



Since years, healthcare professionals agree on the importance of the motivation-aspect regarding the positive outcome of the after-stroke rehabilitation process. However, the ability of therapists to stimulate motivation with their different patients is challenged by many factors, like the differences in personalities of the patients themselves but also the very nature of motivation itself. Different solutions thus have to be considered in order to prevent boredom aroused by the repetition of the same movements during a typical therapy session. Due to the fact that the rehabilitation phase following a stroke event can spread over several years, and because of logistical, organizational and economic constraints, rehabilitation is a process that many individuals will have to manage to a large part themselves at home. In this home context, motivation becomes a key issue for patients leading their own rehabilitation process without the motivational support provided by therapists [Balaam and al., 2011]¹. Therefore, in order to maximize the patient's compliance, it becomes unavoidable to develop a system which is able to stimulate the patient's self-motivation.

“Feedback and independence”

In their study, “Motivating mobility: designing for lived motivation in stroke rehabilitation” [Balaam and al., 2011]² the authors highlight different requirements to maintain motivation at a higher level like helping people to find what really motivates them, finding the optimal balance between exercise and fun, being able to stimulate motivation over time, and also, understanding the patient's social context in order to adapt the rehabilitation process to it. Beyond the specific lessons discussed in this study, two of the most important aspects that can boost patient's motivation and which encompass the ideas of this study are Feedback and Independence.

¹ Madeline Balaam et al., Motivating mobility: designing for lived motivation in stroke rehabilitation. Conference Paper: Proceedings of the International Conference on Human Factors in Computing Systems, CHI 2011, Vancouver, BC, Canada, May 7-12, 2011

² Madeline Balaam et al., Motivating mobility: designing for lived motivation in stroke rehabilitation. Conference Paper: Proceedings of the International Conference on Human Factors in Computing Systems, CHI 2011, Vancouver, BC, Canada, May 7-12, 2011

Indeed, both aspects can exert a direct or indirect influence on the patient's motivation, which in turn will maximize their compliance during their rehabilitation at home [Van Vliet and al., 2006]³.

By providing patients the chance to get an overview on the state of their recovery, a feedback system will provide them a concrete idea of their progress over time. This will allow to avoid blindly performed exercises without any indication about their effectiveness and progress, which tends to demotivate patients over time. Such a motivation-boosting feedback can for example be provided by a device which quantifies the movements of the patient's limbs over time. Additionally, a playful interface associated to the feedback by the use of games can allow the individuals to have fun while carrying out the training. Such games, which take into account the difficulty of the performed exercises in order to achieve a reward, such games do not only generate motivation over time but also promote progress in the long run.

“Feedback and gaming”

The concept of an indicative but also playful feedback is implemented in the application Tree of Recovery™ which interfaces with the arm-movement tracker ARYS™ me invented by yband therapy AG. The patient carries out activities with the impaired upper limb which will be recorded by the sensors of the tracker and are reflected in the size of the tree displayed in the app. This allows to constantly arouse the patient's interest and to promote active participation in the rehabilitation. Moreover, through the data provided by the tracker, the application allows the individual to quantify the progress over time and giving a clear indication about the advancement of the therapy, which is necessary for maintaining

³ Paulette Van Vliet, Use of information feedback and attentional focus of feedback in treating the person with a hemiplegic arm, Physiotherapy Research International Physiother. Res. Int. 14(2): 77-90 (2009), Published online 23 December 2008 in Wiley InterScience



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the motivation [Van Vliet and al., 2006]⁴. In case that the patient still unintentionally neglects the training of the impaired upper limb, the tracker will provide feedback by vibrating, a silent reminder: These reminders will allow the patient to recognize the insufficiency of the efforts and thus to re-adapt the level of activity to the needs specific to the rehabilitation therapy.

The second aspect which seems essential for a good level of motivation, is none other than **independence**. The feeling of freedom provided - of not being dependent on a third person - can exert a significant psychological influence directly increase the patient's motivation. The feeling of being helped can easily lower the morale of a formerly autonomous person. In addition, the patient's independence relative to the time and place of the training allows exercising in an environment the patient feels most comfortable and secure - such at his home. Indeed, it is understandable, that the introduction of a favorable social context, such as the proximity of the patient's family, to his rehabilitation can act as a catalyst for the proper execution of his exercises and for maintaining his motivation over time. This in turn, can exert a positive influence on the intensity of training [Richard and al., 2007]⁵. Moreover, the fact of not being depended on healthcare professionals, such as therapists, allows to overcome the barrier restricting the frequency of training due to the therapist's availability.

Conclusion:

Yband therapy's system ARYS™ me encompasses these two essential motivational aspects: **Feedback and Independency**. Thanks to the use of the smartphone app with the integrated Tree of Recovery™, motivation can directly be triggered by the gamification of the rehabilitation process as well as by the insight of the milestones reached. The general concept of the tracker working with the application provides a much bigger independence, allowing to exercise in the environment the patient will enjoy the most at any given time. Such a freedom in rehabilitation will inevitably have a positive influence on motivation and provides a maximum of freedom which remains nevertheless controlled by the reminders of the tracker.

⁴ Paulette Van Vliet, Use of information feedback and attentional focus of feedback in treating the person with a hemiplegic arm, *Physiotherapy Research International* Physiother. Res. Int. 14(2): 77-90 (2009), Published online 23 December 2008 in Wiley InterScience

⁵ Richard D. Willmann et al., Home Stroke Rehabilitation for the Upper Limbs, *Conf Proc IEEE Eng Med Biol Soc.* 2007, 2007:4015-8.