EVER PHARMA

SALK

klinik pirawarth
Therapie und Rehabilitation

NEUROREHABILITATION AFTER STROKE

Essential exercises to regain independence

The booklet „Neurorehabilitation after Stroke – Essential Exercises to regain independence" has been published to support physiotherapists and also caregivers in their efforts to improving patients quality of life after they suffered from stroke.

It accompanies a video - showing the same exercises.

The exercises have been selected by Austrian Neurologists and Rehabilitation Experts as well as experienced physiotherapists and demonstrate - in the selected order - the normal recovery process of stroke patients.

The content of the chapters ranges from being moved in the bed (passive movement) to gait and stair walking training.

Specific emphasis is also put on complications geriatric patients might experience after a stroke.

The ultimate goal is to restore a level of functioning that allows stroke patients to live as independently as possible.

The exercises shown in this booklet are based on established physio- and occupational therapy methods. They are intended for people who work with stroke patients in professional institutions as well as for caregivers who look after them at home. Therefore the usage of the terms "therapist" and "caregiver" are interchangeable in this booklet.

We hope that this booklet will help many patients and caregivers to manage the consequences of stroke and we wish them all full and speedy recovery.

We would like to express special thanks to Mrs. Miriam Galoppi and Mrs. Ines Schandl from the Rehabilitation Clinic in Bad Pirawarth for their advice and support in finalizing this booklet.

Preface

Neurorehabilitation of stroke patients has long become a speciality in its own right. Emerging new concepts have changed this field and many of the skills we are training with our patients are being studied with new, multimodal and sophisticated neuroscience methods. The first principle to follow is the restoration of function which is mirrored in the plasticity changes of the cerebral cortex. Hubs of competence within the brain are remodelled to allow the restitution of motor skills or regaining of cognitive abilities. Functional recovery from stroke is not always possible at the best level and therefore many stroke patients exhibit limitations of activity and restriction of participation. We have to focus on approaches for reactivating mobility, speech, cognition and activities of daily living. To assist us, a number of new methods for stimulation of the brain have come up recently and the fields of robotics and virtual reality are also expanding rapidly.

All these new and fascinating developments do not abolish the need for what is considered the basics of neurorehabilitation. The nursing care, the stepwise mobilisation according to principles of neurophysiology and recovery are laid down in this book. To regain motor function and cognition, enabling independent activities of daily living and social participation in the family and community are not possible without the principles and examples given in this book. Wherever there is a stroke survivor, this kind of knowledge is needed. The training given by nurses and therapists, who work as a team following an individual target with social relevance, fills most of the day in neurorehabilitation wards and practices. To compile simple but truly effective measures in one book is an honourable achievement of the doctors, therapists and nurses involved in the making of this book but also the sponsor EVER Pharma.

Michael Brainin
Danube University Krems, Austria

Interview

Neurological disorders, and strokes in particular, are amongst the leading cause of death worldwide, and also cause disabilities of serious consequence. While the disorder primarily affects the elderly, younger adults and even children are not spared. Here at Klinik Pirawarth, we treat 4,500 inpatients in the neurological rehabilitation department a year. The majority of these patients have suffered an ischaemic stroke. In the past 20 years, we have made enormous progress in acute care for and prevention of stroke. Meanwhile, the discipline of neurological rehabilitation has undergone a dramatic transformation over the course of the last century. In neurological rehabilitation, an interdisciplinary team works with the patient, striving to restore a functional level that allows the patient to live independently in his usual domestic situation and environment once again following any organ damage, social impairments and environmental disadvantages a stroke may entail.

While neurological rehabilitation techniques are subject to continuous change, it always remains vital that the personal contact between the therapist and the patient is given absolute priority. It is of fundamental importance that the most basic rehabilitation measures are performed by the affected person with the support of his care givers and relatives throughout the rest of his life. These basic methods are based on physiotherapy, occupational therapy, and especially exercise and training therapy.

Andreas Winkler
Neurological Rehabilitation Clinic Bad Pirawarth, Bad Pirawarth, Austria

Interview

New insights in the field of neuroregeneration and about neuroplasticity have led to a change in therapeutic rehabilitation concepts over recent years. An increasing focus is placed on frequency of repetition, as well as high intensity, to promote optimum neuroplasticity.

For elderly patients, the primary therapy goal is often to regain everyday functions, rather than restoring neurological function. These everyday functions may include functions relevant for everyday living, such as mobility, but also self-help abilities, such as getting dressed independently, using the bath, personal hygiene or food preparation.

The basic requirement for an effective therapy design is that the patient has a certain attention span. That means they should be able to understand therapeutic instructions, implement therapeutic instructions, and ideally remember these instructions, enabling them to repeat the exercises independently as required.

A crucial requirement for the success of the rehabilitation measures is an adequate diagnosis. For instance, the rehabilitation potential following a stroke is dependent upon the coronary volume to a great extent. Other factors that play a role, especially for the elderly, include the functional condition before the stroke event. People who were already compromised in their everyday functions require an extensive geriatric assessment before any rehabilitation measures are initiated. Such an assessment should test everyday living capabilities, physical resilience, as well as the mental strength to cope with the relevant rehabilitation measures, given that both excessively high and excessively low expectations compromise the patient's rehabilitation success.

Nevertheless, it is important to remember that rehabilitation measures can still be successful at an advanced age, and any age limit for the initiation of rehabilitation must therefore be rejected.

Bernhard Iglseder
Christian-Doppler-Klinik, Salzburg, Austria

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CHAPTER 1

FACILITATION OF MOVEMENT: LYING POSITION

- **Lying position and positioning**
- **Movement of the extremities**

EXERCISE 1

POSITIONING WHILE LYING ON THE BACK

1

2

1 The therapist is standing on the patient's unaffected side and provides support by reaching underneath the patient's knee and holding the foot.

2 The therapist then gives a pressure impulse toward the bed and uses one hand to hold the patient's pelvis and turn it towards himself. With his free hand, he places a pillow underneath the leg of the affected side.

3

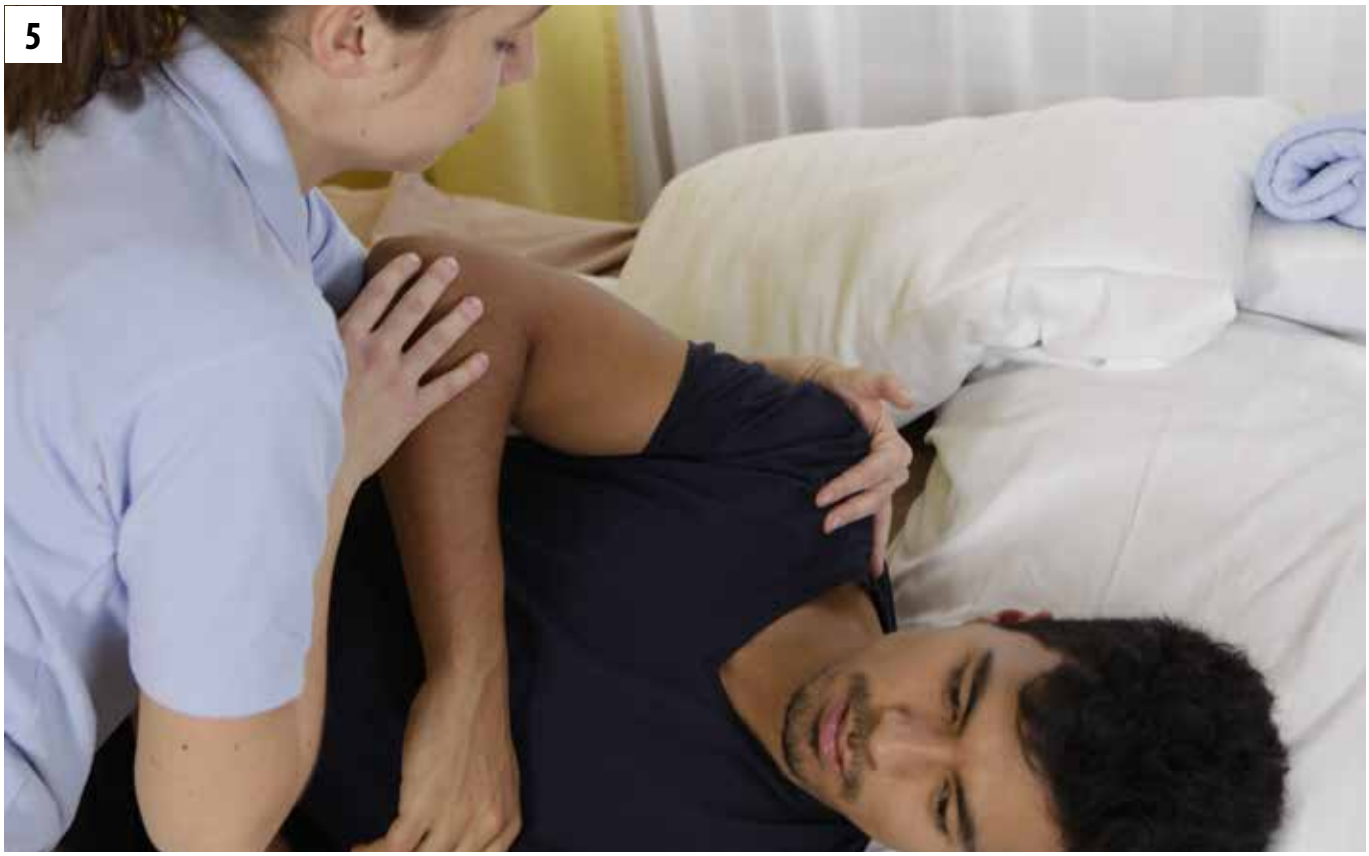
4

3 | Stretch the affected leg and place it on a thick pillow.

4 | The knee is slightly bent throughout and the heel exposed.

5 Afterwards, put the affected arm in position. The therapist holds underneath the shoulder blade and places the shoulder on a pillow in protracted (forward) position.

6 Place the arm now also on a pillow so that the hand is at a higher level than the shoulder. Finally, place the hand in functional position on a towel roll, with the fingers slightly bent and the wrist supported.



EXERCISE 2

POSITIONING ON THE AFFECTED SIDE

1 Place a large pillow next to the patient's affected leg.

2 The therapist stands on the affected side.

3 The patient bents the unaffected leg and then the therapist puts one hand on the pelvis and the other hand on the unaffected shoulder.

4 Then the therapist turns the patient onto the affected side. The therapist brings the shoulder blade forward so that the patient doesn't directly lie on the shoulder.

5 Lying on the side, place the good leg at an angle on the pillow while a second cushion protects the patient's back. Now stretch the affected leg at the hip with the knee slightly bent.

6 Place the affected arm on pillows so that the hand is at a higher level than the elbow. Place the hand in functional position.

5

6

EXERCISE 3

SECURE GRIP

1

2

1 The patient independently grips the wrist of his affected hand with the unaffected hand.

2 The thumb of the unaffected hand is lying in the palm of the affected hand. This stabilises the wrist.

EXERCISE 4

MOVEMENT OF THE LOWER EXTREMITIES

1

1 The patient is lying in the middle of the bed. The caregiver is standing on the affected side.

The caregiver bends the affected leg and lifts it towards the nose.

2 Stretch the affected leg carefully as shown. Repeat several times.

2

3

4

3 | Hold the knees with both hands, the patient's leg rests on the caregivers arm.

Carefully rotate the patient's leg.

Rotation should be careful and always with both hands around the knee.

Turn in both directions.

4 | The caregiver grips the back of the patient's lower leg and the heel.

Move to the side and back.

6

6 To mobilise the ankle joints, the caregiver stands at the patient's feet, grips around the foot from the front with the thumbs on top of the foot.

7 The foot is moved in all directions.

8 Finally, the patient's toes are flexed and extended.

7

8

EXERCISE 5

MOVEMENT OF THE UPPER EXTREMITIES: SCAPULA

1

1 The therapist grips the scapula with one hand and the ventral shoulder joint with the other hand. All movement directions are performed.

- Shoulder up to the ear and back down.
- Shoulder forward towards the sternum and back.
- Circular movements to combine all directions.

The caregiver should always keep both hands around the shoulder blade and perform all movements carefully and slowly.

EXERCISE 6

MOVEMENT OF THE UPPER EXTREMITIES: SHOULDER JOINT

1

2

3

1 | The therapist grips the scapula with one hand and slightly grips the upper arm from below with the other hand. The patient's arm lies next to the caregiver's lower arm

2 | First, the arm is moved upward up to 90 degrees and then moved back.

3 | Next, it is moved to the side, also up to 90 degrees

4, 5 | For further flexion movements, the therapist changes his grip. The therapist grips around the patient's elbow with one hand and stabilises the patient's lower arm with his lower arm, using his other hand to stabilise the shoulder joint from above.

Now the movement is performed beyond the 90 degrees. Caregivers need to encourage patients to say "Stop" if there is pain.

EXERCISE 7

MOVEMENT OF THE UPPER EXTREMITIES: ELBOW

1

2

1 The caregiver stabilises the upper arm at the elbow with one hand and grips around the lower arm near the wrist with the other hand.

2 Flexing the elbow, the patient's hand is guided alternately to

- the forehead,
- the ears
- and the mouth.

This causes a flexion and extension movement in the elbow and a functional link is created.

EXERCISE 8

MOVEMENT OF THE UPPER EXTREMITIES: WRIST

1 To treat the wrist and finger joints, the arm is laid down next to the body and flexed by 90 degrees at the elbow. This moves the hand so the patient can see it.

2-7 | The caregiver grips around the wrist and moves it carefully in all different directions.

EXERCISE 9

MOVEMENT OF THE UPPER EXTREMITIES: FINGERS

1

2

1 The thumb is isolated ...

2 ... and also equally moved in all directions.

3

3 | Finally, the finger joints are flexed and extended.

4

4 | One hand stabilises the wrist, and the other hand grips around the fingers.

CHAPTER 2

FACILITATION OF MOVEMENT: SITTING AND STANDING

- **Verticalisation**
  A vertical position of the patient should be achieved quickly, especially in the **early stages after stroke.** The objective is to mobilise the patient into a seated position on the side of the bed, then into a standing position. Verticalisation has a **positive effect on circulation and muscle tone**, especially in the legs. Sitting and standing results in **automatic activity facilitation, promotes patient independence** and facilitates his participation in everyday activities. The patient's starting position is the supine position on the bed. Care should be taken that there is **sufficient space at the edge of the bed** where he is intended to sit.
- **Trunk mobilisation**
- **Mobilisation into standing up**
- **Transfer**

EXERCISE 1

MOBILISATION FROM LYING TO SITTING POSITION VIA THE UNAFFECTED SIDE

1

1 Patient in supine position in the middle of the bed.

Secure grip.

The bed is at the correct height, and the patient can reach the floor with the feet when sitting.

2

3

2 | Caregiver supports the patient in lifting the affected leg.

3 | Caregiver supports the pelvis with one hand...

4

5

4 | ... and the scapula with the other hand to bring the patient into a stable sidelying position.

5 | The unaffected leg hooks under the affected leg and pushes it towards the edge of the bed.

6

7

6 The patient pushes himself up into a seated position with the unaffected hand.

7 As soon as the patient reaches the seated position, the caregiver should stand at the affected side to stabilise the affected side immediatly. Loosen the hooked legs and place the feet on the floor.

EXERCISE 2

MOBILISATION INTO SITTING ON THE EDGE OF THE BED VIA THE AFFECTED SIDE

1 The bed should be at a height that the patient can reach the floor when the patient is sitting at the edge of the bed. Secure grip, caregiver on the affected side.

2 The affected leg is stood up as shown. The patient lifts the unaffected leg himself.

1

2

3

4

3 | Caregivers hands on pelvis and scapula.

4 | The rotation is performed in one movement to the affected side. The secure grip is loosened, the patient pushes himself up into a seated position with the unaffected hand.

5

6

5 | Patient's unaffected hand helps to push the body into vertical position.

6 | As soon as the patient reaches the seated position, he must be stabilised immediately by the caregiver on the affected side to feel secure.

EXERCISE 3

POSITIONING CHAIR

Positioning in the seated position should be comfortable and supporting for the patient, as this will allow him to remain in the vertical position for longer. The objective is to regulate the muscle tone.

1

1 The patient sits right at the back of the armchair, with the back leaning against the backrest in an upright position. The hip and knee angles should be at least 90 degrees. First, the feet are positioned symmetrically and a hip width apart on the floor. It is important that the entire sole of the foot is in contact with the floor. This can be ensured by pressing straight down on the upper leg to push the heel down.

2

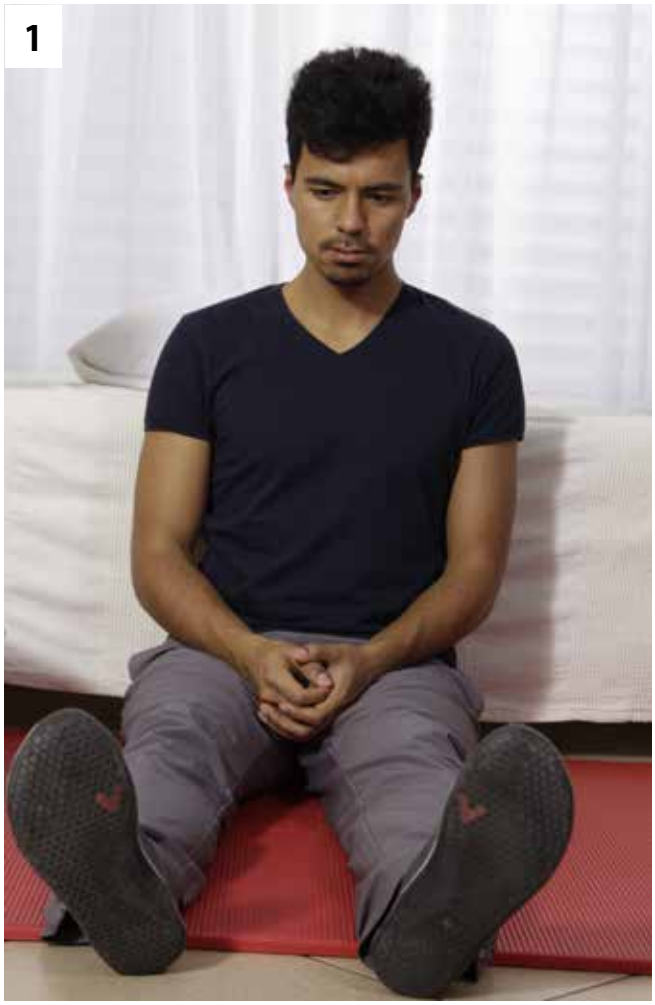
3

2 | The affected arm is supported by a pillow. The pillow should be large enough to reach under the elbow, and ideally all the way to the armpit. This places the upper arm raised a little bit to the side.

3 | Now the elbow is flexed so that the hand is in the patient's field of vision. It should be higher than the elbow to stimulate drainage.

EXERCISE 4

POSITIONING FLOOR



1 The patient sits in an upright position, with his back against the wall. The back is supported with a pillow. The legs should be extended in front of him.

2 If muscle tightness prevents complete extension, the affected leg is supported by the caregiver with a pillow under the knee, flexed slightly.

3 The affected arm is supported by a pillow which should be long enough to reach under the elbow, and ideally all the way to the armpit. This places the upper arm raised a little bit to the side.

The hand is in the patient's field of vision on the pillow in a functional position.

EXERCISE 5

TRUNK MOBILISATION IN A SITTING POSITION

1

1 The patient is seated. The caregiver sits next to him on the affected side. The caregiver grips the patient at the sternum with one hand and at the back with the other hand. All possible trunk movements are performed.

2

3

4

2 shifting sideways

3 Rotation to each side

4 Flexion bend to the front

5

6

7

5 | Extension straighten up

6, 7 | For the pelvic tilt, the caregiver sits (kneels) behind the patient and grips around his pelvis.
Pelvic tilt: Firstly to the back into a hunchback and then into the front into a hollow back.

EXERCISE 6

TRUNK TRAINING: SUPPORTING ACTIVITY OF THE AFFECTED HAND

1

1 The caregiver sits at the affected side and places the patient's hand on the surface cover.

2 The caregiver stabilises the hand at the elbow and the shoulder joint.

3 The patient should shift his weight away from and to the affected hand.

2

3

EXERCISE 7

TRUNK TRAINING: TILTING THE UPPER BODY FORWARD

1

1 The caregiver sits at the affected side. The patient holds his hand in the secure grip. The caregiver's leg stabilises the knee or leg of the patient from the front.

The caregiver grips under the arms near the elbow with one hand and places the other hand on the patient's back for movement instruction and stabilisation.

2 The patient moves the body forward.

3 The patient moves the body back.

4 The patient also moves the body sideways.

2

3

4

EXERCISE 8

SLIDING ON THE BED TO CHANGE POSITION

1

2

1 The caregiver kneels in front of the patient and grips around his pelvis. If possible, the patient should straighten up and shift his weight alternately to each side.

2 The caregiver moves the relieved side in accordance with the direction of motion. Repeat several times.

EXERCISE 9

CROSSOVER - UNAFFECTED LEG

1

2

1 The therapist kneels in front of the patient. The therapist starts by positioning the patient's foot in the centre and presses on the patient's leg and foot.

2 The patient is now asked to support himself with the unaffected hand to lift the unaffectd leg over the affected leg. The unaffected leg is crossed over and consequently the affected leg is underneath. This improves the perception in the leg, facilitates an upright posture and activates the trunk.

EXERCISE 10

CROSSOVER - AFFECTED LEG

1

2

1 The caregiver is positioned in front of the patient. The patient supports himself on his unaffected hand. Depending on the patient's capabilities, the affected hand lies either on his legs or also supports the patient. The therapist supports the leg by gripping the foot (ankle) and the upper leg.

2 Now the affected leg is crossed over. This specially promotes activity and facilitates the functionality for activities of daily living (e.g. putting on socks).

EXERCISE 11

FUNCTIONAL TRAINING

1 – 6 The therapist sits behind the patient and supports the stabilisation of sitting upright. Various objects are placed in front of or next to the patient, e.g. cones, bottles, balls. He is asked to transport them to various specified places. The patient grips an object with the affected hand with support of the caregiver and puts it back down. The objective is to initiate trunk activity and promote balance. The exercise can be performed with or without the feet touching the floor.

5

6

7 - 9 The patient changes the side of the working hand. The affected hand supports with help of the caregiver, who stabilises the arm, mainly the elbow.

7

8

9

EXERCISE 12

TRUNK TRAINING AT THE TABLE

1

2

3

1 The patient is seated in front of the table. The patient's arms are positioned on the table (if necessary, supported by a towel, pillow, etc.), holding the affected hand in a secure grip.

2, 3 The patient now initiates trunk movements, and consequently his weight shifts.

This promotes trunk activity, and can help to regulate muscle tone and mobilise the shoulder joint.

EXERCISE 13

MOBILISATION INTO STANDING POSITION

1

2

1 When mobilising the patient into a standing position, he must feel safe. The caregiver must be close to the patient. The patient's feet must be positioned sufficiently far back and flat on the floor. If they are too far to the front, the patient is unable to move his centre of gravity above the supporting surface which makes standing up more difficult. The exact sequence and the rhythm are crucial when standing up. It is important that the upper body is tilted forward to achieve sufficient pressure on the feet. Standing up must be practised from different heights.

2 The patient slides forward to the edge of the bed or chair either independently or with assistance, depending on ability. The caregiver stands at the affected side, slightly diagonally in front of the patient. His feet are flat on the floor and sufficiently far back. The caregiver blocks the patient's affected leg with his knee.

3 The caregiver positions his leg at a slight angle to prevent their knees touching. The caregiver reaches under the unaffected arm and grips around the scapula with one hand, and grips the buttocks on the affected side with the other hand. The patient places his unaffected hand on the caregiver's back.

4, 5 In order to create pressure on the feet, the upper body is tilted slightly forward.

When the patient is standing up, the caregiver primarily uses the hand at the patient's buttocks to facilitate an extension of the hip.

6

7

8

6 When both parties are ready, the caregiver and the patient slowly straighten up together.

7 The steps are performed in reverse order to sit the patient back down. The forward tilt of the upper body is crucial to control the return into the seated position.

8 The caregiver will remain close to the patient until he sits securely on the bed again.

EXERCISE 14

LOW TRANSFER VIA THE UNAFFECTED SIDE FROM THE CHAIR TO THE BED

The low transfer is used if the patient is not able to stand yet. The chair must not have armrests. The seats should be of the same height. If necessary, any height differences can be balanced out with pillows or similar. First, the transfer is practised via the unaffected side. This has the advantage that the patient can sit on the side he feels safe on.

1 In order to ensure that the feet are firmly placed on the floor and to move the centre of gravity forward, the patient slides to the very front of the chair.

The feet are positioned slightly into the direction of rotation before the exercise is performed. The rotational movement must not cause pain.

2 The caregiver places his hand on the patient's back while securing the buttocks on the affected side with the other hand.

The caregiver reaches under the arm on the unaffected side (please only focus on the position of the therapist's arm).

3 The patient reaches with the unaffected hand to the edge of the bed, in order to support the following transfer.

4 Please pay attention to the knee. The patient pushes himself to the very front of the chair with the unaffected hand. Ensure that the patient does not block himself. The caregiver also secures the knee.

2

3

4

5 Pay attention to the rhythm. Move the upper body far forward and …

6 …swing the buttocks towards the bed.

7 The caregiver stabilises the patient after the transfer.

EXERCISE 15

LOW TRANSFER VIA THE AFFECTED SIDE FROM THE BED TO THE CHAIR

1

2

3

1 The feet are positioned into the direction of rotation before the exercise is performed.

2 The caregiver reaches under the arm on the unaffected side and places his hand on the patient's back.

3 Move the body far forward and transfer the buttocks towards the affected side onto the chair. The chair must also be secured, as it may slide away.

EXERCISE 16

HIGH TRANSFER VIA THE UNAFFECTED SIDE FROM THE CHAIR TO THE BED

The high transfer requires a greater degree of functional patient participation, facilitates activity and is considered independent training. The patient must already have stood up safely several times as shown in picture 2. The high transfer is necessary if armrests or excessive level differences prevent a low transfer. First, the transfer is practised via the unaffected side.

1 In order to facilitate standing up, the feet must be placed sufficiently far back. The caregiver blocks the patient's affected knee with his knee.

2

2 | The caregiver reaches under the unaffected arm and grips the scapula or the back. Then the caregiver grips the buttocks with the other hand (not visible). The patient can hold onto the caregiver's back with his unaffected hand.

3

3 | The patient stands up with his body tilted sufficiently forward. The caregiver must always secure the patient's knee, as soon as the weight is shifted onto the affected side when turning. Now the weight shifts back onto the unaffected side.

4 The affected foot is turned with the assistance of the caregiver. If necessary, these steps are repeated several times.

5 When sitting down, the patient should hold onto the caregiver or the armrest and sit down slowly, keeping the upper body tilted forward sufficiently.

EXERCISE 17

HIGH TRANSFER VIA THE AFFECTED SIDE FROM THE BED TO THE CHAIR

1

2

3

1 In order to facilitate standing up, the feet must be placed sufficiently far back. The caregiver blocks the patient's affected knee with his knee.

2 The caregiver reaches under the unaffected arm with one arm and grips the buttock on the affected side. Then the caregiver grips the scapula with the other hand. The patient stands up with his upper body tilted sufficiently forward. The patient can hold onto the caregiver's back with his unaffected hand.

3 The caregiver must always secure the patient's knee as soon the weight is shifted onto the affected side when turning.

4 The patient turns the unaffected foot towards the chair. Now the weight is shifted back onto the unaffected side.

The affected foot is turned with the assistance of the caregiver. If necessary, these steps are repeated several times.

5 When sitting down, the patient should hold onto the armrest and sit down slowly, keeping the upper body tilted forward sufficiently.

CHAPTER 3

FACILITATION OF MOVEMENT: STANDING AND EVERYDAY TASKS

- **Mobilisation of the upper extremities**
  Facilitation of upper extremity movement is best performed in an upright seated position. The focus is on facilitating functional and everyday activities. The patient should actively assist all movements and actively think about them. It is crucial that all movements are performed without force or pressure and cause only minimal pain.
- **Training for functional activities of daily living**
- **Mobilisation of the lower extremities**
  The objective of facilitating lower extremity movement, i.e. leg movement, is to facilitate a secure standing position as quickly as possible to prepare the patient for walking. Standing upright has a positive effect on muscle tone, facilitates posture and physiological movement, and stimulates balance. First, a secure supporting leg is developed. Always remember: supporting leg before free leg! The exercise sequence starts in the seated position, with a few exercises for improved sensation. All exercises can be intensified by using a higher seat, which places additional pressure on the legs.
- **Floor transfer**

EXERCISE 1

FACILITATION OF MOVEMENT: SCAPULA

1 The patient sits as upright as possible on a bed or chair. The caregiver sits at the affected side of the patient and grips the scapula with one hand, and the shoulder joint with the other hand.

2 All directions of movement are activated:

- towards the ear and back down
- forward and backward
- also circular movements

EXERCISE 2

FACILITATION OF MOVEMENT: ARM

1

2

3

1 The initial small movement can gradually be increased in range. The caregiver grips the lower arm with one hand and with the other hand the upper arm above the elbow.

2 Perform the forward movement to approx. 45 degrees and than to 90 degrees..

3 The lateral arm movements are also performed with this grip.

4

5

4 To increase the range higher than 90 degrees, the caregiver stands on the side of the patient, grips the scapula with one hand, and grips around the patient's arm from below with the other hand. The caregiver's arm acts as a supporting surface for the patient's arm.

5 This allows a movement range up to approx. 160 to 180 degrees.

EXERCISE 3

FACILITATION OF MOVEMENT: ELBOW

1

2

1 The caregiver grips around the upper arm with one hand and the lower arm with the other. The arm, or rather the elbow, is flexed and then extended again.

2 Exercises for everyday life include arm movements towards:

- the mouth
- the nose
- the forehead

EXERCISE 4

FACILITATION OF MOVEMENT: HAND

1 The caregiver grips around the upper arm on the affected side with one hand and the affected wrist with the other.

2 First, the lower arm and the wrist are moved inward and outward. The patient must actively assist the movement and concentrate on it.

3 The caregiver grips the front of the lower arm near the wrist, and moves the hand upward and downward. With the same grip, the hand is now moved slightly to the right and to the left.

EXERCISE 5

FACILITATION OF MOVEMENT: FINGER JOINTS

1 The caregiver sits at the affected side of the patient, stabilises the patient's wrist with one hand and places his other hand loosely around the thumb.

2 The caregiver moves the thumb into the palm and back.

3 The caregiver also grips around the fingers from the outside and closes and opens the hand.

EXERCISE 6

WIPING

1

1 The patient is seated upright at the table and his affected hand lies as flat as possible on the table. The therapist is seated next to the patient and may grip around the upper arm with one hand and place the other hand on the patient's hand or lower arm.

2

2 This allows the therapist and the patient to execute the different movement directions together.

The patient now wipes the hand in various directions.

If required, the therapist supports these movements.

Paper towels, flannels or similar could be used as aids for the wiping exercises (here not shown).

EXERCISE 7

GRIPPING ACTIVITY

1 The patient is seated at the table, and the affected arm is positioned on the table.

2 With the therapist's assistance, the gripping function can now be facilitated. The caregiver grips around the fingers from the outside, and opens the fingers.

3 The patient places the prepared object (ball, small bottle, etc.) into the opened hand.

4 Positioning and stabilisation exercises as well as functional movements can now be performed.

EXERCISE 8

INDEPENDENT PRACTICE

1 The exercises are performed at the table, should facilitate patient activity, and can be initiated by the therapist for independent practice. The patients holds his hand in the secure grip.

2 He now guides the hand along the table in all directions, just as he did in the previous exercises.

It is important that the patient does not work with force of strength, and only performs exercises that cause no pain.

EXERCISE 9

ACTIVITIES OF DAILY LIVING: PUTTING ON A SHIRT

1 The patient is seated, takes the shirt and tries to position it, so that the sleeve for the affected arm is lying on his lap.

2 The patient independently grips the affected hand with the unaffected hand and feeds it into the sleeve.

3 He pulls the sleeve over the affected arm with the unaffected hand and ...

4

5

6

7

8

9

10

4 | ... if possible over the elbow.

5,6,7 | In order to pull his head through the top, the patient grips the neck opening.

8,9,10 | He slips his unaffected hand through the other sleeve and pulls the top over his head in the same motion.

EXERCISE 10

ACTIVITIES OF DAILY LIVING: PUTTING ON PANTS

1

2

3

4

1 The patient is seated, and the garment is within reach.

2 The patients crosses the affected leg over, ...

3 ... pulls the trousers over the affected foot…

4 ... and the affected leg as far up as possible.

5 Then he puts the affected foot back down and places the unaffected foot in the respective trouser leg.

6 The trousers are pulled up to the upper leg.

5

6

7 | **Version one:** If the patient is not able to stand yet, the trousers are pulled over the buttocks bit by bit by shifting the weight from one side to the other. The caregiver should only assist when necessary.

8 | **Version two:** If the patient is already able to stand for a short period, the patient stands up and pulls the trousers over his buttocks with the unaffected hand**.**

9 | The caregiver should only stabilise the patient when necessary but remains close to him.

EXERCISE 11

EXERCISES IN THE SEATED POSITION: STAMPING AND ECCENTRIC MUSCLE CONTRACTION

1

1 The patient sits on a chair or on the edge of the bed barefoot and has good contact to the floor. The caregiver supports the affected leg by gripping the upper leg and foot, and the patient starts to stamp together with the support of the caregiver.

2 The next exercise focuses on perception. The caregiver presses his hand onto the upper leg to push the heel firmly to the ground.

3 The next exercise trains relaxing the muscle. The caregiver lifts the affected leg several centimetres above the floor and then lets it drop. The patient is meant to feel the impact.

EXERCISE 12

EXERCISES IN THE SEATED POSITION: MOTOR SKILLS

1 The stability of the supporting leg has to be practiced and trained first. The affected leg stands firmly on the ground and is supported by the caregiver as needed. The patient is asked to pull the unaffected leg up to his nose; the caregiver supports the affected leg in the process.

Next, the patient cycles with the unaffected leg and then puts the leg back down. He then slowly draws large outward circles and puts the leg back down.

EXERCISE 13

EXERCISES IN THE SEATED POSITION: WIPING EXERCISES FOR THE FREE LEG

1

2

1 The patient trains the free leg by performing wiping motions while seated. He should wipe in all directions with the sole of his foot. The caregiver supports the knee and stabilises the foot.

2 The caregiver can put a cloth under the foot (not shown here) and the patient wipes forward and backward with his foot.

3 | He then wipes outward, far forward and back again. The patient then practices crossing the affected leg over the unaffected leg. He firmly pulls the affected foot and toes up.

4 | The caregiver supports the foot and leg movements. The heel of the unaffected leg remains on the floor.

EXERCISE 14

EXERCISES: SUPPORTING LEG TRAINING

1 To train the supporting leg and to bear his entire weight, the patient stands in a position that allows him to stabilise himself against a wall, next to a chair or a table with his unaffected hand. The caregiver is standing on the affected side.

He uses one hand to stabilise and stimulate the knee and therefore muscle activity. With the other hand, the caregiver grips around the pelvis. The patient's affected hand hangs in front of the body, or is positioned at the caregiver's back.

Now, the weight is shifted onto the affected leg, and then shifted back.

2 | The affected leg is positioned to the front to change the starting position. The weight is shifted to the affected leg which is supported by the caregiver. Now, the patient has to bring the unaffected leg forward.

3 | Then the patient brings the leg back. The feet are now positioned side-by-side.

EXERCISE 15

EXERCISES: FREE LEG PHASE

1 The patient starts in step position, with the unaffected side in front. The caregiver grips around the pelvis with one hand and in the hollow of the knee with the other. The patient stands with his legs slightly wider apart and his weight is on the unaffected leg.

2 The patient moves the hand, supported by the bed, further forward and brings the affected leg forward.

3

3 | When the patient steps back, the caregiver changes his grip from the hollow of the knee to the ventral lower leg and guides the leg backward with a sufficiently flexed knee.

4

4 | The patient can now shift his weight forward again and step forward and back again with the affected foot. At the end, straighten the patient up again.

EXERCISE 16

GAIT TRAINING

1 Walking training is an essential part of gait rehabilitation. The developed gait phase should be executed in a coordinated manner. The patient starts with the unaffected side at the side of a wall or bedside. As before, the caregiver secures the patient by gripping the knee in the supporting leg phase and the hollow of the knee in the free leg phase, while the other hand grips around the pelvis.

2 The patient straightens the supporting leg and makes the first step.

First, he moves the hand forward. The caregiver supports the knee when the patient shifts his weight.

3 The caregiver stabilises the affected leg when the patient steps forward. The movement rhythm must be observed.

EXERCISE 17

STAIR TRAINING

Stair training - walking up

1 The patient starts with the unaffected side to the railings.

2 The caregiver secures the knee with one hand, and the pelvis with the other. The patient starts climbing with the unaffected leg, then the affected leg follows, supported by the caregiver.

3 The knee is then stabilised again before the next step follows.

Stair training - walking down

When walking down the patient always makes the first step with the affected leg.

4 The caregiver supports the patient by gripping the knee and one arm around the pelvis.

5 The caregiver supports the affected leg as shown in the freelegs phase. In the supporting leg phase the caregiver needs to secure the patients knee..

Stair training - walking alternating up

6 For patients who can already climb the stairs in an alternating way also the unaffected leg starts.

7 Then the affected leg climbs up one more step, this with the active support of the caregiver.

Stair training - walking alternating down

8

9

10

8-10 | When walking downstairs, the affected leg leads to allow the unaffected leg to brake the motion better. The knee can also be secured with the caregiver's knee.

EXERCISE 18

FLOOR TRANSFER: COMING DOWN TO THE FLOOR

1 The patient sits on a stable chair or the bedside, and is turned towards the unaffected side. The unaffected hand is supported by the seating area. The legs are positioned in a large step position, the affected leg to the back.

2 The caregiver kneels close to the patient and secures the sternum with one hand and the pelvis with the other. The patient slowly slides down onto the affected knee. Now, the unaffected leg is brought to the back. The patient is now in a kneeling position. He reaches for the floor with the unaffected hand and slowly shifts onto the affected side.

EXERCISE 19

FLOOR TRANSFER: FROM THE FLOOR BACK UP

1

2

1 The patient supports himself with the unaffected hand and pushes himself up into a kneeling position. The caregiver supports him by gripping the sternum.

2 The patient now grips the seat with the unaffected hand, brings the unaffected leg forward…

3 | …and pushes himself back onto the seat with the support of the unaffected leg.

4 | The caregiver can offer support at the trunk or the leg.

CHAPTER 4

TEST OF THE UPPER EXTREMITIES

ACTION RESEARCH ARM TEST (ARAT)

The ARAT is a standardised upper extremity performance assessment for clients experiencing hemiparesis after a stroke. It is commonly used in Stroke Rehabilitation Trials as one of the major assessments to test upper extremity motor function and improvement.

This measurement tool includes 19 items covering four domains of upper extremity movement:

Grasp (6 items)

Pinch (6 items)

Grip (4 items)

Gross movement (3 items)

The ARAT typically takes 10-15 minutes to administer.

CHAPTER 5

GERIATRICS

EXERCISE 1

MOBILISATION INTO SITTING ON THE EDGE OF THE BED VIA THE AFFECTED SIDE

1

2

1 Before turning the patient on his side in the lying position, the arm should only be moved slightly to the side, as there is no full mobility. Any strong outward rotation of the shoulder joint should be avoided.

2 Both legs are stood up.

3 The patient can now roll onto the affected side. Please pay attention: Many elderly patients react fearfully if they roll to the side too quickly.

4 Therefore: If trunk mobility allows, their knees are moved to the side first followed by the upper body.

5 As soon as the patient reaches the seated position legs must be stabilised.

EXERCISE 2

SCAPULA AND HIP JOINT MOBILISATION

1

2

3

This exercise is usually sufficient to the existing degree of mobility, it is suitable for everyday practice, and it usually also facilitates the achievement of the full range of motion for the hip joint

1 The patient folds his hands.

2 He tries to reach the floor between his legs with hands folded.

3 The shoulder is flexed by 90 degrees and the scapula is mobilised.

EXERCISE 3

WALKING EXERCISE

1 The caregiver supports the affected side.

2 To facilitate an upright position, the caregiver places one hand on the chest, and the other one on the inferior angle of the scapula.

3 If the patient is weak, the caregiver supports the knee and helps to bring the leg to the front. The caregiver can support the shift in weight by reaching behind the back and placing his other hand on the opposite side of the pelvis, or the armpit of the unaffected side.

4

5

4 | While the patient is walking, the caregiver should always focus on the feet so that he notices any caving in early.

5 | Once the patient is able to perform the movement independently, the support is reduced. If necessary, the patient may use a walking stick in the unaffected hand.

CHAPTER 6

DYSPHAGIA

- **Medical history**
- **Testing of the motor and sensory skills related to swallowing**
- **Direct swallowing test**
- **Dietary recommendations**
- **Thickening fluids**

Dysphagia describes a condition where fluids, food, or even saliva or secretions cannot be transported safely from the mouth via the oesophagus to the stomach, and instead end up in the airways aspirating them.
In the best-case scenario, the patient immediately starts to cough and clears his throat. This is a protective reflex of the lungs to remove the foreign body. However, in silent aspiration, this does not happen, the patient shows no reaction. Consequently, the condition cannot be assessed externally. This entails the risk that the aspiration results in a lung infection - and in extreme cases, it may be fatal.

If dysphagia is suspected, an extensive clinical swallowing examination should be performed. This comprises three important areas:

- Medical history
- Testing of the motor and sensory skills related to swallowing
- Direct swallowing test / direct swallowing attempt

After the procedure the therapist can recommend dietary to the patient.

MEDICAL HISTORY

First, the therapist talks to the patient directly. He asks simple situational questions, e.g.: "Why are you here?", "Do you have any difficulty swallowing?", "Do you often need to cough when eating or drinking?", "Have you had a lung infection in the past? If so, how long ago was that?", "Do you often experience heartburn after a meal?"...

TESTING OF THE MOTOR AND SENSORY SKILLS RELATED TO SWALLOWING

Observation at rest

- Vigilance: The patients must be able to stay awake for 15 min.
- Breathing: inconspicuous, or coated and seething respiratory sounds
- Oral cavity check
- Dental health (dentures in place or missing? own teeth?)

Motor and sensory skills

- Random cough/throat clearing
  CAVE check: Coughing is an important protection mechanism that helps to move penetrated or aspired food back out of the airways. Special care is required if this mechanism is compromised.
- Random saliva swallowing –> is the swallowing motion successful, or can it not be triggered, does the patient swallow spontaneously?
- Mimic muscles -> symmetrical or asymmetrical
- Velum
- Tongue mobility
- Tongue strength
- Sensitivity test -> is sensation reduced on one side?

DIRECT SWALLOWING TEST

1 We start with pulpy consistencies or thickened fluids and a teaspoon. The patient swallows normally. The caregiver feels for the pharyngeal reflex.

2 The patients loudly says "day" while the caregiver presses down on the tongue with a wooden stick and checks the oral cavity. For the second attempt, the patient is given a heaped teaspoon. Again, the pharyngeal reflex and tone of voice are tested.

3

4

3 | Next, the fluids the patient drinks are tested. The patient drinks a sip, and the examination is conducted as before. Then, the patient takes 2-3 sips in succession.

4 | Now, the solid consistencies are tested, such as a piece of bread with or without crust. The pharyngeal reflex is re-examined again by placing the index and middle finger on the larynx. Special attention is paid to clinical signs of aspiration.

5 As soon as the patient feels he has swallowed everything, the oral cavity is again checked and the tone of voice is tested. Then, the patient takes another 2 bites. Following the solid consistencies, mixed consistencies and crumbly food are tested, such as apples, cake or biscuits. Again, the pharyngeal reflex is already tested while the patient is chewing.

With each consistency, attention is paid to any clinical signs for aspiration. If no symptoms are detected, the examination is continued with the next consistency. Clinical signs for aspiration means that the patient is coughing or clearing his throat while or after swallowing, up to a maximum of 3 minutes after swallowing. The tone of voice is assessed. If it is clear, it is inconspicuous. If the voice sounds like a gurgle, or it is coated, then it is pathologic, i.e. noticeable. The breathing is also assessed, whereby the breathing sounds are observed. Overall, the patient should be encouraged to cough. The speech therapist will then recommend an appropriate form of diet which the patient can swallow safely.

DIETARY RECOMMENDATION

There are 4 forms of diet which should be used in accordance with the findings of the direct swallowing test.

- **Regular food**
  All consistencies are inconspicuous.

- **Soft food with mixed consistencies (soups with added ingredients, compote...)**
  The patient has difficulty chewing -> oral phase is delayed for solid consistencies, difficulty taking a bite, loose fit of denture.

- **Soft food without mixed consistencies (only creamed soup)**
  Pulpy and soft consistencies (brioche, dumplings...) successful, fluids impossible -> must be thickened (see section "Thickening fluids").

- **Pulpy strained food**
  Pulpy successful, fluids impossible -> all fluids must be thickened (see section "Thickening fluids"), medicine must be crushed and mixed with pulpy consistencies for administration, no liquid medication, additional parenteral nutrition if necessary

THICKENING FLUIDS

Fluids are thickened to make it safer for the patient to swallow them!

- Slight: 1 measuring spoon per 200ml
- Moderate: 2 measuring spoons per 200ml
- Strong: 3 measuring spoons per 200ml

Instructions

1 To thicken a fluid slightly, one tea or measuring spoon is mixed into a glass with approx. 200 ml of fluid while stirring continuously.

2 After stirring for approx. 30 seconds, the fluid needs to rest for one minute before it is ready for drinking. Moderate thickening requires 2 spoonfuls, and strong thickening 3 spoonfuls.

Usage tips

- Use for all fluids: soups, sauces, hot and cold drinks, compote juice...
- Do not thicken carbonated drinks!
  (e.g.: beer, mineral water...) The thickening agent will settle at the surface while the underlying drink remains liquid.
- Drinks which are already thickened should not be thickened further. This often results in lumps.
- Your doctor can prescribe a recipe for the thickening agent.

Period of oral food and fluid restriction

High aspiration rate for all consistencies -> food supplementation with nasogastric tube or parental food; possibly PEG tube placement (decision to be made by the patient or a relative; in the event of an emergency, a doctor can also order the placement of a PEG tube)

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CERE/INT/03/2017/5