

Armeo Clinical Report

Where leaders in rehabilitation of neurological disease & trauma tell how they enhance care with the Armeo

Rheinburg-Klinik first to use Armeo for routine rehab of stroke patients

“Rheinburg-Klinik is a private 55-bed rehabilitation clinic on the shoreline of Lake Constance. It concentrates on treating patients with neurological diseases and conditions (e.g. stroke, Parkinson’s disease, multiple sclerosis) and orthopedic diseases.”



Louise Rutz-LaPitz, PT
Director of Therapy and Training

Rheinburg-Klinik in Walzenhausen, Switzerland is the first in the world to use the Armeo[®], a medical device for upper extremity functional rehabilitation.

Rheinburg-Klinik is a private 55-bed rehabilitation clinic overlooking Lake Constance. It concentrates on treating patients with neurological diseases and conditions (e.g. stroke, Parkinson’s disease, multiple sclerosis) and orthopedic diseases such as spinal and joint disorders, joint replacements etc. Most patients treated in Walzenhausen have suffered a stroke, and while the clinic is approved for care by all the cantons in Switzerland, it attracts patients from all over the world, too.

Louise Rutz-LaPitz, Director of Therapy and Training at Rheinburg-Klinik, and a member of the clinic’s executive board, is a physical therapist trained in the United States at St. Louis University. She is also an NDT/Bobath and IPNFA Senior Instructor

How acute can stroke patients be and still be admitted to your clinic?

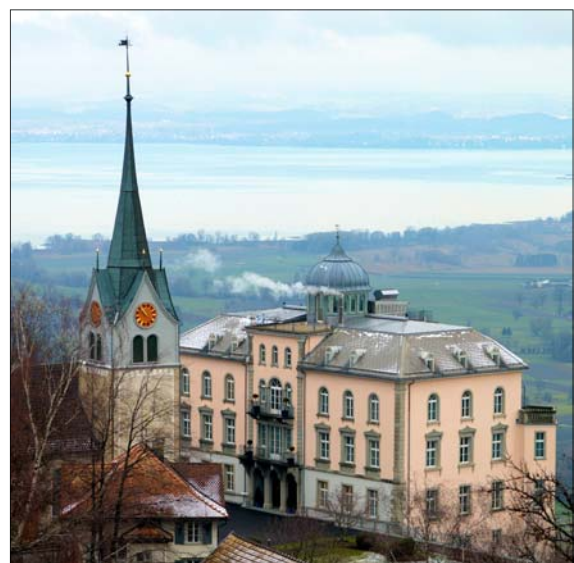
Rutz-LaPitz: We like to get the patients as soon as possible, but they must be medically stable as we do not have an intensive care unit. Frequently patients have tracheostomies, catheters, etc. Dealing with those things is part of rehabilitation.

When they arrive, how do you go about deciding what kinds of therapy, in what sequence, each patient will receive?

Rutz-LaPitz: When patients arrive, the first thing we do is a multi-disciplinary assessment by each of our treatment groups: Physiotherapy, occupational therapy, speech therapy, clinical and or neuropsychology, activation (recreational) therapy. The Rehabilitation Report is the place where we then set Interdisciplinary goals based on the patient’s goals. At that time, we also decide if the patient has the inclusion criteria for our two week CIMT (Constraint-Induced Movement Therapy) program. From that assessment, we develop a patient-specific therapy program, and begin implementing it.

Where does your new Armeo fit into that plan?

Rutz-LaPitz: I believe Armeo is an excellent adjunct therapy. It allows the patient a possibility for active, independent practice



Rheinburg-Klinik, near Switzerland’s picturesque Lake Constance

“I am convinced that a real limitation in rehabilitation could be overcome if we could encourage the active participation of our patients over a prolonged rehabilitation period.”

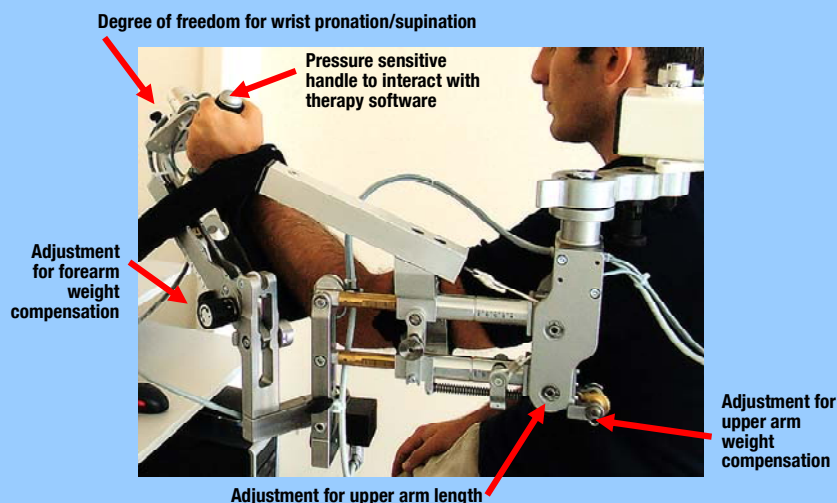
with lots of goal oriented repetition and it is definitely interesting and fun to work on.

To facilitate upper extremity recovery, one must employ a range of motor control principles. In all cases the patient *has to actively participate* over a prolonged rehabilitation period. When I saw the Armeo, what I liked is that it encourages patients to be active – to *self-initiate* motion in order to solve a problem. It’s like a computer test or a virtual reality test – it puts them *right there*, they’re trying to do it, they’re involved, and they’re interested.

This is a fantastic way to give more practice to the upper extremity.

I am absolutely convinced the upper extremities do not get enough practice in rehabilitation. And there are a lot of reasons for that. Among others, one quickly learns to compensate with the less affected hand, because it is so frustrating to try to use your affected arm all of the time. I thought that working with Armeo would be a great way to emphasize the use of the affected arm. I am so convinced of this that when I heard about the Armeo, I asked Hocoma if I could get involved as fast as possible.

Armeo[®] : Helping hemiparetic patients use residual neuromuscular control to exercise, strengthen arm movement and grip function



Many patients with stroke, TBI and other neurological or musculoskeletal impairments possess residual neuromuscular control in a hemiparetic limb, yet are unable to reacquire useful arm function due to severity of muscle weakness and the inability to overcome gravity.

The Armeo neutralizes limb weight, enabling patients to use residual control in both arm and hand and to follow exercises guided by 3D simulations of real-life challenges, with difficulty level adjustable to each patient’s ability. A pressure-sensitive handgrip detects even small amounts of grip force, facilitating grasp and release exercises at an early stage of therapy. The Armeo incorporates wrist pronation and supination, allowing patients to enhance functional reaching patterns

Armeo’s weight compensation allows patients to strengthen their impaired arms with a wide range

of functional and fun video-game-like exercises simulating activities of daily life. The Armeo can be used as a mouse input device in the MS Windows environment, enabling patients to surf the web or control standard software.

Armeo software captures patients’ joint angles and hand path, allowing therapists to assess patients’ coordination patterns and progress. It provides a clinic database for the management of individual patient therapy schedules and documentation of progress.

To promote the best possible outcome for each patient, the Armeo is quickly adjustable for individuals with various body sizes, arm weights, and right or left hemiparesis. Grip force, workspace, and level of exercise difficulty are all easily adjustable to patients’ capabilities. The handgrip can be removed for training with real objects (i.e. grasping a drinking glass).

I have been involved in stroke patient rehab for a long time. I think we have to find additional, new strategies to motivate our patients to do what's necessary to recover upper extremity function. I think the Armeo is one of these.

Who are the patients you believe would be the most ideal candidates for Armeo therapy?

Rutz-LaPitz: They should have some motor function in their upper extremity and have visual capabilities to see the computer screen. Attentional deficits are not absolute exclusion criteria. Extreme "spasticity" or stiffness in the arm could be a problem.

Might motor function be masked by the effects of gravity?

Rutz-LaPitz: Yes. The patient may not know they have some motor function. Often I can "see" it. My hands are there. I feel it and can facilitate the motion.

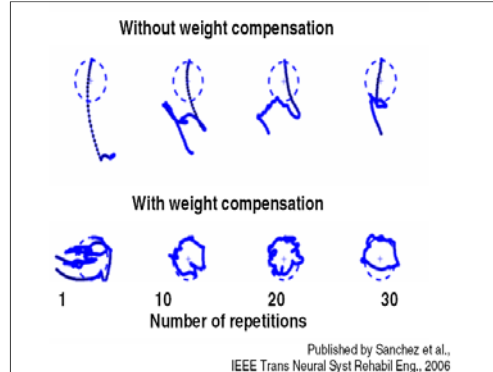
Then comes the same old question - "Oh, did I do that or did you do that?" That's what's nice about the Armeo. It's gravity-neutral. It assists by influencing the effects of gravity. If the arm moves, the patient initiated and did the movement themselves. Armeo did not give the patient's arm impulses.

From a therapeutic perspective, the important point is, the Armeo isn't moving their arm – *they* are moving their arm. But the impact is more than just movement – the software lets them grab an apple and put it in a shopping basket. In another program, they can pick up an egg and break it over a frying pan. I think they get a real kick out of that, and you can see by their expressions and enthusiasm that they're really enjoying what is very much therapy. That is what really impresses me – they are happy to practice by themselves. They keep going longer than any other similar therapy – more practice, more repetitions.

I can't overemphasize how important it is that the effort with the Armeo is self-initiated. In usual therapy, the initiation of movement probably comes from the therapist. With the Armeo, it's coming from the patient's own brain. I think that's terrific!

Some therapists might argue that the improvements you see in patients treated with the Armeo could be the result of normal recovery after stroke, or could be accomplished as well with standard therapy, and they're not the result of their work with your therapists and this new system. How might you respond to that argument?

Rutz-LaPitz: I am familiar with that claim. Thank goodness for spontaneous recovery and brain plasticity. The job of therapists is to facilitate more recovery! The central nervous system requires novel input to reorganize, and the involved upper extremity after stroke probably does not get enough input to drive the reorganization! As mentioned before, this is one hypothesis as to why most stroke patients have less than optimal recovery of arm function.



How stroke patient performance is enhanced when the affected arm is unweighed by the Armeo

Then there is the problem of how much time is spent practicing. In 2006 in *JAMA* and 2008 in *Lancet Neurology*, Wolf and colleagues at Emory University published results of their multicenter Extremity Constraint Induced Therapy Evaluation (EXCITE) trial, which looked at the results of emphasizing the use of the affected arm and hand by constraining the least affected arm for two weeks, versus usual and customary stroke rehab therapy. They concluded that "forcing" patients to use their affected arm resulting in twice the functional recovery of the group treated conventionally and, that this improvement lasts over time. Assuming that a reason for this incredible improvement has to do with the three motor learning principles – lots of practice, active participation, and meaningful goals – Armeo, which fulfils the first two principles, may provide a novel adjunct therapy to improve function of the involved arm.

A Rheinburg-Klinik patient discusses his Armeo experience

A 56 year old male patient at Rheinburg Klinik volunteered to share with physical therapy professionals how he is recovering upper-extremity function with the Armeo

How did you come to be treated here at Rheinburg Klinik?

Patient: I am a professor at a university in Geneva, and it was there I experienced my stroke. Once the initial episode had passed, I had no symptoms for three days. All my muscles in the legs and arms were functioning normally. Then, over a period of a few days, I gradually lost more and more function on my right side, both the arm and the leg.

I did some research, and determined the Rheinburg Clinic would be the best place for me – it has reputation for the top therapies. In addition, the environment here is so interesting.

How do you feel Armeo is benefitting you?

Patient: Well, first of all, I now know the range of the space that I can work inside. I know that I can use the space for doing the exercises, such as chasing the

"I can't overemphasize how important it is that the effort with the Armeo is self-initiated. In hands-on therapy, the initiation often comes from the therapist. With the Armeo, it's coming from the patient's own brain."

“I can see the changes in my ability to eat with my right arm. Now I can coordinate feeding myself with my right arm.”

balloons and cleaning the wall, but by doing those exercises, I've also learned where my weaknesses are. In the beginning I did as much as I could do that was easy. But now, I go right to the tasks that challenge my weaknesses, and I would like to explain that further.

For me, the difficult part is to stretch the arm and keep it in the extended position. The more you stretch the arm, the more it goes down because of the gravity and less power in the arm. And the other area of difficulty for me is reaching toward the right upper corner. Now, each time I use the Armeo, I go right to those areas, to make the best use of the time allocated for therapy with it.

How many sessions have you used the Armeo to date? Have you seen changes?

Patient: I think I've used it eight or ten times. And yes, I have seen changes. When I came here, my right arm was paralyzed. I came with a wheelchair and a cane. I'm improving in my walking, but I still have a long way to go.

One of the first things I learned here was the importance of concentrating on my shoulder, because that represents the “root of the tree.” If the roots are not good, then you have no leaves or no flowers on the tree. So it's all interconnected.

For example, in the room-cleaning exercise, I increased my capacity to raise my arm and to extend my arm to the lower left corner. I was down at the lowest part, and I am able to go up here. (Patient gestures, moving his arm diagonally, from lower left to upper right). I missed only the exercise of cleaning the ceiling because you need the nerve function. In the Armeo program, that is a challenge. I am getting higher in my right upper corner because I can now raise my right shoulder more than before. My challenge is to get my brain to adapt to the patterns of movements, as much as the exercises.

I can see the changes in my ability to eat with my right arm. Now I can coordinate feeding myself with my right arm. When you're limited in the use of one arm, you tend to compensate a lot with the other arm. In my case, the left side is trying to help

do what the right side, in my case, cannot do. The left shoulder, in my case, is very active when I eat. I actually find myself talking to my left shoulder, telling it to be quiet when I try to eat.

Rutz-LaPitz: What he has learned to do on the Armeo he puts aggressively to use at meals. No matter what the struggle, he always uses his right arm for breakfast, lunch and dinner.

Patient: And not just at meals. Each night, before bed, I enjoy a piece of Swiss chocolate. I have to unwrap the chocolate with my right hand, and then eat it with that hand. When I first came, most of the chocolate was on my face. Now, it's in my mouth.

What have you learned about Armeo training that might help therapists and patients starting to use it?

Patient: I would encourage patients to use the Armeo to focus on where they have limits, and not do the easy stuff. They should ask themselves, “Where can I improve my capacity?” I'm not sure that all patients work in that way. I learned from the therapist that many patients are interested in simply practicing their easy maneuvers to make good scores. In my case, my score went down once I learned on the Armeo what I couldn't do, and focused just on that.



Interviewed patient training on the Armeo

Contact

**International Headquarter
Hocoma Switzerland**
Tel. +41 43 444 22 00
E-mail info@hocoma.com

**North American Hub
Hocoma USA**
Tel. +1 781 792 01 02
E-mail info@hocoma.com

**Asia Pacific Hub
Hocoma Singapore**
Tel. +65 6513 0580
E-mail info@hocoma.com

www.hocoma.com