Medical Xpress

Ground-breaking safety protocol has successfully allowed pilots with diabetes to work

September 25 2020

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A new study presented at this year's Annual Meeting of the European Association for the Study of Diabetes (EASD) shows that the

introduction of a new safety protocol has successfully enabled people with insulin-treated diabetes to work as commercial pilots, and could potentially allow individuals with the condition to perform other "safety-critical" jobs such as bus drivers or maritime workers.

The study was conducted by Dr. Gillian Garden and colleagues at the Department of Metabolism and Ageing, University of Surrey, Guildford, UK, as well as researchers and industry professionals from universities and civil aviation authorities in the UK, Ireland, and Austria. Its goal was to evaluate the performance and safety impact of a new protocol that enabled certificated pilots with insulin-treated diabetes to fly commercial aircraft for the first time.

Strict health requirements are imposed on pilots and air crew to ensure a very high standard of safety and minimise the risk of a commercial aircraft carrying passengers from being involved in a potentially catastrophic accident. The risk of hypoglycaemia in people with insulin-treated diabetes has for many years debarred them from working in certain 'safety-critical' jobs, including flying commercial airliners. Hypoglycaemia occurs when blood glucose becomes too low and can cause potentially very hazardous side effects including dizziness, reduced cognitive performance, memory problems, shaking, blurred vision, confusion, and in the worst cases, unconsciousness and eventually death. Further complications that can result from diabetes can reduce flying performance such as retinal damage, which can lead to sight loss, and nerve damage which can cause pain or loss of sensation, particularly in the feet.

The UK, together with Ireland and Austria introduced a ground-breaking safety protocol for certificated pilots with insulin-treated diabetes, and now have the largest number of people in the world with the condition working as commercial pilots. Anyone with diabetes is subjected to strict oversight including glucose monitoring during duty periods, and frequent

clinical health reviews.

The team performed an observational study of 49 pilots with insulin-treated diabetes who had been granted medical certification to fly commercial (Class 1 certificate) and non-commercial (Class 2 certificate) aircraft. Clinical details, pre and in-flight (hourly and 30 minutes pre-landing) blood glucose values were compared with the protocol-specified ranges: 'Green' (5-15mmol/L), 'Amber' (low 4-4.9mmol/L, high 15.1-20mmol/L), and 'Red' (low 20.0mmol/L).

This "traffic light" system classifies blood glucose levels as "acceptable" (green), "caution" (amber), or "immediate action required" (red). In the case of a "red" low reading for example, the pilot is required to immediately hand over duties to the co-pilot or, if flying solo, consider landing as soon as is practical. They must also consume 10-15g of readily absorbed carbohydrate and re-test their blood sugar level after 15 minutes.

Participants in the study had either type 1 (84%) or type 2 (16%) diabetes and had been issued with Class 1 (61%), or Class 2 (39%) medical certificates. Most were male (96%), with a median age of 44 years, a median diabetes duration of 10.9 years, and a median follow-up period of 4.3 years after the receipt of their medical certificate.

Pilots had a mean glycated haemoglobin (HbA1C—a measure of average blood sugar over the previous 3 months) level of 55.0 mmol/mol (7.2%), and a post-certification mean of 55.1 (7.2%). A total of 38,621 blood glucose measurements were taken during 22,078 flying hours, of which 97.69% were within the 'Green' range, 1.42% within the low 'Amber range and 0.75% within the high 'Amber range. Only 0.12% of measurements fell within the low 'Red' range, and just 0.02% were within the high 'Red' range. Out of range readings declined from 5.7% in 2013 to 1.2% in 2019, while no episodes of pilot incapacitation occurred

and none of the study participants showed a deterioration of their glycaemic control during the 7.5 years of the study. Use of a "traffic light" system provided a straightforward way of alerting pilots of the need to take preventive action to avoid impairment of performance or decision making that could arise from unduly high or low blood glucose levels.

The authors conclude that the protocol is practical and feasible to implement and has performed well. There were no reports of pilot incapacitation during flights, and no events occurred in which safety was compromised. They point out that this study represents the most extensive data set for people with insulin-treated diabetes working in a "safety-critical" occupation. The team suggest: "These data should help to inform the debate about whether people with insulin-treated diabetes can perform some safety-critical occupations, and similar safety protocols may be devised and tested for this purpose."

The researchers note: "As a group, pilots are highly trained and well-motivated, and they generally manage their diabetes with considerable care. They are accustomed to frequently monitoring instruments during flight and had no problem accommodating additional glucose monitoring. In this study they were able to successfully balance close adherence to the protocol with maintenance of excellent long-term glycaemic control." They also highlight: "Another facet of the protocol that should be noted is the ongoing surveillance for micro- and cardiovascular complications, which could adversely affect flying skills."

Provided by Diabetologia

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