

INTEGRATED SOLUTIONS

Redesigning clinical treatment pathways for a best practice model for modern gait training

Jakob Tiebel, Melanie Grom

What factors are particularly important for successful mobility rehabilitation following a stroke? Which rehabilitation measures have been proven to improve balance, standing and walking ability? What are the most likely strengths and what opportunities will there be for rehabilitation facilities by being more open to change? What are the current weaknesses and what risks need to be avoided?

The restructuring taking place in the German healthcare system over recent years has resulted in increasingly competitive conditions among

hospitals and rehabilitation units [4]. A willingness to change is required in order to survive as a competitor against other service providers in the long term. Healthcare reforms have brought about significant changes in management and business administration. This has put many departments under pressure. There is a need for far-reaching restructuring measures, which must at least match the speed and scope of change in environmental factors and framework conditions [29, 34]. Optimisation measures have to be initiated and



Neurological symptoms on the rise

After decades of very little change in the healthcare system, in recent years change has become one of the only remaining constants [30]. The structural developments of an ageing society, the increase in chronic diseases and the onward march of medical

According to Darwin's theory of evolution, those who manage to adapt most quickly to changing conditions will prevail in the long term.



For more information, please visit <https://www.youtube.com/user/THERAtrainer>
Complete Solution for Gait Rehabilitation

successfully implemented at lightning speed, since – just as in Darwin's theory of evolution – those who will survive in the long term are not the ones who are largest and who defy everything, but the ones who manage to adapt fastest and most effectively to the changing conditions. As a result, those who wish to remain successful will need to change faster in the competitive environment, become more targeted, and develop more sustainably – and those who do not move with the times will be left standing [29].

and technological progress have led to fundamental changes in the requirements of rehabilitation medicine. The shift in the morbidity spectrum towards chronic diseases means that neurological symptoms and syndromes, in particular, are on the increase. The most common treatments are for age-related diseases such as stroke, common illnesses such as polyneuropathy, neurodegenerative diseases including Parkinson's disease and autoimmune diseases such as multiple sclerosis [2, 28, 35]. Stroke in particular is one of the most significant diseases in western industrialised nations. It is one of the most common causes of permanent restrictions to independence and quality of life [15, 27].

Taking into account the additional costs incurred from the loss of productivity, stroke is the disease with the highest burden on the healthcare system [8]. The epidemiological data on strokes and other neurological diseases forms an important basis for planning future care needs and using existing potential for optimisation, since the costs of treatment, rehabilitation and care are an increasing challenge for the healthcare system [15, 35].

Values and value in therapy

Given this background, questions relating to effectiveness and efficiency are becoming increasingly important in order to reduce the consequences of neurological diseases and to achieve the best possible reintegration into daily life, employment

and society, whilst keeping costs at a reasonable level [35]. Experts overwhelmingly agree that this requires thorough optimisation in terms of effectiveness, transparency and economic efficiency in order to guarantee high-quality care, despite the tough financial conditions [1].

In particular, the use of quality-assurance evidence-based measures is being discussed as a potential solution [1], whereby it must be noted that the process of quality generation must inevitably be accompanied by a restructuring of context-relevant process flows in order to reconcile “values” and “value”, i.e. a focus both on values from a medical and therapeutic point of view and value in the sense of goal-oriented economic activity [31]. In this regard, healthcare facilities generally face more difficulties than, for example, purely business-oriented companies. Healthcare facilities have much more complex characteristics. The organisational structure of rehabilitation departments is usually based around functional units instead of processes, and in patient care, the demand for individuality is still higher than for standardisation. In many departments, especially in the therapeutic disciplines, there is also a lack of focus on business-oriented targets [4].

Paradigm shift thanks to plasticity

With regard to an evidence base, the proof that lifelong plasticity of the nervous system forms the basis of functional motor rehabilitation is one of the decisive catalysts for the paradigm shift in neurorehabilitation. Due to the scientific findings on the ability of the central nervous system to reorganise and the effectiveness of therapeutic interventions, neurology has developed over the last 25 years from a discipline of observation to one

of treatment [10]. The implementation of clinical approaches based on evidence and guidelines has become increasingly important. The knowledge of neuroplasticity has cleared the way to use treatment techniques in a targeted manner to favourably influence the restitution of functions after damage to the brain. And so the view of the patient has also changed fundamentally in motor therapy [18]. Traditional treatment methods are increasingly receding [19]. They are being replaced by approaches to treatment that are scientifically investigated, heavily geared to models of learning theory and are far more effective [18, 33].

Differentiated recommendations for therapy

The treatment spectrum has also continued to expand over the last decade due to the use of device-based therapies and modern technologies [7]. In particular, there is good evidence for electromechanical-assisted standing and gait therapy. In December 2015, the guideline of the DGNR for the rehabilitation of mobility after stroke (“ReMoS”) was published. In systematic literature research, the working group reviewed more than 1,500 scientific publications and selected around 200 randomised controlled studies and systematic reviews in accordance with the highest quality criteria and incorporated these into the guideline. The use of conventional and electromechanical-assisted gait therapy in particular, as well as the targeted training of strength, endurance and balance with regard to improving standing and walking ability in the different stages following a stroke, were investigated on the basis of the data. Such an intensive and differentiated analysis of available literature had not existed until then. No other guideline provides such clear and differentiated recommendations

According to experts, effectiveness, transparency and efficiency must be optimised in order to ensure continued high-quality care.

Modern device-based therapy processes still contrast heavily with the usual ways of working in neurorehabilitation.

for therapy for patients who are initially unable to walk or whose walking is restricted in the acute, subacute or chronic stage following a stroke [24].

Device-based therapy vs. customised individual treatment

Due to an explicit requirement for the use of electromechanical gait trainers, treadmills and similar, their importance in physiotherapy has increased significantly. However, the possibilities that result from the targeted use of the apparatus are far from exhausted. Even if the devices are available in clinical departments, they are usually used only sporadically in gait therapy. On the one hand, this is due to a lack of integration into the clinical routine and, on the other hand, to the fact that customised treatment is still regarded as the higher-quality form of therapy and is therefore preferred [14]. The modern device-based therapy processes still contrast strongly with the usual ways of working in neurorehabilitation, which still tends to be dominated by manual activities, close contact with the patient and a holistic perspective on the treatment process.

Correct treatment focus?

This is not only a business problem but also a therapeutic one. As important predictors for achieving a positive outcome, in terms of keeping the degree of disability to a minimum following neurological damage, the earliest possible initiation of therapy [6] and the highest possible intensity of therapy is described [20, 23]. A daily treatment duration of up to three hours is recommended, depending on the patient's physical capacity [3]. Studies on the dose-response relationship have shown that providing more therapy time and maximizing active

exercise-oriented training time can significantly improve the functional outcome of neurological patients [9, 20]. Therapists are therefore called upon to boost performance with existing resources if the current standard of therapy is not only to be maintained, but even improved, given the same funding base [9]. In clinical practice, however, it has been shown that on average, patients tend to receive too little therapy, are doing physical activity for less than two-thirds of the time within one treatment session, and do not achieve the number of repetitions necessary for changes in neuroplasticity. Whether the focus of treatment is on the frequent repetition of a functional activity depends very much on the setting and the expertise and personal motivation of the treating therapist [16].

Knowledge transfer – a big hurdle

The successful implementation of evidence-based guidelines into clinical practice does not appear to be quite as trivial as commonly thought. In the specialist literature, various strategies for implementation are set out and, in part, the subject of heated debates [11, 12, 13]. In general, a “mixed teaching strategy” is recommended, aimed at ensuring effective knowledge transfer into clinical practice [13]. In this regard, Mehrholz refers to an implementation model by Lomas and Kitson, who propose a “teaching strategy via knowledge transfer” [17, 21]. 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 [32]. But who is available for these services? It seems that this problem is still not resolved and is largely left to the commitment of individuals.



An efficient approach to modern gait training in Magdeburg

Search for orientation in therapy

Many clinics are still far from meeting the requirements of the theoretical models given in the literature. The therapists involved in the treatment would have to be given much more consistent and effective specialist knowledge. Finally, the paradigm shift has led to a completely altered understanding of the role of therapists [7]. For many therapists, the structural changes in clinical practice and the lack of knowledge transfer are triggering a search for orientation. Habitual, learned approaches in treatment, which were considered correct, are suddenly being called into question, and concerns that in future modern treatment robots might take over differentiated therapeutic work entirely and make specialist therapeutic skills superfluous often lead to “rejection out of self-preservation” [5, 25]. Individualised treatment will continue to be a key component in the therapy strategy. It can only be optimized and supported by the standardization of treatment pathways and the use of technology-based procedures that comply with the guidelines.

Lack of integration has expensive consequences

It can therefore be stated that strategic approaches to the effective integration of guidelines into clinical practice are hardly practised in reality. In addition, therapists still have major reservations about device-based training approaches, although they have been well studied scientifically. Existing devices are usually used only sporadically and lack clear definition. This in turn leads to poor utilisation, which ultimately makes a very expensive investment appear uneconomical.

From evidence to clinical practice – a best practice model

With the THERA-Trainer Complete Solution for Gait Rehabilitation, medica Medizintechnik GmbH has brought a complete device-based concept for neurological rehabilitation onto the market. The company is thus addressing the challenge, faced by many clinics, of offering scientifically established and effective therapies despite the lack of resources, cost pressures and time constraints.

With the multi-phase group therapy concept, which offers the opportunity to train strength, endurance, mobility, balance, standing and walking in a task-oriented manner, using the latest robotics and computer technology, the requirements of the guidelines for the rehabilitation of mobility following a stroke can be consistently implemented in everyday clinical practice.

An individual solution is developed with each customer and is tailored to the current operational reality of the clinic. Through an in-depth analysis of the initial situation and the customised design of the solution, the care processes in gait training are effectively optimised and the utilisation of the training and therapy equipment increased. The Complete Solution is not a substitute for therapists, but instead facilitates and supports their work. In addition, it enables a single therapist to treat several patients at the same time.

An efficient solution approach for modern gait training

With the Complete Solution concept, THERA-Trainer primarily addresses the described organisational and process weaknesses in clinics. With this approach, previously unused economic potential in clinics can be utilised, while at the same time achieving effectively better treatment outcomes. The focus is not on the individual products, but on an optimised therapy process and the full set of devices as a complete solution. The innovation lies in integrating these products intelligently into a high-efficiency setting.

The overall solution facilitates the work of therapists, maximises the likelihood of patient success and systematically establishes current research results into everyday clinical practice. Thus, by restructuring the therapy processes of a clinic and

implementing standardised treatment pathways, the therapy frequency can be increased without an over-concentration of resources, in order to achieve the best possible outcome for patients while simultaneously releasing existing economic potential.

Pilot project: effective use through clear processes

An initial pilot project was launched last year in collaboration with one of Germany's largest health-care providers. The first THERA-Trainer Complete Solution in Germany was installed in the neurological centre at MEDIAN Klinik in Magdeburg. The close cooperation showed that with clearly defined processes, effective use can be achieved, generating high patient motivation and satisfaction. This can be seen as an example for many neurological departments. Prof. Dr. Michael Sailer, Medical Director of MEDIAN Klinik in Magdeburg, confirms that a differentiated use of the complete solution was made possible with professional support. The process of carrying out a preliminary analysis of a department's therapy processes, followed by the creation of new therapeutic pathways, is of vital importance for cost-effective use.

Initial studies show a significant increase in efficiency

The processes in Magdeburg were analysed over an intervention period of three weeks. 27 patients with neurological phases B and C were included in the device-based circuit training after a start-up phase. During the intervention period, on at least two days a week, the patients attended one out of three 90-minute treatment blocks taking place every day. They were asked to do one unit each at

The overall solution facilitates the work of therapists, maximises the likelihood of patient success and systematically establishes current research results into everyday clinical practice.

The development of new technologies and their practical use can significantly increase frequency of therapy for patients and boost training motivation.

three available training stations (standing frame, gait trainer, movement exerciser). In each case, two therapists were responsible for the care of up to six patients per treatment block.

To assess the effective training time, the net times at the three training stations were recorded by the therapists using a computer and a documentation sheet. On average, patients in one treatment block did 25 (\pm 5) minutes of standing balance training, 21 (\pm 4) minutes of walking and 16 (\pm 1) minutes of strength and endurance training on the movement exerciser. Overall, this resulted in a net therapy time averaging 62 (\pm 3) minutes. Typically, patients spent an additional 15 minutes on low-threshold additional therapy and participant observation as other patients trained on the equipment. The other 13 (\pm 3) minutes were for the setup times at the individual training stations.

Opportunity for intensive cooperation between the rehabilitation sector and industry

In recent years, especially in the field of neurological rehabilitation, the industry is undergoing an unbroken process of change: The path is leading away from traditional therapeutic treatments to comprehensive evidence-based concepts. Due to the development of new technologies and their practical use, therapy frequency can be significantly increased for the patient and the motivation to train is boosted.

Adapted to individual customer needs, THERA-Trainer develops a standardized treatment process taking into account all interest groups. This is therefore about more than just devices – the process is crucial. Initial studies show a significant increase in efficiency. An unprecedented form of cooperation with the industry has therefore opened up, paving the way for setting new standards. It is now up to clinical departments to seize this opportunity.

LITERATURE

- [1] **Bassler M, Nospel P, Follert L et al.** (2007). Datenquellen für eine kontinuierliche Qualitätsverbesserung in der medizinischen Rehabilitation [Data sources for continuous quality improvement in medical rehabilitation]. *Rehabilitation*: 2007; 46 (3): 155-163.
- [2] **Berger K, Heuschmann PU** (2006). Epidemiologie neurologischer Erkrankungen [Epidemiology of neurological disorders]. In: Günnewig T, Erbguth F (editors): *Praktische Neurogeriatrie: Grundlagen-Diagnostik-Therapie-Sozialmedizin* [Practical Neurogeriatrics: Basic Principles - Diagnostics-Therapy-Social Medicine]. Stuttgart: Kohlhammer 2006; 33-41.
- [3] **Bode R.** (2004) Relative Importance of Rehabilitation Therapy Characteristics on Functional Outcomes for Persons with Stroke. 35, 2537-2542.
- [4] **Cabana MD** (1999). Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA* 1999; 282, 1458-1465.
- [5] **Cifu DX, Steward DG.** (1999) Factors affecting functional outcome after stroke: a critical review of rehabilitation interventions. *Arch Phys Med Rehabil*: 80 (5), 35-39.
- [6] **Dettmers C, Stephan KM.** (2011) Motorische Therapie nach Schlaganfall. Von der Physiologie bis zu den Leitlinien [Motor therapy after stroke. From physiology to guidelines]. Bad Honnef: Hippocampus.
- [7] **Diener HC.** Leitlinien zur multiprofessionellen neurologischen Rehabilitation [Guidelines for multiprofessional neurological rehabilitation]. Stuttgart: Thieme 2008.
- [8] **English C, Van De Port I, Lynch E.** Group Circuit Class Therapy for Stroke Survivors – A Review of the Evidence and Clinical Implications. *Physical Therapy Perspectives in the 21st Century*.
- [9] **Greenhalgh T, Robert G, Macfarlane F et al.** (2004). Diffusion of innovations in service organisations: systematic review and recommendations. *Milbank Q* 82:581-629.
- [10] **Grimshaw JM, Thomas RE, MacLennan G et al.** (2004). Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess* 8: 72.
- [11] **Hesse S, Köhler U, Schnaack S, Werner C** (2015). Das Lokomotionsstudio: eine effektive und effiziente Lokomotionstherapie in der Gruppe für Patienten der Phasen B, C und D der neurologischen Rehabilitation [The locomotion studio: effective and efficient locomotion therapy in the group for patients in Phases B, C and D of neurological rehabilitation]. *Neurol Rehabil*: 2015; 21 (4): 195-200.
- [12] **Heuschmann P, Busse O, Wagner M et al.** Schlaganfallhäufigkeit und Versorgung von Schlaganfallpatienten in Deutschland [Stroke frequency and care of stroke patients in Germany]. *Akt Neurol*: 2010; 37 (07), 333-340.
- [13] **Kaur G, English C, Hillier S.** How physically active are people with stroke in physiotherapy sessions aimed at improving motor function? *Stroke Research and Treatment*: 2012.
- [14] **Kitson A, Harvey G, McCormack B.** Enabling the implementation of evidence based practice: a conceptual framework. *Qual Health Care* 1998; 7, 149-158.
- [15] **Kwakkel G** (2010). Bobath under Fire. *Frontline* [The Chartered Society of Physiotherapy]: 2010; 16 (1).
- [16] **Kwakkel G, VanPeppen R, Wagenaar RC et al.** Effects of augmented exercise therapy time after stroke – a meta-analysis. *Stroke* 2004; 35, 2529-2536.
- [17] **Lomas, J.** Teaching old (and not so old) does new tricks: effective ways to implement research findings. In: Dunn, EV et al.: Volume 6: Disseminating research/ changing practice. London: Sage 1993.
- [18] **Merten H.** Das deutsche Gesundheitssystem – unheilbar krank?: Wie das Gesundheitssystem funktioniert und wie es erneuert werden muss [The German healthcare system – incurably sick? How the health system functions and how it needs to be renewed]. Norderstedt: BoD 2015.
- [19] **Page SJ.** Intensity versus task specificity after stroke: how important is intensity? *Am J Phys Med Rehabil* 2003; 82, 730-732.
- [20] **ReMoS Arbeitsgruppe [ReMoS working group]** (2015). S2e-Leitlinie. Rehabilitation der Mobilität nach Schlaganfall [ReMoS] [S2e guideline. Rehabilitation of mobility after stroke (ReMoS)].
- [21] **Salbach N et al.** Physical therapists' experiences updating the clinical management of walking rehabilitation after stroke. *Physical Therapy* 2009; 89, 556-568.
- [22] **Schöffski O, Schulenburg JM.** Gesundheitsökonomische Evaluationen [Health economy evaluations]. Berlin Heidelberg: Springer 2000.
- [23] **Sitzer M, Steinmetz H** (2011). *Lehrbuch Neurology* [Manual of neurology]. Munich: Elsevier 2011.
- [24] **Federal Statistical Office.** Diagnosedaten der Patienten und Patientinnen in Vorsorge- oder Rehabilitationseinrichtungen [Diagnostic data of patients in care or rehabilitation facilities]. 2014: Fachserie 12, Reihe 6.2.2.
- [25] **Töpfer A, Albrecht DM.** Anforderungen, Schlüsselbereiche und Mitwirkende des Veränderungsmanagements [Requirements, key areas and participants in change management]. In: Töpfer A, Albrecht DM (Hrsg.). *Handbuch Changemanagement im Krankenhaus* [Manual for change management in hospitals]. Berlin Heidelberg: Springer 2017; 1017-1042.
- [26] **Töpfer A.** Medizinische und ökonomische Bedeutung von Qualität im Krankenhaus: Vermeidung von Fehlerkosten als Wertvernichtung und wertorientierte Steuerung [Medical and economic significance of quality in hospitals: Avoidance of failure costs as value destruction and value-based management]. In: Töpfer A, Albrecht DM (Hrsg.). *Handbuch Changemanagement im Krankenhaus* [Manual for change management in hospitals]. Berlin Heidelberg: Springer 2017; 161-180.
- [27] **VanPeppen R, Mehrholz J.** Evidenzbasierte Rehabilitation nach Schlaganfall [Evidence-based rehabilitation after stroke]. In: Mehrholz, J. (ed.): *Neuroreha nach Schlaganfall* [Neurorehab after stroke]. Stuttgart: Thieme 2011.
- [28] **Veerbeek JM, van Wegen E, van Peppen R et al.** What is the Evidence for Physical Therapy Poststroke? A Systematic Review and Meta-Analysis. *PLoS One*: 2014; 9 (2), e87987.
- [29] **Vogt W, Junker G.** Den Wandel im Griff. Mit geeigneten Führungsinstrumenten eine Veränderungskultur schaffen [Change under control. Creating a culture of change with suitable management instruments]. *QZ*: 2001; 46 (1), 41-45.