TACSM Abstract

Comparison of Walking Mechanics between Manual and Automated IV Poles

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ABSTRACT

Many older adults fall while admitted in the hospital. The increased incidence of hospital falls is associated with intravenous (IV) pole manipulation when maneuvering through the room. **PURPOSE**: to determine whether an automated IV pole can decrease fall risk in older adults. **METHODS**: Twelve healthy older adults (> 65 years) performed three walking trials for each of three walking conditions (normal walking [no IV pole], walking with a manual IV pole, and walking with an automated IV pole [robot]). Each walking trial consisted of three phases: walking up to a door (entry), opening the door (door), and walking through the door (exit). Performance (entry velocity, exit velocity, door manipulation time, and smoothness defined by total body jerk during entry, door manipulation, and exit) and postural (reach distance, posterior displacement) kinematic variables were analyzed and compared among the walking conditions. The no IV pole condition was used as a control, with deviations in walking mechanics during manual and robot conditions assessed relative to increased fall risk. **RESULTS**: Compared to no IV pole, entry and exit velocity significantly decreased in manual (entry: 15.4%, exit: 35.5%) and robot (entry: 18.3%, exit: 30.9%) walking trials ($P<0.001$), while door manipulation time significantly increased in manual (36.4%, $P=0.002$) and robot (19.0%, $P=0.028$) walking trials. The manual IV pole required greater posterior displacement compared to no IV pole (113.3%) and robot (146.2%) walking trials ($P<0.001$), while reach distance was significantly greater compared only to no IV pole (14.6%, $P=0.009$). Gait smoothness during entry (entry jerk) was significantly less in robot walking trials compared to no IV pole (5.9%, $P=0.038$), while exit jerk was significantly less in the manual walking trial compared to the robot trial (20.3%, $P=0.007$). Compared to no IV pole walking trials, the manual IV pole produced greater door manipulation jerk (14.3%, $P=0.043$). **CONCLUSION**: The present study demonstrates an automated IV pole can reduce certain kinematic factors related to fall risk when maneuvering a manual IV pole. The apparent high potential from this study for use of automated IV poles in clinical settings with patient populations warrants further exploration and development with respect to the efficacy of automated IV poles.

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