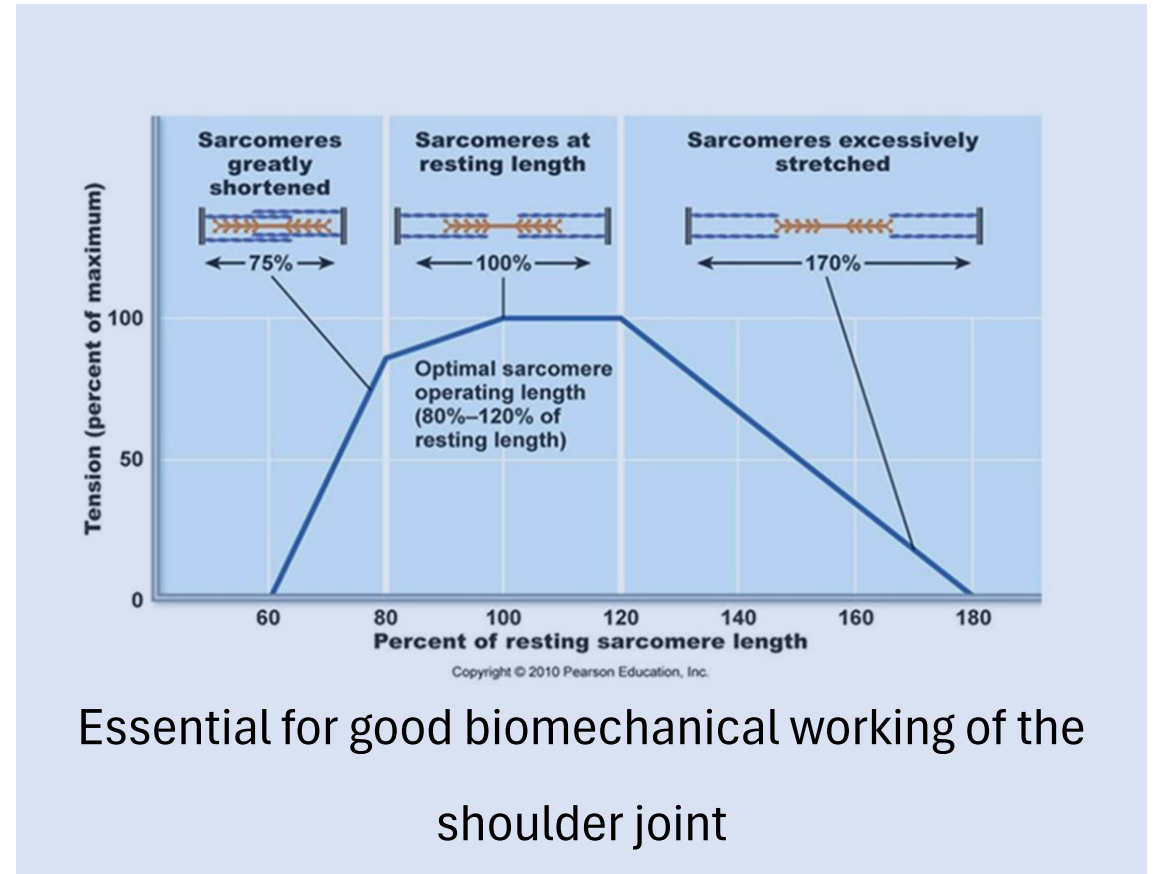


MAINTAINING PROM



Reduces from two weeks post-stroke

Contributing factor to develop shoulder pain





PASSIVE MOBILISATION

South African Journal of Physiotherapy
ISSN: (Online) 2410-8219, (Print) 0379-6175

AOSIS

Page 1 of 7 Original Research

Passive mobilisation of the shoulder in subacute stroke patients with persistent arm paresis: A randomised multiple treatment trial



↓ Load + ↑ Load capacity



EDUCATION
POSITIONING



MAINTAINING
PROM



ACTIVE
EXERCISES



UL recovery & time post-stroke



ACTIVE EXERCISES

- Create the best condition for each exercise
 - Trunk stability
 - Muscle length/tension
 - Kinetic chain



ACTIVE EXERCISES

- Create the best condition for each exercise
 - Trunk stability
 - Muscle length/tension
 - Kinetic chain
- Goals depending on the level of recovery and UL prognosis



Increased activity SA – active extension ipsilateral leg

Increased activity LT – active extension contralateral leg



ACTIVE EXERCISES

CASE 1

Severe UL paresis

55 y - 5 m post stroke – left

Passive ROM shoulder:
120° flexion – 90° abd – 20° ext
rot

FMA: LE 14/34 – UE 9/66

TIS: 16/23

BBS: 23/56

6 MWT: 57m with orthopedic
shoes and tripod

CASE 2

Moderate UL paresis

53 y - 6 m post stroke – right

Passive ROM shoulder:
100° flexion – 90° abd – 0° ext
rot

FMA: LE 32/34 – UE 21/66

BBS: 55/56

6 MWT: 360m no aids

CASE 3

Mild UL paresis

53 y - 7 m post stroke – left

Passive ROM shoulder:
130° flexion – 90° abd – 10° ext
rot

FMA: LE 32/34 – UE 54/66

CBMS: 78 (75-79)

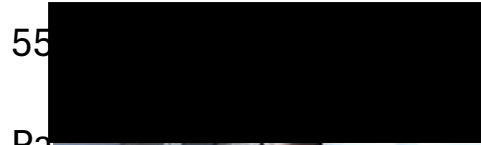
6 MWT: 490m

DASH: 64/100



ACTIVE EXERCISES

CASE 1
Severe UL paresis

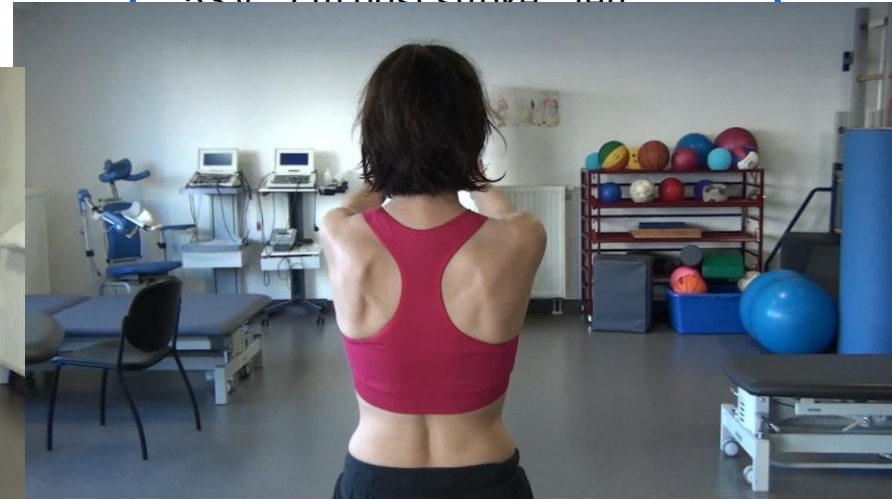


shoes and tripod



CASE 3
Mild UL paresis

53 y. 7 m post stroke left



6 MWT: 490m

DASH: 64/100

CASUS 1
Ernstige parese BL

CASUS 2
Matige parese BL

CASUS 3
Milde parese BL

Doel ifv schouder

Afhankelijk van het te verwachten herstel ifv tijd na CVA en huidige niveau van beperking

Aandachtspunten
Moeilijkheden

Additionele
info/therapie



ACTIVE EXERCISES

- Goals depending on the level of recovery and UL prognosis

Influence of arm position on hip extension during walking?



CASUS 1
Ernstige parese BL

CASUS 2
Matige parese BL

CASUS 3
Milde parese BL

Doel ifv schouder

Preventie secundaire
complicaties
Rol BL ifv houding, romp,
gang

Belasting opdrijven op
veilige en gecontroleerde
manier

Inzet in ADL
Zonder (risico op) pijn

Aandachtspunten
Moeilijkheden

Additionele
info/therapie

CASUS 1
Ernstige parese BL

CASUS 2
Matige parese BL

CASUS 3
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Doel ifv schouder

Preventie secundaire complicaties
Rol BL ifv houding, romp, gang

Belasting opdrijven op veilige en gecontroleerde manier

Inzet in ADL
Zonder (risico op) pijn

Aandachtspunten
Moeilijkheden

Verwachtingen Th/Pt
Inzetten van hand
Goede uitgangshoudingen
Variatie in oefeningen

Verwachtingen/motivatie (bewegen met arm vraagt veel energie)
Nog geen inzet in ADL

Hoe inzet in ADL afstemmen op belastbaarheid zonder patiënt te remmen?

Additionele info/therapie

Aandeel musculoskeletale voorwaarden voor goede functie

CASUS 1
Ernstige parese BL

CASUS 2
Matige parese BL

CASUS 3
Milde parese BL

Doel ifv schouder

Preventie secundaire complicaties
Rol BL ifv houding, romp, gang

Belasting opdrijven op veilige en gecontroleerde manier

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Zonder (risico op) pijn

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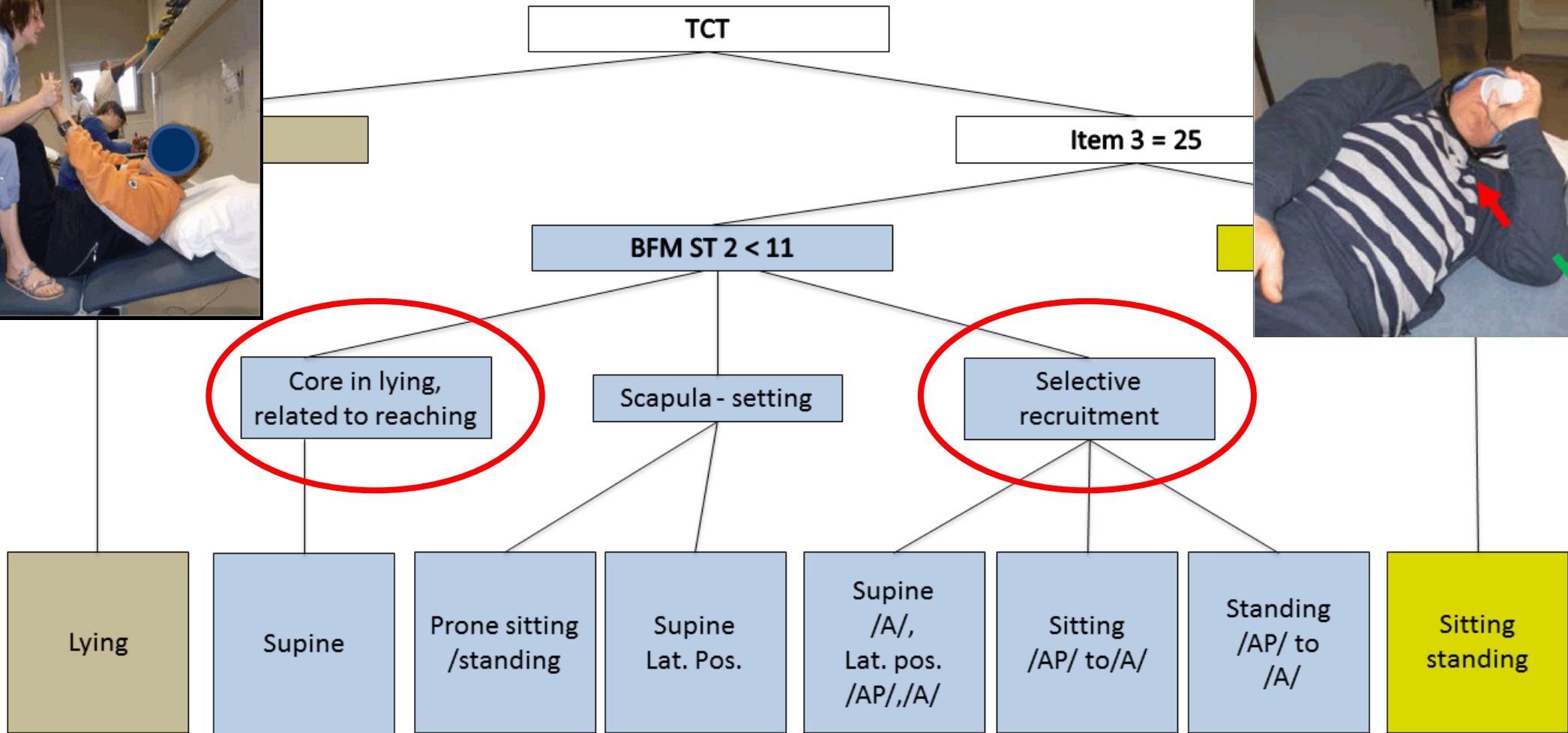
Hoe inzet in ADL afstemmen op belastbaarheid zonder patiënt te remmen?

Additionele info/therapie

JSU diagram

Aandeel musculoskeletale voorwaarden voor goede functie

JSU-diagram for rehabilitation of the upper limb after stroke



CASUS 1
Ernstige parese BL

CASUS 2
Matige parese BL

CASUS 3
Milde parese BL

Doel ifv schouder

Preventie secundaire complicaties
Rol BL ifv houding, romp, gang

Belasting opdrijven op veilige en gecontroleerde manier

Inzet in ADL
Zonder (risico op) pijn

Aandachtspunten
Moeilijkheden

Verwachtingen Th/Pt
Inzetten van hand
Goede uitgangshoudingen
Variatie in oefeningen

Verwachtingen/motivatie (bewegen met arm vraagt veel energie)
Nog geen inzet in ADL

Hoe inzet in ADL afstemmen op belastbaarheid zonder patiënt te remmen?

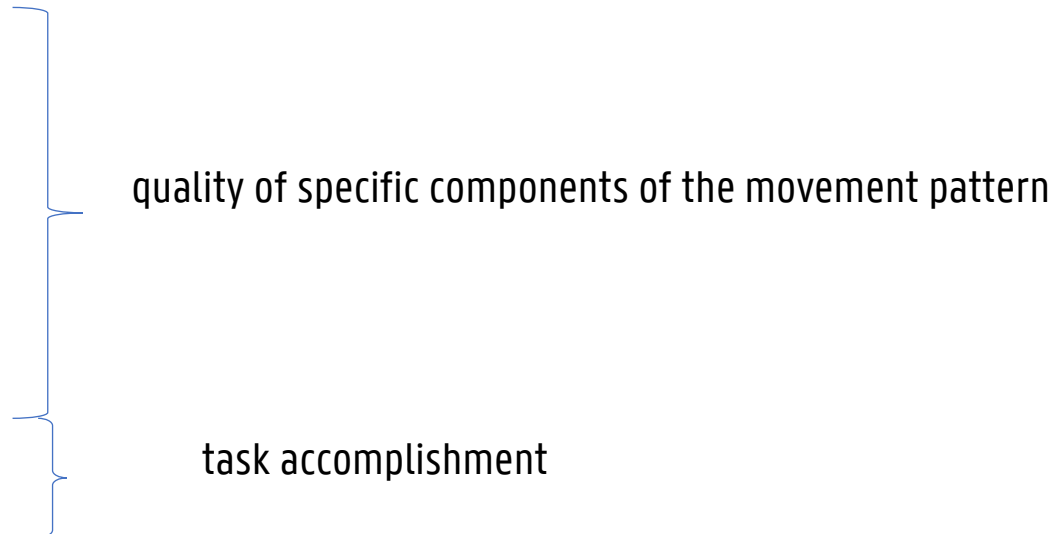
Additionele info/therapie

JSU diagram

Reaching performance Scale
Thuis oefenprogramma's
Mental practice
Taping

Aandeel musculoskeletale voorwaarden voor goede functie

Reaching performance scale for stroke

- quantifies UL and trunk movement patterns and compensations used when reaching to grasp a cone located close (within arm length) and far (beyond arm reach) from the body
- Assessment of reaching quality to each target:
 - trunk displacement
 - movement smoothness
 - shoulder movements
 - elbow movements
 - prehension
 - global score

quality of specific components of the movement pattern

task accomplishment
- 4-point scales ranging from 0 (only compensations used) to 3 (no compensations used)

BELANG VAN INTENSIEVE EN SPECIFIEKE OEFENTHERAPIE

RESEARCH PAPER

Intensive upper limb neurorehabilitation in chronic stroke: outcomes from the Queen Square programme

Nick S Ward,^{1,2,3} Fran Brander,^{2,3} Kate Kelly^{2,3}

Long-Dose Intensive Therapy Is Necessary for Strong, Clinically Significant, Upper Limb Functional Gains and Retained Gains in Severe/Moderate Chronic Stroke

Janis J. Daly, PhD, MS^{1,2}, Jessica P. McCabe, MPT³, John Holcomb, PhD⁴, Michelle Monkiewicz, DPT³, Jennifer Gansen, DPT³, and Svetlana Pundik, MD, MS^{3,5*}

Neurorehabilitation and Neural Repair
1–15

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Arm-Hand Boost Therapy During Inpatient Stroke Rehabilitation: A Pilot Randomized Controlled Trial

Sarah Meyer^{1*}, Geert Verheyden², Kristof Kempeneers¹ and Marc Michiels¹

¹Jesse Hospital, Rehabilitation Centre, Campus Sint-Ursula, Herik-de-Stad, Belgium, ²Department of Rehabilitation Sciences, KU Leuven-University of Leuven, Leuven, Belgium

BELANG VAN INTENSIEVE EN SPECIFIEKE OEFENTHERAPIE

GRASP

Graded
Repetitive
Arm
Supplementary
Program



Exercise manual

Level 1



This research project is funded by UBC and the Heart and Stroke Foundation



Finding answers. For life.

1



**you
can
recover**
with
TRIO

TARGETED
REHABILITATION
IMPROVED
OUTCOMES

Home Programme

UBC
THE UNIVERSITY
OF AUCKLAND



Zelf oefenen
na een beroerte (CVA)

Naam:

Instructies:

Oefengids

SNEL IN
BEWEGING

<https://presto.auckland.ac.nz/home-exercise-programme/>

BELANG VAN INTENSIEVE EN SPECIFIEKE OEFENTHERAPIE

NHS tested apps.

All our apps have passed our 50 point [digital safety](#) check developed in conjunction with the NHS health apps library and then tested clinically in the NHS by NHS clinicians and patients. This ensures our apps are reliable, safe and clinically assured.

I would like help with



<https://www.my-therappy.co.uk/medical-condition/stroke-brain-injury>

[FAME@Home](#) – FAME – Fitness and Mobility Exercise Program (fameexercise.com)

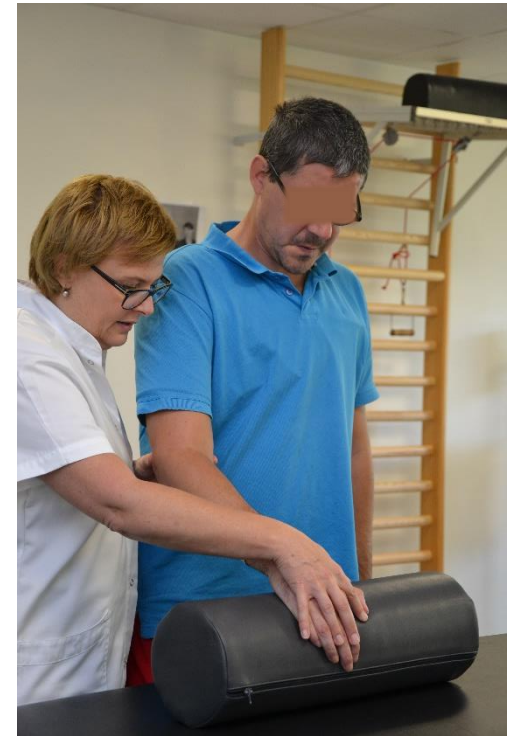


ACTIVE EXERCISES FOR PERSONS WITH PAIN OR LOW LEVEL OF RECOVERY

Reduce the weight of the UL



Standing





ACTIVE EXERCISES FOR PERSONS WITH PAIN OR LOW LEVEL OF RECOVERY



Practice without glenohumeral movements

Safe and not painful

Use mirror



ACTIVE EXERCISES FOR PERSONS WITH PAIN OR LOW LEVEL OF RECOVERY



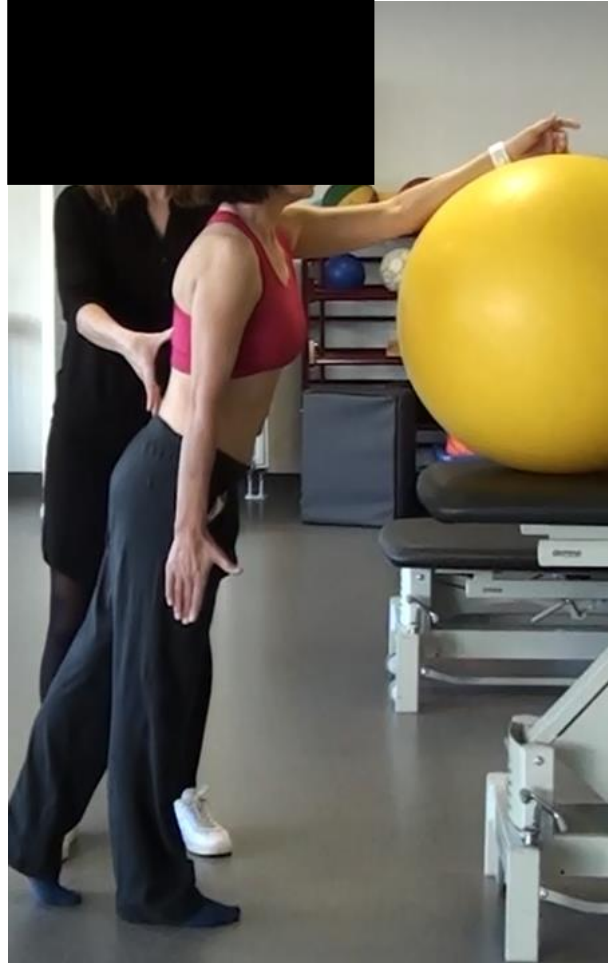
Practice without glenohumeral movements

Safe and not painful

Use mirror



ACTIVE EXERCISES FOR PERSONS WITH PAIN OR LOW LEVEL OF RECOVERY



Use more external rotation

Dorsal GH translations if necessary





ACTIVE EXERCISES FOR PERSONS WITH PAIN OR LOW LEVEL OF RECOVERY

Object in the hand – external focus



TAKE HOME MESSAGES – PART 2

- Every patient needs/can do exercises for his/her shoulder.
- Goal: improve balance between load and load capacity.
- Goals depend on recovery and prognosis.
- Adjust exercises to pain level.



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