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THERAPIE

THE SPECIALIST MAGAZINE OF MEDICA MEDIZINTECHNIK GMBH

Best Practice

Launch of a major series "PART 1"

From evidence to clinical practice

DEVELOPMENT
Effective balance training in rehabilitation

INTERVIEW
Ensuring research reaches the patient

THERAPY & PRACTICE
Therapy for severely-affected patients

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see Page 51

FOREWORD

What's it all about?

Evidence-based therapy, correctly practised, is no recipe-book treatment. It is a modern and effective combination of a solid knowledge base and personal enjoyment of one's professional work.

Dear Readers,

Do you sometimes find yourself asking what it's all about? I'm sure you do – because recent years have seen a lot of changes in the rehabilitation sector. It would be fair to describe it as a paradigm shift, in which traditional treatment procedures are increasingly being replaced by clinical "best practice" solutions based on the latest scientific findings. The patient is always the central focus in this, and should take over the leading role in the treatment process at the earliest possible point.

We asked the question: "What is behind this approach? With various articles on the subject of evidence-based therapy, in this first issue of THERApie we have taken a closer look at one of the most fundamental aspects of modern treatment procedures. Naturally, this is set against the background of steadily-growing demand for device-based therapy concepts. It felt a little like a quest for the truth. A quest for the truth that perhaps does not exist - and maybe never will. At least, not while researchers still have many questions to ask that have the potential to contribute to decision-taking for the best possible treatment of individual patients. And that makes every one of us a researcher, doesn't it?

Best wishes on behalf of the editorial team,

Jakob Tiebel

If you ask patients what their goals are on the day they are admitted to hospital, they generally reply:

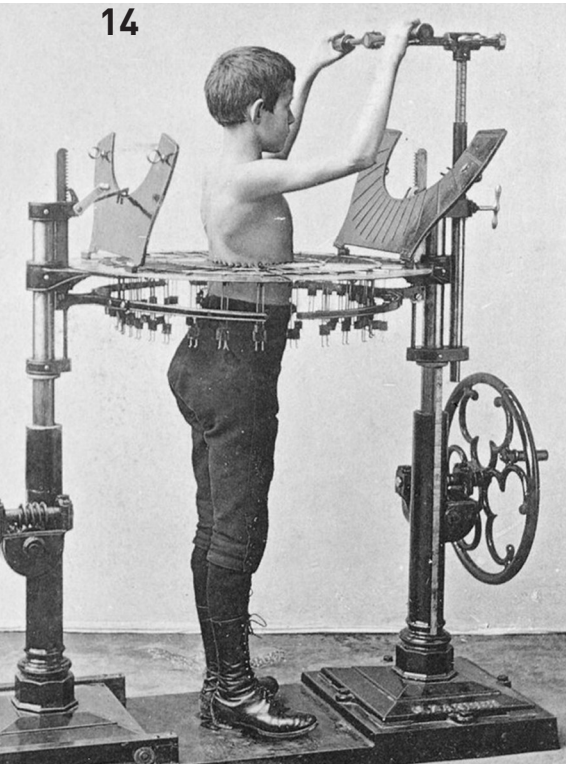
"I want to be able to walk again!"

Free and independent walking appears to be top priority.

08

Changes bring a new view of the world

The neurological patient



Interview: Ensuring research reaches the patient

Lead article: Best Practice

Science & Research

Therapy & Practice

Technology & Development

Sections

Technology and evidence

Text Jakob Tiebel **Photo** Maximiliane Windheim

Technological progress in modern neurorehabilitation is opening many possibilities for optimal treatment of neurogenic movement disorders.

"Device-based therapy is more than just a valuable add-on"

In physiotherapy, device-based procedures have increasingly been used in recent years. However, these technology-oriented methods are often still in big contrast to customary ways of working in therapy. This is particularly the case in neurorehabilitation, which tends to be dominated by manual activities, close contact with the patient and a holistic perspective on the treatment process.

Given this, you might assume that the future prospects for device-based therapy are relatively small – regardless of what science has to say on the subject. On the other hand, there is plenty of potential in technological progress. Thus, for instance, only the use of modern therapy equipment makes it possible to skillfully combine therapeutic and diagnostic procedures in such a way that the greatest possible success is achieved from treatment. Moreover, device-based therapy is exceptionally motivating for patients, especially if delivered in a group context. The majority of patients react very openly to the use of therapy equipment, even specifically requesting it, and preferring to exercise with other patients.

Generally, time is the limiting factor in therapy. It is often not enough to allow for sufficiently frequent repetition of the movements to be learned. According to current scientific findings, however, it is precisely this frequent repetition that is the key to a rapid recovery. Sensibly-structured self-training also falls short – although it is an extremely effective measure. Therapists far too often make "moving" the patient one of their supreme tasks. Yet it is precisely this task that the therapy equipment can take over. Today's modern systems are based on the most advanced technologies, which can even recognise when a patient is becoming active themselves and performing movements independently.

Device-based therapy is a key component of modern treatment concepts, and more than just a valuable add-on. By using therapy equipment, patients are supported as they re-learn movements. Additionally, the computer measures individual movement patterns. This means that deficits and improvements through therapy can be documented. Device-based therapy demonstrably leads to increased intensity of treatment and to recognisable and measurable improvements in patients. Intensifying therapy increases the prospects of success for better motor recovery, and for therapists it primarily offers them the opportunity to concentrate on the key aspects of the therapy.

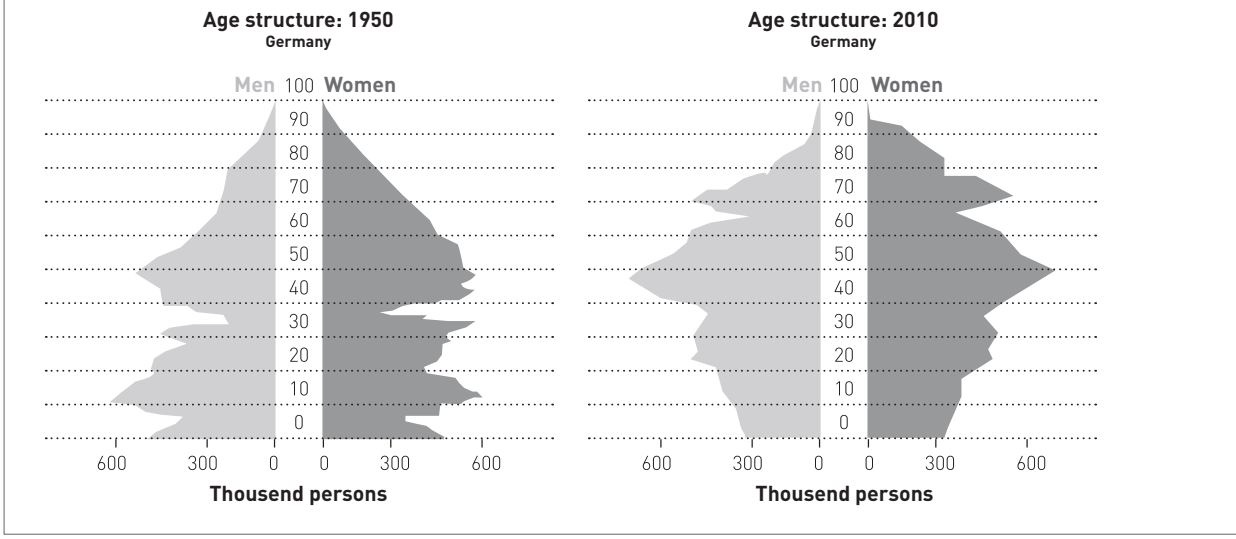
This means that training can be optimally adapted to the patient's exercise capacity with as much support as is needed (whilst being as little as possible). This increases effectiveness.

BEST PRACTICE

Changes demand a new view of things

More and more people are reliant on rehabilitation. Therapists need to redefine their tasks at the conflict area of science, efficiency and client focus. The courage to embrace change is called for.

Text Jakob Tiebel



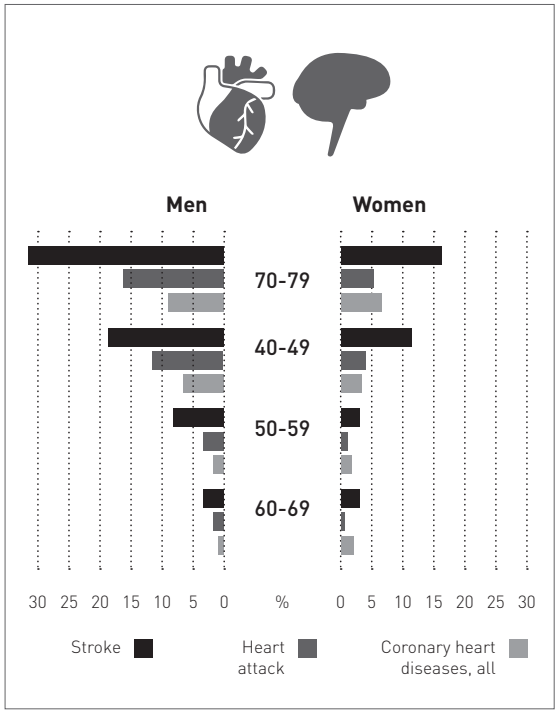
Population forecast, German Federal Statistics Office (2015)


Age structure: 2060
Germany
Men
Women
100
90
80
70
60
50
40
30
20
10
0
600
300
0
0
300
600
Thousend persons

According to the demographic projections by the Federal Statistics Office, the population structure is steadily changing, with the proportion of older people growing. There is every prospect of this trend continuing over the coming decades [19].

Due to the structural changes of an ageing society, the increase in chronic diseases and rapidly-developing medical and technological progress, key tasks are emerging for physical medicine and rehabilitation [18]. The focus is on people with a wide range of illnesses. The one thing they all have in common is the aim of full rehabilitation of function, improvement in quality of life and reintegration into daily life wherever possible [7].

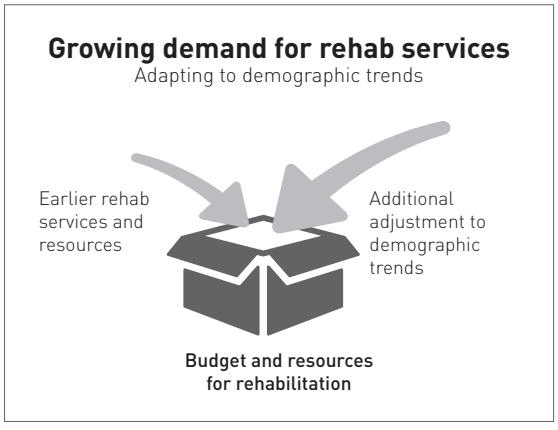
The shift in the morbidity spectrum towards chronic diseases means that neurological diseases and syndromes, in particular, are on the increase. Neurology departments across Germany treat around a million people a year. The most common treatments are for age-related diseases such as stroke and widespread diseases such as polyneuropathy, neurodegenerative diseases including Parkinson's disease and autoimmune diseases such as multiple



How many people have already been diagnosed with a heart attack or coronary heart disease or a stroke? (Robert Koch-Institut 2013)

sclerosis [2] [23] [20]. Stroke in particular is one of the most significant medical conditions in western industrialised nations, after cardiovascular diseases and tumours, and ranks amongst the most common causes for permanent restrictions on independence [17][10].

In Germany every year, there are around 196,000 first-time strokes and 66,000 recurrent strokes [10]. As a result, most patients suffer from considerable restrictions of the motor system, leading to major deficits in their daily lives. For example, three months after a stroke 60% of all patients still have a significantly impaired ability to walk [8].



A bigger budget for rehabilitation – adapting to demographic trends (German Federal Ministry of Labour and Social Affairs 2014)

The epidemiological data on strokes and other neurological diseases forms an important basis for planning future care needs and potential opportunities for optimisation.

The costs for treatment, rehabilitation and care are a massive burden on the health care system [23] [10][21]. Taking into account the costs incurred from the loss of productivity, stroke is the disease with the highest burden on the health care system [5]. These trends are similarly reflected in other comparable industrialised countries [1].

Against this background this background, questions relating to effectiveness and efficiency – particularly in rehabilitation – are becoming increasingly important in order to alleviate the consequences of neurological and geriatric diseases and to achieve the best possible reintegration into daily life, employment and society, whilst

keeping costs at a reasonable level [23]. Experts overwhelmingly agree that this requires "thorough optimisation in terms of effectiveness, transparency and financial viability" [1] in order to guarantee high quality care, despite the tough financial conditions. A vital condition for achieving this objective is to carry out evidence-based quality assurance measures [1].

What does this mean for therapy?

Neurological rehabilitation, in particular, has undergone significant change in the past 25 years, in the course of new scientific findings on neuronal reorganisation and plasticity of the nerve system, and on the proof of effectiveness of various interventions. More than ever, the focus is on implementing an evidence-based and guideline-supported clinical approach. There has similarly been a paradigm shift in relation to motor therapy [11]. Traditional treatment methods are increasingly receding [12]. They are being replaced by evidence-based approaches to treatment that are scientifically investigated, heavily geared to models of learning theory and are far more effective [11][22].

The treatment spectrum has also expanded through the targeted use of device-based therapy and modern technologies [4]. Device-based standing and walking therapy is documented by sound evidence [13] [15] and has already developed into a core component in neurological rehabilitation. Despite being highly effective and despite sound evidence, however, the possibilities are not yet fully exhausted. In many cases, the devices are not used optimally, even where they are available. Firstly, there is often a lack of meaningful and targeted integration into day-to-day clinical care, and secondly – in terms of limited resources in therapy – all too often individual treatments are more valued as a form of therapy and are therefore preferred [9].

What is the role of the therapist?

The paradigm shift that is currently happening in neurorehabilitation and the new findings emerging in basic and intervention research are leading to a changed understanding of the role of therapists [4]. For many therapists, the structural changes in clinical practice are triggering a search for orientation. Familiar, learned approaches in treatment, which were considered correct, are now being called into question due to new findings, and concerns that the modern treatment robots might take over entirely in future and make therapeutic skills and expertic often lead to "rejection out of self-preservation" [3] [16].

Individualised treatment continues to be a key component in the therapy strategy. In future, this approach is set to be supplemented and reinforced through the use and targeted application of device-based therapies and the latest technologies. Evidence-based concepts and, particularly, therapy equipment are, in the overall context, simply two – but highly important – complementary components.

We are seeing that the patient, with the support of the therapist, needs to move away from the role of the "treated person" and take personal responsibility for themselves and the rehabilitation process as early as possible [6]. Ultimately, goal-oriented rehabilitation should not only bring about the maximum achievable degree of independence, but should also teach the strategy for maintaining the abilities that have been regained following rehabilitation. "Neurological rehabilitation is on the one hand always a circumscribed, goal-oriented and thus finalised measure, but on the other hand it must not neglect the need to secure and develop for the long term the improvements in function achieved for patients through rehabilitation [4]". In an ideal scenario, two experts are working together: the patient, as the expert for their own goals, and the therapist, as the process expert [6].

What goals do patients have?

One vital factor for long-term success is patient motivation to work on the defined objectives, including working independently, well beyond the designated rehabilitation process [4]. Here, too, device-based therapy offers possible solutions, too. With the continuous development of the devices and the use of modern computer technology, patients can always be offered differentiated therapy adapted to their individual needs. Self-training increases therapy frequency as well as patient self-confidence in their own motor skills. This increases confidence in being able to improve one's own condition through active practice and exercise. The patients develop a strong sense of self-efficiancy.

The use of therapy equipment combined with forms of therapy such as individual and group therapy will increase the effectiveness of rehabilitation. The greatest possible success can be achieved by cleverly combining these aspects.

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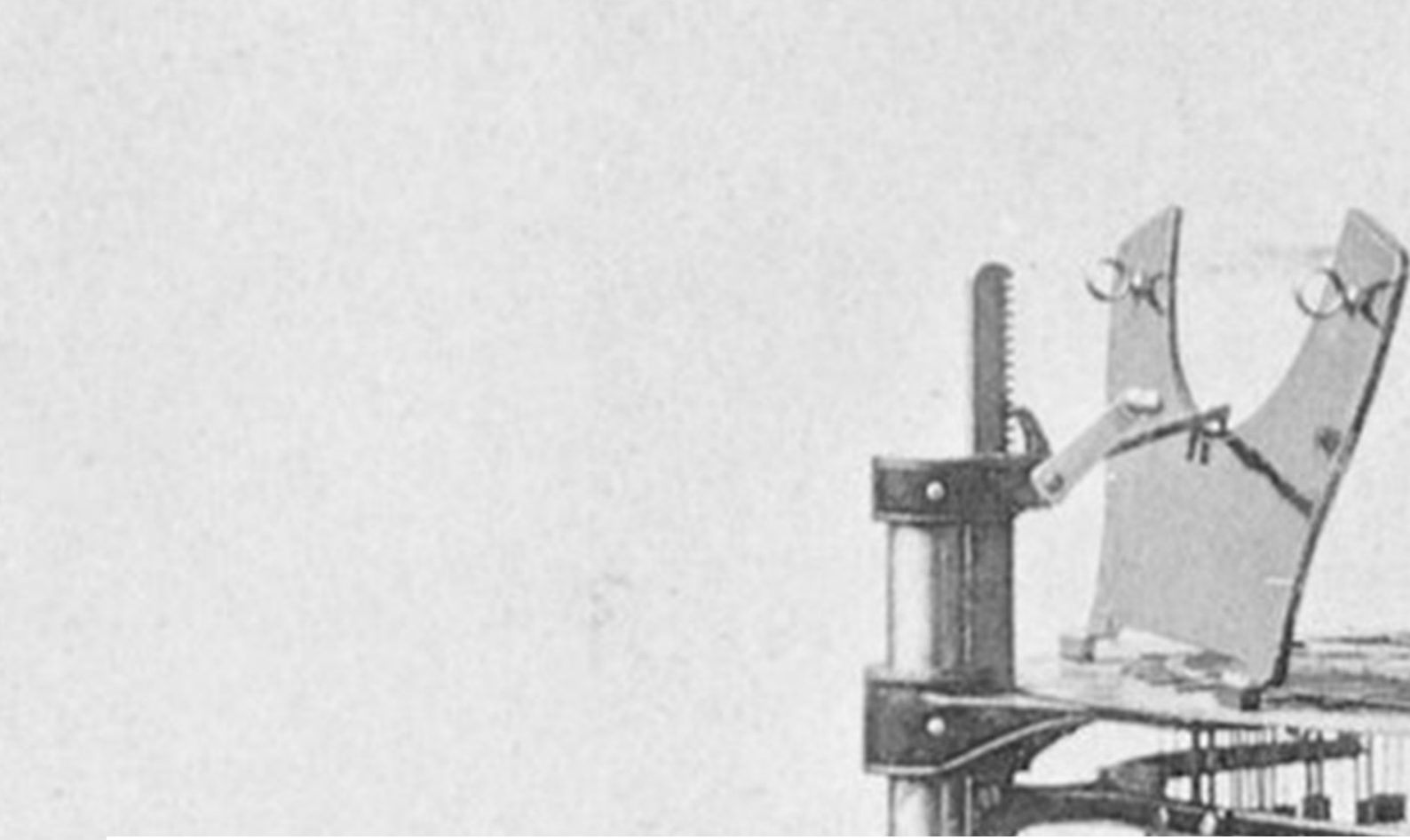


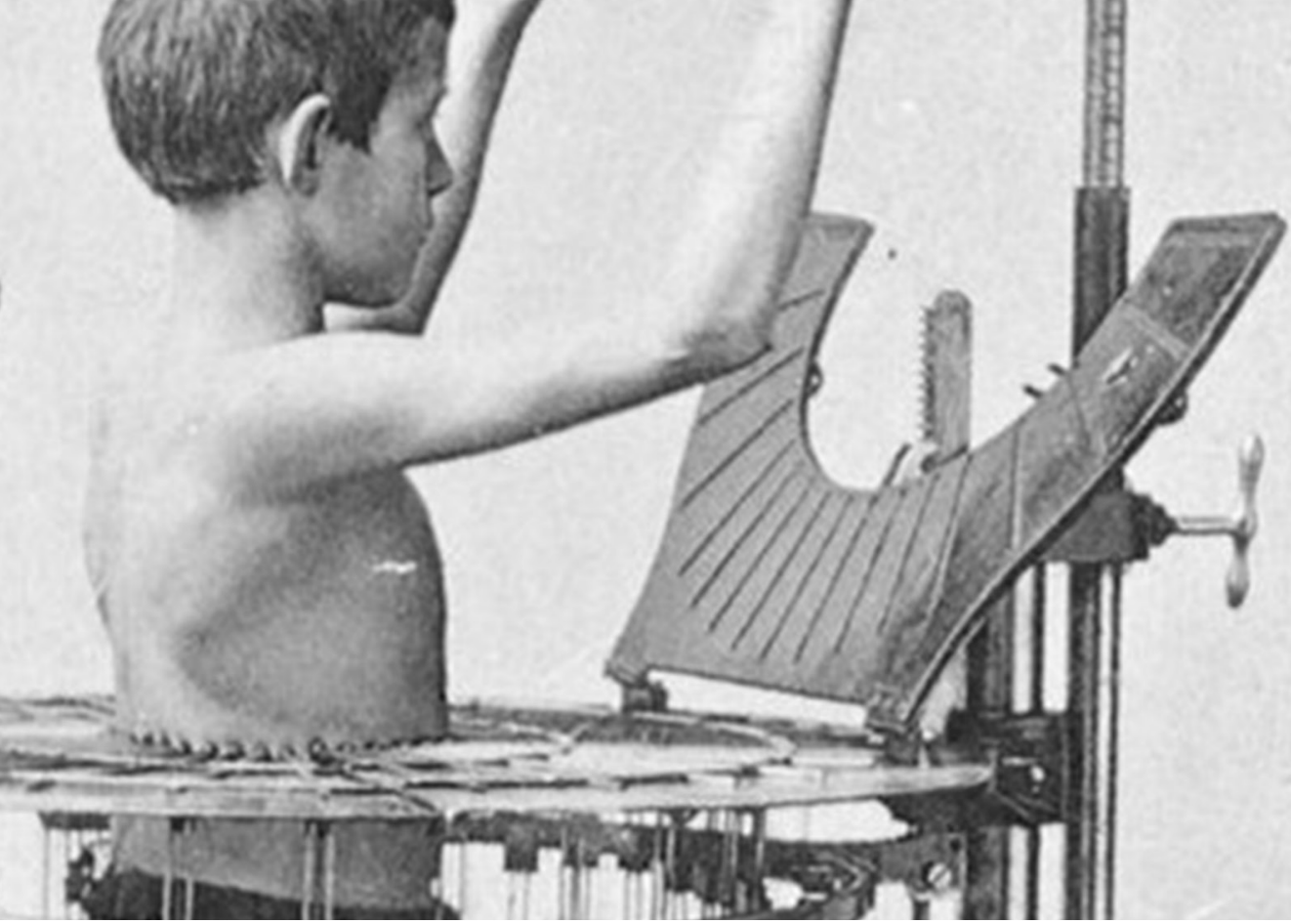
BEST PRACTICE

The neurological patient

If you ask patients, on the day they are admitted to hospital, what their goals are, they generally reply:

"I want to be able to walk again!"

Free and independent walking appears to be top priority.



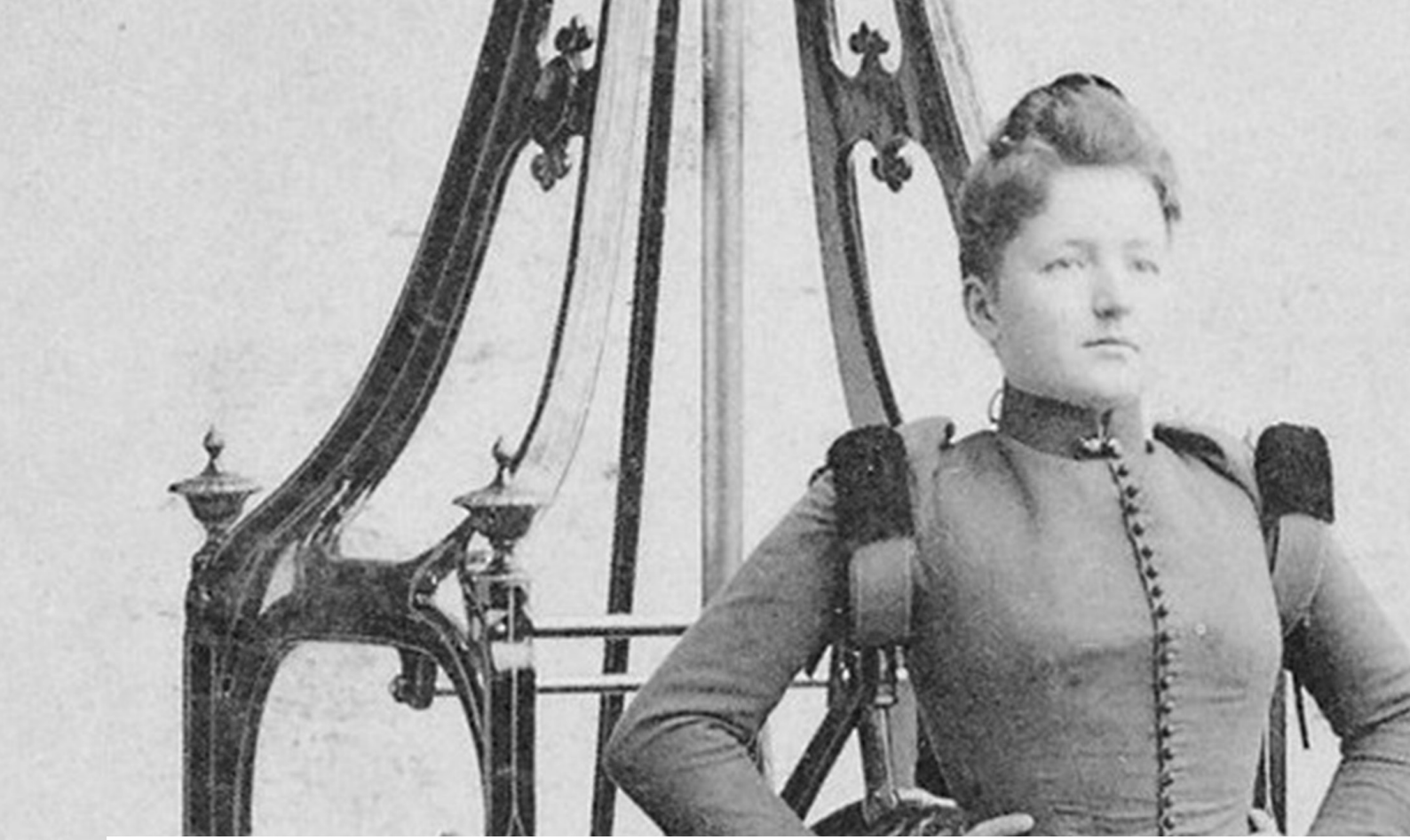
Text Helmut Krause

We know that three months after a stroke, around 70% of patients have regained the ability to walk. But we also know that only around 7% of these patients can walk 500 metres in one go following their stay on a rehabilitation ward. Moreover, their speed of walking often remains considerably reduced. Patients are not quick enough to be able to cross the road safely.

Firstly, let's review the path our patients take from the day of the incident to the day they are discharged from the rehabilitation unit. Depending on the severity of the symptoms, acute medical care is the initial focus of attention. This phase of the rehabilitation process can be described as a "phase of purposelessness". It generally leads to a complete loss of independence. Those affected are suddenly torn from their usual way of life and are usually completely helpless and dependent. They have to put responsibility for themselves and their life – often unwillingly – into the hands of physicians and therapists.

"How can we improve things?"

Once their condition has stabilised, the first "intentions" are formed. Many patients are relieved that they are still alive. A search for orientation begins. It is generally during this phase that the patient is admitted into a rehabilitation unit. By this time, the goal should be that patients move away from the role of being the "treated person" and again start to take responsibility for themselves and the rehabilitation process. Ultimately, goal-oriented rehabilitation should not only restore maximum independence, but should also motivate the patient to continue to work on their individual goals after the rehabilitation process and to maintain and improve their condition. For this to



happen, patients need to move as early as possible back into the role of "actor".

Patient and therapist work closely together and there is a clear division of tasks. The patient formulates the goal and the therapist maps out the right path. This kind of collaboration can be illustrated by the image of a mountain guide and his companion. The guide shows the hiker the path to the summit, but the hiker has to walk and carry his own backpack. Often, it is a long and, in parts, very demanding path. For that reason, motivation is a vital factor in long-term rehabilitation. Above all, the motivation to work independently on the defined objectives well beyond regular therapy.

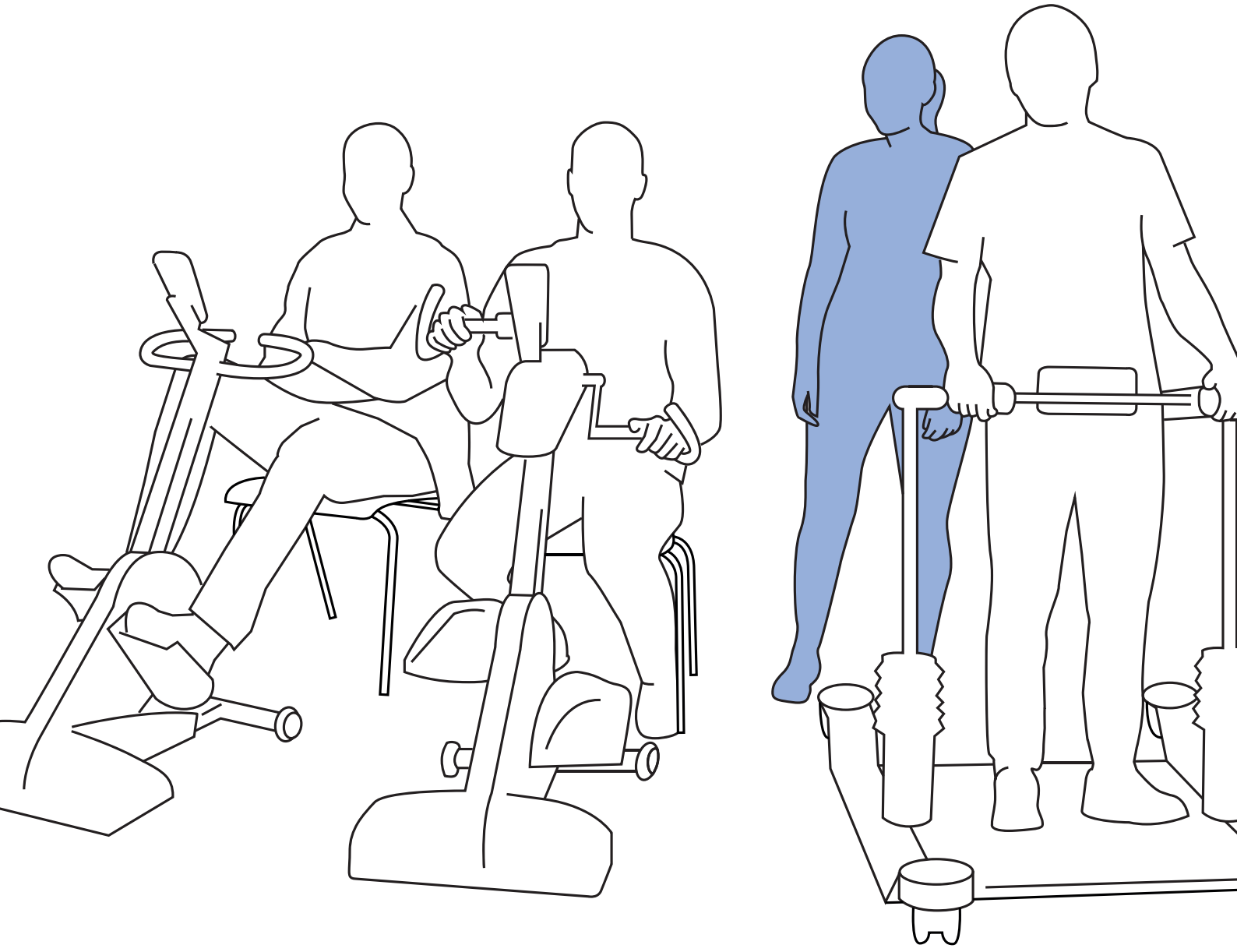
Towards the end of the 19th century, the early principles of motor learning were already being described by the Swedish physician and physiotherapist Jonas Gustav Vilhelm Zander, and "medico-mechanical devices" were even being used for effective therapeutic gymnastics. Zander pursued this line of thinking because "you only learn what you practise […] through frequent repetition of exercise sequences".

Today, this thinking is perhaps more current than ever in modern rehabilitation. With the continuous development of different therapy devices and the use of technologies, patients can be offered more differentiated therapies adapted to their individual needs and capabilities. The benefits are clear: Without any additional expense, therapy frequency can be significantly increased for the patient and the motivation to train is boosted.

What does this mean for therapy? Our sector has been in a sustained process of change for some years now, moving away from traditional methods and towards evidence-based practice. In these phases, too, new intentions are formed, new courses of action initiated, maintained and critically examined on a continuous basis. So go with it!

"Linking up to a computer means that training today can be very clearly defined. Patients get direct feedback on performing the movement and are motivated to improve their condition through active exercise."

Helmut Krause graduated from university as an ergotherapist at DIPLOMA in Northe Hesse, Germany. He has worked as an ergotherapist for a number of years in neurology and early rehabilitation. From 2002-2004, he was Head of Ergotherapy at the Neurological Therapy Centre in Cologne, before moving in 2005 to the St. Mauritius Therapy Clinic in Meerbusch. Until 2015, he worked as Head of the Motor Function Department at the St. Mauritius Therapy Clinic in Meerbusch. Helmut Krause now has a successful freelance role with his independent consultancy firm "AMBUTHERA", advising clinics and therapy centres along with SMEs in the medical technology sector. Presentations on modular therapy and walking rehabilitation are amongst Krause's specialties.



Best Practice

Device-based therapy – but how?

In this first part of our major "Best Practice" series of articles, learn about the challenges facing evidence-based practice and why there is a need for a practice-oriented concept with a structured treatment guideline.

The attempt not simply to make therapeutically meaningful devices available, but to also pass on the necessary knowledge for its best possible use and application, last year THERA-Trainer began to develop their own, evidence-based treatment concept: the THERA concept. It takes account of every aspect for supportive action, drawing on the latest scientific findings. The content is relevant both for the professional groups involved in the practical work, such as physiotherapists, ergotherapists and sports therapists, and for physicians, health economists and patients. Only someone who is well-informed about how these things operate understands why it is vitally important to exercise actively and continuously after suffering damage to the nervous system; and such persons will recognise the benefits from the systematically targeted use of therapy devices. That is the philosophy of its inventors.

The first part considers the challenge of the transfer from current evidence to clinical practice.

Part 1
of a major series

BEST PRACTICE

From evidence to clinical practice

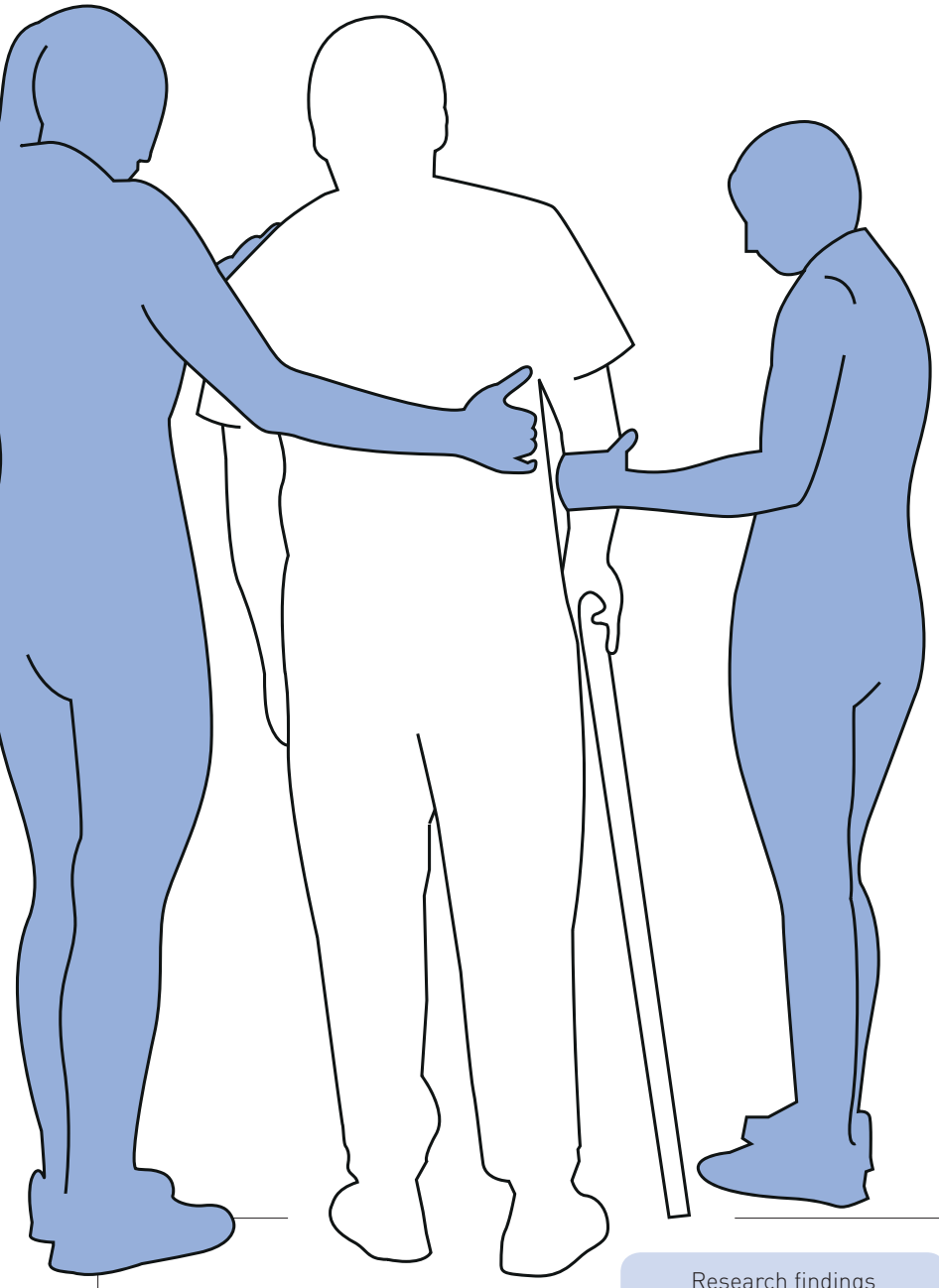
In the context of neurological rehabilitation, evidence-based practice has become very important. Various expert committees at national and international level have taken on the task of developing guidelines, systematically setting out the evidence relevant for therapeutic decision-making. The intention of the authors of clinical guidelines is to prompt a change of behaviour on the user side and thus bring about an improvement in the quality of care. However, the fact is that there is still a lack of solutions for practical implementation.

Text Jakob Tiebel

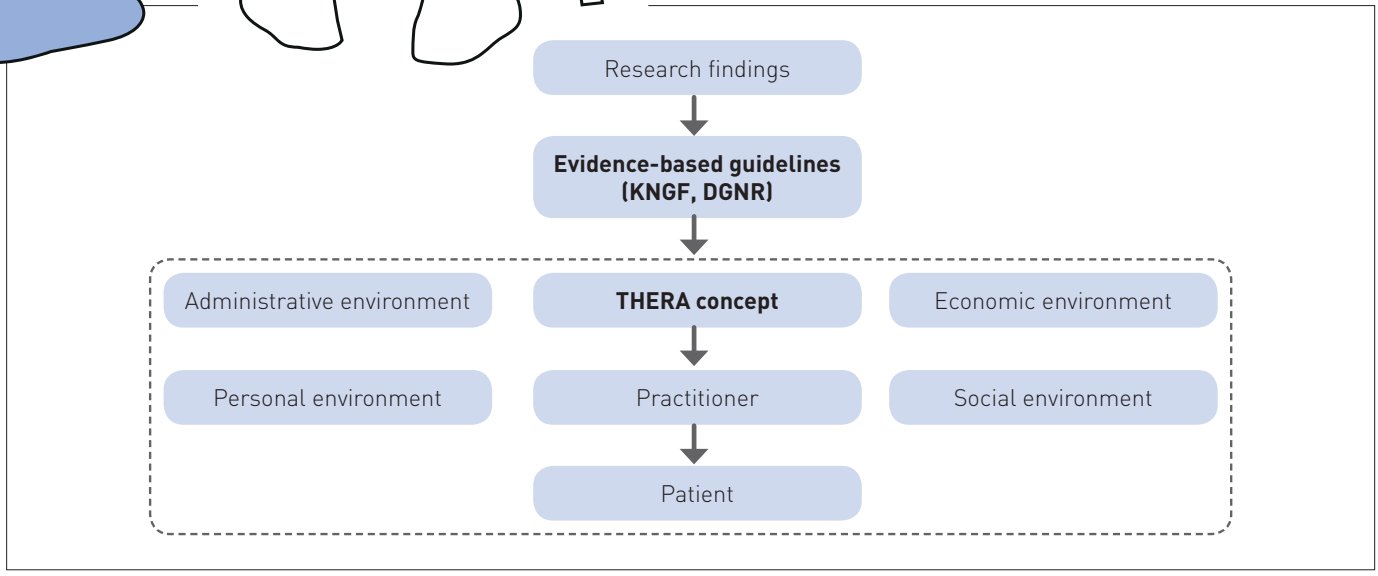
Modern neurorehabilitiation is increasingly evidence-based, and thus takes account of the increasingly complex findings from basic and intervention research. Having an evidence base for therapies is, rightly, a modern-day requirement, and it is increasingly becoming standard. But what exactly is meant by the phrase "evidence-based therapy"?

The "grandfather" of evidence-based medicine, Daniel Sackett, defines it as: "integration of individual clinical expertise with the best possible external evidence from systematic research and the experiences and wishes of the patient" [14].

In evidence-based practice, therefore, the conscious, explicit and appropriate use of contemporary scientific findings is central to the choice of therapeutic measures [14]. This presents a fundamental question: which of the available therapeutic measures are best suited for the individual patient at a particular time? The answer should always be sought with the involvement of the patient and as part of a critical weighing-up



The THERA concept: implementation model based on Lomas and Kitson (Kitson et al. 1998)



of the available options [1], since the decision is dependent on the personal goals and preferences of the patient, the experience of the therapist and the structural conditions [5][6].

In the context of neurological rehabilitation, evidence-based practice has become highly important [7][11]. Various expert committees at national and international level have taken on the task of developing guidelines, and systematically viewing and presenting the evidence relevant for therapeutic decision-making. The intention of the authors of clinical guidelines is to prompt a change of behaviour on the user side and thus bring about an improvement in the quality of care [15].

Despite good progress and overall positive development, there is still potential for improvement. "Guidelines do not spontaneously implement themselves" [15] and scientific findings from specialist associations are not yet producing a treatment concept fit for the requirements of day-to-day clinical practice.

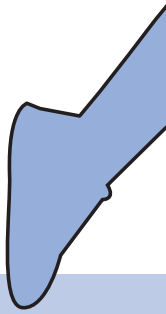
Implementation in clinical practice

In the literature, various strategies for implementing evidence-based guidelines in clinical practice are set out and, in part, the subject of heated debates [4][3][2]. In the vast majority of cases, a "mixed teaching strategy" is recommended, aimed at ensuring effective knowledge transfer into clinical practice [4]. Jan Mehrholz refers to an implementation model by Lomas [9] and Kitson et al. [8] who propose a "teaching strategy via knowledge transfer". Under this arrangement, the results from science, research and development are consistently integrated into the therapeutic decision-making processes, with training being given without fail in the practical application [15].

The THERA concept is one such implementation model. And it is the first of its kind which transfers solutions for structured and individualised application of device-based therapy measures into practice.

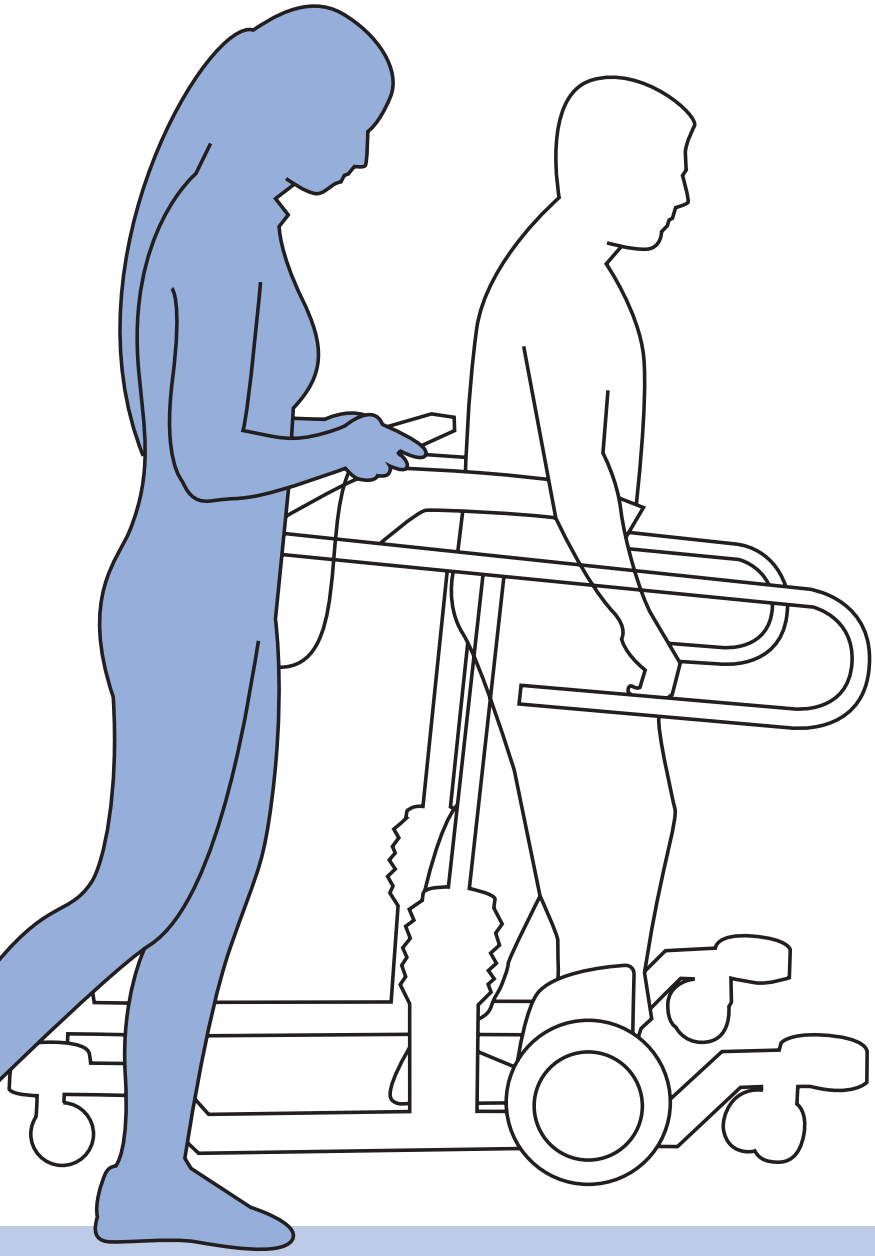
Via guidelines for action and interactive workshops with clinicians and practitioners, the THERA concept contributes to ensuring that therapeutic measures adopted as part of device-based therapy are designed more rationally and more efficiently. The challenge lies in providing orientation not only to clinical and out-patient users, but also to the adjoining and downstream administrative, economic and social core areas, as well as to patients and their family members.

Transferred to the Lomas and Kitson implementation model, it means consistent alignment to the latest research findings and scientific progress (see illustration on p. 21). The THERA concept is mainly oriented to the practical guidelines on "Stroke" by the Royal Dutch Society for Physical Therapy and the German Association for Neurological Rehabilitation [12][13], which are characterised by comprehensive research of the literature, significant specialist knowledge and a strong emphasis on practice.



The THERA concept

The THERA concept offers comprehensive expertise for all facilities involved with active rehabilitation and care of patients, on the basis of the latest evidence. At the heart of the concept is a practically-oriented guideline for action, making goal-oriented use of THERA-Trainer products possible across all phases of rehabilitation. This happens on the basis of the latest scientific findings, taking account of all adjoining areas. The THERA concept was developed together with physiotherapists, ergotherapists, doctors, engineers and IT experts.



Coming in the next issue:

1. Which are the assessment instruments that can be used quickly and straightforwardly in day-to-day clinical practice to determine the patient's capabilities in order to be able to formulate individual objectives?
2. Which interventions are most suitable, depending on the ability level and goals of the patient at a particular time?
3. Which THERA-Trainer products can be used in the respective phases to make the therapy more effective and economical?

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Evidence

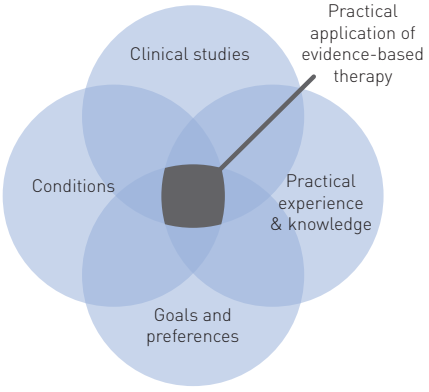
What's the meaning of?

Evidence-based medicine (EbM or EBM) is originally defined as the "conscientious, express and cautious use of current best evidence for decisions in the care of an individual patient". EbM is therefore based on the respectively current state of research, clinical studies and medical publications – collectively termed "evidence".

In the clinical practice of EbM, this means integrating individual clinical expertise with the best available external evidence from systematic research.

Building on this evidence-based individual decision for the individual patient, the term EbM is also used in evidence-based health care provision.

For this, the principles of EbM are transferred to the organisational and institutional level. This means that a treatment recommendation is not determined for individual affected persons, but for a group of affected people or for an entire population. Treatment recommendations, or guidelines, are diverted from the results of the research.



History of EbM

Evidence-based medicine (EbM) is therefore medicine based on "evidential material" and includes every form of medical treatment where patient-oriented decisions are taken explicitely on the basis of proven effectiveness. The proof of effectiveness is arrived at via statistical procedures. EbM therefore stands in contrast to forms of treatment for which no such proof of effectiveness is available.

The concept was formed in the early 1990s by Gordon Guyatt from the group working with David Sackett at McMaster University, Hamilton, Canada. In the German-speaking world, the first publications relating to the concept appeared in 1995.

The idea of evidence-based medicine can be traced back to the concept of "medical arithmetic", developed in the second half of the 18th century by British doctors. The term is found for the first time in an article published in 1793 by the Scottish doctor George Fordyce, "An Attempt to Improve the Evidence of Medicine". One of the first controlled clinical studies was carried out in Great Britain. And as early as 1753, James Lind published the results of his trial into treating scurvy with oranges and lemons.

In the German-speaking world, it was in 1848 that the Hungarian doctor Ignaz Semmelweis (1818–1865), working in Vienna, introduced "systematic clinical observation" into medical research.

The book "Effectiveness and Efficiency: Random Reflections on Health Services" by Archie Cochrane, a British epidemiologist, published in 1972, marks the start of the current international work around EbM. His later works led to increasing acceptance of clinical epidemiology and controlled studies. Cochrane himself, sadly, did not live to see the establishment of the EbM movement. However, his efforts were recognised in that an international network for assessing effectiveness in medicine – the Cochrane Collaboration – was named after him.

Martin Huber Physiotherapist and Master of Science

Ensuring research reaches the patient

German physiotherapy is faced with the challenge of establishing solid structures that ensure evidence-based methods in medical practice. For that to happen, all those involved in the system need to work together. The importance of evidence-based therapy is growing. The number of scientific publications is continuously expanding. But are the findings actually being transferred into practice?

Martin Huber is a physiotherapist, and in 2007 he gained his Master of Science in Neurorehabilitation. It was in 2012, in his article "Wissenschaft braucht Kutscher" ["Science needs people in the driving seat"] in the specialist magazine Physiopraxis, that he reported on the subject of "knowledge translation" in neurorehabilitation. In an interview with THERA-Trainer, he explains which obstacles still need to be overcome.

Mr Huber, you have been tackling the question of how evidence-based therapy reaches patients. How do things look today, in terms of practical implementation?

Many clinics advertise the fact that the therapy is aligned with the latest scientific findings. But that is not always the case. As I pointed out in my article, early mobilisation, for instance, is very important following a stroke, and has proven positive effects on recovery of function. Despite this, even today therapists still cling to outdated guidelines and treat patients in the early phase very cautiously and hesitantly. As a result, valuable time is wasted.

What makes it so difficult to pass this knowledge down to the front line of treatment?

It's to do with the complexity of the processes. They are difficult to control, since many actors are involved at various interfaces.

Can you give an example?

In physiotherapy there are researchers, trainees in schools, apprenticeships and continuing training, knowledge users in medical practice, employers, professional associations, health care politicians and health insurance providers involved in the processes. Only if all these actors communicate with one another and work together in a closely-connected way at the interfaces is it possible to ensure that new knowledge reaches the patient. But for that to happen, a lot of things still need to change.

And presumably not just at one of the interfaces?

That's right. If you look at the efforts to date by actors in physiotherapy, it is clear some things are still needed before everyone is pulling in the same direction.

For example, the training and examination regulations for physiotherapists are now over 20 years old. You will search in vain for subjects such as "scientific working" or "evidence base".

Can knowledge be passed on following training, for example via CPD and advanced professional training?

Even that's problematic. There is no body regulating the CPD and advanced professional training market. It's true there is an obligation to undertake CPD, and there are certain quality criteria, but there is no monitoring body examining the curricula of the respective CPD providers for their evidence. The CPD providers are not required to pass on current knowledge or at least to clarify which content is backed by scientific evidence and which is based on an empirical approach. Therapists may potentially invest a lot of time and money in CPD with outdated content.

Are there any pioneers showing the way forward?

Of course, there are schools and clinics which are driving knowledge transfer forward. Particularly in the in-patient context, a fair amount has happened in recent years. Device-based therapy, backed by good evidence, is also increasingly on the rise here. By contrast, things are more problematic in the out-patient sector. Here, the problem is the health insurance providers. In relation to treatment for people with neurological disorders, the catalogue of treatments provides traditional approaches to treatment, such as Bobath, Vojta. Therapists receive more money for them per treatment unit than for normal physiotherapy. More modern, evidence-based procedures such as task-oriented training are, on the opposite, not mentioned in the catalogue of treatments and certainly do not result in any higher financial compensation. This skewed situation also blocks evidence-based procedures from becoming established in the CPD market. The catalogue of treatments is no incentive for therapists to use contemporary methods. This is where the professional associations should engage with the health insurance providers and push for updates in the joint Federal committee.

What steps are needed to improve the situation?

Physiotherapy in Germany needs a superior body to coordinate the exchange between the interfaces. At the moment, "knowledge translation" is more or less a personal matter for each individual. Of course, there are schools and clinics which are driving knowledge transfer forward and implementing it in practice. And there definitely is process change – for instance, the new possibility of studying physiotherapy in Germany at undergraduate level – but at the broader level a vacuum continues to exist.

How do physiotherapists react to the increasing changes? Their day-to-day work must surely change as new findings emerge.

Certainly – not least the therapists need to critically examine their work "on the test bench", if the

results from research are to reach the patient. Some applications where the evidence is lacking have become favoured habits. Changing one's own behaviour is, naturally, a process that provokes resistance. Motivated physiotherapists urgently need to overcome this hurdle if they want to treat patients efficiently.

The talk in the research field is about "knowledge translation". What are the latest findings being offered on this subject?

For actors in vocational training and in the CPD market, science offers recent findings on how they can support the change process. In randomised controlled studies, researchers have investigated which knowledge translation interventions are the most effective. In a large-scale work of review, for instance, Jeremy Grimshaw has identified that passive interventions – i.e. articles, presentations, conference attendance and training material – are not sufficiently effective on their own to change the behaviour of users. The approach is only meaningful in generating an awareness of the problem. Learning with the aim of changing behaviour, however, contains several critical steps: with regard to physiotherapy, the learner needs to acquire the knowledge, to apply it firstly in the practice situation and later with patients, and to integrate it into their day-to-day therapeutic work. This is a complex path, which learners can only accomplish through active involvement.

What is your own personal summary of the situation?

Knowledge translation is a complex process, and in German physiotherapy it is still in its early days. Active and diverse measures provide effective support for it, but require motivation, time and money - these are daunting obstacles, but not insurmountable. All actors should communicate with one another for the patient's benefit and to professionalise the status of the profession, and to move the process forward together.

Mr Huber, thank you for this interesting interview.

SCIENCE & RESEARCH

Device-aided balance training for people with stroke

A clinical study on the feasibility and effectiveness of dynamic standing training in the recovery of function for stroke patients living at home.

Text Anis Hamila, from the German Sport University, Cologne

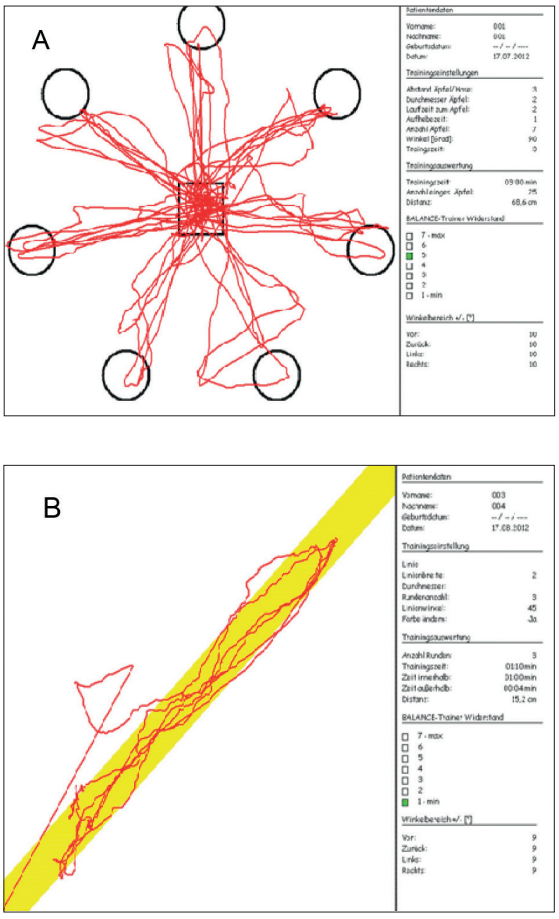
In many industrial countries, as in Germany, the age structure of the population is changing, with the number of older people increasing. The probability of a stroke increases significantly with age. In 2007, CVD was responsible for around 15% of all hospital stays for people aged 65 and over [8]. Thanks to improved examination and treatment methods in specialist centres, known as stroke units, the mortality rate has continued to fall in recent years [13].

The pattern of recovery following a stroke is very different from patient to patient [2]. One-third of survivors suffer a life-long disability, which in addition to the physical and mental impairments for the person affected also represent a major burden for the health care system [6]. According to Schaechter, 50% to 60% of stroke patients still suffer motor impairments after the end of standard rehabilitation. Around 50% of them show at least one restriction, with the result that partial dependency influences the activities of daily life (ADL) [9].

Given the many different consequences of a stroke, rehabilitation needs to be multidisciplinary in order to minimise the physical and mental impairments over the long term. The primary goals of rehabilitation in the early phase following a stroke are to improve mobility and to minimise the risk of a fall [11]. Regaining lost motor skills is the goal of many measures in the later phase, which

represents a major challenge in addition to the age-related deterioration in these skills. Improving mobility and minimising the risk of a fall in the chronic phase (from 6 months following a stroke) are fundamental for the patient's individual recovery process.

In order to guarantee participation in daily activities following a stroke, it is important to improve, or at least maintain, mobility in older patients. Several studies show that the key to this lies in a good capacity for balance and in a reduced fear of falling [12,3,10]. Today, medical progress permits the use of new technologies and devices, such as e.g. virtual reality. Many studies show that patients in the chronic phase following a stroke can benefit from such approaches [1][7][4][5].



Example of training evaluation of games played "Apple picking "(A) and "Walk the line" (B). The red line shows the distance covered by the test subject

The "Apparative Balance Training mit Apoplex Betroffenen (ABmAB)" ["Device-based Balance Training with apoplexy sufferers (ABmAB)"] project was launched for scientific establishment of new forms of therapy in the treatment of stroke patients in the chronic phase. This project investigates the effect of a new training method, the BALANCE-Trainer system, on the capacity for balance, mobility and fall-related self-efficacy of stroke patients living at home, and its feasibility. The issue of balance, in particular, will be the focus of the investigation. In doing so, the goal for the future is to develop better interventions for older people following a stroke in order to extend the level of knowledge regarding therapeutic measures.

Background and purpose

Even years after a stroke, many older people living at home suffer from reduced mobility and capacity for balance, and also from an increased risk of falls. Movement therapy and various new training methods, including virtual reality, can improve balance and mobility in patients. The goal of this study is to examine the feasibility and the effectiveness of a new, dynamic standing training method for stroke patients living at home in relation to balance, mobility and fall-related self-efficacy.

Methods

A longitudinal study with a control period based on a cross-over design was carried out. The test subjects (9 men; 3 women, aged 71. 2 ± 5.7 years) trained on 12 training units using a BALANCE-Trainer system. Training took place twice a week over seven weeks. The performance of the test subjects was tested at three points in time (T1, T2 and T3). The period between T1 and T2 represented a control period without training and T3 took place following the end of the intervention period. Tests examined balance (Berg Balance Scale), functional reach (Functional Reach Test), mobility (Timed Up And Go Test), speed of walking over 10 metres, and fall-related self-efficacy (Activities-Specific Balance Confidence Scale).

Results

The low drop-out rate (14.28%) indicates sound feasibility of the training intervention. After training, the test subjects were able to improve significantly ($p<.05$) in nearly all measured results. On the Berg Balance Scale, the test subjects improved on average from 40.4 ± 12.5 points to 45.6 ± 13 points, on the Functional Reach Test from 13.4 ± 5.1 cm to 17.9 ± 6 cm and on walking speed from 0.82 ± 0.39 m/s to 0.97 ± 0.46m/s. The changes in the Timed Up And

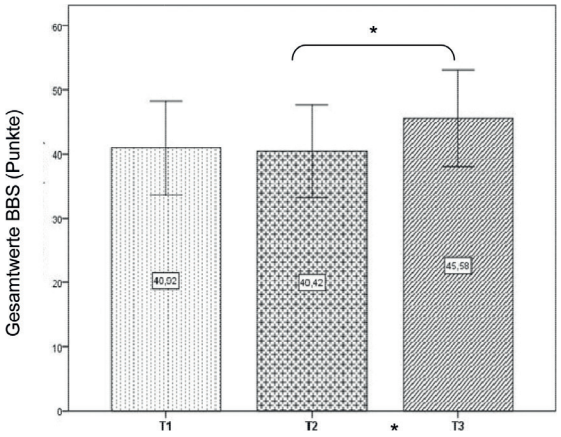
Go Test and in fall-related self-efficacy were not statistically significant.

Discussion

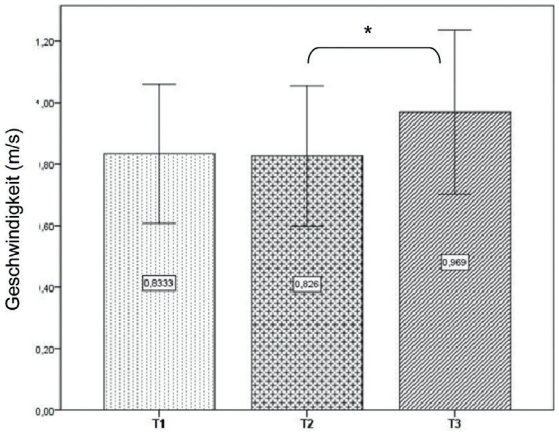
The intervention using the BALANCE-Trainer system was suitable for use with stroke patients living at home. The training intervention demonstrated an improvement in balance and mobility. However, these results should be further examined in future studies over a longer period and with more suitable measurement procedures.

Keywords

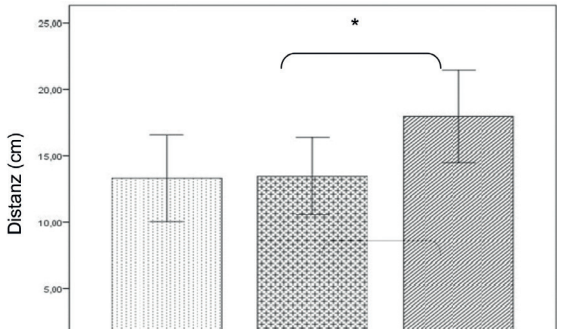
BALANCE-Trainer, stroke, balance, mobility, fall-related self-efficacy.



Balance measured using BBS before (T1) and after (T2) of the control period and after standing training (T3). The graph shows the mean values and the standard error. *: the mean difference is significant at the .05 level.



Functional reach before (T1) and after (T2) of the control period and after standing training (T3). The graph shows the mean values and the standard error. *: the mean difference is significant at the .05 level.



Walking speed over 10 metres before (T1) and after (T2) of the control period and after standing training (T3). The graph shows the mean values and the standard error. *: the mean difference is significant at the .05 level.

You can request the full study from:

therapie@thera-trainer.de

Anis Hamila is a trained physiotherapist and studied at the "Ecole supérieure des sciences et techniques de la santé de Monastir" in Monastir, Tunisia. In 2010, Hamila commenced his Masters course, specialising in movement and sports gerontology, at the German Sport University in Cologne, and he has supported a number of research projects as a research assistant at the Institute. As part of his Masters work, he has worked intensively on the feasibility and effectiveness of device-based dynamic standing training in stroke patients, and as part of his dissertation he carried out a longitudinal study of stroke patients living at home.

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Therapy for severely-affected patients

Both in the home care environment and in in-patient care, you will come across severely-affected patients who are mobilised far too infrequently. The therapy is given to the patient in a lying position, in and on the bed. There is virtually no eye-level communication; instead, communication is literally across the patient, from above to below. This is clearly not done out of any bad faith. The fear of "doing something wrong", causing pain to the patient or overburdening them is generally the primary concern.

Text Janine Ehlers **Photos** Janine Ehlers

Appropriate therapy and care of severely-affected patients in their home is an increasingly important subject. Progress in medical technology means that survival rates for severely ill or severely injured people are rising dramatically. From neonatology to geriatrics, highly-developed systems for maintaining life are able to save patients in a critical condition and to significantly prolong their life span. Patients affected by craniocerebral trauma, heart attacks and strokes, along with people suffering with chronic diseases, increasingly need long-term, intensive medical support, sometimes outside the hospital setting. This has led to a new and challenging field of work for the various health care professions. Care, respiratory therapy, physiotherapy, ergotherapy and speech therapy all need to adapt their content and refocus. The joint efforts of the professions and disciplines involved is to safeguard and improve the quality of life of those affected. Modern devices, adapted to the needs of severely-affected patients, such as the THERA-Trainer tigo and the THERA-Trainer balo, offer

THERA-Trainer balo
provides security

therapists efficient options for optimising their treatment concepts, from the intensive care ward through to the home environment.

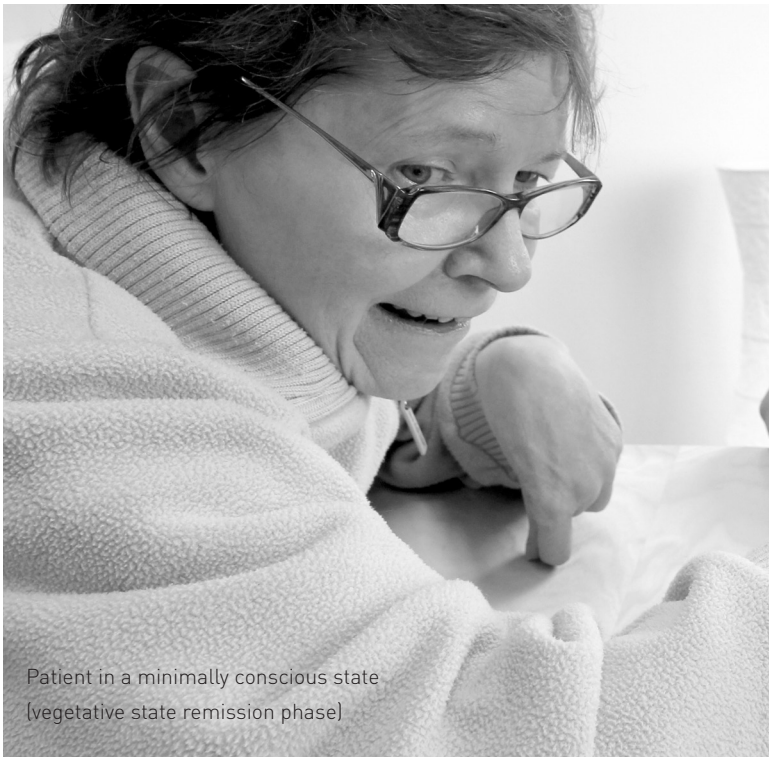
New pathways via device-based therapy

The complexity and interaction of the symptoms in severely-affected patients calls for up-to-date and specialist knowledge from all those involved in the therapy process. Symptoms such as spasticity, contractions, dysphagia and respiratory dependence can be avoided or alleviated with early mobilisation and verticalisation.

Mobilisation and activation using the cycling movement trainer THERA-Trainer tigo is not just reserved for conscious and mildly-affected patients. The cardiovascular system and metabolic processes can be stimulated using the THERA-Trainer tigo, even in patients in a vegetative state, via passive or assisted training, while flexibility can be maintained or improved.

Full physiological verticalisation, i.e. standing upright, can only be achieved in a standing position. Physiological, biomechanically beneficial standing requires the body's centre of gravity to be along the plumb line in the lower spinal area. The further a body part deviates from the plumb line, the more gravity is placed on bones, cartilage, ligaments, tendons and musculature. We only use the term verticalisation to refer to someone who is brought into the vertical position (on the plumb line to the centre of gravity) from head to foot. However, this is only possible if the pelvic girdle is kept dynamically stable in a wide-angled position. This dynamic stabilisation is achieved most readily in a standing position. Mobilisation at the bedside is therefore not "proper" verticalisation, since it is only when the severely-affected patient is fully upright that they get the necessary biomechanical support to be able to learn adequate torso and head control.

In severely-affected patients with deficient head and torso control, and with a lack of tone in the lower extremities, therapeutic straightening into the standing position can only be achieved with difficulty unless suitable aids are used. Achieving early verticalisation using a flexibly-adjustable standing device is therefore recommended. A rigid standing device, without scope to support the patient's individual and current joint flexibility via flexible knee and pelvic supports, is of little use. The THERA-Trainer balo offers therapists, care staff and suitably-trained family members the opportunity to carry out efficient, gentle



Patient in a minimally conscious state (vegetative state remission phase)

standing training without the fear of falling upsetting the patient. The option of being able to work statically, as a simple aid to standing, or dynamically as a balance trainer enables the patient to adapt their training situation to their daily condition and/or training progress.

Twenty years ago, Pat Davies called for daily standing for severely-affected patients, starting in the intensive care ward [1].

Scientific studies [3][4] and new rehabilitation concepts [5][6] show that passive mobilisation at and/or in the hospital bed is not sufficient to smooth the path back to active participation in society. Mobilisation out of the bed into a standing position is becoming increasingly important in the treatment of severely-affected patients, both inside and outside the hospital setting.

The earlier the better! Standing in intensive care

In recent years, an increase in the importance of early-intervention therapeutic measures has been observed. Studies relating to intensive care medicine show that an early start to therapeutic interventions can prevent immobility, becoming bedridden and sensory deprivation [7][8][3]. A randomised controlled study in mechanically ventilated patients in the intensive care ward [9] shows that a combination of interrupting sedation and simultaneously starting ergotherapeutic and physiotherapeutic treatment in the early phase leads to a better outcome than the usual standard care in the intensive care ward.

Severely disabled patients who are fully dependent on outside assistance are mobilised out of bed at the earliest opportunity, activated and brought into a standing position. Early mobilisation is possible even with intubated and mechanically ventilated patients [10]. These simple therapeutic measures in the earliest days of mechanical ventilation can thus reduce the delirium period and lead to better functional outcomes when the patient is discharged [11][9].

Standing for persons in a vegetative state

Vegetative state is one of the least well-understood medical phenomena. The range of different diagnoses and definitions of vegetative state leads to confusion and misdiagnosis [4], while the extent of the remaining abilities is underestimated, inaccurate prognoses are offered and important opportunities for rehabilitation missed [12][13]. Studies of rehabilitation medicine [14][15][16] show that, for patients in a vegetative state, remission of symptoms can be achieved through appropriate therapy, even after a number of years, or the development of serious secondary symptoms can be reduced or prevented. In addition to the basic understanding of vegetative state as a "menschenmögliche Seinsweise" ("humanly possible state of being") [17], in the therapeutic setting the diagnosis of vegetative state should not be considered as final, but rather as a process in which functional capacities can be regained. Studies of vegetative state [4] emphasise that optimising the patient's position into a vertical position leads to a better outcome in diagnostics and therapy. A therapy device such as the THERA-Trainer balo which can be flexibly used here both for diagnostics and for an individually adapted treatment concept. ▸

Using a tilting table is not recommended

Moving severely-affected patients into a vertical position with a tilting table is not recommended. At first sight, a tilting table may appear to be more practical, particularly for people in vegetative state. Verticalisation is easier and it appears to be low-risk for the therapist and less demanding. But if a patient is moved into an upright position using a tilting table, is it reasonable to refer to this as verticalisation? Standing upright aligned on a plumb line from head to foot through the centre of gravity is definitively not achievable using a tilting table. The same goes for wheelchairs with a function allowing the patient to stand up. But there are many other arguments in favour of using the THERA-Trainer balo rather than a tilting table.

Moving someone into a standing position from a lying position without bending the hips and knees can cause anxiety and insecurity [2]. The patient presses their weight backwards against the supporting surface of the table, since they commonly have the feeling that the table has already tipped too far forwards, even though the patient is not yet in a vertical position. This therefore significantly increases plantar flexion of the feet and clawing of the toes in flexion (plantar flexion). The ostensibly positive effect of standing (see above) is negated, and the result is extension mass movements in the lower extremities [2][1].

By contrast, verticalisation using the THERA-Trainer balo enables standing up from a sitting position with hip and knee flexion. Perception-impaired patients can prepare themselves better for standing up into a vertical position. The tray unit with stomach cushion also offers a holding-point. Moreover, the tray creates a visual restriction, thereby reducing the patient's fear of falling.

Janine Ehlers is a qualified speech therapist, ergotherapist and specialist therapist for vegetative state patients. She heads up three interdiscliplinary therapy centres in Kerpen, Cologne and Solingen, specialising in non-hospital based intensive care, mainly treating people in vegetative state and patients who have undergone a tracheotomy and/or are dependent on a respirator. She is writing her thesis at the Department for Neurosciences & Rehabilitation at the University of Cologne. Janine Ehlers is an active member of the German Interdisciplinary Association for Non-Hospital Based Mechanical Ventilation and is a founder member of its working group for Therapists Working in Home Ventilation.

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Why is standing so important for treating the most severely affected patients?

9.
Improved outflow from upper urinary system

3.
Mobilisation of the whole nervous system is performed more easily when standing.

11.
Standing upright on your own feet again is an extremely positive experience. It is progress in therapy, which even patients with diminished vigilance can appreciate.

4.
Regular standing protects against osteoporosis and fracture

1.
Hypertonia and spasticity can be significantly reduced by standing.

12.
It offers family members, therapists and carers the opportunity to communicate with the patient at eye level.

7.
Improved circulation training

2.
Daily standing can prevent contractions of the torso and of the lower extremities. In cases of strong spasticity in the plantar flexors, standing is the only way to maintain full dorsal flexion of the foot. The muscle group is too powerful for manual manipulation.

"We have vegetative state patients who we put in the dynamic standing trainer. It may be somewhat unusual, but it is very interesting. Because it is precisely when we move these patients into vertical position that important stimuli are set."

Inga Brambring

6.
Early and regular standing reduces fear of falling during later training in standing and walking.

10.
Regular standing supports lung ventilation, thus improving and making breathing easier.

5.
Standing upright appears to have a positive effect on vigilance. Patients become more awake.

8.
Relieving and avoiding bedsores. The time needed to heal existing pressure sores is shortened by standing.

TECHNOLOGY & DEVELOPMENT

Development up close with the customer

Interview Andrea Sommer **Photos** Maximiliane Windheim

Otto Höbel is CTO and head of development with medica Medizintechnik. Shortly before market launch last year, he reported exclusively for **THERA**PIE on the latest developments in the market and gave a foretaste of what awaits customers with the new THERA-soft.

Mr Höbel, where do you see the challenges in developing the modern technologies used to treat movement disorders in therapy?

That's very easy to describe. If you consider the clinical day-to-day world, there is relatively little spare time available to handle complicated technology. The day-to-day of therapy is characterised by time-limited therapy sequences. Within these sequences, the therapist needs to manage his or her work as effectively as possible with the patient and his or her individual goals. So our aim is to address the everyday problems in neurological rehabilitation and to offer solutions for this.

In the development phase, you have already been working closely with therapists and doctors. What insights have you gained as a result? ›

We identify wishes. If we summarise the many hundreds of discussions with a wide range of therapists in recent years, in most cases we come up with similar kinds of wishes. As little as possible, as much as necessary!

In most cases, patients are not able to adopt a functional starting position in therapy without assistance or to retain this starting position over a longer period. This is where the patient needs support. Ideally, this support should be capable of being adapted to the patient's capacity. Preparatory tasks should also only reduce valuable therapy time to a modest degree. This is the problem area that we are addressing with our developments, delivering genuine value-added for day-to-day treatment with our therapy devices and software solutions.

In that regard, the "practicality" you referred to earlier plays a big role. Experience has shown that high-tech solutions in particular often cannot be integrated into day-to-day therapy because they are simply too complicated. How do you tackle that?

I agree with you. And in recent years, more and more software-aided systems are coming to be used in rehabilitation, and these are not easy to operate. Imagine you have a device with ten different parameters, which need to set up individually depending on the patient. And the facility not only has one therapy device, but ten different ones. Ultimately, the therapist needs to know more than a hundred parameters, understand how these influence one another and also be able to operate everything. Which parameter leads to which goal? What needs to be set in order to walk that narrow line between over and under exerting a patient?

This is where we aim to come in with our solutions. Certainly, any software has a variety of parameters. But from our perspective, these need to remain out of sight in the therapist's day-to-day work. We need to meet therapists at the point where they are in their day-to-day work – engaged in their core skill of providing patient therapy. That's why, for example, when developing THERA-soft we worked with experts to put together a systematic set of therapy tasks. The tasks are matched to one another in a way that makes meaningful training possible, including shaping, without needing to know any of the technological parameters. We are moving in an entirely new direction with this software framework.

You have already mentioned the new THERA-soft. What can customers expect?

A fully-revised software, which even from the design perspective has nothing to do with its predecessor.

What innovations will there be?

I'd like to consider that mainly from the user side. There are two user groups who work with our software. Firstly, there are the therapists, and secondly we have the patients. We need to do what's right for both groups. For the therapist, we have now managed to prepare the content in such a way that he or she can find, assign and select sensible tasks for the patient. And for the patient, there is great motivation and fun in carrying out the tasks using the new software. I am convinced that this will again clearly increase the success of the therapy.

What will most surprise and excite customers, in your opinion?

I am sure that will be the new layout we have chosen. That is sure to genuinely excite most customers. But we have also identified improvements in usability in quite a number of places. THERA-soft is now truly capable of being operated intuitively. There's not a lot of deliberation needed, and I'm sure that the software will support therapists in their day-to-day work, without presenting them with massive technical challenges.

Thank you for the interview, Mr. Höbel.

You can find the video interview at:

youtube/THERAtrainer

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TECHNOLOGY & DEVELOPMENT

Effective balance training in rehabilitation

Postural control forms the basis of all activities in daily life, and is the main concern in rehabilitation. It is a vital condition for active participation in daily life, and thus an integral part in a person's independence and mobility.

People with motor, sensory and cognitive impairments frequently suffer from restrictions on postural control. For safety reasons, training postural control in patients with impaired balance always requires use of a standing trainer. Apprehensive patients and patients who are unable to stand independently can therefore train without fear in a fall-safe environment. During postural control training, patients need to be brought to the point of instability in order to achieve positive effects from the training. The new THERA-soft is revolutionising postural control therapy. Using the new therapy software, interventions become intensive experiences of movement for patients. The motivation to train at the limits of performance is increased, and detailed documentation and evaluation mean that movements can be accurately analysed and progress documented. ›

Thanks to the dynamic system of springs with up to 11° range of movement in all directions, the body's centre of gravity can be balanced freely above the supporting surface.

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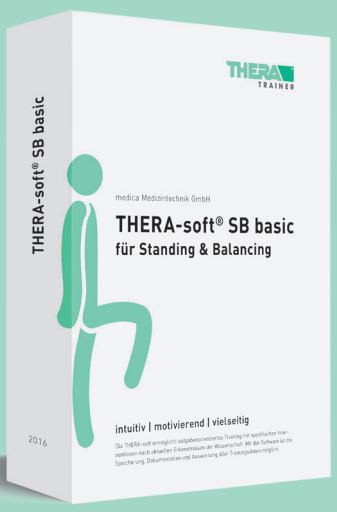
THERA-soft for Standing & Balancing is an innovative piece of software for sensor-based balance training in a standing position.



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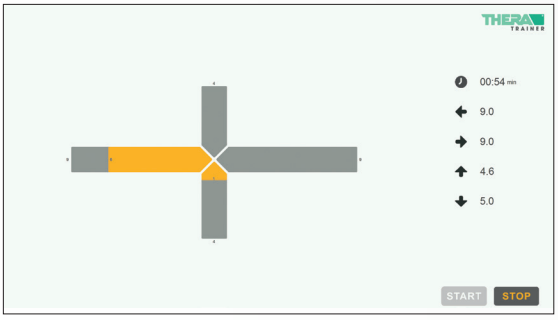
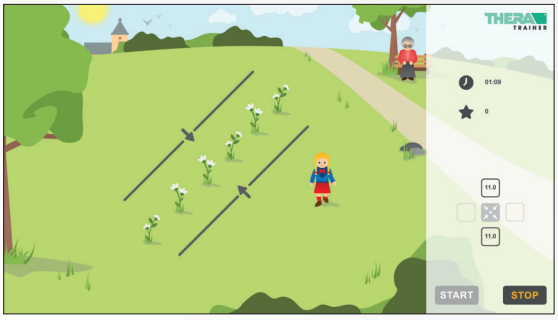


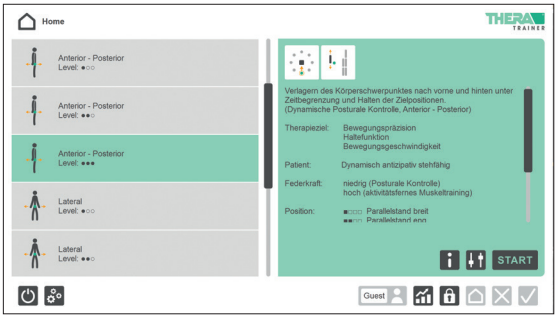
1. Movement analysis

At the start of the therapy, the patient's range of movement is determined using movement analysis. Movement deficits can therefore be quickly identified in order to accurately determine the degrees of freedom for the training. This ensures that patients are training at their individual performance limit. Measurements can be monitored in real time on the display. All parameters can still be changed, even during the training session.



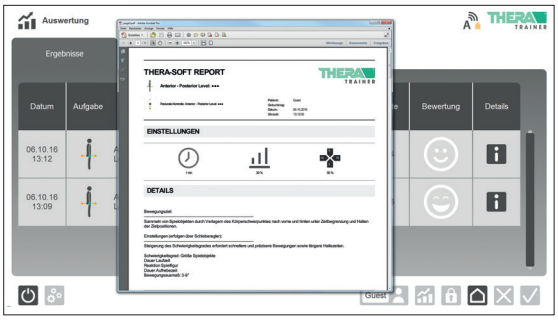
3. Start training

Individual training offers for patients can be put together and stored, using a patient database. The movement data is transferred to the software during training via a cable-free sensor. Patients are tasked with performing various activities in game scenarios. Control is intuitive and is achieved by moving the centre of gravity. Even the smallest of weight shift is recorded.



2. Select task

THERA-soft offers various tasks for postural control training. It differentiates between isolated exercises for finding the body's central position, for displacing the centre of gravity forwards and backwards (anterior-posterior) and to the side (lateral), along with combined exercises in every direction (2-dimensional). By selecting the level, the focus can be directed towards improving precision of movement, the hold function and speed of movement.



4. Evaluation

All training settings and movement data are recorded on a patient basis and can be reviewed following therapy in the evaluation phase. All results and movement diagrams are saved automatically and can be compared with one another over the course of treatment. This enables interactive control of training and the best possible way of monitoring outcomes. Individual training logs can be exported from the software.

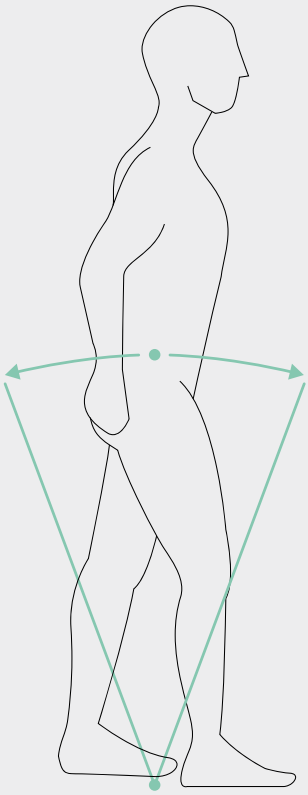
During training, the patient is secured using a simple belt system. It eliminates the risk of a fall, even during exercises at the limit of performance.

For more information, please visit:

www.thera-trainer.de

Preview

The next issue will be published in summer 2017



Effective training of postural control

Part 1: Understanding standing!

Interview with Martin Huber

"Effective training of postural control"

Best Practice

Part 2: From evidence to clinical practice

Other articles in the next issue

Movement in the health care sector - moving with it rather than standing still!
Changes in the health care market and effects on therapy

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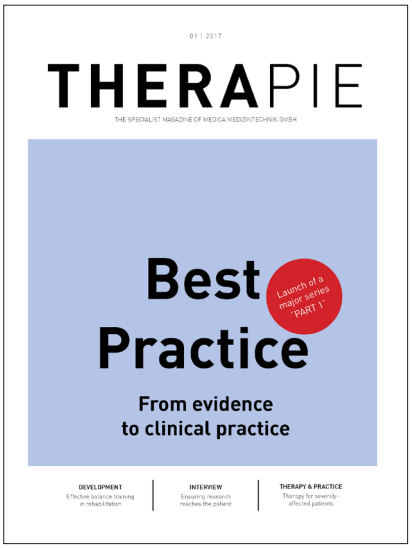

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