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EXERCISE INTENSITY OF ASSISTED WALKING AFTER STROKE. THE IMPACT OF ROBOTIC ASSISTANCE.

NINA LEFEBER

Tuesday, October 15th 2019 at 18:00

Room Auditorium P. Brouwer, campus Jette

Please confirm your presence before October 8th to nina.lefeber@vub.be

EXAM COMMISSION
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ABSTRACT OF THE RESEARCH

Research on aerobic exercise interventions has been selected as one of the top ten research priorities relating to life after stroke. Unfortunately, to date, most research regarding aerobic exercise interventions for persons with stroke focused on persons with mild to moderate disability. Hence, a large gap remains regarding how persons with severe disability could engage in aerobic exercise programs. Stroke-related impairments such as non-ambulatory status, limited trunk control and poor coordination of the affected limbs restrict stroke survivors to exercise using conventional devices, such as cycle ergometers or treadmills.

Historically, lower limb robotic devices have been designed to overcome issues that are associated with manual assisted gait training. However, new evidence is emerging that the use of robotic devices can also solve some of the issues associated with aerobic exercise post-stroke. Although, a randomized controlled trial would be the gold standard method to evaluate the effectiveness of robot-assisted walking exercise for improving cardiorespiratory fitness after stroke, such trials are complex, laborious and expensive. Thus, a first step in this research is to understand how robotic assistance impacts the exercise intensity of walking. Hence, this thesis included one systematic literature review and three cross-sectional studies investigating the exercise intensity of robot-assisted walking after stroke:

- Chapter One: Energy consumption and cost during walking with different modalities of assistance after stroke: a systematic review and meta-analysis
- Chapter Two: Physiological responses and perceived exertion during robot-assisted and body weight-supported gait after stroke
- Chapter Three: Physiological responses and perceived exertion during robot-assisted treadmill walking in non-ambulatory stroke survivors
- Chapter Four: Physiological responses and perceived exertion during robot-assisted overground walking in non-ambulatory stroke survivors

Summarized, the results of this thesis suggested that the exercise intensity of static exoskeleton walking is rather low for both ambulatory and non-ambulatory stroke survivors. Physiological responses, such as the amount of oxygen consumption and heart rate, appear to increase only moderately compared to rest. In line with the physiological responses, stroke survivors also perceive static exoskeleton walking as a light-intensity exercise. Similarly, also mobile exoskeleton walking with maximum bilateral assistance seems to induce only small increases in physiological responses. A sample of non-ambulatory stroke survivors perceived the intensity as “light” at the beginning to “somewhat hard” at the end.

So, although robot-assisted walking training is often referred to as a high-intensive therapy, therapists should be aware that in terms of exercise intensity, it appears not that intensive after stroke.

CURRICULUM VITAE

Nina Lefebre (born 28 February 1992) is a researcher at the Rehabilitation Research group of the Vrije Universiteit Brussel. She holds a master’s degree in Rehabilitation Sciences and Physiotherapy and an advanced master’s degree in Manual Therapy. In 2016, she obtained a 4-year doctoral grant Strategic Basic Research funded by the Research Foundation Flanders (FWO). To date, Nina authored 15 peer reviewed articles (6 as first author, 4 as second author and 5 as co-author), she presented her work at 12 international conferences, and she did 4 months research at the Robotic Neurorehabilitation Lab of the Santa Lucia Foundation in Rome, Italy.