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Role of continuous glucose monitoring in preventing severe hypoglycemia in people with type 1 diabetes:

a population-based study conducted in Andalusia (Spain)

Severe hypoglycemia remains one of the most feared acute complications among people with type 1 diabetes. Although therapeutic advances have markedly improved glycemic

control over recent decades, many people with diabetes continue to experience episodes of hypoglycemia that can compromise their safety and quality of life and, in some cases, require urgent medical care.

The introduction of continuous glucose monitoring (CGM) has represented one of the most important changes in diabetes management since the advent of modern insulins. Beyond facilitating daily monitoring of glucose levels, this technology provides real-time information on glycemic trends and patterns, making it possible to anticipate risk situations and intervene before complications arise.

The experience gained in Andalusia (Spain) over recent years provides an exceptional opportunity to assess the real-world impact of this technology on the prevention of severe hypoglycemia.

WHY IS SEVERE HYPOGLYCEMIA SO IMPORTANT?

Hypoglycemia occurs when blood glucose levels fall below the normal range. In many cases, it can be easily corrected by consuming carbohydrates. However, when a person requires assistance from another individual to resolve the episode or needs urgent medical care, the event is considered severe hypoglycemia.

These situations can cause loss of consciousness, seizures, accidents, trauma, or hospital

admission. They also impose a substantial emotional burden on both people with diabetes and their families.

The so-called “fear of hypoglycemia” is one of the main barriers to achieving good glycemic control. Many people deliberately maintain higher glucose levels to reduce the risk of experiencing severe episodes, which may contribute to the development of long-term chronic complications.

Therefore, preventing severe hypoglycemia is one of the main priorities in the treatment of people with type 1 diabetes.

HOW CGM HELPS

CGM provides virtually continuous information on changes in interstitial glucose through a sensor placed on the skin.

Unlike conventional capillary blood glucose monitoring, CGM provides not only the current glucose value but also the direction and rate of change. This makes it possible to identify potentially dangerous situations before hypoglycemia occurs.

Additionally, current systems include alarms that alert users when glucose levels are fa-»

CGM MAKES
IT POSSIBLE TO
ANTICIPATE MANY
HYPOGLYCEMIC
EPISODES
BEFORE THEY
BECOME SEVERE

WHY DOES SEVERE HYPOGLYCEMIA MATTER?



- It can cause loss of consciousness, accidents, and hospital admissions.
- It causes fear and reduces quality of life.
- Its prevention is a key objective in type 1 diabetes.

CONTINUOUS GLUCOSE MONITORING HELPS PREVENT IT



Real-time information, trends, and alerts make it possible to anticipate drops in glucose levels and take timely action.

ANDALUSIA: LARGE-SCALE REAL-WORLD EXPERIENCE



- 13,600 adults with type 1 diabetes.
- Before and after the implementation of flash glucose monitoring in 2020.
- Data from out-of-hospital emergency services throughout the region.

FEWER EPISODES OF SEVERE HYPOGLYCEMIA AFTER THE IMPLEMENTATION OF FLASH GLUCOSE MONITORING

Episodes of severe hypoglycemia requiring emergency care per 10,000 person-years.



358,6

BEFORE
(2018–2019)

-27%

Relative reduction in severe hypoglycemia.

260,9

AFTER
(2018–2019)



Mean reduction in glycated hemoglobin (HbA1c).

-0,35%

WHO IS AT GREATER RISK?

FACTORS THAT INCREASE RISK

- History of severe hypoglycemia.
- Nocturnal hypoglycemia.
- A greater number of comorbidities.

PROTECTIVE FACTOR



The use of continuous glucose monitoring is associated with a lower risk of severe hypoglycemia.



MAIN CONCLUSION

Population-wide implementation of continuous glucose monitoring in Andalusia was associated with a substantial reduction in severe hypoglycemia and improved glycemic control. Technology, together with education and personalized care, is key to continuing to prevent these episodes and improving the safety of people with type 1 diabetes.

THE ANDALUSIAN EXPERIENCE SHOWS THAT THE IMPLEMENTATION OF GLUCOSE SENSORS CAN RESULT IN FEWER EMERGENCIES AND GREATER SAFETY FOR PEOPLE WITH DIABETES



» lling rapidly or approaching low values, thereby enabling early intervention.

Because of these features, CGM has become a fundamental tool for improving the safety of insulin therapy and reducing the daily burden associated with diabetes management.

ANDALUSIA: A LARGE-SCALE REAL-WORLD EXPERIENCE

In January 2020, the Sistema Sanitario Público de Andalucía began publicly funding flash glucose monitoring systems for adults with type 1 diabetes.

Implementation was carried out uniformly throughout the autonomous community and was accompanied by structured therapeutic education programs, making it possible to subsequently assess outcomes under real-world clinical practice conditions.

To evaluate the impact of this measure, investigators analyzed changes in severe hypoglycemic episodes requiring urgent care from out-of-hospital emergency services among more than 13,600 adults with type 1 diabetes.

The results provide one of the largest population-based experiences published to date on the use of CGM within a public health care system.

FEWER SEVERE HYPOGLYCEMIC EPISODES AFTER THE IMPLEMENTATION OF FLASH GLUCOSE MONITORING

The analysis showed a significant reduction in severe hypoglycemia after the introduction of flash glucose monitoring.



» Before the use of glucose sensors, approximately 359 severe episodes were recorded per 10,000 person-years. After implementation of the technology, this figure dropped to 261 episodes per 10,000 person-years.

Overall, this represents a reduction of approximately 27% in episodes requiring emergency medical care.

One of the most relevant findings was that the benefit became apparent within the first few months of use and was maintained throughout the follow-up period. Moreover, the reduction was particularly marked among older individuals, one of the groups most vulnerable to the consequences of hypoglycemia.

These results are particularly important because they reflect what occurs outside clinical trials, in the everyday lives of thousands of people receiving care at health centers and hospitals throughout Andalusia.

In addition to the reduction in severe hypoglycemia, an overall improvement in glycemic control was also observed, with a mean reduction in glycated hemoglobin (HbA1c).

NOT EVERYONE HAS THE SAME LEVEL OF RISK

Although CGM has contributed substantially to reducing the frequency of severe hypoglycemia, these complications have not disappeared completely.

Therefore, the Andalusian multicenter SEHYPAN study was recently con-

ducted to identify the factors that can help recognize people at greater risk of experiencing severe hypoglycemia.

The results showed that several factors clearly increase the likelihood of new episodes. These include a history of previous severe hypoglycemia, the presence of nocturnal hypoglycemia, and multiple associated diseases.

By contrast, the use of CGM systems was independently associated with a lower risk of severe hypoglycemia.

These findings reinforce the concept that technology is an essential tool, but one that must be integrated into a broader strategy involving personalized care, therapeutic education, and clinical follow-up.

LOOKING INTO THE FUTURE

CGM technology continues to advance rapidly. Current systems offer increasingly greater accuracy, improved alarms, and enhanced integration with mobile applications and automated insulin-delivery systems.

At the same time, identifying high-risk profiles will make it possible to develop specific preventive strategies aimed at those most likely to benefit.

The combination of technology, education, and personalized medicine probably represents the best available strategy for continuing to reduce the impact of severe hypoglycemia among people with type 1 diabetes. **D**

CONCLUSIONS

- Severe hypoglycemia remains one of the main acute complications affecting people with type 1 diabetes.
- CGM makes it possible to detect risk situations early and intervene before severe episodes occur.
- Population-wide implementation of flash glucose monitoring in Andalusia was associated with a significant reduction in hypoglycemic episodes requiring urgent care.
- A past medical history of severe hypoglycemia and nocturnal hypoglycemia identifies people at greater future risk.
- The combination of technology, therapeutic education, and personalized care represents the best strategy for preventing severe hypoglycemia.

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