



## RESEARCH ARTICLE

## Diabetes and Driving - Significant Deficits in Knowledge and Practice

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### Abstract

Motor vehicle drivers who are diabetic and health care professionals who care for them, lack awareness of regulations pertaining to safe driving. We aim to assess their knowledge, practice, and adherence to recommendations in this study of diabetics who drive while taking hypoglycaemic agents.

**Methods:** We recruited 185 subjects from our secondary care diabetes clinic, and obtained details about demographic characteristics, medications, blood glucose monitoring, hypoglycaemia and knowledge of current regulations.

**Results:** The majority were males (72.5%) and their median age was 60 years. 92.4% of subjects were on hypoglycaemic agents (109 on insulin and 62 on sulphonylureas alone or in combination). Of the subjects on hypoglycaemic agents - (a) 87% regularly monitored blood glucose - 60% of them did so twice/day or more; (b) 66.5% had been advised by health care professionals about driving regulations (77% of those on insulin); (c) 79% thought their knowledge was adequate about regulations and 21% requested more information (d) 55.4% reported hypoglycaemic awareness and (e) only 55.2% checked blood glucose before driving.

**Discussion:** This study confirms deficits in knowledge and practice amongst both patients and healthcare professionals about diabetes and driving. Educating these groups appropriately should become a priority locally and nationally.

### Keywords

Diabetes, Driving, Hypoglycaemia, Knowledge, DVLA

### Introduction

The European Union has recommended changes to driving regulations for diabetics, through their Third Directive on Driving [1]. All European states are obliged to adopt these measures as a minimum standard [2]. As recent severe hypoglycaemia is thought to be the single most important factor associated with road traffic accidents, there is a significant emphasis on hypoglycaemia in these and subsequent publications [3,4]. The UK's Driver and Vehicle Licensing Agency (DVLA) recommends strategies for avoiding hypoglycaemia while driving, and for managing hypoglycaemic symptoms, or low blood glucose levels [5]. However, there is anecdotal and published evidence that a significant proportion of drivers with diabetes are unaware of guidelines, and do not discuss these with their carers (physicians and specialist nurses - estimated to be half of all type 1 diabetics and three quarters of type 2 diabetics [6]). We attempted to establish the extent of this problem amongst drivers with diabetes in our own practice and explore other aspects of this important issue of personal and public safety.

### Subjects and Methods

#### Subjects

We enrolled 185 consecutive subjects with type 1 and type 2 diabetes mellitus, who drove a vehicle for private or professional use attending a secondary care general

**Table 1:** Details of 185 consecutive diabetic patients who drive class 1 or 2 vehicles.

This table highlights patient characteristics, driver class, hypoglycaemia avoidance and awareness.

Characteristic	Result
<b>Males</b>	72.5%
<b>Females</b>	27.5%
<b>Median age (interquartile range)</b>	60 (50-67) years
<b>Class 1 vehicle drivers</b>	182
<b>Class 2 vehicle drivers</b>	3
<b>Hypoglycaemia - avoidance and awareness</b>	Blood glucose check before driving - 55.2% Hypoglycaemic "awareness" present - 55.4%

diabetes clinic, Details were gathered at routine clinic review about demographic data, medications, blood sugar monitoring and hypoglycaemia. We also collected data about their knowledge of current regulations and practice relating to driving, blood glucose testing, preventing hypoglycaemia and actions in the event of experiencing hypoglycaemic symptoms while driving.

## Results

We recruited 185 patients whose median age was 60 years (interquartile range 50-67) and of whom 72.5% were males (Table 1). The majority (182) drove Class 1 vehicles (3 drove Class 2 vehicles. 171 of 185 (92.4%) subjects were on hypoglycaemic agents (109 on insulin alone or in combination; 62 on sulphonylureas (SU) alone or in combination). 161 (87%) thought they monitored blood sugar levels regularly – of these 60% did so twice/day or more frequently.

## Diabetes and driving regulations

Only 123 out of 185 (66.5%) subjects had been informed about diabetes and driving regulations by their health care professionals - but 77% of those on insulin had 131 (of 165 who responded) i.e. 79%, felt their knowledge was adequate about diabetes and driving regulations, and only 34 (21%) requested more information. Of the 108 subjects on insulin, 83 (77%) had been advised to inform the DVLA, as the regulations require; 25 (23%) had not.

## Hypoglycaemia, and "hypoglycaemic awareness"

61 of 180 patients (34%, all insulin treated) had experienced a hypoglycaemic episode during the previous 12 months - 9 (15.5%) required third party assistance (family, paramedic, hospital). However, none of them reported an accident during hypoglycaemia. When asked about "hypoglycaemic awareness", 102 (55.4%) reported awareness and 82 (44.6%) reported no awareness of hypoglycaemia. One subject had never had a hypoglycaemic episode.

## Preventing and managing hypoglycaemia while driving

Only 89 (55.2% of 161) on hypoglycaemic agents admitted to checking blood sugar levels before driving

(times varying between "just before driving" to 2 hours before driving). During driving, 18 subjects checked blood sugar levels up to every 2 hours; 2 checked every 2-3 hours; 10 never checked whatever the journey time was; and the rest undertook short trips, drove only locally etc. No information was available for the majority. 9 subjects (5%) had experienced 1 or more episodes of hypoglycaemia during driving; 158 reported none (there was no information for 18).

Only 41 subjects responded to questions inquiring about corrective actions if they developed hypoglycaemia during driving - of them all said they would stop; 10 said they would take glucose or a glucose containing drink; and 24 would wait for between 30-120 minutes before resuming driving (4 would wait only for 20 minutes; 6 would wait for blood sugar levels to rise with no specified level given).

## Discussion

This prospective study of 185 diabetic subjects, who drive motor vehicles for leisure or business, confirms shortcomings in knowledge and practice amongst both patients and healthcare professionals. The main concerns relate to the following - (a) Deficits in knowledge about driving regulations, both amongst healthcare professionals and diabetic patients (only two thirds had been informed by health care professionals about diabetes and driving, but nearly 80 percent felt their knowledge was satisfactory); (b) Lack of awareness of the need to inform regulatory authorities of the use of insulin (only 77% of those on insulin had been advised by healthcare professionals); (c) Lack of awareness of strategies regarding anticipating and managing hypoglycaemia before and during driving (only 55% checked blood glucose levels before driving and the majority who undertook long trips, did not). These findings in general reflect findings in other similar studies [7,8]. The high prevalence of a lack of "hypoglycaemic awareness" in this group of subjects is unexplained. Previous studies have found a prevalence of 29% amongst T1DM subjects [9] and 8% in insulin treated T2DM subjects [10]. But it is likely that not using validated questions in this study, partly accounted for this.

Only a third of subjects in this group reported hypoglycaemia during the previous 12 months and of them only 15.5% required third party help. 9 of 167 who responded reported hypoglycaemia while they were driving. No accidents were reported as a result of these hypoglycaemic episodes. However, we are unable to comment on behavior during driving, as the responses provided were insufficient for analysis.

## Conclusions

The education of both healthcare professionals and patients about all aspects of diabetes and driving should become a priority. We recommend the following at every patient and healthcare professional contact - (a) Reinforcement of information about driving regulations, particularly in insulin treated diabetics; (b) Discussion about hypoglycaemia during driving, its recognition, avoidance and treatment; (c) Obtaining detailed information about hypoglycaemic unawareness in every insulin treated subject. This important aspect of diabetes management needs to attain a higher priority amongst both patients and healthcare professionals in current practice.

## Author Contributions

INK helped conceive the idea for the study, collected data and helped in writing the manuscript; MAA and FC helped in analyzing the data and writing the manuscript; LDP conceived the idea for the study, designed the proforma for data collection, analysed the data and wrote the manuscript. All authors have approved of the final manuscript before submission.

## Conflicts of Interest

All authors declare that they have no Conflicts of interest.

## Acknowledgements

MA Adlan is the guarantor for this paper.

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