

Clinician knowledge of driving restrictions following a stroke event

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ABSTRACT

AIM: To investigate the knowledge and practice of health professionals when advising persons on driving restrictions after a transient ischaemic attack (TIA) or stroke in a tertiary hospital in New Zealand.

METHODS: Health professionals working in the area of stroke care across the acute and rehabilitation services in a large tertiary hospital were invited to complete an electronic survey around knowledge of driving restrictions based on the New Zealand Transport Agency (NZTA) guidelines. Knowledge was assessed for both private and commercial vehicle use. The other information gathered included participant profession, level of seniority and experience working in stroke care, previous education around medical-related driving restrictions and how and what driving recommendations were discussed with patients. Knowledge of driving restrictions was established by the number and percentage of correct responses for each condition (single TIA, multiple TIA and stroke with full recovery) relating to the recommended restrictions in both private and commercial vehicle use.

RESULTS: Forty-nine participants' surveys were analysed with representation from across all the health professions (24.5% (12/49) doctors, 38.8% (19/49) nurses and 36.7% (18/49) allied health). Only 38.8% reported having had received training around post-stroke driving restrictions. Knowledge around driving restrictions was highest for a single episode TIA for private vehicle use (73.5% (36/49)). For all other categories, fewer than 50% of participants answered correctly, with knowledge of commercial vehicle restrictions being the least accurate.

CONCLUSIONS: Many health professionals have discussions with people about driving restrictions following a TIA or stroke. However, there appears to be limited knowledge of all the restrictions for each condition as they relate to either private or commercial vehicle use. Insufficient training and education for clinicians might explain this gap.

When a person experiences a medical event or condition that affects their ability to drive safely, they pose a risk to themselves or to others.¹ A stroke presents with a variety of impairments that could impact on a person's ability to safely drive a car, such as altered visuo-spatial perception, reaction time, attention, sensation and muscle power.^{2,3} A safe return to driving is an important part of recovery, and the inability to do so has a profound impact on community participation.^{4,5}

The New Zealand Transport Agency (NZTA) provides a guide for health prac-

tioners regarding the medical aspects of fitness to drive.¹ These are safety guidelines for clinicians to advise patients about returning to driving after suffering from certain medical conditions. Such guidance is in place to ensure that drivers on New Zealand roads are fit and competent to drive, with the aim of reducing harm caused by road accidents.¹ The New Zealand Clinical Guidelines for Stroke Management⁶ highlight driving post-stroke as a chapter in its recommendations. These consensus-based recommendations include: asking all admitted patients whether they intend to

drive again; providing information about assessments for fitness to drive to those who do intend to drive again; advising people with a diagnosis of stroke or transient ischaemic attack (TIA) not to drive for a minimum of one month; visiting their general practitioner (GP) or specialist prior to resuming driving; and an occupational therapy assessment for driving, which should be undertaken (if required), with its outcomes documented and provided to the patient and the GP.⁶ In New Zealand, the legal obligation of the health practitioner is to assess the fitness of an individual to drive and to report those persons who continue to drive against medical recommendation. However, the NZTA guidance booklet, although part of legislation, is a guideline for best practice only and not legally enforceable.¹ Therefore, advice about returning to driving can be confusing, resulting in variance in health professionals' knowledge and their provision of return-to-driving information to patients.^{5,7-9}

To support health professionals when giving advice, the Stroke Foundation of New Zealand has produced a free printable resource titled *Fact sheet: driving and transport after stroke*. This is located on the Stroke Foundation website and provides a summary of the NZTA driving recommendations following a TIA or stroke for both private and commercial drivers.¹⁰ The fact sheet provides clear rationale for the driving restrictions as well as information for on-going driving rehabilitation and alternative transport options.

Internationally, regulations related to post-stroke driving vary, and it has been demonstrated that knowledge of post-stroke driving restrictions is low among healthcare professionals.¹¹ In the UK, a study by Batool et al found that only 29% of physicians and 36% of allied health professionals knew the restrictions for domestic driver's licence holders following a stroke or a TIA.⁷ In addition, a Swedish review of medical records indicated that a report of a discussion relating to driving cessation post-stroke was missing in 81% of the medical records.¹² Despite health professionals reporting they were aware of fitness-to-drive (FTD) guidelines, only 33.9% of the respondents had utilised these guidelines within stroke care in the past two years.¹³

Many were of the view that further training around FTD was required, with some professional groups reporting that they obtained their knowledge of where to find return-to-driving (RTD) information through their colleagues.¹³

It has been estimated that a quarter of New Zealand's population will be aged 65 years and over by 2030.¹⁴ Therefore, the number of older drivers on the roads is going to see a dramatic rise.¹⁵ Of all the people in New Zealand who have a current learner, restricted or full driver's licence, 551,754 are over the age of 65. Of this group, 7,569 people are aged 90 years and older.^{16,17} Driving is one of the main transport options for our older population in New Zealand, especially for those outside of urban centres, where public transport is limited.^{16,18} With current trends demonstrating that stroke mortality is falling quicker than the stroke incidence, and along with New Zealand's population growth and ageing demographic, a rise in stroke related disability is inevitable.¹⁹ With this information, it is reasonable to assume that there will be more drivers on the road who may have experienced a stroke.

Being able to return to driving is a priority for many patients after a stroke or TIA. However, driving too soon after an acute medical event, such as a stroke or TIA, has safety implications. Given the lack of research examining people who return to driving following an acute medical event in New Zealand, this study aimed to assess health professionals' knowledge of driving restrictions following stroke and TIA in a tertiary hospital setting in New Zealand and how they deliver this information to patients.

Methods

Ethical approval for this study was granted from the University of Waikato (UoW HREC (Health) #2017-26).

Participants

An advertisement for the survey was posted on the intranet of a large tertiary district health board in New Zealand, inviting medical, nursing and allied health professionals working across acute and rehabilitation services involved with the care of stroke patients to participate. In

addition, information about the survey was circulated via email by the service leaders of relevant disciplines/departments.

Procedure and questionnaire design

The questionnaire was developed on the Qualtrics online survey software. As described above, an advertisement containing a link to the survey was circulated via email, and information about the study was posted on the intranet of a large tertiary district health board in New Zealand. Upon clicking a link to a website, the respondents were provided with a short overview of the purpose of the research, reassured that their responses were anonymous and that they had the ability and right to withdraw at any time. The respondents were asked to complete the questionnaire without accessing any reference materials. Respondents were then presented with the survey questions, which took approximately 10–15 minutes to complete (a copy of the survey can be found in Appendix). The questionnaire was based on the version used by Batool et al⁷ and modified to reflect the New Zealand advice and restrictions as per the NZTA guidelines.¹ Participants were asked to choose the appropriate private and commercial driving restrictions from a pre-populated list for a number of conditions, including single and multiple transient ischaemic attack (TIA) and stroke. The restrictions recommended by NZTA are as follows:

- Single TIA with full recovery: one month for a private vehicle and six months for commercial driving.
- Multiple TIA: three months after last incident for a private vehicle and 12 months for commercial driving.
- Stroke with no residual deficits: one month for a private vehicle and three years (with medical approval) for commercial driving.

Participants were also asked to provide information on their profession, level of seniority, experience working in the field of stroke and, if any, previous fitness-to-drive education they had received. Finally, they were asked about when and how they discuss driving restrictions with their patients and whether they thought that patients adhered to the advice they

provided. At the end of the survey, participants were given the option to provide their email address to receive a summary of the findings, and they were provided with a list of relevant resources/additional information about fitness to drive and return to driving.

Results

A total of 66 participants began the survey, but 17 were excluded from the analyses due to missing data, leaving a final sample of 49. Twelve of these 49 (24.5%) were doctors, 19/49 (38.8%) were nurses and 18/49 (36.7%) were allied health professionals. Fifteen of the 49 participants (30.6%) had been practising between 0–5 years, 18/49 (36.8%) between 6–15 years and 16/49 (32.7%) had been practising for over 15 years. Just over a third of participants (15/49) worked in the medical area, 6/49 (12.2%) in cardiology, 8/49 (16.3%) in community/rural health, 8/49 (16.3%) in geriatrics/stroke and 12/49 (24.5%) in other clinical areas.

Training and knowledge of driving restrictions

With regard to training received about driving restrictions, 20/49 (40.8%) reported having received no training, 19/49 (38.8%) had received training about driving post-stroke and 10/49 (20.4%) had received training about driving restrictions in relation to other medical conditions.

The percentage of respondents choosing the correct response for the driving restrictions and TIA or stroke is shown in Table 1. As can be seen in the table, knowledge of driving restrictions was best for a single TIA for private vehicles. However, fewer than 50% of participants knew the driving restrictions for the other categories.

Table 1: Percentage of correct responses among health professionals for driving restrictions for TIA and stroke for private and commercial licence holders.

	Private (n, %)	Commercial (n, %)
Single TIA	36, 73.5	9, 18.4
Multiple TIA's	11, 22.4	11, 22.4
Stroke with no residual deficits	22, 44.9	9, 18.4

A high percentage of respondents indicated that they did not know the restrictions related to operating a commercial vehicle (38.8% (19/49) for single TIA, 44.9% (22/49) for multiple TIA, 42.9% (21/49) for stroke). For each scenario, some respondents reported the driving restrictions as being shorter than the NZTA guidelines: For driving a private vehicle, 3/49 respondents (6.1%) reported there was no restriction after a single TIA (NZTA recommend one month), 7/49 (14.3%) reported a restriction of one month following multiple TIA (NZTA recommend three months) and 3/49 (6.1%) reported no restrictions after stroke with no residual deficits (NZTA recommended one month). For driving a commercial vehicle, 8/49 participants (16.3%) selected restrictions of less than six months for a single TIA, 3/49 respondents (6.1%) selected periods of less than 12 months after multiple TIA and 15/49 participants (30.6%) selected periods of less than three years after a stroke with no residual deficits.

Action and advice provided by clinicians

Overall, 83.3% (41/49) of respondents reported that they discussed driving restrictions with their patients. The majority of these discussions followed an assessment or were provided prior to discharge home (50% (25/49)). Half of the respondents reported that the advice they provided included when to resume driving and where to obtain further information if needed. Thirty-five percent (17/49) of respondents discussed only one of these options with the patient. The remainder of respondents reported that they would advise the patient to seek GP advice and approval before resuming driving.

Seventy-five percent of clinicians reported that patients had questions regarding driving, yet only 35.4% (17/49) of clinicians reported providing written information regarding driving restrictions and RTD to patients. This was despite 60.4% of the respondents (30/49) reporting that they thought that patients did not adhere to driving recommendations and that only two-thirds of patients (66.6% (33/49)) understood the driving restrictions.

The majority of respondents (63.2% (31/49)) were aware that reporting to NZTA was required for conditions that led to

permanent driving restrictions, with only 14.3% reporting that they would notify the GP instead. However, 22.5% (11/49) stated that they did not know who to report to. Furthermore, 79.5% (39/49) of respondents identified that medical professionals (eg, doctors, GPs, specialists) were responsible for reporting these restrictions, with a further 8.1% of those respondents (4/49) also stating other health professionals should also notify the appropriate agency. Seven respondents (14.2%) thought it was the patients' responsibility, one (2.1%) was unsure and one (2.1%) identified everyone as responsible for reporting.

Nearly two-thirds of respondents (62.5% (31/49)) reported that they knew where to refer patients for post-discharge driving assessments. The preferences for onward referral were 36.8% (18/49) to occupational therapy (OT), 14.3% (7/49) to medical or nursing professionals and 10.4% (5/49) reported other referrals as appropriate post-discharge driving follow-up.

Over half of the respondents (55.1% (27/49)) reported that the advice provided to patients about driving restrictions is inadequate, and 83.7% (41/49) indicated that the information should be improved. In the general, respondents noted that many patients do not understand the need for the driving restrictions and that, as they are only guidelines, they are hard to enforce. There was also some suggestion that certain demographic groups may be more resistant to the restrictions, particularly older men.

Discussion

This local New Zealand study showed that health professionals working in a large tertiary hospital have poor knowledge around driving restrictions following a TIA or minor stroke. Fewer than 50% of the staff surveyed indicated that they knew what advice to provide around driving to this patient population, with the least knowledge being demonstrated around restrictions for returning to commercial driving.

The majority of staff (83%) surveyed in this study reported they were providing driving recommendations to patients, which is a lot higher than what was found amongst allied health staff (33%) across Australia.⁵ However, it is concerning that

half of these respondents (48%) reported having had no formal training around the return-to-driving issues, and they did not know the correct recommendations for each condition, which calls into question the accuracy of the information being provided to patients. Also, three-quarters of clinicians reported that patients often had questions relating to RTD, but only a third would actually provide written information regarding these restrictions and recommendations. It therefore cannot be expected that persons' driving behaviours following a TIA or stroke align with what is outlined by the NZTA and Stroke Foundation of New Zealand, given that the information provided in the first instance is inaccurate and not supported by written documentation.

Evidence suggests that, within New Zealand, 27–35% of persons return to driving within one month following a stroke, often against medical or allied health recommendations.^{20,21} The characteristics of the persons who had resumed driving were most likely to be male or the main income earner, and they were often independent with activities of daily living (ADL).²¹ Over half of these subjects interviewed—of whom 15% were found to have cognitive impairment—reported that they could not remember being given any specific advice around RTD. In mild stroke, cognitive deficits can persist for several months after injury,²² and this may predispose individuals to an increased risk of having a motor-vehicle accident. The education and advice provided by physicians during hospital stays has been shown to significantly reduce the annual rate of road crashes in people considered to be medically unfit to drive by 45% per 1,000 persons.²³ Therefore, the provision of correct driving information during acute hospital admission is important, and a range of educational

strategies should be considered and utilised depending on the needs and characteristics of the patient.

Limitations

The main limitation to this study is the small sample size that is local to one tertiary hospital in New Zealand and therefore may not be representative of the rest of the country. Future research in New Zealand regarding safe return-to-driving advice following stroke should be multi-centre and also include GPs to better understand clinicians' knowledge and delivery of driving restrictions and support. Furthermore, investigating patients' understanding and adherence to return-to-driving advice following stroke would add to this body of knowledge and aid the development of clinician (and/or NZTA) education and information regarding safe return to driving.

Recommendations

Formal training and education regarding the driving restrictions around common medical condition and safe RTD education should be provided within undergraduate programmes and also to clinicians as part of ongoing professional development.

Provision of accurate, standardised written information regarding driving restrictions and safe RTD (eg, *Fact sheet: driving and transport after stroke*)¹⁰ to all persons diagnosed with a TIA or mild stroke prior to discharge from hospital.

Patient education should include recommended standdown period appropriate for each licence type and where to obtain advice and driving assessments if required.

Acute hospital services could benefit from having clear processes for identifying which members of the team will provide advice on driving restrictions and RTD and written information alongside NZTA reporting procedures.

Appendix

Figure A1: Driving after a stroke/cardiovascular event.

This study aims to explore the driving-related advice health professionals provide to patients following a stroke/cardiovascular event, and how they deliver this information to patients. Your participation is entirely voluntary and your responses to the survey are anonymous and cannot be linked with you personally. Completion of the questionnaire and the submission of the responses will be taken as your consent to participate. You are free to withdraw without penalty from the study at any time, by closing the browser window. If you have any questions about the study please contact a member of the study team (Nicola Starkey, nicola.starkey@waikato.ac.nz; Victoria Donoghue, Victoria.Donoghue@waikatodhb.health.nz; John Parsons, j.parsons@auckland.ac.nz; Samuel Charlton, samuel.charlton@waikato.ac.nz and Jess Leov, jessica.leov@waikato.ac.nz). The study has received approval from the University of Waikato Human Research Ethics Committee (Health) #2017-26.

We would like to encourage you to answer the questions based on your current knowledge and how you have dealt with patients over the last few months (rather than trying to find the correct answers).

Q1 What professional group are you from?

- a. SMO
- b. RMO
- c. HO
- d. Nurse
- e. Social Worker
- f. Physiotherapist
- g. Occupational therapist
- h. Other

Q2 How many years have you been practicing?

- a. 0 - 5 years
- b. 6 - 10 years
- c. 10 - 15 years
- d. 15 + years

Q3 What clinical area do you practice?

Q4 Have you worked with stroke patients?

- a. yes
- b. no

Q5 Have you received teaching about driving restrictions surrounding medical conditions? (tick all that apply)

- a. No Training
- b. Epilepsy
- c. Cardiac Diseases
- d. Stroke
- e. TIA
- f. Other (6)

Q6 Where should medical conditions that permanently restrict driving be reported?

- a. Insurance company
- b. NZTA
- c. GP practice
- d. Don't know

Q7 Who is responsible for reporting such conditions?

Q8 What should you do if patients continue to drive when they are not fit to do so?

Q9 What are the restrictions for the following conditions?

Q10 Single TIA - Full recovery - Vehicle private driving?

- a. No restriction
- b. 1 week
- c. 1 month
- d. 6 months
- e. 1 year
- f. Don't know
- g. Outside my area of practice
- h. Other (8)

Q11 Single TIA - Full recovery - Commercial driving:

- a. No restrictions
- b. 1 week
- c. 1 month
- d. 6 months
- e. 1 year
- f. Don't know
- g. Outside my area of practice
- h. Other

Q12 Multiple TIA - Private driving:

- a. No restrictions
- b. 1 week
- c. 1 month
- d. 3 months
- e. 6 months
- f. Don't know
- g. Outside my area of practice
- h. Other

Q13 Multiple TIA - Commercial driving:

- a. No restrictions
- b. 1 month
- c. 3 months
- d. 6 months
- e. 12 months
- f. Don't know
- g. Outside my area of practice
- h. Other

Q14 Stroke - No residual deficits - Private driving:

- a. No restrictions
- b. 1 week
- c. 1 month
- d. 6 months
- e. 12 months
- f. Don't know
- g. Outside my area of practice
- h. Other (8)

Q15 Stroke - No residual deficits - Commercial driving:

- a. No restrictions
- b. 3 Months
- c. 6 months
- d. 12 months
- e. 3 years
- f. Don't know
- g. Outside my area of practice
- h. Other

Q16 Seizure (unprovoked):

- a. No restrictions
- b. 1 week
- c. 1 month
- d. 6 months
- e. 12 months
- f. Don't know
- g. Outside my area of practice
- h. Other

Q17 Myocardial infarction:

- a. No restrictions
- b. 1 week
- c. 2 weeks
- d. 1 month
- e. 2 months
- f. 3 months
- g. Don't know
- h. Outside my area of practice
- i. Other

Q18 Pacemaker implant:

- a. No restrictions
- b. 1 week
- c. 2 weeks
- d. 4 weeks
- e. 6 weeks
- f. Don't know
- g. Outside my area of practice
- h. Other

Q19 Coronary artery bypass graft (CABG):

- a. No restrictions
- b. 1 week
- c. 1 month
- d. 3 months
- e. 6 months
- f. Don't know
- g. Outside my area of practice
- h. Other

Q30 Name two residual impairments that may require discontinuation of driving following a stroke.

- a. (1) _____
- b. (2) _____

Q21 Do you discuss driving restrictions with your patients?

- Yes (1)
- No (2)

Q22 When do you typically tell the patient about the driving restriction?

- a. After I have assessed them
- b. Before they discharge home
- c. When I remember
- d. Rely on someone else telling them
- e. Other (5)

Q23 Where do you typically tell the patient about their driving restrictions?

- a. When they are in the hospital bed
- b. When I give them their discharge papers
- c. Over the phone
- d. During assessment
- e. Other

Q24 What information do you tell the patient about driving restrictions?

- a. What the restrictions are
- b. Where to get further information
- c. What to do to resume driving
- d. all of the above
- e. Other

Q25 Do you give the patient any written information about driving restrictions?

Yes / No

Q26 Do patients ask questions about driving restrictions?

Yes / No

Q27 What kind of questions do patients have about driving restrictions

Q28 Do you think that patients understand the driving restrictions?

Yes / No

Q29 Do you think that patients adhere to driving restrictions?

Yes / No

Q30 Do you know where to refer patients to for driving assessments post discharge?

Yes / No

Q31 Name where you refer patients to for driving assessment post discharge

Q32 Do you think that the information you provide to patients about driving restrictions is adequate?

Yes / No

Q33 Do you think there needs to be any improvements about patient information regarding driving restrictions?

- a. Yes (1)
- b. No (2)
- c. Add comment (3) _____

Q47 Are there any other comments you would like to make about driving restrictions?

Q34 Thank you for completing the survey. If you would like to receive a summary of the findings please enter your email address below (this will not be linked with your answers)

If you would like more information about current recommendations for driving after stroke, the following resources may be helpful: NZTA- Medical Aspects of Fitness to Drive
NZTA- Information for Medical Practitioners, NZTA- Occupational Therapy Assessments for Driving Fitness, Stroke Foundation Resources for Health Professionals.

Competing interests:

Nil.

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