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Research paper

Is driver licensing restriction for age-related medical conditions an effective mechanism to improve driver safety without unduly impairing mobility?

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ABSTRACT

Background: While medical conditions have been recognised as a minor contributing factor to road traffic crashes, clinicians and driver licencing agencies need mechanisms for promoting safe mobility for those with age-related illnesses which can impact on driving safety. Restrictive licensing has been proposed as a possible intervention for decreasing the risk of crashes associated with medical crashes, whilst not unduly affecting patient mobility.
Objective: To analyse how the term "restrictive licensing" is defined in the literature, and to determine the effectiveness of this mechanism in improving driver safety.
Design: A systematic literature review.
Methods: A search of the Medline and TRID databases.
Results: Restrictive licensing is most commonly defined as a geographical, time of day or speed restriction placed on the driver. Personal and vehicle modifications are considered by some to also be a form of restrictive licensing. Existing studies are supportive of the efficacy of restrictive licensing programs, with reduced crash rates for drivers carrying restricted licences compared to controls.
Conclusion: Restrictive licensing has been shown to be an effective mechanism of increasing driver safety without unduly impacting driver mobility. It has significant potential to have a positive impact on the ability of those with medical conditions to drive safely. Further research is needed to determine the optimum format and policies for advising driver restrictions for age-related disease and disability.

1. Introduction

While medical conditions have been recognised as having a modest role in road traffic accidents [1] when compared to factors such as wearing a seatbelt and speeding [2], it is increasingly clear that clinicians and driver licencing agencies need to develop strategies for supporting safe mobility for individual drivers with age-related disease and disability [3]. Older drivers as a group present no increased risk to road users in general but are more likely to present with conditions which may impact on fitness to drive [4]. Significant potential exists for support and remediation of fitness to drive through general rehabilitation and fitness training [5], as well as more disease specific intervention with conditions such as cataracts [6], sleep apnoea [7], arthritis [8], and stroke [9]. A further strategy that has been proposed as a method of reducing the number of crashes associated with medical conditions is restricted licensing. There is a significant literature on the use of restrictions for alcohol misuse and dependence but not yet for physical and cognitive disabilities which increase with age and which may affect fitness to drive.

One of the main advocacy organizations for older people in the USA, the AARP, has advocated adoption of restricted licencing for over 20 years, defining it as "a driver's license that for one reason or another has a restriction attached to it. To operate a motor vehicle, holders of such a license must meet some special requirement or must restrict their driving practices in some well-specified fashion" [10]. On a preliminary literature review, we found that there were discrepancies among various authors as to the definition of restricted licensing. Therefore, we conducted a review on how the term restrictive licensing is defined in the literature for

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medical conditions other than alcohol misuse and dependence and also reviewed the effectiveness of restrictive licensing as a mechanism to improve driver safety, particularly for older drivers.

2. Aim

There are two main aims to this review: to analyse how restrictive licensing is defined in the literature, and to determine the effectiveness of the mechanism of restrictive licensing in improving driver safety.

3. Method

We undertook a literature review of both Medline and Transport research international documentation (TRID). The latter is an integrated database that combines the records from US Transportation Research Board's Transportation Research Information Services Database and the OECD's Joint Transport Research Centre's International Transport Research Documentation Database: TRID provides access to more than one million records of transportation research worldwide. Our search included only articles written in the English language and had no date restriction. We searched Medline using the terms: "(Restricted and driver and licensing) not learner". This returned 35 articles, of which 6 were considered relevant. The remaining 29 articles dealt with graduated licensing programs in place for adolescent drivers, which we did not consider. To further expand our literature base, we then searched the reference lists in the appropriate articles. We then conducted another Medline search using the terms "(Restricted and [driver or driver's] and [licensing or licenses]) not learner". This resulted in 42 articles, 7 of which were considered relevant. Of the remaining 35 articles, 15 dealt with graduated licenses, 4 with young driver issues, 3 with interlock devices, 4 with specific medical issues and their effect on driving ability, 4 with the effects of alcohol upon driving ability, and 5 with further education of adult drivers. A search of TRID using the same terms resulted in 110 results, 23 of which were considered relevant. One of these was a research project that had not yet been concluded, so we were left with 22 articles. Excluding those which overlapped, we reviewed a total of 22 papers, of which seven described the nature of the restrictions and five their effectiveness.

4. Results

4.1. Definition of restricted licensing

Seven papers described actual driving restrictions in use. The range of definitions used is summarized in Table 1. Braitman et al. split the restrictions into three separate categories – headlight restrictions (not allowed to drive at night), speed restrictions, (not allowed to drive on high speed roads) and geographic restrictions (not allowed to drive 5 miles or more from home) [11]. Nasvadi and Wister also considered licensing restrictions to be restrictions on speed, time of travel or geographic area of travel [12]. Restrictions to licenses in Utah include speed, area and/or time of day limitations [13]. Marshall et al. noted that drivers in Saskatchewan may either have a driving restriction (driving during certain hours, at certain speeds or on certain roads), a licensing restriction (requiring a periodic eye examination or having a shorter license renewal time), or both [14]. These restrictions are based on a combination of a driving ability assessment, an on-road evaluation and the expected progression of the person's medical condition. Langford et al. split the restricted license categories into personal restrictions (e.g. wearing corrective lenses), vehicle modifications (such as fitting hand-operated controls) and license restrictions (driving within a certain radius of home, in daylight hours, etc) [15].

Vernon et al. discuss the 12 medical diagnosis categories, which are used to determine a person's fitness to drive [13]. In each category, drivers are assessed to determine the severity of disease process and impairment, often times by a physician. This assessment therefore assigns drivers to one of 12 categories, each outlining the various restrictions considered appropriate for safe driving by the licencing agency in Utah. The functional ability level and imposition of restrictions are reconsidered each time the license is renewed.

A review of the effectiveness of restricted licensing for North Carolina's older drivers adopted the term "restricted licensing" rather than graduated licensing, primarily to avoid confusion with the graduated licensing policies and programs now being targeted to young learner drivers [16]. They do explain, however, that the underlying principle remains the same across both populations of drivers: allow driving under conditions that maximise safety while retaining mobility.

4.2. Effectiveness of restrictive licensing

Five papers discussed the effects of restricted licensing. In Utah, restricted licensing for single condition was associated with less citations and crashes for drivers with diabetes, less citations for those with psychiatric conditions and less crashes for those with respiratory disease [13]. For those with multiple conditions, those with restricted licences had less citations and crashes than those with unrestricted licences. A study in Iowa found that the most noteworthy change in driving behaviour resulting from license restrictions was a significant reduction in weekly mileage for drivers with any kind of restriction relative to drivers without restrictions [11]. Drivers with license restrictions reduced their weekly mileage by about 40% between the initial and follow-up surveys, whereas weekly mileage for drivers without restrictions changed little.

A significant decrease in the rates of crashes and traffic violations in drivers with license restrictions for medical impairments was noted in a study in Saskatchewan, Canada [14]. Although the findings indicated a higher adjusted risk of at-fault crashes, this increased risk attributable to restricted licenses is

Table 1
The type of restrictions described in existing papers on restricted licences.

Author(s)	Location	Time of day restrictions	Speed restrictions	Geographical restrictions	Personal restrictions	Vehicle modifications	Renewal time restriction
Braitman et al. [20]	Iowa	X	X	X			
Nasvadi and Wister [12]	British Columbia	X	X	X			
Langford and Koppel [15]	Victoria, Australia	X		X	X	X	
Marshall et al. [14]	Saskatch-ewan	X	X	X			X
Vernon et al. [13]	Utah	X	X	X			
Stutts et al. [16]	North Carolina	X	X	X	X		
Dugan et al. [21]	USA	X	X	X	X		