Motor and Functional Recovery After Stroke
A Comparison Between 4 European Rehabilitation Centers

Tobias Brandt, MD

See related article, pages 2101–2107.

There is increasing knowledge over the past years on which factors influence stroke recovery.1–6 Organization and strategies of the rehabilitation seem to be particularly important because they can be influenced other than natural factors such as stroke location or age of the patient. Whereas in the US guidelines for the management of rehabilitation care are organized by an expert panel and the government,7 in the European Union there are considerable variations in both rehabilitation care and outcome.8,9

Within the framework of the research Collaborative Evaluation of Rehabilitation in Stroke across Europe (CERISE), the European Commission funded a multicenter longitudinal cohort study comparing inpatient stroke care and recovery patterns between 4 European rehabilitation centers with a total of 531 patients included. The aim was to assess variation in motor and functional recovery patterns for 6 months after stroke. The authors were able to identify the influence of different rehabilitation programs and single components on outcome. This strategy of research may help to develop future models for delivery of rehab care.

Here, the authors have great merits. This publication follows from a series of other articles by this group addressing the question of differences of rehabilitation programs within the European Union.10–13 Major differences were found in therapy intensity, organization, and efficiency. In a time sampling study, daily therapy time ranged on average from only 1 hour in the UK to the nearly 3-fold in the Swiss center independent of the patients-to-staff ratio.10 The reason for these large differences was not attributable to the content of the therapies but rather the proportion of time spent on direct patient care.11 Therapists in the UK center spent more than half of their time on nontherapeutic activities in comparison to Germany with only one-third.11,12 Physiotherapy was the most important therapy in all centers, with nearly 40% of the therapeutic time, whereas the proportion of occupational therapy in the UK center (11.6%) was less than half of the others resulting in a significantly reduced overall therapy time.12 Furthermore, organization of therapy in Switzerland and Germany was scheduled and not on an “ad hoc” basis as in the 2 centers in the UK or Belgium.12

The authors now correlated the functional results of the same patients after 6 months with the earlier data. Gross motor and functional recovery were better in the Swiss and German centers than in the UK center, with the exception of personal self-care recovery in the UK. It is interesting to notice, however, that the Rivermead Motor Leg/Trunk function and the Arm function showed no significant differences. This might reflect that a better transfer effect of a more intensive therapy is best measured by functional scales as the Nottingham Extended Activities of Daily Living than on single motor assessments. The better recovery on activities of daily living functions might also be influenced by the different proportions of the occupational therapy.12 Another interesting result of the study is that most of the recovery was achieved between months 2 and 4 during the inpatient rehabilitation supporting the 6-month follow-up period to assess final outcome in transition to a more or less plateau phase of neuroplasticity.14 In summary, the data presented indicate that more intensive rehabilitation results in better recovery and efficient use of the therapeutic resources makes a difference in daily practice: “more is better.”15 Intensity depending effects of therapies were also found in many randomized rehabilitation trials in the past decade.16–18

Let us take a closer look at the limitations of this study. First, generalization of the results to the country is not appropriate because only 1 center per country was included. Second, in an opposite way to a randomized controlled study with a defined uniform intervention and a controlled study population, here we have an observational study of 4 different cohorts of 4 countries with different admission and discharge policies with the question whether different therapeutic interventions result in a difference of recovery.15 Length of stay was significantly shorter in the UK center compared with the other 3 centers. Length of stay was also significantly shorter in the German center compared with the Belgian and Swiss centers. The authors call it “real situation in existing settings.” Even with a careful selection of inclusion and exclusion criteria (eg, excluding very mild functional impairment on admission or pre-existing morbidities), patient characteristics are clearly heterogenous depending of the participating country with Germany with best and the UK with the worst functional status on admission.13 While stroke location and etiology are balanced, several known prognostic factors such as age, sex, urinary incontinence, and dysphagia are not. At least, Germany and the UK group differences indicate significantly different patient characteristics influencing rehabilitation potential and such recovery. In patients with severe deficits, rehabilitation recovery measured by the difference
on the Barthel Index or the Nottingham Extended Activities of Daily Living might be more pronounced in some patients but probably not in the complete group compared with patients with mild deficits on baseline. The authors are aware of these restrictions and therefore cautioned the interpretation of their findings. The case mix was statistically corrected for the differences in confounding variables. In order not to overfit the data of this complex statistical model, a minimum of 10 patients per included variable was achieved limiting; however, the variables included several other important confounders for stroke recovery and could therefore not be included in this study such as neglect, attention deficits, medical complications, and medication influencing neuroplasticity such as sedatives, dopamine, or antidepressives.\textsuperscript{1,5,19,20} Poststroke depression, however, was equally distributed within the groups and will be addressed later by the authors.

Future research on rehabilitation therapy. The high number of factors influencing recovery after stroke illustrates the complexity of studies for effectiveness of single interventions in rehabilitation.\textsuperscript{9} This is even more true in heterogeneous patient groups. Potential confounders have to be more carefully controlled.\textsuperscript{6} Neurocognitive deficits such as neglect are increasingly recognized as important outcome factors as a long-time rehabilitation studies focused on motor recovery.\textsuperscript{1,4,19} Ideally, centers should be compared that have large homogenous patient groups.\textsuperscript{5} Another approach could be to perform smaller therapy intervention studies possibly correlating to activation pattern of functional imaging in chronic patients at least 6 months after stroke during the plateau phase of neuroplasticity to downsize the number of confounders.\textsuperscript{14} Specific therapeutic interventions should be tested not only for different intensities but also for transfer effect to activities of daily living functions.\textsuperscript{5} Impairment and task-oriented therapy strategies turned out to be as important as the intensity.\textsuperscript{5,18} Persistence of the training effects are another important issue for future rehabilitation trials.\textsuperscript{21} Regarding outcome, quality of life scales and assessment of social participation are also to be assessed in further studies on long-term recovery from stroke and therapy efficiency.\textsuperscript{5,22}

Disclosures

None.

References


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