save | economical | effective

intelligent motion

hirob

Worldwide the first solution for a save, economical and effective implementation of the automated hippotherapy for neurorehabilitation.

The complex three-dimensional movement of the horseback was analysed with a 3D-motion capturing system and transferred onto the rehabilitation robot. This physiological motion pattern can be used for the automated therapy.

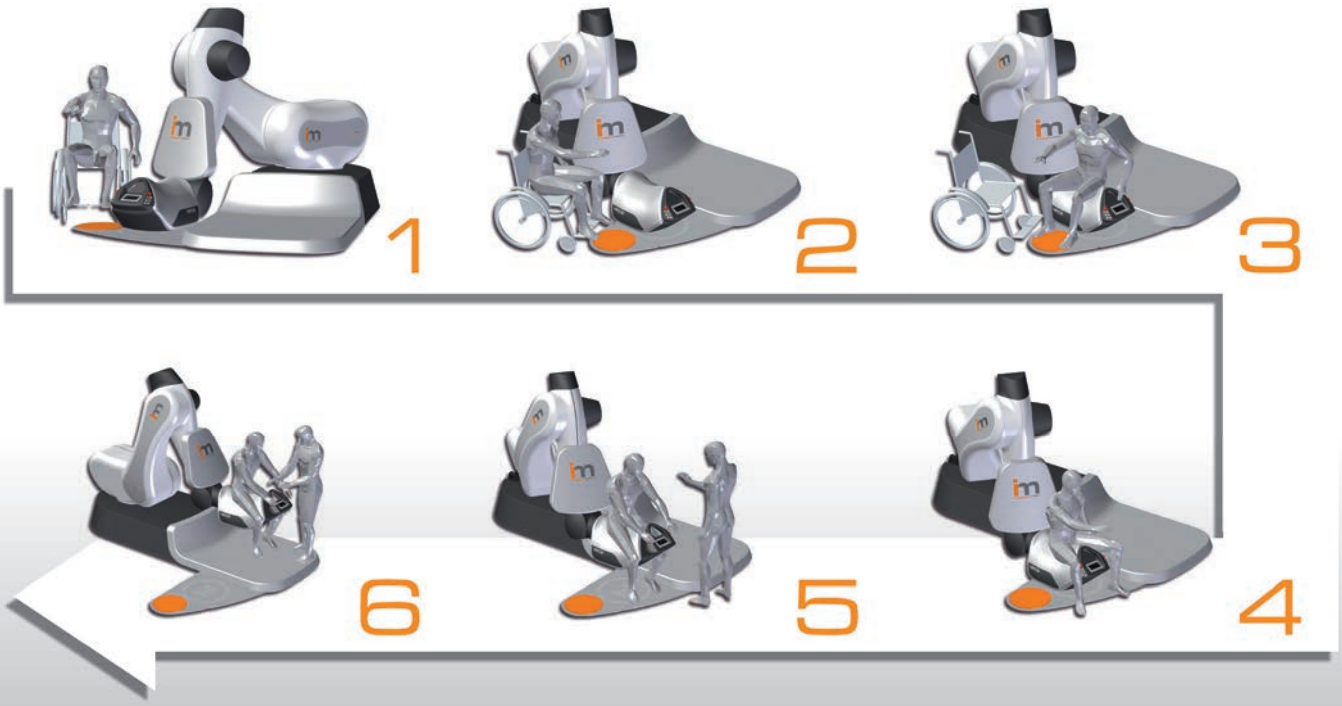
The exact imitation of the horse‘s movement, a simple patient transfer as well as a massive cost reduction enables the wider use of this effective therapy for neurological patients, e.g. stroke patients, patients with head and brain injuries, patients with multiple sclerosis or children with cerebral paresis etc.

The device is a class 2a medical product according to EU Directive 93/42/EEC.

simplified treatment

The implementation of the robot-based therapy is considerably easier compared to the conventional hippotherapy with the horse. The robot-based therapy can take place directly in the clinic and the patient transfer onto and from the robot can be easily done from only one person within a few minutes.

To uptake the patient, the robot moves into the transfer position, in which the patient can be lifted effortlessly and safely from the wheelchair and turned onto the robots’ seat. The turntable, which is integrated in the basement, supports the turning of the patient (pictures 1 to 3).



After the uptake of the patient, the robot returns into the therapy position. The height, in which the therapy is implemented, can be individually adjusted from the therapist before the therapy starts (pictures 4 to 6).

A further essential argument for the robot-based therapy is the significant improved hygiene situation compared to the therapy with the horse.

higher individualisation

According to the patients' state of convalescence including his or her day's condition the intensity of the therapy must be adjusted. On the robot this is easily possible through a simple reduction or increase of the motion pattern.

Furthermore also the motion pattern itself should be adjusted according to the patients' individual requirements. For patients with multiple sclerosis it could be for instance a steady movement, but with incidentally generated changes of the pattern at the push of a button.

If desired individual motion patterns for different symptoms or states of the therapy can be provided to further increase the efficiency of the therapy.

increased safety

Clearly one of the essential points is the patients' and therapists' safety. On the robot, the height in which the therapy takes place can be easily adjusted. This ensures an ideal position of the therapist during the whole treatment as well as a therapy in the lowest possible height above the ground.

To ensure utmost safety for patients and therapists, the robot is equipped with a special safety system comprising full redundancy of both hard- and software. Therefore in contrast to the handling with animals it can be ensured that no hazardous situation occur during the therapy.

Furthermore medical emergencies through seizures of patients should be considered. As the therapy with the hirob can take place directly in the clinic, an ideal and quick patient care is possible.

higher economic efficiency

Such a therapy can only be offered to a sufficient wide range of patients, if the total costs allow this. Not only the operating costs of the robot-based therapy but also the personnel costs required for the treatment are much lower than the costs of the conventional therapy. Instead of three to four people, only one therapist is necessary for the robot-based therapy. Furthermore there are no additional costs for the transportation of patients.

Due to the possibility to adjust the robot easily and quickly to the patients' condition, the robot can be used over a very long period of the therapy

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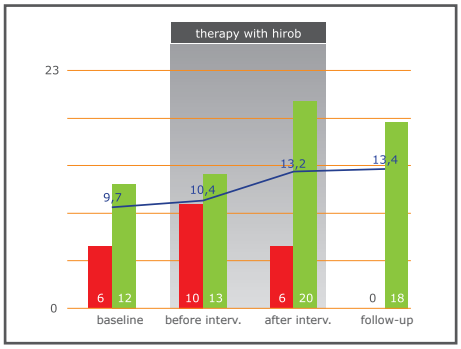
To provide evidence for the effectiveness of the robot-based therapy, a clinical trial with twelve patients with little trunk control of different aetiologies was conducted at the hospital Hochzirl from September to December 2011.

The study had three phases each lasting three weeks. The first phase (baseline) consisted of conventional treatment in the hospital for three weeks. Phase two comprised add-on training with the hirob five times per week for 20 minutes each for another three weeks (intervention). During the subsequent follow-up phase patients were treated conventionally in the hospital or had no additional therapy when already discharged. At the beginning and the end of each phase the patients were tested with several clinical scores, a 3D movement analysis, and an electromyography of selected trunk muscles.

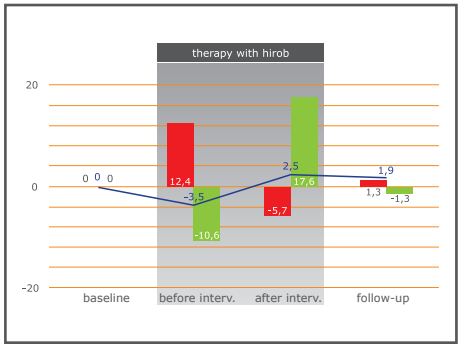
subjective improvement of trunk stability



For the evaluation of trunk stability the Trunk Impairment Scale (TIS) was used. The picture shows the result of the worst value in red, the best in green (bar), and the overall average group value in blue (line). The diagram depicts a clear positive effect of the robot-assisted training on trunk stability.

Furthermore the high level of trunk stability after the end of the robot-based treatment was preserved over three weeks of the follow-up phase.

pelvic tilt



To evaluate the pelvic tilt during a dynamic sitting task on the robot the patients were measured with a 3D movement analysis system (Lukotronic, Innsbruck, Austria). During baseline the pelvic tilt decreased, whereas after the robot-based treatment the anterior tilt of the pelvis improved significantly and again persisted during the follow-up phase.

activity of the back muscles

By the use of electromyography (sEMG) the activity of several back muscles (erector spinae muscle, middle trapezius muscle, cervical paraspinal muscles) of both sides was measured. A significant improvement of muscle activity after the robot-assisted training could be noticed in nearly all patients.

intelligent motion gmbh
Franzosenhausweg 51 | 4030 Linz | Austria
T: +43 732 37 12 44 | F: +43 732 37 12 44 19
info@intelligentmotion.at | www.intelligentmotion.at