

Staying on Track – Evaluating the Efficacy of Power Wheelchair Tracking Technology in Switch Driving

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Tracking technology has been available on certain complex rehab power wheelchairs for a number of years. This tracking technology varies in design, but shares the same goal of increasing driving efficiency, particularly for consumers who do not use a joystick. When completing a turn in a power wheelchair, the casters are skewed, or facing to one side. When a Forward command is sent (by activating the Forward switch), these casters “pull” the wheelchair to one side before straightening out and moving the chair in a forward direction. The consumer must activate the Left and/or Right directional switches to compensate for this. Varied terrain, slopes and inclines also “pull” the wheelchair off course by turning the casters. Tracking technology compensates for these influences and keeps the power wheelchair on the course dictated by directional switch inputs. Several distinct technologies are used to achieve this.

General clinical consensus is that tracking technologies increase driving efficiency, however this has not been proven in any formal manner. A protocol was developed and followed on June 20, 2011. A course was marked out on a smooth level surface (gym floor) with tape. Four trials were completed. A single volunteer drove in each of the 4 trials (18 year old female, no motor, sensory or cognitive limitations). The first trial was with a midwheel drive power wheelchair (Invacare TDX SP) and 3 AbleNet Jellybean switches on a tray (Forward, Left, Right). Driving parameters were programmed and remained the same throughout the first trial. The time to complete the course was recorded, as were the number of switch activations of each switch. In the first trial, the volunteer completed the course 3 times without tracking technology and 3 times with tracking technology (Invacare G-Trac). The switch activations for each of the 3 runs were averaged and the averaged results compared for course completion with and without tracking. The second trial used the same midwheel drive power wheelchair with a head array. The third trial used a front wheel drive power wheelchair (Invacare FDX) with 3 switches on a tray. The fourth trial used the same front wheel drive power wheelchair with a head array. Each trial required the volunteer to complete the course 3 times without tracking technology and 3 times with tracking technology.

Final Summary:

Trial 1: Invacare TDX SP midwheel drive, 3 switches on tray

- **57% less switch hits**
- **38% less time**

Trial 2: Invacare TDX SP midwheel drive, Head Array

- **69% less switch hits**
- **47% less time**

Trial 3: Invacare FDX front wheel drive, 3 switches on Tray

- **76% less switch hits**
- **52% less time**

Trial 4: Invacare FDX front wheel drive, Head Array

- **73% less switch hits**
- **48% less time**