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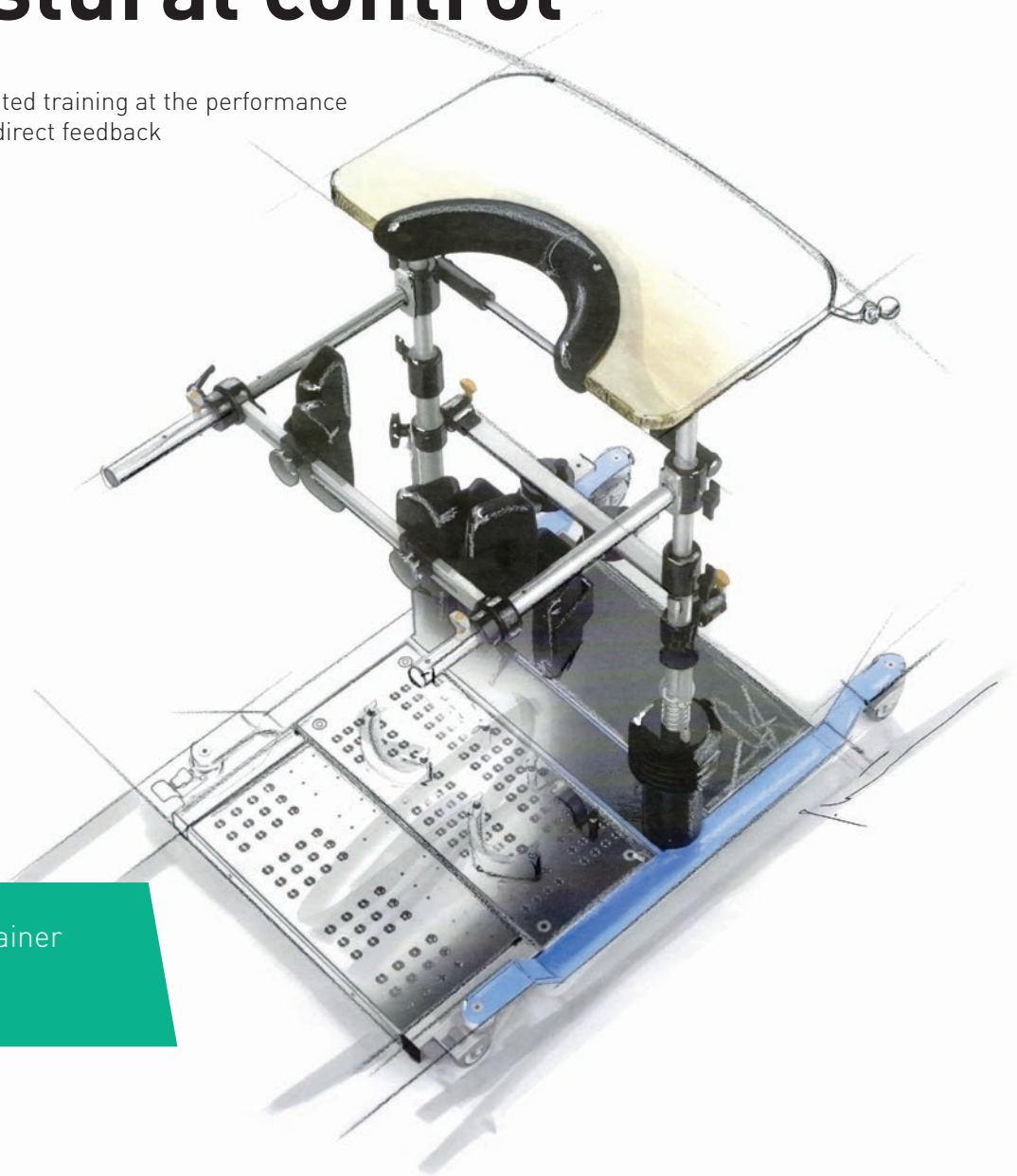

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FOREWORD

Virtually virus-free!

Dear Readers,

Welcome to the 2020 summer issue of THERAPY – without any brightly-coloured virus bubbles or a Covid-19 headline on the front page! How can this be?

Be warned: even our most discerning readers will find that it barely gets a mention. The reason is simple. Our team is small and the editorial deadline for this issue was in February – before the big lockdown.

We thought long and hard about whether it was even possible to publish an issue that doesn't deal with the coronavirus after everything that has happened as a result of the pandemic.

But of course it is! Covid-19 hasn't changed the principles of motor learning after all, and rehabilitation training hasn't become any less important. Quite the opposite: the positive effects of early mobilisation are undisputed for Covid-19 patients too, even in intensive care.

So this issue does in fact contain plenty of important information for the therapy of the future. Happy reading and best of luck applying these new findings to our present situation.

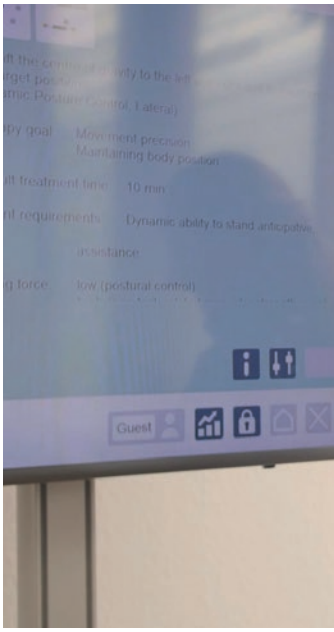
Stay safe
Jakob Tiebel

Contact the editorial team: therapy@thera-trainer.com

Giving up is out of the question – I want to enjoy life!

Jürgen Winkler

My life in motion



Training in neurology
and geriatrics

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Cover story

Therapy & Practice

Science

A field report from Jürgen Winkler

THERAPY & PRACTICE

MY LIFE IN MOTION

A swimming accident changed Jürgen Winkler's life completely. One moment he was an active pedestrian; the next he found himself sitting paraplegic in a wheelchair. Faced with the question, "Give up or fight?", he decided to do everything to become as active and independent as possible again. A story about optimism, training and motivation.

Jürgen Winkler

Even my "pedestrian" life was very active. As an active football club member, I was busy with training and matches several days a week. On other days I was involved with the water rescue service and the THW (German Federal Agency for Technical Relief), as well as the volunteer fire brigade, which also took up a lot of my time. I was involved in most of the fire brigade's missions – usually between 80 and 120 a year – alongside my career as a carpenter, and it was almost like a second job. When there were no club activities scheduled, I rode my motorbike or took my chainsaw and axe to the forest so I could stay warm in winter. With travel, day trips, friends and parties, my life was pretty well-rounded.

In June 2003, my life changed from one second to the next. I had a swimming accident at Lake Garda in Italy and have been paraplegic ever since – completely paralysed from the fifth and sixth cervical vertebrae. The life I had been living was turned upside down completely. Suddenly it came to a standstill. Everything I had been doing up to this point was no longer possible.

During my first weeks in hospital I was completely bedbound. I was then allowed to sit in a wheelchair for a few hours at a time. In this initial period I thought a lot about how to keep going: Should I give up or see what was still possible? Luckily, I met other wheelchair users

in the hospital who had been in a wheelchair for years and who told me how worthwhile their lives were in spite of it.

This made my decision easy: giving up was out of the question – I want to enjoy life! From that point on I did everything I could to become as independent as possible again. For myself, above all, but also for my girlfriend at the time, my parents and friends. So it was full steam ahead for occupational therapy, physiotherapy and strength training. I quickly noticed that I was making progress with the daily exercises and the strength training. I regained more and more independence and life became worth living again. After about 6 months, I was discharged from hospital.

At home I continued to attend occupational therapy and physiotherapy regularly and continued to build up my strength. After a few months, I got a place in a vocational training centre. Here I not only completed a new qualification as an administrative officer, I did rehabilitation as well. I spent two years at the training centre, and a lot changed in that time. I became fully independent, found a job and tried out lots of new sports.

Giving up is out of the question – I want to enjoy life!

A LIFE IN MOTION

as a wheelchair user

I have been a wheelchair user for about 17 years now. A lot has happened during this time. But one thing never changes: I lead an active life.

I'm an enthusiastic handbiker, and I enjoy both simple day tours and participating in races. I've also been working as a freelance speaker for many years giving talks on motivation to companies, medical and surgical supply stores and insurance companies. As well as that, I provide training courses in paraplegia clinics on the topic of "Everyday life in a wheelchair" for occupational therapists, physiotherapists, sports therapists and nursing staff, as well as for patients. Travelling to cities and scenic places has also become an important part of my life.

To be able to do all these activities, I also have to stay fit. I train a lot with my handbikes and I use my wheelchair a lot as part of everyday life. This exercise mostly happens outdoors. Of course, I can't do this in the winter months or when the weather's bad. Instead, I use my recumbent bike in the apartment to train on a roller.

From the moment I first started using a wheelchair, the THERA-Trainer has been a constant training device. I first encountered it in the hospital. I then had it prescribed so that I could train at home. In particular I use the cranks for my upper body and arms, so that I can actively maintain and build up my remaining muscles. I try to train with the tigo several times a week. I usually train from 30 minutes up to 3 hours at a time – depending on how much time I have and whether I just want some gentle exercise or a real workout. The passive leg exerciser also gets a lot of use. Although I can't work actively with it, it's still good for me because the leg movement reduces my spasticity. It also has a positive effect on my gut health.

What's great is that there's little to no set-up time. For upper body training I simply have to move my wheelchair over to the trainer and I can start immediately. Some manoeuvering is required to move my legs through, but it doesn't take long. The good thing is that I can manage all this on my own despite my high degree of paralysis. The THERA-Trainer can be easily integrated into everyday life. I keep mine in the living room and often use it while I'm watching television. I usually use the tigo when I'm watching sports reports. I love to watch sports while I'm exercising – it's fun and the training sessions are over before I know it. I can enjoy myself while doing something that benefits my everyday life and my body feels better for it. Because I'm always trying to increase my numbers, I don't lose motivation. When I succeed, I feel so much better.

My life might be different now - but I am totally happy.

My advice to everyone is to exercise as much as possible. You don't have to be as extreme as me, of course. The results will simply have a positive effect on your everyday life.

Therapy recommendations for improving mobility in MS patients

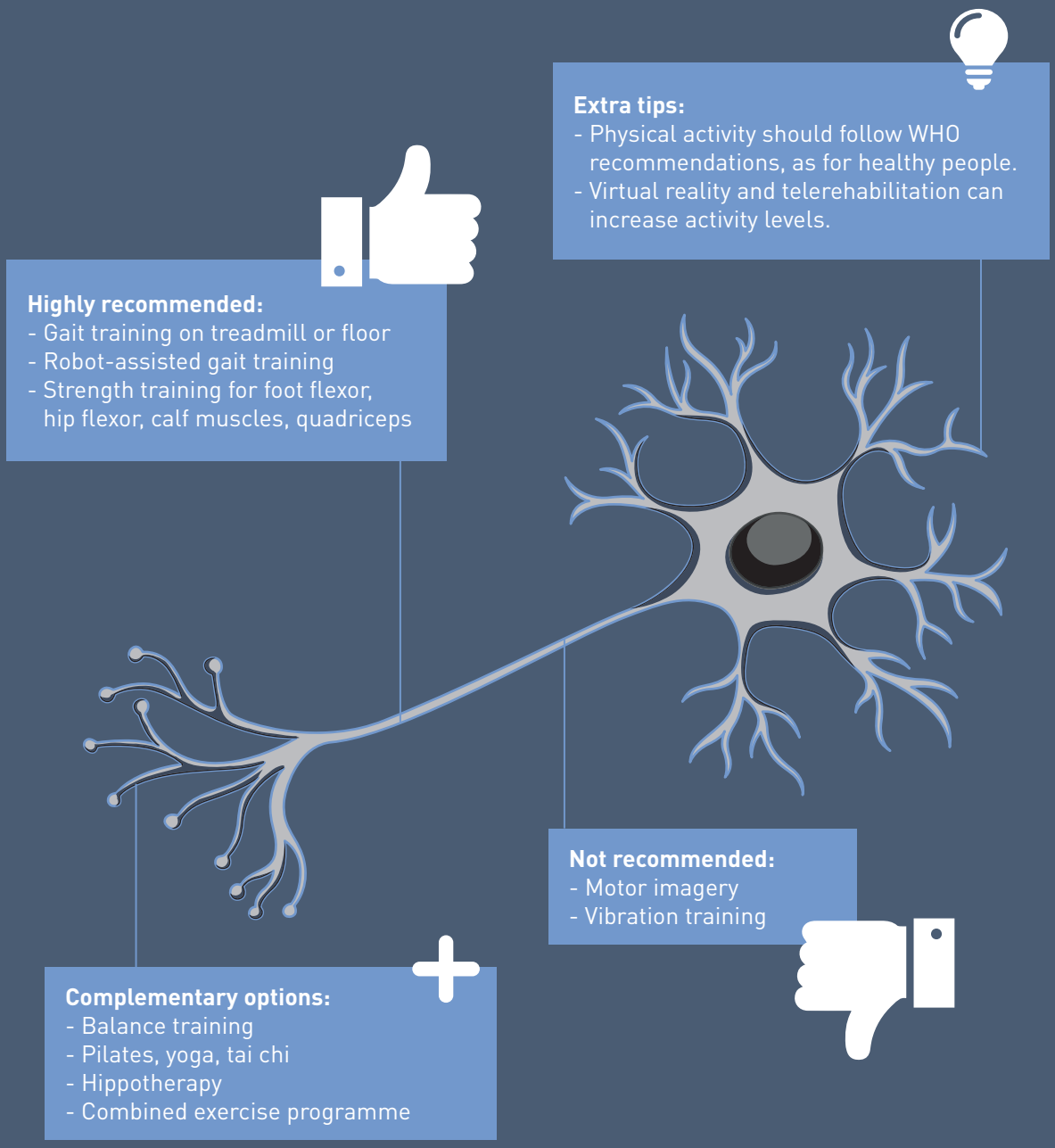
In its S2e guideline "Bewegungstherapie zur Verbesserung der Mobilität von Patienten mit Multipler Sklerose", the German Society for Neurological Rehabilitation (DGNR) makes therapy recommendations for improving the mobility of patients with multiple sclerosis. Which treatments are beneficial?

Jakob Tiebel

The primary type of therapy for improving the mobility of multiple sclerosis patients is therapeutically guided gait training. This is usually done on the floor but can also be done on a treadmill. In any case, it must be designed so that the patients are challenged by the training in terms of endurance and strength. It is advisable to perform targeted testing of the foot flexor, hip flexor, calf muscles and quadriceps in advance, as these muscles often show a strength deficit in MS patients. Depending on the findings, weaknesses in these areas should be trained by strengthening the relevant muscles separately.

Balance training is recommended as a complementary therapeutic tool for a safe gait and particularly for preventing falls. It is not a replacement for gait training, however. In the study, pilates, yoga, tai chi and hippotherapy showed similar effects to traditional balance training, which is why these forms of therapy can be used for variety, particularly in patients with milder symptoms.

Motor imagery and vibration training are not recommended. These showed no effect on the mobility of the patients in the study.



The fundamental goal of treating MS patients is to increase their own activity. This should also be based on the WHO physical activity recommendations for people with health conditions (150 minutes of moderate exercise or 75 minutes of high-intensity exercise per week). Of course, the individual physical conditions of the patients must be taken into account. In this context, the study also examined the influence of telerehabilitation, for example in the form of virtual reality or telecommunication (video tutorial). It was shown that these procedures significantly increased the patients' activity in everyday life and were thus a worthwhile complement to the therapeutic interventions.

The overview graphic summarises all treatment recommendations.

SOURCE

Deutscher Verband für Physiotherapie (ZVK) e. V. (2019). Fokus Forschung: Therapieempfehlungen zur Verbesserung der Mobilität bei Multiple Sklerose, accessed 09/03/2020: https://www.physio-deutschland.de/fachkreise/news-bundesweit/einzelansicht/artikel/detail/News/fokus-forschung-therapieempfehlungen-zur-verbesserung-der-mobilitaet-bei-multiple-sklerose.html.

Part 2

-

Expert report by Marc Michielsen

SCIENCE

Expert report on postural control

We all live with gravity – usually without worrying that we might fall over. Falling is prevented by an integrated postural control mechanism. In the second part of our expert report, you will learn more about how this mechanism is activated.

Marc Michielsen

Activation of the postural control mechanism

A basic prerequisite for postural control is the ability to stand up straight and actively counteract gravity. A further prerequisite is the ability to select and perceive sensory input in order to develop the body schema and to align the body in relation to the environment. This article focuses on the neurophysiological mechanism responsible for the activation of postural muscles.

The neuromotor system that enables movement and balance is the system of medial descending neural pathways. It runs through the centre of the spinal cord and ends on both sides in the motor pools of the axial muscles in particular. It activates the head and torso and transmits commands to the legs, ensuring strength and balance.

The supraspinal "processor" for balance control has many points of departure. The power centre for our sense of balance is located in the brain stem (reticulospinal nuclei). The reticulospinal pathways enable an upright posture. The "shadow system" for balance control is a complex interconnected structure that connects the vestibular nuclei with the cerebellar neurons. The vestibulospinal pathways enable quick and precise reactive postural control. "Reactive" here refers to movement correction via direct communication channels through peripheral error feedback. The reactive postural

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A sense of balance can be trained

In a series of experiments, the balance of trained ballet dancers and a control group of non-dancers was mechanically disturbed in order to measure the time until the muscles began stretching and the consistency of the stretching. The results support the assumption that the neuromuscular responses of ballet dancers are characterised by significantly faster long-latency reflexes (LLR) with significantly more consistent muscle stretching. These findings suggest a superior postural control mechanism in trained dancers and may explain their ability to maintain static balance even with a minimal base of support [6].

control follows the movements of the body like a shadow to keep us upright. Balance errors are detected by the cerebellum, which continuously compares movement transfers with the intended posture. In order for the error feedback to be useful in predictive movement control, subsequent movements must be corrected with recourse to previous movements. Through repeated trial and error, the cerebellum adapts our movements to new circumstances. Predictive mechanisms must be learned and updated by comparing predicted and observed results [1].

Prediction of balance disorders

The cortex, which controls consciousness, is a superordinate entity for the co-ordination of the interconnected reticular, vestibular and cerebellar systems. It predicts the consequences of a movement based on previous experience and aligns the body in advance to counteract any shift in the body's centre of gravity. The risks of a movement are automatically detected: the cortex can predict a fall. For example, the brain "knows" that the body can be thrown off balance when we reach a hand out to greet someone. Even the mere intention of shaking hands with someone invokes the postural knowledge stored in the body schema. During the earliest phases of a movement, in which corrections via peripheral feedback are not yet possible, the cortex shapes this movement from the body schema. This predictive movement control can be observed by means of a more co-operative alignment of the body and an increased alertness of the sensory systems. Without these postural adjustments by the cortex (via the cortico-reticulospinal pathways), there would be a risk of falling into the other person's arms when shaking hands. The term "predictive" refers to planned movements. This command to move is known as an anticipatory postural adjustment (APA). The postural muscles are structured in such a way that they generate powerful forces against the respective standing surface in order to shift or maintain the body's centre of gravity and to be able to control or prevent excessive movements of the joints due to indirect counteracting torques. To enable efficient balance control, these forces must have the necessary strength, speed and precision.

However, the motor commands of the cortex only provide a good estimate. They can only make the connection and initiate the movement from a more or less efficient postural set. The cerebellum is also required to make the parameters (weight, direction, speed, etc.) more precise. Symptoms of paralysis, for example after a severe stroke, impair this system. The lack of motor experience reduces the ability to balance. Patients with corresponding symptoms show reduced and/or delayed anticipatory postural adjustments compared to healthy subjects [3]. In this context, any deliberate selective movement carries the risk of losing balance. Although it seems possible to shake someone's hand, reach for something or lift one's foot, the brain is being deceitful; stroke patients lack precision because not enough anticipatory postural adjustments are transmitted and they are transmitted too weakly and too slowly.

Postural mechanisms can be observed

The strategies we use to keep our balance can be observed – if you know where to look. For minor swaying with an adequate footing on the supporting surface, the ankle strategy is usually used. The shifting centre of gravity is restored by movements around the ankles and the transverse tarsal joint. Balance corrections in response to stronger, faster disturbances, such as when standing in a moving bus, are controlled by

"Cerebellar" balance can be improved through small mistakes

It is assumed that the learning process in the cerebellum is largely based on error feedback. But only small mistakes lead to successful learning. If the deviations or errors are too unpredictable, i.e. too close to the stability limit, the cerebellum cannot determine the cause of the error. As a "teacher", it is not able to provide the motor systems with the sensory information required to adjust movements. The cortex learns to compensate for this with predictive cognitive strategies: The patient increases their base of support, stiffens their legs, takes a lot of corrective steps, their arms become overly active, they press their head tightly against their chest. In order to improve the cerebellar controlled sense of balance, stability limits must therefore be maintained. Only small errors within these limits cause the cerebellum to intervene, so that the ability to reactively correct postural errors can be improved.

The cerebellum learns as a result of a small mistake and the sense of balance improves. When the errors are somewhat larger, the cortex looks for compensation possibilities. In the case of major errors, a fear of falling can develop and the stability limits are lowered through fixation.

sweeping, rapid movements of the hip joints in combination with inverse rotations of the foot joints. If the balance disturbance is too great and affects the body too quickly, a new base of support must be found with the help of a corrective step to restore balance. This step must be fast, precise and powerful. It often occurs even when the body's centre of gravity is within the base of support [2, 4]. Older people often take a corrective step before the stability limits have been reached. As a last resort, several steps can be taken in order to escape the disturbances. The number of steps a person needs to take to intercept a fall provides insight into the effectiveness of this balance strategy. These posture control strategies – ankle, hip and step strategies – are sensorimotor solutions that vary from person to person. They are comparable with the different types of human locomotion: walking, striding, jogging, running and sprinting.

A trained observer will notice balance problems when sensory conditions change. Postural fixation, for example, is observed more often in dark rooms or when subjects are

not wearing their glasses. When reaching for a cup on the top shelf, a corrective step may be necessary to counteract the dizziness caused by the head movement when looking up. These examples show the importance of re-evaluating sensory impulses. When environmental conditions change, the brain bases its strategic decisions on the sensory source that provides the most accurate information. Every sensory strategy is therefore a process of re-evaluation. The re-evaluation of the sensory impulses causes a slight time delay in the postural "processing mechanism". Through training, this time delay can be kept to a minimum.

Stability limits are real

The Limits of Stability (LOS) are defined as the maximum distance a person can lean in all directions from an upright, vertical position without falling, taking a corrective step or reaching for support. The ability to assume any body position within these limits is crucial for basic actions, such as reaching for objects, standing up from a sitting position (or sitting down from a standing position) and walking.

Within our respective stability limits, we feel safe and stable in our movements. In this state we are able to explore the environment by evaluating sensory impressions and through motor actions. For this reason, restoring balancing ability is a crucial component of motor behaviour and is necessary for performing everyday activities independently [4]. Our sense of balance has a strong influence on our daily life. After a fall, many people develop a fear of falling again, even if they have not injured themselves. This fear leads to avoidant behaviour, which in turn leads to reduced mobility and a lack of physical fitness. This in turn increases the actual risk of falling [7].

Is the ability to balance measurable?

It is common practice for many therapists to test balancing ability by inducing swaying in static posture and evaluating the corrective steps. This procedure is particularly popular with young therapists. Such "static" tests are indeed important for functional stability in everyday

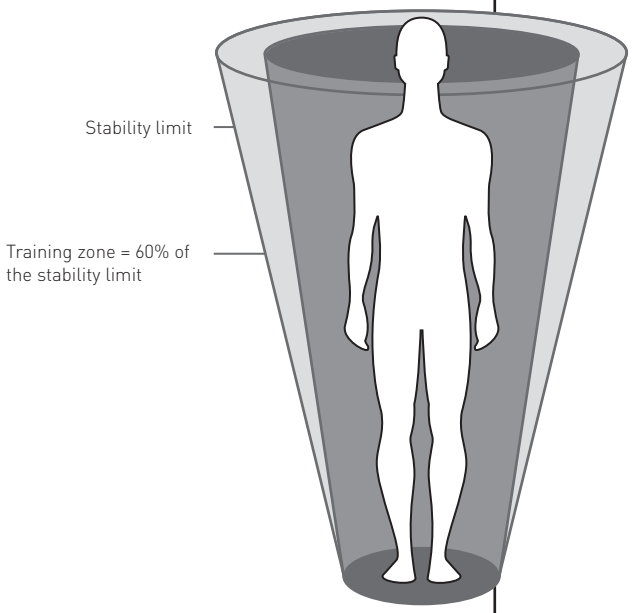

Fig. 1: The light grey funnel denotes the stability limits, which are defined by the maximum standing range of the person in different directions. The training zone, which comprises 60% of the area within the stability limits, is the area in which therapeutic exercises can be performed in a safe and beneficial way.

Do not lose sight of stability limits

Patients monitor their own stability limits. One treatment goal is to activate the postural "processing mechanism" in order to increase its efficiency. Motor and sensory strategies can be improved through insulation and targeted exercise. Many patients suffer from an impaired joint alignment and a weakened joint environment. An extremity affected by paresis cannot control the body in an upright position and behaves more passively than limbs with movable joints. This results in hyperextension of the knee or continuous hyperextension of the leg. As a result, patients are forced to adopt an adjustment strategy by involving the limbs not affected by paresis [5]. The body compensates for this by increasing the activation of the non-paretic muscles and/or using a step strategy to maintain an upright posture. These patients do not like fast movements. Only slight internal or external swaying is tolerated. The stability limits of these patients should not be overestimated.

life. Maki and McIlroy give two reasons for this. Firstly, quasi-static movements and actions are actually responsible for a considerable proportion of falls (40 to 50%). Secondly, "static" tests provide revealing information with regard to the numerous falls that occur while walking. Corrective steps to compensate for shifts in the body's centre of gravity share similarities with gait initiation and step adjustments when walking.

However, a single test or test method is not sufficient to assess the ability to balance. The result is also often debatable. The cause of a fall varies between individuals, as each person has different limiting factors and resources for postural control. The therapist should try to identify the relevant risk factors. It is important to evaluate the underlying physiological systems and the available compensation strategies in order to assess the risk of falling and to identify optimal intervention options for patients with balance disorders. Current clinical tools for balance assessment are not designed to help therapists identify the underlying postural control systems responsible for poor balance function [3].

Learn more in the next issue: Jan 2021

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Marc Michielsen studied physiotherapy at the University of Leuven, Belgium, and is also an Advanced Bobath Instructor. He specialises in neurological rehabilitation, particularly after a stroke. After several positions as a senior physiotherapist at various hospitals, he has been working as head of emergency services at the Jessa Hospital rehabilitation centre since 2008. Michielsen has published several articles, abstracts and other scientific publications in renowned scientific journals.

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Designing practical balance training

Martin Huber

This article deals with the application of taxonomy in the context of therapy with standing and balancing devices (self-service devices).

"Balance disorders and evidence-based therapy" in the 1/2019 issue of THERAPY Magazine.

Fig. 1: Postural Control exercise video: Parallel Standing

The central idea of taxonomy is to ensure an individually tailored therapy ("targeted therapy") [9] through the targeted selection of tasks and the equally targeted design of the environment. This approach implements the requirements of the Dutch guideline for task specificity and environmental specificity in therapy for stroke patients [5, 6, 10, 16]. Standing and balancing devices (self-service devices) provide many options here.

Support surface

One of the most important options for the targeted adjustment of the task is choosing the size of the support surface (see Fig. 1), because foot positioning is probably the most traditional way of shaping. Shaping here refers to systematically increasing the level of difficulty [15]. According to the challenge point framework, the aim is to always challenge the patient at their individual

Fig. 2: Postural Control exercise video: Stepping stance

		"easy"	"moderate"	"difficult"
Task	Balance mechanism	steady state	anticipatory	reactive
	Balance strategy		Focus: Upper ankle strategy activation distal	Focus: Protective steps reaction speed distal
	Size of support surface	Parallel Standing	Stepping stand – Tandem stand	Single-leg stance
	UE (LE/head)	Rebound	Catching Reaching within arm's length	Catching asymmetrically Reaching beyond arm's length
	Sensory system	Multisensory	Eyes closed Eye tracking/gaze stabilisation	Sensory conflict Eye tracking/ gaze stabilisation
	Cognition	single task	dual task	multiple task
Environ-ment	Support surface	level, stable	sloping	sloping diagonally, unstable
	Durable medical equipment	several	one	none

Fig. 3: Taxonomy for designing postural control therapy when standing

Fig. 4: Postural Control exercise video: Grasping exercises

Fig. 5: Postural Control exercise video: Sensory integration and rebalancing

The "classic" therapy for sensory weighting involves working with closed eyes.

performance limit [4]. The increasing levels of difficulty are: parallel standing, stepping stand, tandem stand, single-leg standing [8]. Cross-legged standing could be added. However, this standing position is not very functional.

Another important component in adjusting the task is to determine the directions in which the body's centre of gravity should be moved across the support surface. The main directions of movement are anterior-posterior (a-p), medio-lateral (m-l) and 2D movements, which result from a combination of a-p and m-l weight shifts (see Fig. 2). Anterior weight shifts are a useful means of practising the "ankle joint strategy", which mainly activates the distal muscles [11, 13], while m-l weight shifts train lateral movement control. The proximal muscles are mainly required here. In severely affected patients it can also be beneficial to exercise statically, i.e. the body's centre of gravity should simply be held above the support surface without any visible movement. The aim here is not to fall over.

Weight shifts can also be induced through reaching and grasping movements of the upper

extremities (see Fig. 4). This is a very functional approach, because everyday life involves lots of arm and grasping movements while standing. Depending on the target point of the reaching or grasping movement, the direction of the weight shift can be determined [11]. For grasping movements, the level of difficulty of the task can also be adjusted by changing the weight of the object to be lifted (keyword: shaping).

Sensory weighting

Many neurological and also geriatric patients have difficulties with what is known as sensory weighting. Sensory weighting is the dynamic process of integrating and processing sensory information [12]. The sensory information that the central nervous system uses to control balance is somatosensory, visual and vestibular input. For example, in unfavourable lighting conditions, sensory integration must be weighted in favour of somatosensory input and away from visual input. People with balance problems often rely excessively on visual acuity [7]. This results in a more or less pronounced gaze fixation. To train sensory weighting, the task can be adjusted accordingly. One option for reducing gaze fixation is to perform gaze sequence or gaze stabilisation tasks. This involves moving the head while the eyes remain stable. The "classic" therapy for sensory weighting is working with closed eyes. It is important to note that it makes sense to give target points for shifting weight that can be sensed by the somatosensory system (see Fig. 5). These target points provide the patient with orientation for the extent of the weight shifts.

Games can have a positive influence on motivation during training.

Adjusting the environment

Targeted adaptation of the environment provides further interesting therapy options (see Fig. 6). Physical therapy wedges are particularly suitable for specific training of certain aspects of postural control [8]. There are three basic wedge position variations: toes-up, toes-down and both in

Fig. 6: Postural Control exercise video: Various surfaces

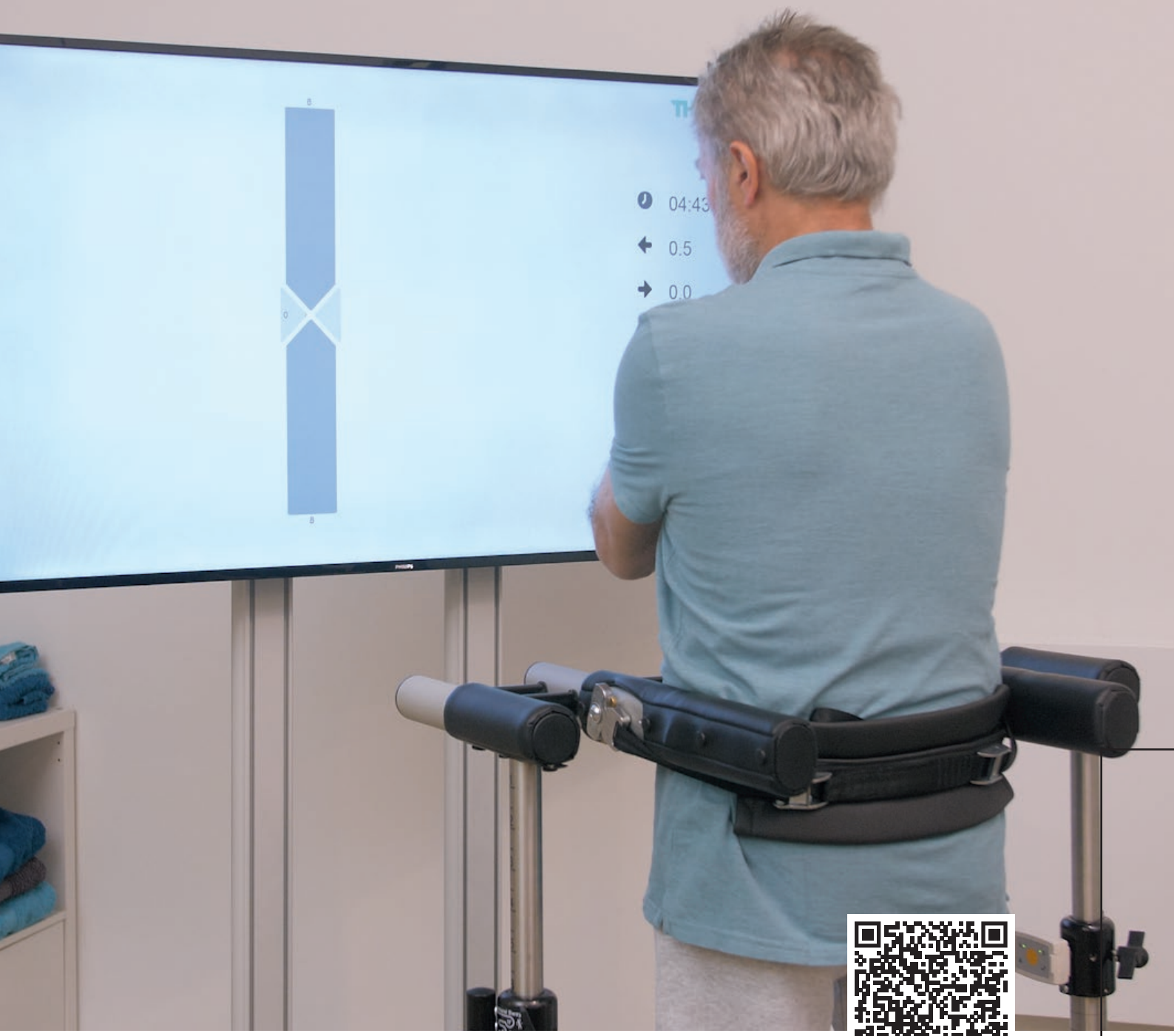

Fig. 7: Postural Control exercise video: Exergames (THERA-soft)

combination with a diagonal wedge position, which then has a pronatorial tilting effect. The different wedge positions have different indications [8]. The toes-up position causes a mobilisation of the calf muscles, the toes-down position causes an increased activation of the calf muscles; this can help to improve the ankle joint strategy. The diagonal wedge position causes a pronated position in the lower ankle joint, which is intended to counteract the typical supinated misalignment of the feet in neurological patients. The diagonal position can be combined with both toes-down and toes-up. Further options then arise from the additional inclusion of different foot positions when working with the therapy wedge.

Motivation through exergaming

Exergaming allows for an expansion of therapy options (see Fig. 7). Through various game situations, certain aspects of postural control can be trained in a very specific way. The games can have a positive influence on motivation during exercise and are also well-suited for independent training, as permanent supervision by a therapist is not necessary. Exergaming can easily be

combined with all the aforementioned aspects of task and environment design.

Finally, a short (and incomplete) list of "typical" balance problems in neurological and geriatric patients [1, 2, 3, 14]:

– limited upper ankle strategy for shifting weight, particularly anterior but also posterior
– medio-lateral instability or limited weight transfer, particularly on the more heavily affected side
– limited sensory weighting

The problem areas of the patient are identified in a prior clinical reasoning session. Then a tailored therapy is developed.

Ultimately, task and environmental specificity are essential criteria for the effectiveness of the therapy. Using imagination and expertise, meaningful and individualised therapy situations can be created with self-service devices.

Conclusion

Therapy using self-service devices can be designed individually and in a targeted manner. It provides many therapy options in a fall-safe environment. In addition to the task and environmental specificity, the effect factor of intensity can also be implemented.

The possibilities and limits of the balance trainer:

Though balance trainers offer many possibilities, they are also limited in some respects.

Possibilities:

+ Fall-proof environment
+ Very suitable for severely affected patients
+ Advantages of verticalisation (prophylaxis, alertness etc.)
+ Functional mobilisation of the upper ankle joint
+ Passive and active standing
+ Static and dynamic standing
+ Exergaming → Fun, independent training
+ Increased standing time
+ Can be used for self-training

Limitations:

- Influence of the device frame on balance control (holding, leaning). One solution is to have the patient's arms crossed in front of the chest.
- No "free" weight shifts possible within the device frame (move in the frame), the user must move the device frame (move the frame).
- The user must work against the spring resistance of the device frame when shifting their weight. This partly changes the postural synergies.

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Martin Huber is a physiotherapist and received his Master of Science in Neurorehabilitation in 2007. As a therapist, he mainly treats patients with damage to the central nervous system. Since 2010 he has been working on a freelance basis in outpatient physiotherapy with neurological patients. He has been reporting on postural control and task-oriented therapy in well-known scientific journals for several years, and he has been a speaker at various national physiotherapy conferences.

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SCIENCE

Better outcome through rehabilitation after intensive care

Early mobilisation has been shown to improve the outcome of ventilated patients in intensive care units. But what are the effects of a subsequent intensive rehabilitation programme after discharge to the regular therapy ward? So far there is no consensus on this. A Japanese working group led by Shunsuke Taito investigated this question.

Jakob Tiebel

The positive effects of early mobilisation in intensive care are undisputed.

"Our goal was to determine whether a rehabilitation programme after discharge from the ICU improves the activities of daily life (ADL), quality of life (QOL) and mortality of patients who were ventilated in the ICU," Taito and colleagues explain.

In a systematic review with meta-analysis, they investigated the effects of rehabilitation for ventilated patients after their discharge from intensive care. "We have included randomised controlled trials that evaluate the effect of post-intensive care rehabilitation. For this purpose, the therapy either started earlier and/or was more intensive than in the control group. Only adults who were mechanically ventilated for more than 24 hours were included."

Two independent experts extracted the data and assessed the risk of possible bias. Standard mean differences (SMD) with 95% confidence intervals (CI) were calculated for the QOL, and pooled risk ratios (RR) with 95% CI were specified for mortality. "We evaluated heterogeneity on the basis of I^2 and the quality of evidence on the basis of the GRADE approach," the researchers explain in their work.

Ten studies with a total of 1,110 patients compared an early/intensive rehabilitation programme with standard care or no intervention after discharge from intensive care. With regard to quality of life, the standardised mean difference (SMD) (95% CI) between the intervention group

I^2: The effects of several studies can only be meaningfully summarised if the differences between the individual studies are not too great, e.g. in terms of the measurement methods applied or the patient populations. The studies should therefore be as homogeneous as possible. Heterogeneity is often evaluated with the measure I^2. It is assumed that the variability of results is based on systematic differences between the studies on the one hand and random deviations on the other. The smaller the value for I^2, the more likely that differing study results are due to random variations; the larger the value, the more likely that differing results are due to differences between studies. I^2 can adopt values between 0 and 100%.

and the control group was 0.06 (-0.12 to 0.24) and -0.04 (-0.20 to 0.11) for the physical and mental components respectively. Rehabilitation did not significantly reduce long-term mortality (RR 1.05, 95% CI 0.66 to 1.66). The studies analysed did not report on ADL. The quality of evidence for quality of life and mortality was moderate.

Improved rehabilitation after discharge from the ICU therefore makes little or no difference to quality of life or mortality in patients who were previously ventilated in the ICU. Given the broad range of CIs, further studies are needed to confirm the effectiveness of intensive rehabilitation after discharge from intensive care.

Comments

The positive effects of early mobilisation, which can be performed, for example, using a bed bicycle in the intensive care unit while patients are still in bed and on artificial ventilation, are undisputed. Numerous high-quality studies have proven this in recent years. It appears that these effects can no longer be achieved at a later point in time, or only to a much lesser extent, even if follow-up rehabilitation on a normal therapy ward begins earlier than usual and is more intensive than in the conventional setting. The results underline the need for early mobilisation in intensive care units.

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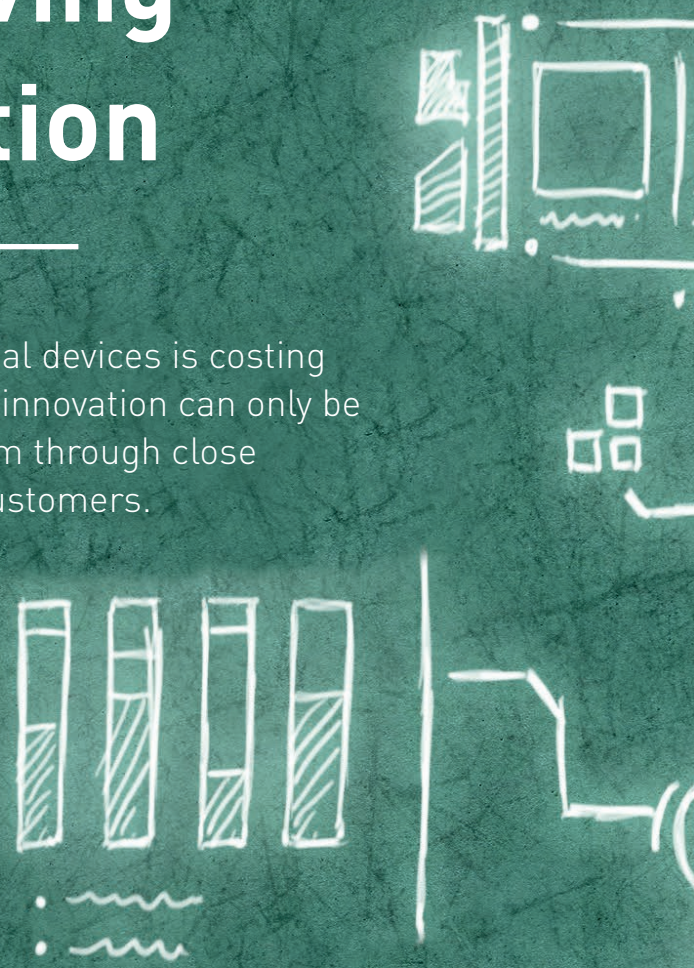
TECHNOLOGY & DEVELOPMENT

Preserving innovation

Why the approval of new medical devices is costing more and taking longer, and why innovation can only be guaranteed in the long term through close co-operation with customers.

Jakob Tiebel



The world of medical technology is fascinating, and the technological progress made in recent decades is impressive. Medical technology companies work together with users, doctors and scientists to develop innovative products, therapies and treatment procedures – for the benefit of patients. Modern treatment methods, which include electromechanical gait therapy and robot-assisted therapy for the upper extremities, would be inconceivable without the use of technology and would make quality assurance in therapy considerably more difficult, if not impossible.

The downside of medical technological progress is exaggerated promises of healing and sometimes false statements about the safety and performance of medical devices. In particular, the scandal surrounding a French breast implant manufacturer in 2010 has led to a loss of confidence in medical technology. At the time, the company illegally brought breast implants onto the market, which were implanted in around 500,000 women worldwide and which caused serious health problems. No wonder: instead of using high-grade medical silicone, the company filled their implants with commercial

Greed for profit led to a significant tightening of the regulatory requirements for bringing medical devices to market.

industrial-grade silicone to increase profits [8, 10, 13, 18].

This resulted in a significant tightening of the regulatory requirements for bringing medical devices to market. Patient protection and patient wellbeing are the highest priority in medical device law [6, 11, 14, 17]. The regulatory system for medical devices required to ensure this has actually existed for over 15 years [1, 12]. However, such scandals put European legislators under enormous pressure, forcing them to amend the regulations. On 25th May 2017, a new European Medical Device Regulation (MDR)[1], was introduced. It intends to increase patient safety in future. To this end, the regulation provides for stricter clinical evaluation and measures for uniform Europe-wide monitoring of medical devices on the market, among other things [16].

The existing legislation based on Directives 90/385/EEC[2] and 93/42/EEC[3] will remain in force until 26th May 2021. This will mark the end of the transitional period during which manufacturers

For the safety of patients, a new European Medical Device Regulation (MDR), was introduced.

can still obtain certification for medical devices under the old law [9].

The additional safety measures of the MDR will have an impact on the development of the entire medical technology sector [5, 15]. Small and medium-sized enterprises (SMEs) are affected in particular [15]. They are considered the innovators and drivers of the industry and account for over 90 percent of medical technology companies [2, 3, 4]. They will feel the negative effects of the MDR particularly strongly and face a major challenge in meeting stricter regulatory requirements [7, 15].

What effects do the additional safety measures have on the development of new medical technology? In times of demographic change, increasing digitalisation and better-informed customers, expectations are high for product development and marketing [19]. Rapid development is desired above all in order to be able to react to current challenges in medicine and remain competitive. About one third of medical devices on the market have been available for less than three years [4]. It is not yet possible to fully predict the effect that the implementation of the MDR will have on the medical technology market as a whole. However, the effect of rising costs and the increased time required for certification is undisputed. It will be difficult to reconcile the quality targets associated with the regulation and the demand for rapid development of innovative products. The more complex testing and approval procedures will inhibit the agility and innovation capacity of companies [4, 9].

As a result of the stricter and more elaborate test procedures, manufacturers will have to plan considerably more time for the certification of their products in future. The implementation of the new requirements will also require more quality assurance staff. Inevitably, fewer resources will be available for research and development. The new regulations will prolong the period of time until patients benefit from new technologies. There is also the question of how the additional costs will be financed. After all, companies will have to recoup the additional costs incurred by the certification in some way. The bottom line is that patients will benefit from the increased safety of medical devices in the future, but will have to wait much longer and probably have to pay more for them [20].

[1] Regulation (EU) 2017/745, OJEU L 117, 5 May 2017

[2] Directive 90/385/EEC of 20 June 1990 on active implantable medical devices, OJEU L 189, 20 July 1990

[3] Directive 93/42/EEC of 14 June 1993 concerning medical devices, OJEU L 169, 12 July 1993

The bottom line is that patients will benefit from the increased safety of medical devices in the future, but will have to wait much longer and probably have to pay more for them.

The changes in the market, already heralded by the new EU regulation, will be unstoppable despite industry protest. SMEs in particular will have to continue to be skilful in overcoming challenges in the development, production and distribution of medical devices in future. But what strategic approach should SMEs take in future to remain competitive? In the era of MDR regulations, it is important to recognise product trends as early as possible, for innovations, existing medical devices and services alike. Customers play a central role here. The more willing they are to work closely with medical technology and the more clearly they formulate their requirements, the easier it will be to predict which new, innovative products will be in demand in the future. Manufacturers can then pool their resources and focus their research and development on the needs of customers. This will save a lot of time and money and ensure the timely availability of new products despite longer approval processes.

So join in and help shape the future!

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Intensive neurological rehabilitation following a stroke

More than three years after his stroke, Ron undertook an intensive neurological rehabilitation programme. Four days a week he got therapy and training for four hours a day. His outcome concerning walking and postural control is amazing.

Sarah Daniel

Ron had a hemorrhagic stroke in October 2015. On discharge from hospital he received treatment from the Community Stroke Team and also had some private physiotherapy. Ron came to MOTIONrehab's Intensive Neurological Rehabilitation Centre at the end of April 2019 to undertake an intensive neurological rehabilitation programme consisting of four hours of therapy a day for four days a week.

Working alongside the MOTIONrehab team Ron identified the goals that were important to him and that he wanted to work on during his

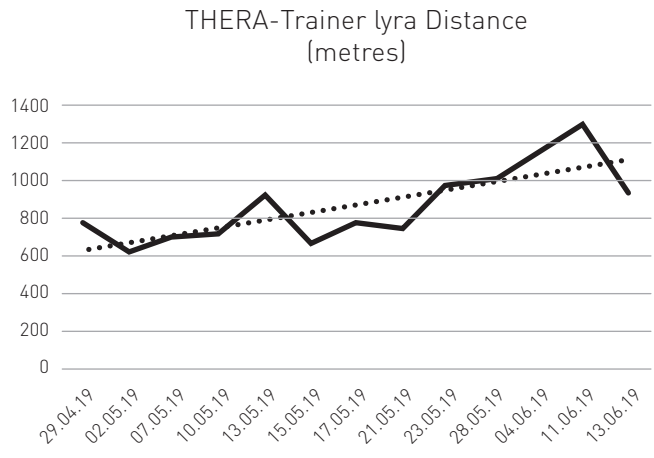

Fig. 1: Lyra distance in metres

Ron was keen to improve his walking and his overall confidence with daily activities.

intensive neurological rehabilitation programme. Ron was keen to improve his walking and his overall confidence with daily activities. During his time at the centre Ron had one-to-one hands-on specialist neurological physiotherapy as well as also spending time training with the robotic, sensor based and virtual reality devices every day. These devices enabled Ron to practice high repetitions of movements which is critical to promoting the rewiring of the nervous system known as neuroplasticity. This helped to optimise Ron's outcomes.

In Ron's more traditional hands-on neurological physiotherapy sessions he worked on strengthening his right side, balance work, and confidence building. Ron also had Functional Electrical Stimulation (FES) trials to support with lifting the foot during walking.

As well as traditional manual walking, Ron practiced his walking on the THERA-Trainer lyra. The lyra helped to achieve an increase in cardiovascular fitness as well as an improved walking pattern. The graph below shows a significant increase in the distance covered. By the end of the package, Ron was able to increase walking speeds as

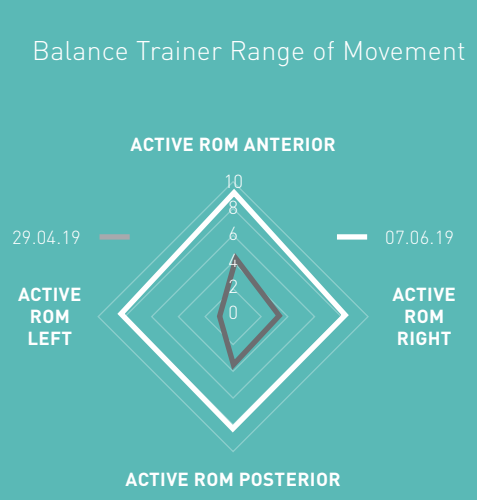

Fig. 2: Balance trainer range of movement

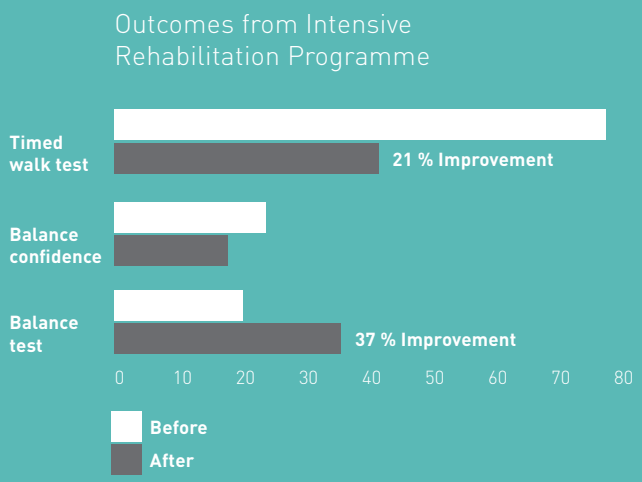

Fig. 3: Intensive Neurological Rehabilitation Programme results

well as reducing the additional supports due to increased strength and control of his right leg.

Ron also used the balance trainer balo to practice standing and more dynamic challenging tasks. The below graph demonstrates a significant improvement in Ron's ability to transfer weight more freely in all directions. The initial assessment (in blue) shows a reduced ability to transfer weight away from his weaker side, however, this significantly improved. This further translates into improved balance, walking and reduced risk of falling.

By the end of his Intensive Neurological Rehabilitation Programme, Ron was mobilising consistently with high walking poles and reported significant improved confidence in his daily activities. Ron now continues to work on his rehabilitation at home alongside a personal trainer. Ron reports that he is able to access the community more easily and feels more confident with his balance and walking.

Please see the graph below demonstrating the comparison of data from initial assessment to the end of Ron's Intensive Neurological Rehabilitation Programme.

Sarah Daniel is the owner and director of MOTIONrehab. She qualified at St George's Hospital Medical School, London, with a 1st Class Honours Degree in Physiotherapy in 2001. She completed her Master's degree with a Merit in Neu¬rological Physiotherapy at Coventry University in 2006. In April 2018 Sarah Daniel opened the UK's first intensive outpatient neurological rehabilitation facility aug¬mented by robotics and virtual reality technology in Leeds.

MOTIONrehab's Intensive Neurological Rehabilitation centre includes a range of upper and lower limb robotics and virtual reality technology by Tyromotion and THERA-Trainer. The MOTIONrehab centre is the only location within UK with all of these particular devices, giving the clinic International Reference Centre Status for treatment, teaching and research.

Exergaming does not improve exercise adherence

In a comparative study with 64 test subjects, Oesch and colleagues investigated the effectiveness of self-exercise programmes in geriatric patients. While the control group was encouraged to practise in the conventional way with the help of exercise sheets and booklets, the intervention group trained with exergames on the computer.

The results of the study show that traditional self-exercise programmes are not only inexpensive and practical, but were also better received by the test subjects. This was reflected in greater compliance and adherence to therapy. In addition, enjoyment and motivation were higher in the control group. There were no significant differences with regard to the outcome. It can therefore be assumed that the training intensity in the intervention group tended to be higher at lower doses – conventional exercise sheets, however, led to higher continuity of exercise compared to exergames.

Oesch P, Kool J, Fernandez-Luque L et al. Exergames versus self-regulated exercises with instruction leaflets to improve adherence during geriatric rehabilitation: a randomized controlled trial. BMC Geriatrics. 2017; 17:77. doi:10.1186/s12877-017-0467-7

If the patient is the limiting factor, the rule of thumb is x+1, i.e. one more step should be taken every day.

Increasing intensity during electromechanical gait training

In everyday clinical practice, therapists are constantly confronted with the question of which load and level of intensity is adequate during electromechanical gait training. This article makes some basic recommendations.

Jakob Tiebel

In electromechanical gait training, as in other exercise and exertion situations, the training intensity is also described as a function of frequency (number of exercise intervals, e.g. per week), duration (time) and number of repetitions. The aspects of effort and difficulty are also considered.

If the aspects mentioned above are applied to the specific training situation, the result is a structure for shaping with the following basic recommendations for targeted gait training:

- With regard to frequency, international guidelines usually recommend five training sessions per week, i.e. one session per day for a five-day therapy week. However, in order to significantly increase the chances of regaining walking ability, training should take place at least three days a week.
- The number of repetitions depends on the mobility of the patient. One step is usually considered one repetition. Patients who are not able to walk should achieve 500 to 1,000 steps per exercise unit; patients who are beginning

Counting the steps and setting individual goals can increase motivation and willingness to perform.

to regain walking ability should achieve at least 3,000 steps. The fitter the patient, the more the recommendations are based on the World Health Organisation (WHO) data for healthy people (10,000 steps per day). Depending on the level of performance, the recommendations cannot always be followed. If the patient is the limiting factor, the rule of thumb is x+1, i.e. one more step should be taken every day. This ensures progression. In most cases, the patient makes much faster progress. Counting the steps and setting individual goals can increase motivation and willingness to perform.

– As a rule, a gait training session is planned for 30 to 45 minutes. 10 minutes are required for set-up, so that the net exercise time is between 20 and 35 minutes. This makes it clear that achieving the necessary number of repetitions within a limited therapy duration can only be achieved by increasing the walking speed. In general, a speed should be selected that is tolerable for the patient. Faster walking is often easier, even for severely affected patients, because they are not forced to stand on the affected leg for an unnaturally long time. In addition, high speeds activate the Central Pattern Generators (CPG) in the spinal cord. Slow walking is only suitable for targeted improvement of the supporting leg phase, balance and equilibrium.
– The level of exertion required by the patient determines how strenuous the exercise feels. Partial relief of body weight plays a decisive role here. Patients who are unable to walk should be dynamically relieved of about 40% of their body weight at the beginning. Relief should be consistently decreased by 5% as functional recovery increases.

How do you find the optimal "challenge point" between all parameters? Unfortunately there is no "one size fits all" solution for this. Although this might be a good thing. Every patient reacts differently to electromechanical gait training.

In order to select the optimal individual parameters, the expertise of the therapist is required – preferably in partnership with the patient. A simple and effective way to measure exertion is by using the Borg scale, for example. Patients can determine for themselves how strenuous they find the training. As a therapist, it is important to remember that the optimal level of difficulty is not when the patient performs best. The performance limit is reached when performance visibly and noticeably decreases.

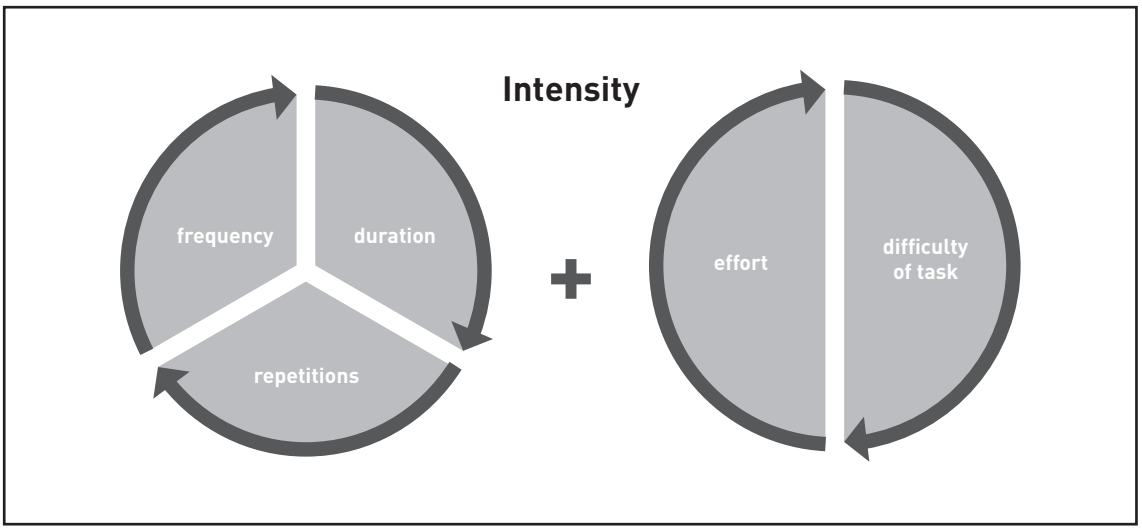

Fig. Modern neurorehabilitation follows the principles of motor learning

This point must be found carefully and then shifted progressively towards increasing performance.

Summary

Training should begin with up to 40% partial body weight relief in order to make effective use of the full therapy duration. Active takes precedence over passive, however, so the weight relief should be gradually phased out as soon as possible. In general, a higher walking speed should be set rather than a lower speed. However, it must be tolerable for the patient and should not be increased at the expense of endurance, particularly in patients who are unable to walk. As walking must be practised repetitively, the number of repetitions is crucial. Counting the steps can be an incentive and can help to set goals: take at least one step more every day! Progression is the name of the game. The Borg Scale provides a simple way to determine the patient's perceived level of exertion. Once the patient reaches their limit, their performance drops visibly. The key is to neither overexert nor to underchallenge the patient.

SCIENCE

Effects of device-based circuit training in stroke patients

Due to growing economic and demographic pressures, focus is shifting increasingly onto group therapies. There is already moderate evidence of the effectiveness and superiority of circuit training after stroke. A pilot study is now being conducted to investigate the use of a device-based setting to improve walking ability.

Jakob Tiebel

The consequences of a stroke often manifest themselves as significant limitations in walking ability and participation, so that regaining the ability to walk is extremely important for many patients as part of neurological rehabilitation. A combination of conventional and electromechanical end-effector-based gait training is recommended for treatment [3]. Assisted gait training was also shown to have an effect on the parameters of walking distance and walking speed [2]. Due to growing economic and demographic pressures, focus is shifting onto group therapies. There is already moderate evidence of the effectiveness and superiority of group-based circuit training in relation to the walking parameters [1].

Therefore the aim of the planned study, according to the authors, is to investigate the effects of device-based circuit training in a group setting on the walking parameters of subacute stroke patients unable to walk.

For the prospective pilot study, scientists from Bad Salzuflen and Gera, in Germany, planned to recruit 40 subacute stroke patients unable to walk for a three-week device-based circuit training course between October 2019 and March 2020.

Three patients each undergo one-hour training three times a week on an end-effector-based gait trainer, a balance trainer and a movement exerciser. As a primary target parameter, walking ability is evaluated using Functional Ambulation Categories (FAC). As secondary parameters, the walking distance in metres, the walking speed, using the 5-metre walking test (5mWT), and the muscle strength of the lower extremities, using the Motricity Index - Leg (MI-L), are recorded. Data is collected before the intervention and three weeks after. Non-parametric test procedures are used to calculate systematic group differences.

No results were known at the time of printing. It is expected that after the intervention phase an improvement of the primary target parameter of walking ability as well as the secondary gait parameters will be observed. If the results are positive, the design of this study means that future studies will have to investigate whether device-based circuit training is superior to standard therapy.

The original version of the abstract for this scientific paper was submitted to the annual conference of the German Society for Neurological Rehabilitation (DGNR) in 2019 and was published in the conference proceedings [4].

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Part 3
Geriatrics

THERAPY & PRACTICE

Training in neurology and geriatrics

Using various neurological and geriatric diseases, we want to show how effective exercise can be designed. In this instalment we will deal with exercise adapted for older people. The goal of exercise in geriatrics is to enable elderly people to enjoy optimal independence and quality of life. But why should elderly people train?

Sabine and Hans Lamprecht

DOI: 10.6084/m9.figshare.11994348

Reduced muscle strength in the lower extremities means a higher risk of falling.

Everyone gets older, but everyone ages differently

It is a fact that old age brings physiological changes that affect people to a greater or lesser extent. These physiological changes include a decrease in muscular performance through a reduction of capillaries and mitochondria and reduction of muscle mass. From the age of 50, the musculature decreases by approximately 0.8% annually; between the ages of 50 and 60, muscle strength decreases by approximately 1.5% every year, and by approximately 3% a year thereafter (sarcopenia). In a new meta-analysis, prevalences between 9% and 51% were found in people over 60 [5]. With age, type 2 fibres (fast-twitch fibres) in particular decrease, the number of motoneurons decreases and we find an increase in the proportion of fat in the muscle [1, 3, 7]. Reduced muscle strength in the lower extremities is associated with a higher risk of falling and a lower walking speed.

Strength training for healthy muscles

Maintaining muscle health in old age is possible through regular strength training combined with a protein-rich diet. Seniors should exercise three times a week and the exercise session should last 20 to 45 minutes. Warm-up and cool-down should be longer than for young people. Optimal warm-up activities should last 15 to 20 minutes, while 10 to 15 minutes are set aside for the cool-down

phase [4]. Continuity is of course crucial for the success of the training. This means that therapists must create situations for seniors in which the enjoyment factor is not neglected.

How can this be implemented effectively in practice? A movement exerciser, such as the THERA-Trainer tigo, is ideal for exercising at home or in a retirement home. It is important to take a targeted approach.

Targeted endurance and strength training

Endurance training involves exercising with minimal resistance, but for a long time – 15 minutes or longer. This can also be done as interval training, i.e. with short breaks of 5 minutes, for example, and another subsequent interval. Of course, in the case of certain pre-existing conditions, such as cardiovascular conditions, the watt values recommended by the cardiologist should be observed, if necessary. It should also be noted that geriatric patients in particular are often prescribed beta-blockers, meaning that pulse-controlled training is often not useful or useful only to a limited extent. Apart from this, endurance training should be designed individually with an experienced therapist. In regular endurance training, three intervals are used.

As we know that strength plays an important role in geriatrics, it is essential that a movement exerciser also trains strength in a targeted manner. Here too, it is important not to be too cautious, but to use as much resistance as possible and rather reduce the duration or number of repetitions [2].

Therapists should create situations for seniors that are fun and keep them motivated.

Exercising arms or legs

For both endurance and strength training, it is important to carefully consider whether to exercise arms, legs or both. Of course, walking requires more leg strength, but endurance training can be done with both arm and leg activity, and arm strength is also an important factor in preventing falls. Training with a movement exerciser must be individual, targeted and carefully thought out in order to achieve the greatest benefit for the patient.

In a retirement home, group exercise with a cycling device, such as the THERA-Trainer tigo, is a good approach, as it is ideal for exercising together or even for some friendly competition. Group exercise with the tigo is a lot of fun. It has been shown that participants not only exercise for longer and more intensively, but also that they find the exercise less stressful – even in retrospect.

Performance limit

We should exercise at our performance limit. This is how we achieve the best possible success. What does this mean for geriatrics, where it is not always possible to control exertion via the pulse? Signs indicating that an older person is really exerting themselves or is exercising sufficiently include:

– Increased breathing rate – out of breath
– Flushed face
– Sweating

Motivation for successful therapy

It is crucial that the patient receives feedback on the progress made. When patients achieve success, dopamine is also released, an important neurotransmitter which brightens their mood

A fun and encouraging atmosphere is helpful for motivation.

In group exercise, the participants exercise for longer and more intensively and find the exercise less strenuous.

and helps with motor learning. These successes can also be achieved without devices, but therapists or relatives must then provide the necessary framework conditions. A fun and encouraging atmosphere, plenty of praise and a little competitive spirit are all helpful in motivating neurological and geriatric patients. Those supervising should offer plenty of praise to the exercising patients and report back to them clear improvements based on figures[6].

Balance trainers in geriatrics

Persons who cannot stand alone can exercise very successfully using a balance trainer, such as THERA-Trainer balo. Effective cardiovascular training, strength training and targeted balance training are all possible with the balo. Both the balo and coro are particularly suited to reactive balance training. Problems with reactive balance are primarily experienced by Parkinson's patients, but also by other geriatric patients. This can be tested using the pull test. The patient stands, the therapist pulls the patient back (slightly) by the shoulders and quickly lets go. The patient must take balancing steps. If the patient finds this difficult, they can practise balancing steps successfully in a safe environment using balo or coro. Ideally, patients should exercise on the sagittal plane, i.e. steps are taken forward and backward.
If the spring resistance is increased, strength can also be trained specifically in step position, for example. The following muscles in particular are required for walking:

– Foot flexor – exercising behind the vertical activates foot lifter
– Calf – pushing the body forward
– Thighs – one-legged knee bends

In general, the balo can also be used to do standing-up exercises for transfers. It is easier to transfer from standing to sitting and back up again, and to exercise in small steps with a lot of repetition. Later, patients can practise standing up from a seated position by pulling themselves up, e.g. using a table, or by using the belt system. Standing up while using the side rails for support can be a goal for fitter patients.

Of course, the balo also has all the advantages of a conventional standing frame:

– Contracture prophylaxis
– Pneumonia prophylaxis
– Thrombosis prophylaxis
– Improved alertness and thus improved awareness and cognition

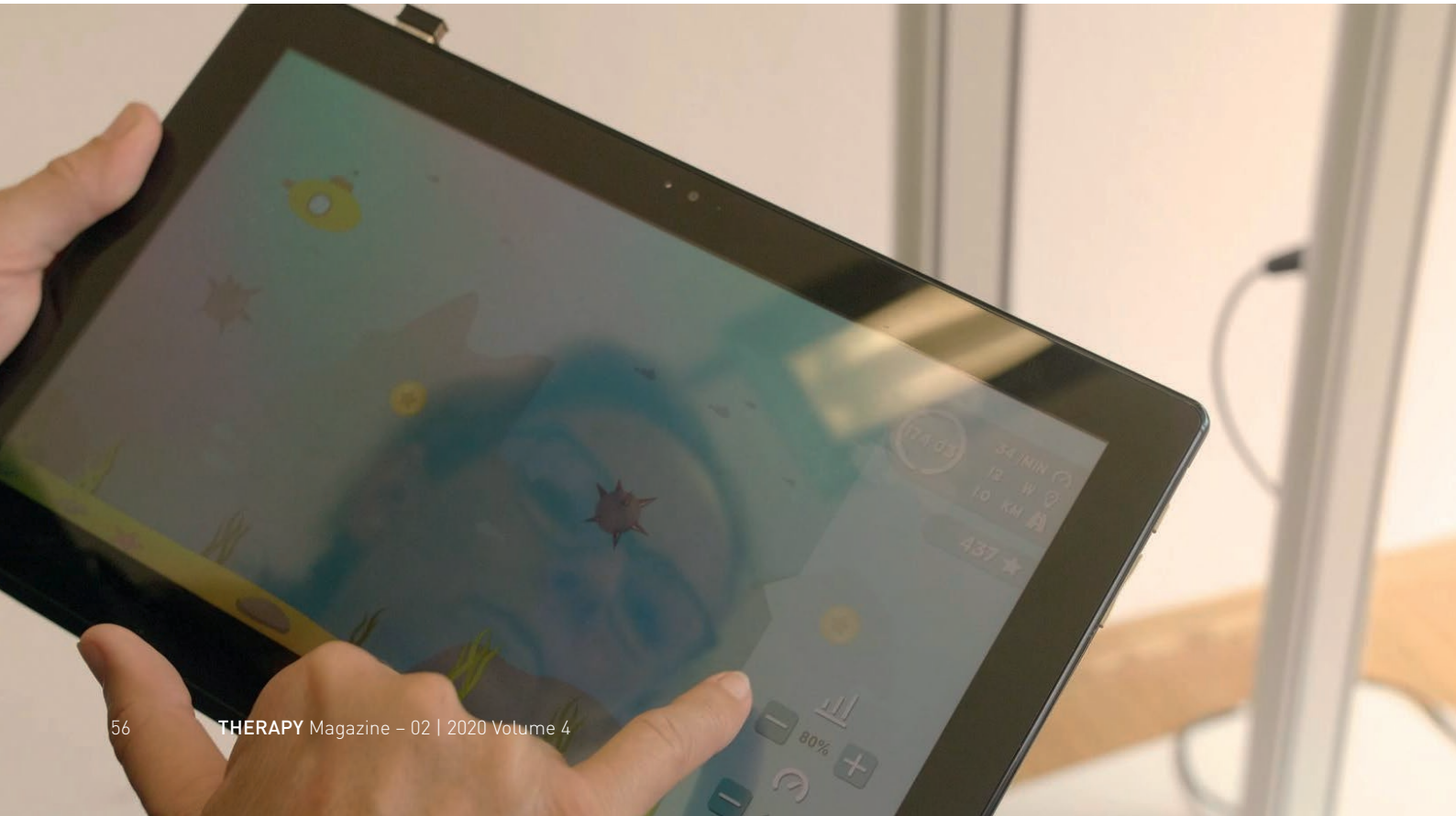
Balo and tigo are devices that no nursing home should be without, perfect for a small exercise/fitness room. If there is a lack of space or more supervision is required, both can also be placed in a corridor.

Therapists, both outpatient and in hospitals, should bear in mind that patients can perform targeted exercise, also at home, with the help of these devices. In this way, both the self-efficacy and the exercise dose can be increased. This leads to better treatment success and helps to prevent deconditioning, which is a particular concern in geriatrics and which can occur rapidly.

Older people need more targeted training – not less

A note on gait training with lyra in geriatrics: Walking can be trained in this way as needed, such as for patients who were immobilised for a long time after an operation or as a result of internal problems, and who can therefore no longer walk even with aids. If the goal is for these geriatric patients to walk again, the lyra is the right exercise

Patients can also use the devices to exercise at home and prevent deconditioning.



device and the following procedure should be followed: as much and as often as possible, but at least three times a week.

If the focus is on walking endurance, this can also be trained in the lyra using interval training, as well as walking speed, balance and dual task. To train walking speed, the lyra should be adjusted as soon as possible. In geriatrics, the performance limit must be considered (see above). During balance training, the patient may only hold on to a TheraBand or similar.

Lyra, balo and tigo are therefore excellent devices that should be used for targeted training in geriatrics.

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Sabine Lamprecht and Hans Lamprecht have been working as physiotherapists since 1980 and 1982 respectively. After working in different hospitals, they opened their own physiotherapy practice with a neurological focus in 1987. After moving the practice to new premises in 2019, they were able to offer a wider range of therapies as an interdisciplinary practice with physiotherapy, occupational therapy, speech therapy and medical training therapy.

After completing her Master's degree in neurorehabilitation in Krems, Austria, Sabine Lamprecht was responsible for the development of technical concepts in physiotherapy, occupational therapy and sports therapy as Head of Motor Skills at Schmieder hospitals. Sabine and Hans Lamprecht are internationally active as lecturers and speakers, and offer advanced training courses on neurorehabilitation and geriatric rehabilitation.

A field report from Michael H.

THERAPY & PRACTICE

EXERCISE FOR A BETTER QUALITY OF LIFE

Coma, movement and independence – Michael H. discovered that these terms are more closely connected than it would seem at first glance. Read about how, with great willpower, the now 80-year-old managed to get back on his feet after a serious illness and long hospital stays.

Up until a few years ago I was a very active person. I enjoyed spending my time in the mountains. Even difficult ascents, via ferrata or routes secured by ropes couldn't stop me from climbing a summit. Mountain biking, inline skating and skiing in winter were among my favourite activities.

Unfortunately my activities in the nearby Allgäu region came to an abrupt end when I caught a hospital virus after a knee operation in 2015. I got pneumonia in both lungs and was in an artificial coma in hospital for four weeks. After I was transferred to a lung clinic, I was in

an induced coma for four more weeks. During this time a large part of my lung tissue was destroyed. Of course, I hardly moved at all during this time. After my treatment in hospital I was in rehabilitation. I received many therapies, but after being discharged in the summer I could no longer

I may not be able to climb mountains anymore. But I am active, I move regularly and I feel fit.

walk independently – I needed the constant support of my walker.

I live with my wife in a small house close to my daughter. We have a small garden, but overall we don't have a lot of space. When I was allowed to go home after rehabilitation, I was able to use a THERA-Trainer right away. I exercised with the device two or three times a day and after a short time I was able to walk on my own again. As a result of the exercise, my condition improved to such an extent that in December 2015 I no longer required the artificial oxygen supply.

For more than three years I was doing really well, until I suffered another case of double pneumonia, as well as a small heart attack in October 2018. Since then, I unfortunately need an additional oxygen supply once again. In winter, and now, while the coronavirus is active, I can't leave our house. The only movement I have left is a few steps in the garden – and the THERA-Trainer. Despite this, or indeed because of it, I still use my tigo to this day. I may not be able to climb mountains anymore. But I am active, I move regularly and I feel fit.

I can only advise those who have similar illnesses to get a THERA-Trainer.

Until he fell ill, my father was a very active and agile person. Whether he was hiking, cycling or enjoying some other sporting activity, he was always on the move. I'm delighted that I was able to give my father back some of his mobility despite his illness. As the managing director of medica Medizintechnik GmbH, I was right at the source, so to speak. But I think that many families, regardless of their health insurance and the size of their wallet, could afford to do this. Whether it's Christmas, birthdays or other occasions, we are so often looking for the right gift for our parents and end up settling for everyday things or another voucher that won't be used.

A lack of exercise can lead to a whole host of problems, but exercise makes you happy. Don't we as children have a duty to treat our parents to some happiness? They brought us up to be a valuable part of society and have given us so much along the way. So why not give them back a little mobility?

Otto Höbel, CTO medica Medizintechnik GmbH

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