6-17-08 FINAL APTA CSM Abstract
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TITLE: Effect of Dynamic Visual and Auditory Feedback on Gait in Persons with Stroke

Background & Purpose: Auditory feedback has been shown to improve walking for persons with stroke. Visual feedback provided by an accelerometer-driven wearable device (virtual tile goggles-VTG) has been shown to improve walking for persons with Parkinson's Disease. There have been no studies examining the value of closed-loop visual feedback for persons with stroke. Based on feedback input research, it is possible that VTG alone or VTG combined with auditory cueing (VTG-A) may improve gait in persons with stroke. The purpose of this case series was to determine short term effects of VTG and VTG-A on walking and begin to address safety and user satisfaction among persons with stroke.
Case Description: Four persons (1 female and 3 males, ages 58-75 years) with stroke greater than 6 months signed an IRB approved consent. Subjects were able to ambulate independently (with or without an assistive device). Testing was conducted with the assistive device used for daily ambulation. Each subject attended a one-time session lasting 2 hours. Gait velocity and symmetry parameters were measured using GAITRite. Each subject underwent gait testing for 3 conditions: baseline, VTG alone and VTG-A. All subjects were first tested at baseline (without VTG or VTG-A). The second gait testing was randomly chosen to be either VTG or VTG-A. Subjects practiced walking with the condition (VTG or VTG-A) for 10 minutes prior to the second and third gait testing. Each subject was analyzed separately and significance was defined by change greater than individual variance.
Outcomes: Among the 4 subjects, baseline gait velocity ranged from 38.8-77.7 cm/sec. There were no significant increases in gait velocity with either VTG or VTG-A and 3 subjects demonstrated a significant decrease in gait velocity with VTG-A. Three subjects had a significant improvement in gait symmetry with either VTG or VTG-A. The subject with the slowest baseline gait velocity had the most consistent gait symmetry improvements. Step length differential, 18.1 cm at baseline, decreased significantly to 12.6 cm (VTG) and 11.1 cm (VTG-A). Single leg support differential decreased significantly with VTG from 0.30 to 0.16 sec. Subjects needed close contact guard while practicing with VTG and VTG-A due to loss of balance during acclimation to the dynamic virtual tiles. Overall, subjects acclimated within the 10 minute practice and felt their gait improved with the goggles.
Discussion: Although there were no significant increases in gait velocity, gait symmetry significantly improved in 3 of 4 patients when using this closed-loop feedback system. It is possible that gait velocity was not changed due to fatigue or use of assistive devices. It is also possible that a decrease in gait velocity helped normalize gait symmetry. These results suggest promise for VTG and VTG-A as an adjunct PT intervention but more research is needed to determine the value of these virtual reality goggles for persons with stroke.