Impaired Awareness of Hypoglycemia and Severe Hypoglycemia in Drivers With Diabetes: Insights From the Association of British Clinical Diabetologists Nationwide Audit

https://doi.org/10.2337/dc21-1181

Hypoglycemia is an acute complication in people living with diabetes, with 83% of those with type 1 diabetes experiencing hypoglycemia at least once a month and even higher rates of 5 events per week recorded on continuous glucose monitoring (1). There are limited population-based data on the prevalence of impaired awareness of hypoglycemia (IAH) and severe hypoglycemia (SH) in drivers with diabetes in the U.K. and worldwide. The availability of these data can inform policy decisions and help optimize treatment options for people living with diabetes (2).

To understand the prevalence of IAH and SH in drivers with diabetes, we obtained data from the nationwide audit of FreeStyle Libre (FSL), conducted by the Association of British Clinical Diabetologists (ABCD). Baseline pre-FSL data included demographics, HbA1c values from the previous 12 months, Gold score (3) (to assess hypoglycemia awareness), and SH. Rates of recurrent SH, defined as two or more episodes of hypoglycemia requiring third-party assistance in the 12 months prior to FSL initiation (4), were documented by clinicians.

The study consisted of 13,127 adults (aged ≥17 years) with diabetes, and information about driving was available for 4,262 (96% type 1 diabetes) of those (3,210 drivers and 1,052 nondrivers). Of those with a driving license, 3,182 had a group 1 driving license (a license to drive a motor car and a motorcycle), 25 had a group 2 driving license (a license for large goods vehicles [lorries or trucks], passenger-carrying vehicles [buses], and horse boxes), and 3 had a taxi license. Information about the Gold score was available for 2,849 people with either a group 1 or group 2 driving license. Overall, the prevalence of IAH was 21.8% (622/2,849), and the prevalence of complete loss of awareness of hypoglycemia, defined in this cohort as Gold = 7, was 1.4% (41/2,849). In those with a group 1 license, 22% (n = 622/2,823) had IAH (Gold ≥4); 1.4% (41/2,823) had a Gold score of 7, and 5% (147/2,823) had experienced more than 1 episode of SH in the preceding 12 months. None of the participants with a group 2 driving license or taxi license had complete loss of hypoglycemia awareness. One participant reported a single episode of SH; none experienced more than one episode of SH in the preceding year. Of the group 2 drivers, only 73% reported full awareness of hypoglycemia (defined as a Gold score of 1).

Drivers living with diabetes were slightly older (mean ± SD 44.4 ± 15.2 vs. 41.3 ± 18.3 years; $P < 0.00001$) and more likely to be male (54% vs. 44%; $P < 0.0001$), with a shorter duration of diabetes (21.7 ± 37.9 vs. 26.8 ± 36 years; $P < 0.0001$), than nondrivers.

Drivers had a lower baseline HbA1c (70.6 ± 19.4 [8.6%] vs. 75.06 ± 19.14 mmol/mol [9%]; $P < 0.0001$) and lower Gold score (2.35 ± 1.5 vs. 3.30 ± 1.96; $P < 0.0001$) than nondrivers.
Diabetes

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$P$ = 0.0001, have a longer duration of diabetes ($P = -0.00003$) and lower baseline HbA1c ($P = 0.04$), and have “frequent hypoglycemia” as an indication for FSL initiation ($P < 0.0001$). The regression analysis shows that higher age ($\beta = 0.001, P = 0.02$), longer duration of diabetes ($\beta = 0.001, P = 0.001$), and frequent hypoglycemia as indications for FSL initiation ($\beta = 0.15, P < 0.0001$) were significantly and independently associated with GOLD score in drivers.

Overall, 41 people who were group 1 drivers with diabetes were reported as having complete loss of hypoglycaemia awareness (defined as a Gold score of 7), and 147 had experienced ≥1 SH epi-

sode in the previous 12 months. Of the group 2 drivers, only 73% had full awareness of hypoglycemia (defined as a Gold score of 1), and one participant had a reported SH episode in the pre-

ceding 12 months.

These data suggest that the impaired awareness of hypoglycemia is prevalent in drivers with diabetes but lower than the prevalence in nondrivers. Complete loss of hypoglycaemia awareness was rare. In keeping with previous data (5), impaired awareness of hypoglycemia was associated with increasing age, longer duration of diabetes, and frequent epi-

sodes of hypoglycemia. Less than one-

tenth of drivers had experienced SH in the year prior to FSL initiation. Overall, these data provide useful insights into the prevalence of problematic hypoglycemia in people with diabetes who hold a driving license.

Table 1—Demographic and clinical characteristics of people with diabetes with and without IAH

| Characteristic               | Impaired awareness of hypoglycemia (Gold ≥4) (n = 622) | Normal awareness of hypoglycemia (Gold <4) (n = 2,227) | $P$ value |
|-----------------------------|--------------------------------------------------------|--------------------------------------------------------|-----------|
| Age (years)                 | 49.2 ± 15.5                                            | 43.2 ± 15.0                                            | <0.0001   |
| Female sex, n (%)           | 287 (46)                                               | 991 (44)                                               | 0.85      |
| Baseline BMI                | 26.7 ± 6.1                                             | 26.9 ± 5.6                                             | 0.5       |
| Duration of diabetes (years)| 24.9 ± 15.3                                            | 20.9 ± 44.4                                            | 0.0003    |
| Insulin pump use, n (%)     | 110 (17)                                               | 394 (17)                                               | 0.45      |
| Mean pre-FSL HbA1c, mmol/mol (%) | 69.4 ± 20.1 (8.5)                                      | 71.2 ± 19.7 (8.7)                                      | 0.04      |
| Frequent hypoglycemia as indication for FSL initiation, n (%) | 231 (37)                                               | 391 (17)                                               | <0.0001   |

Data are mean ± SD unless otherwise indicated. $P$ values are from t test or $\chi^2$ test. ($P$ value <0.05)

Acknowledgments. The authors thank all the clinicians and support staff who participated in the nationwide study, listed at https://abcd.care/Resource/ABCD-Freestyle-Libre-Audit-Contributors.

Funding. The ABCD nationwide FSL audit is supported by a grant from Abbott Laboratories. H.D. is funded by a National Institute for Health Research clinical lecturership.

Duality of Interest. E.G.W. has received personal fees from Abbott Diabetes Care, Dex-

com, Eli Lilly, Insulet, Medtronic, Novo Nordisk, and Sanofi. P.C. has received personal fees from Abbott Diabetes Care, Dex-

com, Eli Lilly, Insulet, Medtronic, Novo Nordisk, and Sanofi. P.C. is also an honorary member of the Medical Advisory Panel on Diabetes to the Secretary of State for Trans-

port. C.W. has a spouse/partner serving on the advisory panel for Celgene and on the speakers bureau for LEO Pharma and Novartis. R.E.J.R. serves on the advisory panel for Novo Nordisk A/S and on the speakers bureau for BioQuest. T.S. is on the speakers bureau for the Novo Nordisk Foundation and reports a relationship with Bristol-Myers Squibb, Eli Lilly and Company, and Sanofi. The FSL audit was independently initiated and performed by ABCD, and the authors remain independent in the analysis and preparation of this report. No other potential conflicts of interest relevant to this article were reported.

Author Contributions. H.D., E.G.W., C.W., R.E.J.R., and T.S. conceived the presented idea. H.D., E.G.W., C.W., R.E.J.R., and T.S. contributed to the data analysis. H.D. wrote the first draft of the manuscript. All of the authors contributed to the writing of the manuscript and made extensive comments, criticisms, and changes to the final draft of the paper. All of the authors saw the final version of the manuscript. H.D. is the guaran-
tor of this work and, as such, had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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