EDITORIAL

The Rational Use of Robots in Neurorehabilitation – Fact or Fiction?

Harald Masur

Although emergency and acute treatment continues to improve, strokes often cause handicap, or, more precisely, severe loss of function, leading to restriction in activities and the possibilities of participating in daily life. For this reason, medical rehabilitation after stroke is of great human interest – not to forget the economic implications. Deeper knowledge of the ability of the brain to reorganize itself (neuroplasticity) and the development of more and more evidence-based functional therapeutic procedures will continue to bring important improvements in stroke rehabilitation. It is then of the greatest importance that therapy should be concentrated, integrated and targeted. Motor rehabilitation has been mainly based on traditional physiotherapeutic methods, such as the Bobath method, proprioceptive neuromuscular facilitation (PNF) or the Vojta method.

There have been new developments in recent years. The neuroplasticity of the brain has been demonstrated, mainly by using the techniques of longitudinal magnetic resonance tomography (fMRT) and transcranial magnetic stimulation. The consequences have included the development of rehabilitation research, which specifically studies the development of new and more efficient forms of therapy, as well as the development of robots and systems to support and perform rehabilitation procedures. This has also provided scientific support for other areas, in particular, for treatments like physiotherapy which enhance mobility. These new therapeutic approaches or procedures to enhance mobility include task-specific repetitive techniques and/or apparative methods, such as treadmill training with support of body weight, training with motor-driven bicycles, balance training with visual feedback, therapy with handarm trainers and the use of virtual environments.

More and more studies are being performed to evaluate the efficiency of the traditional methods and these new approaches, often in comparison. In some studies, it is found that the methods are equivalent, in others, that one method is superior.

Thanks to this development, the use of apparative aids is being increasingly accepted. Aids are becoming conventional. It is very probable that the individually planned and differentiated use of different methods, or the rational combination of several techniques, will improve the patient's function, especially in the activities of daily life, and will lead to more efficient rehabilitation. The development of ever better systems and their differentiated and integrated use will improve rehabilitation in the intermediate term and increase its efficiency,

which is currently of great significance, in view of the current sparseness of resources in the health service, particularly in rehabilitation. Improving the efficiency with apparative forms of therapy can improve neurorehabilitation without increasing expenses, or maintain quality, in spite of reductions in the hospital daily rates or the introduction of lump payments. As pointed out by Hesse et al. in their article, apparative forms of therapy do not replace therapy by the therapist. The human interaction between the patient and the therapist is an important component of the therapy and its success. Therapy from the therapist can be rationally and efficiently complemented by apparative forms of therapy, so that the therapist can treat more patients and in a more specific manner.

The systematic literature search performed by Hesse et al. provides us with valuable information and an overview of the current status of the development of system-supported rehabilitation methods. The results of the evaluated studies show that system-supported procedures to improve walking and arm function can complement, enrich and partially replace conventional forms of therapy. We are just at the start of a promising development, particularly as private firms and departments of applied engineering are increasingly active in this field.

Conflict of interest statement

The author declares that no conflict of interest exists according to the guidelines of the International Committee of Medical Journal Editors.

Manuscript received on 6 February 2008, revised version accepted on 6 February 2008.

Translated from the original German by Rodney A. Yeates, M.A., Ph.D..

Anschrift des Verfassers

Prof. Dr. Harald Masur
Edith-Stein-Fachklinik
Am Wonneberg
76887 Bad Bergzabern, Germany
h.masur@reha-bza.de

Dtsch Arztebl Int 2008; 105(18): 329
DOI: 10.3238/arztebl.2008.0329

Edith-Stein-Fachklinik
Bad Bergzabern:
Prof. Dr. med. Masur