

What is the most effective type of driver rehabilitation for individuals with acquired brain injury? A comparison of driving instructor lessons and driving simulator interventions.

Research Team: Stacey George, Chris Barr, Zoe Adey-Wakeling, Cindy Franchi, Maria Crotty, Kate Laver

Background: For people with acquired brain injury (ABI), return to driving is an important goal. There is currently insufficient evidence to determine whether driving simulation or driving lessons are effective for people with ABI.

Objective: To determine the most effective rehabilitation approach for returning to driving for people following an acquired brain injury to inform clinical practice.

Method: A randomised crossover trial recruited from rehabilitation services in Adelaide, Australia. Inclusion criteria: ABI, have desire to return to driving, meet medical/visual guidelines to return to driving, had a practical driving assessment recommended by a medical practitioner, held a car class license and drove prior to ABI. Exclusion Criteria: unable to provide informed consent because of language abilities. Participants were randomly assigned on a 1:1 allocation basis, to receiving six simulator or six driving lessons with an instructor. Then crossover occurred so that those who received simulator sessions received driving lessons and vice versa. The primary outcome measure was the result of a standardised on-road assessment (pass/fail) performed with a driver trained occupational therapist and driving instructor in a dual controlled vehicle, using a standardised route and scoring system. On-road performance was measured on completion of the first six interventions and after twelve. Secondary outcome measures included: assessments of visual scanning, attention, processing speed, self-efficacy, road sign recognition, reaction time and on-road driving performance. Ethical approval was provided by the Southern Adelaide Clinical Human Research Ethics Committee (HREC/16/SAC/259).

Results: A total of 41 people were screened for eligibility, 4 were ineligible, of those who were deemed eligible 4 declined and 4 were not contactable. Twenty-nine participants were recruited, n = 25 had a stroke, n = 4 a traumatic brain injury (TBI). There were no significant differences in baseline characteristics (refer to table 1).

TABLE 1: Baseline Characteristics		
	Group 1: Simulator first (n=16)	Group 2: Lessons first (n= 13)
Age (mean, SD)	69.75 (15.47)	66.46 (16.34)
Gender	10 males (62.5%)	9 males (69.2%)
Diagnoses	13 stroke, 3- TBI	12- stroke, 1- TBI
Time held license, years (mean, SD)	50.44 (17.40)	47.69 (17.88)
Time since driven, months (mean, SD)	17.16 (17.40)	12.69 (8.66)

Three participants had adverse events while using the driving simulator, one a medical event and two experienced simulator sickness, ending simulator training intervention prior to completion of six interventions. They were able to complete driving lessons and went on to regain their licences. Two people withdrew from study due to ill-health. In terms of the primary outcome measure, the results of the on-road assessment, there was a significant difference between the lesson group and simulator group ($\chi^2 (1) = 5.39, P = 0.02$) with 4 passing in the lessons first group and none in the simulator first group. There was also a significant decrease in critical on-road errors, requiring intervention from the driving instructor for safety, ($t (23) = 2.51, p = 0.02$), for the lesson first group compared to the simulator first group. At the third time point there was no significant differences in the results of the on-road assessment between either group. In the final on-road 10 passed from the simulator first group, and 11 from the lessons first group.

Discussion: In this small trial, on-road intervention designed by an occupational therapist from observations in an on-road assessment, improved the outcomes of an on-road assessment for people with acquired brain injury, compared to driving simulator training. This is the first study internationally to support the effectiveness of driving lessons, usual clinical practice in driving rehabilitation programs.

Trial Registration: Australian and New Zealand Clinical Trials Register (ANZCTR): ACTRN12617000386336

Acknowledgements: We thank the Department of Occupational Therapy, Rehabilitation, Aged and Palliative Care, Flinders Medical Centre (FMC), and the South Australia Brain Injury Rehabilitation Service, and Mareeta Dolling, and Nicole de la Perrelle, Driver Trained Occupational Therapists for their support.