



The need for consistency and equity in driver education and assessment post-stroke



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ARTICLE INFO

Article history:

Received 19 August 2013

Received in revised form

17 January 2014

Accepted 25 February 2014

Available online 2 April 2014

Keywords:

Driving

Assessment

Stroke

ABSTRACT

People who are unable to resume driving after a stroke often experience reduced participation. Return to driving is made difficult by inconsistencies in knowledge regarding legislation, the occupational therapy driving assessment process and access to services. As a result, inequities exist between and within states and territories of Australia. Some drivers miss out on, or bypass formal assessment, while other drivers experience rigorous assessment which may result in licence cancellation. In this viewpoint, the authors propose a way forward to increase the equity of access to driver education and assessment post-stroke in Australia. Strategies proposed to improve consistency and equity include greater education, evidence based written documentation of procedures, a systematic review of current off-road driver assessments and the transfer of administration of driving assessment services from health to transport authorities.

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1. Introduction

Incidence of stroke worldwide is reportedly 15 million with 5 million of these people dying and 5 million being left permanently disabled (WHO, 2002). Each year in Australia there are approximately 50,000 stroke events and 12,000 people who have a subsequent stroke (Australian Institute of Health and Welfare, 2013). This health burden will continue to grow as the population ages, especially in light of data that indicates approximately 50% of stroke survivors need assistance with household chores, home maintenance and mobility (Hankey et al., 2002).

In Western countries, such as Australia, driving is important for social and community participation (Barnsley et al., 2012). However, following stroke return to driving is difficult due to potential impairments limiting vision, cognitive and/or motor function (Edwards et al., 2008). Further, return to driving has safety implications such that the probability of being involved in an accident increases for post-stroke drivers, with an adjusted odds ratio of 1.93 (Sagberg, 2006). Australian guidelines (Austroads, 2012) indicate that stroke physicians, neurologists and general practitioners should make a clinical judgement about a person's fitness to drive, and need for a driving assessment. An on-road driving assessment is often considered the gold standard in determining fitness to drive post-stroke. However, it is unknown how many people are referred for, and successfully complete either an on or off-road driving assessment in Australia before they return to driving post-stroke. One study found only 19% of stroke survivors from a rehabilitation unit in South Australia had returned to driving at the six month follow-up (Allen et al., 2007), but the proportion that received information or referral for a driving assessment was not reported. Overseas estimates suggest that between 30 and 58% of people return to driving post-stroke (Lee et al., 2003; Tan et al., 2011). If the number of stroke survivors doubles by 2017, as is currently predicted (Australian Institute of Health and Welfare, 2013), the number of survivors that return to driving will also increase. This increase will place pressure on existing driving assessment services and licensing authorities in order to adequately address safety issues.

Decisions regarding return to driving are further complicated by the fact that many people with neurological diseases, including stroke, are reluctant to relinquish their licence. As a result some stroke survivors do not follow medical advice to cease driving (Patomella et al., 2009). In addition, anecdotal reports and some published data suggest that stroke survivors are unaware of regulations in regards to

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driving after stroke and make decisions about return to driving without professional advice and/or evaluation (Fisk et al., 2002). Currently in Australia, some people are advised by healthcare professionals to complete an occupational therapy driving assessment post-stroke while others are not (Barnsley et al., 2012). Stroke survivors may also be apprehensive about returning to driving, and unnecessarily delay or avoid completing an assessment, with implications for community participation (Barnsley et al., 2012). This is a concerning outcome given current literature identifying licence loss as a precursor for depressive symptoms (Marottoli et al., 1997; Ragland et al., 2005) and low self-esteem (Whitehead et al., 2006). The aim of this article is to highlight inconsistencies which exist in knowledge about return to drive legislation, access to occupational therapy driving assessment services, and the limited body of research which exists about the 'best' off-road driver assessment. By identifying these inconsistencies we can begin to address them.

2. Knowledge of legislation

Current Austroads guidelines (Austroads, 2012) recommend that people who have had a stroke should not drive for at least one month post-stroke. Following this period of non-driving, the process of return to driving is handled differently across states and services (Vicroads, 2014; Roads and Maritime, NSW, 2014; Department of Infrastructure and Energy, Tasmania, 2014; Department of Transport and Main Roads, Queensland, 2013; Department of Transport, Energy and Infrastructure, South Australia, 2014; Department of Transport, Northern Territory, 2012; Department of Transport, Western Australia, 2014; Road Transport Information Management, Australian Capital Territory, 2014).

In Australia some stroke survivors who are left with residual deficits, are required to obtain a letter, certificate or some 'evidence' of fitness to drive from a medical practitioner and complete a visual acuity test (Austroads, 2012). Written clearance to drive is then forwarded to the licensing authority but the responsibility for this task is not always clear. In other instances, when the medical practitioner decides the stroke survivor is fit to drive and there has been no formal withdrawal of the stroke survivors drivers licence, verbal clearance only is provided. As a result, it can be seen that confusion exists between health professionals and licensing authorities concerning the 'correct' process for return to driving in terms of a standard form, a letter, or verbal clearance (Barnsley et al., 2012). Reasons for the differences in advice given may include limited attention by the medical educators to driving policies and focus given to driving safety and risks in medical curricula, as well as differences in state legislation. As a result, inconsistencies exist in the information provided to people following stroke which leads to inequities in return to driving and premature limiting of driving or even driving cessation.

Australian legislation regarding the return to driving assessment process have been clearly summarised in the recent National Stroke Foundation (NSF) guidelines (NSF, 2010). The NSF guidelines outline a three step process for off and on-road assessments. Firstly, stroke survivors should undertake a medical assessment of fitness to drive by a medical practitioner. Secondly, a comprehensive off-road driving test of motor, sensory, visual and cognitive skills should be undertaken by a multidisciplinary team. This test may incorporate a standardised off-road driving test such as Dynavision Performance Assessment Battery (Klarora et al., 2000) the Cognitive Behavioural Driver's Inventory (Bouillon et al., 2006) or newly developed Australian tests such as DriveSafe DriveAware (Kay et al., 2009) and the Occupational Therapy Driver Off-Road Assessment Battery (Unsworth et al., 2012). Finally, an on-road driving test should be undertaken with a driver trained occupational therapist and driving instructor. Where uncertainty exists about fitness to drive, NSF guidelines (2010) recommend that medical practitioners make a referral for an occupational therapy driving assessment.

3. Inconsistencies in occupational therapy driving assessment procedures across Australia

Currently most Australian occupational therapists involved in driving assessments carry out a battery of standardised and non-standardised off-road driving skills assessments. These assessments test cognitive, perceptual and motor skills required for driving. The off-road assessment is followed by an on-road driving assessment (NSF guidelines, 2010) The on-road assessment is usually conducted in a dual-controlled vehicle, with a driving instructor and an occupational therapist seated behind, observing and recording driving behaviour (NSF guidelines, 2010).

While both Austroads (2012) and NSF guidelines (2010) recommend an occupational therapy on-road driving assessment, it is not mandatory. Further, where concerns remain about driving ability, confusion exists about which stroke survivors should complete this on-road assessment (Barnsley et al., 2012).

Anecdotal evidence suggests that some health professionals advocate that all stroke survivors should be assessed on-road after the mandatory one-month period to ensure a safe return to driving. However, neither Austroads (2012) or NSF (2010) guidelines recommend an on-road assessment for all people post-stroke as this can be a costly and time consuming process that is not always necessary.

In order to address confusion Alexandersen et al. (2009) recommend a multidisciplinary approach to determining fitness to drive, including a neuropsychological, medical and on-road assessment as the most thorough assessment approach. In light of this recommendation, there is a need for improved training of undergraduate and graduate stroke health professionals in Australia about the processes involved in assessment for return to driving post-stroke, and a validated process to determine which standardised off and on-road assessments are recommended towards a comprehensive, multidisciplinary approach addressing return to driving post-stroke.

4. Lack of agreement about the best occupational therapy off-road driving assessment

Decisions about fitness to drive are complicated by the diversity of assessments used and the lack of agreement between occupational therapists about the 'best' (most accurate and predictive) assessment to use prior to on-road testing (Unsworth et al., 2010). A 'good' test is considered one with good specificity, repeatability, reliability and sensitivity (Marshall et al., 2007). As a result, several off-road driving assessments are recommended by the Australian guidelines (NSF, 2010) and are used by Australian occupational therapists; these are discussed as follows.

The first and most commonly used assessment is the Visual Slide Recognition Test (VSRT; Kay et al., 2008). The VSRT consists of 18 slides projected onto a screen. Drivers are asked to recall information shown on the slides about vehicles, people and the environment, and their locations at a roundabout. VSRT results are significantly correlated with on-road driving performance (George et al., 2007).

A second, more recently developed assessment is DriveSafe DriveAware (Kay, et al., 2009). The DriveSafe test consists of 11 images of the same roundabout projected onto a screen whereby the number and position of pedestrians and vehicles vary between images. Clients observe each slide for 3 seconds, the image is removed from the screen, and then clients are asked to describe the position and direction of travel of each pedestrian and vehicle in the image. The images vary in complexity, ranging from four to sixteen factors about positions of objects and people needing to be recalled. The DriveAware test consists of seven questions, completed by the client and rated by the assessing occupational therapist, using a structured marking guide. The determination of the therapists rating is made based on information received at referral, and performance on the DriveSafe test and an intersection diagram test. The scores have been validated with 211 people and a recommended cut-off score can be used to predict whether further on-road testing is recommended or not.

Thirdly, an off-road assessment used by occupational therapist is the Adelaide Driving Self Efficacy Scale (ADSES; George et al., 2007). The ADSES assessment asks participants to rate 12 driving behaviours on a Likert scale. The ADSES has high internal consistency, good construction validity with non-stroke and stroke populations and good criterion validity, with scores differing significantly for participants who passed versus failed. The ADSES corresponds significantly with on-road driving performance (George et al., 2007).

Fourthly, the Stroke Drivers Screening Assessment (SDSA; George and Crotty, 2010) is another post-stroke, predriving assessment. It has three subtests: the Dot Cancellation Test, where the participants cross out groups of dots, the Compass Test where participant's place cards on a grid corresponding with the direction of cars pictured and the Road Sign Recognition Test where participants match cards with traffic signals with another 12 cards showing pictures of different traffic situations. The SDSA assessment has good predictive validity for on-road driving performance (George and Crotty, 2010).

Finally the Useful Field of View (UFOV; George and Crotty, 2010) is an off-road driving assessment which evaluates visual attention. Participants sit at a computer screen and provide answers to questions about location of objects presented to them on the screen. UFOV results correlate significantly with on-road performance (George and Crotty, 2010).

Each of the aforementioned assessments has limitations, and should not be used in isolation to determine fitness to drive. No single assessment is superior, or has changed practice nationally in Australia (Austroads, 2012). We also acknowledge the importance of experience and clinical judgement. Currently, we suggest best practise would consider the use of more than one off-road assessment to validate decisions within a multidisciplinary assessment process. On-road tests are often considered the gold standard but they are not required for all stroke survivors being assessed for returning to driving. Off-road assessments should be used initially to filter out which stroke survivors have the best chance of passing an on-road assessment to reduce time commitments and cost of completing such assessments. Further research is required to better understand and refine the psychometric properties of each assessment, particularly predictive validity before one assessment can be recommended over another. Protocols and algorithms are also needed to highlight which professionals should conduct and interpret assessments, the role of clinical judgement when determining fitness to drive, and what level of postgraduate training is required.

In summary, controversy exists about which the 'best' assessment is regarding return to driving post-stroke. Debate remains as to whether off-road driving assessments should be used to exclude potentially unsafe drivers from the on-road component. Current inconsistencies in practice means some stroke survivors experience rigorous assessment when early screening may already preclude out prospects of returning to driving and ability to pass on-road assessments.

5. Education about alternative transport options

There is merit towards discussions with drivers about alternative transport options in the early stage of recovery as this may assist stroke survivors who are unable return to driving. Of 24 stroke survivors interviewed about driving cessation, most experienced the process as sudden and unexpected, particularly loss of life-roles and difficulty arranging alternative transport (Liddle et al., 2009). Another study by White et al. (2012) identified that stroke survivors experience difficulties making the adaptation to a temporary or permanent non-driving role. High levels of distress may have been averted if education and therapy for alternative transport training (train, bus, and community transport) were commenced in the acute setting.

However this study (White et al., 2012) identified that stroke survivors are still hopeful of resuming driving in the early months and may not be ready to consider therapy addressing alternative transport options for many months down the track. As a result access to allied health services in the interim and longer-term is necessary when driving is not deemed possible or significantly delayed. A group intervention targeting issues of alternative transport options with older adults who had already ceased driving, or planned to do so within 12 months, increased community mobility immediately post-intervention and transport satisfaction at three months post-intervention (Liddle et al., 2013).

6. Access to driver education and assessment services

Despite the existing guidelines in Australia (NSF, 2010; Austroads, 2012) stroke survivors and their families are often given inconsistent and inadequate advice about returning to driving post-stroke (Fisk et al., 1997). As a consequence many are left making the decision concerning return to driving themselves (Fisk et al., 1997) and are unaware of the formal procedures concerning return to driving, particularly when the topic of relinquishing their driver's licence has not been addressed by a health professional. One small qualitative study found that some stroke survivors chose to cease driving, or did not pursue a driving assessment due to lack of confidence and fear of failure (Barnsley et al., 2012). Another study (White et al., 2012) explored return to driving within 12 months post-stroke onset and identified a notable gap in advice and assistance given to stroke survivors with regards to return to driving and accessing alternate transport. As a result, long term difficulties with adaption to life changes as a result of not being able to drive are partly a consequence of professionals' lack of awareness of, or engagement with, the issue. As a result there is a need for greater promotion of awareness regarding

driving issues in acute and rehabilitation settings. Health professionals can provide early education focused on stroke survivors understanding of driving legislation and return to driving processes, including education regarding alternative options to driving such as access to public transport. Further, lack of driving confidence over time remained an issue for those who successfully regained their licence, leading to self-imposed restrictions on driving and community access (White et al., 2012).

For those who receive appropriate advice and support, and proceed to on-road assessment, inequities exist in service access. Publicly funded, subsidised services are limited leading to inconsistencies in access to fees charged for on-road driving assessments. Some people with stroke undergo free testing, while others self-fund at a substantial cost (between AU\$400 and AU\$600 for off and on-road assessment). Waiting lists vary for public and privately funded assessments with occupational therapists. Additionally, waiting lists for occupational therapy driving services are often prioritised according to diagnoses or where rehabilitation was received. This variability in access and funding for assessment and retraining results in further inequities in the return to driving process for people with stroke.

7. The way forward

This viewpoint has highlighted the need for improving clarity in national legislation and written guidelines about return to driving, to guide health professionals and stroke survivors, better education and information provision and improved equity in access to services. Furthermore, there is disagreement about, and much variation in the off-road driving assessment process used by Australian occupational therapists (Devos et al., 2011). Finally, people with stroke face inequities when accessing driver assessment and retraining services across the country. Several strategies are proposed to address the lack of consistency and inequities of access to education and service for returning to driving post-stroke.

Multidisciplinary research, involving medical practitioners, occupational therapists, licensing authorities and stroke survivors is needed to provide policy makers with evidence about best practice in driving assessment and rehabilitation following stroke. A national algorithm could then be produced, outlining the decision-making process for managing return to driving after a stroke.

General practitioners (GPs) play an instrumental role in the management of returning to driving after a stroke as they are often the first healthcare professional the stroke survivor and their families turn to for support. There is a need for better training in medical undergraduate and postgraduate curricula about driving post-stroke and decision-making about driving. More occupational therapy services are also needed to assist GPs, stroke physicians and others in the management of post-stroke driving, and stroke survivors who may benefit from driver training, rehabilitation for residual symptoms, intervention to maintain mobility, confidence, and fitness to drive (or to access public transport), compensatory driving strategies, preparation for driving cessation and alternate transport training.

The inequity in access to on-road assessment services needs to be addressed. One way forward is for the state and territory licensing authorities in Australia to administer a system which employs occupational therapists and driving instructors, as does the Australian Capital Territory. The predominant model in Australia is for state health departments and private organisations to provide driving assessment services. If licensing authorities assumed this role, that change would provide equity for people with stroke, regardless of their geographic location. On-going debate and discussion need to occur regarding the most cost effective assessment process (Ponsford et al., 2008).

8. Conclusions

The psychosocial impact of licence loss after a stroke cannot be underestimated (Liddle et al., 2009). To enhance return to driving service provision, inconsistencies and inequities in Australia need to be addressed. This article has highlighted the need for a review of legislation and national guidelines, improved knowledge about return to driving at undergraduate and postgraduate levels, and knowledge of best practice assessment processes. These changes should be based on research and aim to address service access and inequities. Guidelines and a national algorithm are needed which emphasise the role of clinical judgement, when to refer to a driver-trained occupational therapist and how to select the best standardised test for off and on-road assessment. There is also a need to identify and support stroke survivors who cannot, or do not wish to resume driving, by promoting alternative transport options.

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