Continuous Glucose Monitoring Initiation is Associated with Reduced Mortality in Older Patients with Type 1 Diabetes: A Target Trial Emulation Study Using National Healthcare Data

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Among 8,423 eligible participants, 1,039 initiated CGM. CGM initiation was associated with lower all-cause mortality over 1–4 years, with risk ratios declining from approximately 0.90 at 1 year to 0.84 (95% CI: 0.72–0.97) at 4 years, corresponding to an absolute risk reduction of approximately 2 percentage points (estimated number needed to treat: 49). In exploratory subgroup analyses, estimates were larger among people aged over 65 years and those not using insulin pumps; although these groups substantially overlap, the findings require confirmation. CGM initiation was also associated with a modest additional reduction in HbA1c. However, reductions in hospitalisation, severe hypoglycaemia, and cardiovascular events were not statistically significant in the overall cohort. Negative-control outcomes showed no apparent association, providing some reassurance against residual confounding.

SUMMARY OF KEY RESEARCH FINDINGS

This study examined whether initiating continuous glucose monitoring (CGM) is associated with lower mortality in adults with Type 1 diabetes (T1D), an outcome beyond the established benefits of improved glycaemic control and reduced hypoglycaemia.[1] In this observational analysis, investigators used Veterans Health Administration (VHA) healthcare records to emulate a pragmatic, randomised trial. Adults with T1D who had a second endocrinology visit between 2017–2020 were assigned to CGM initiation or no initiation, with a 6-month window to initiate CGM. Cloning, artificial censoring, and inverse-probability weighting were used to address treatment change from treatment assignment, loss to follow-up, and measured confounding.

WHAT CHALLENGE DOES THIS ADDRESS?

Mortality in T1D remains substantially higher than in the general population despite advances in insulin therapy and diabetes technology.[2] Most CGM research has focused on HbA1c, time in range, hypoglycaemia, and quality of life, leaving uncertainty about whether these benefits translate into improved survival.[3,4] This study addresses that evidence gap using a large, clinically representative dataset and a sophisticated causal-inference approach to examine the effect of CGM initiation on mortality.[5] Although the results were robust and persisted in sensitivity analyses, the findings demonstrate an association rather than definitive proof of causality. Residual confounding, differences in healthcare engagement, and selection of patients able to obtain or use CGM remain possible explanations.

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RELEVANCE TO EUROPEAN PRACTICE

The findings support current European emphasis on offering CGM to adults with insulin-treated diabetes, particularly those at risk of hypoglycaemia or experiencing difficulty achieving glycaemic targets. Potential mortality benefits in T1D would strengthen the case for equitable access, structured education, and continued reimbursement across European health systems. The greater estimated mortality reductions among older adults and people not using insulin pumps are exploratory and merit further study, because these groups may have higher baseline risk and are sometimes underrepresented in technology-based care.

The cohort was predominantly older, White, and male veterans receiving specialist care in the USA. European clinicians should therefore avoid assuming identical effects across women, younger adults, diverse ethnic populations, healthcare systems, or device-access models.

WHAT ARE THE NEXT STEPS FOR THE RESEARCH?

Further prospective studies should confirm whether CGM directly reduces mortality and examine the mechanisms involved, such as prevention of severe hypoglycaemia, diabetic ketoacidosis, cardiovascular events, and improvements in time in range or glycaemic variability. European registry studies and pragmatic randomised trials should assess effectiveness in women, younger people, socially disadvantaged populations, and those using different insulin-delivery systems. Until such evidence is available, CGM should be viewed as an important component of comprehensive T1D care, while mortality claims remain promising but not conclusive. Research should also evaluate how CGM adherence and discontinuation affect outcomes as well as assess the cost-effectiveness of CGM use in distinct diabetes populations. Future studies should determine whether CGM-induced changes in time in range or glycaemic variability mediate improvements in clinical outcomes and prospectively evaluate candidate treatment targets. This would also greatly strengthen the argument that use of CGM may have direct favourable effects on outcomes and help identify the optimal CGM metrics and targets to achieve these benefits.

References

1. Reaven PD et al. Continuous glucose monitoring initiation is associated with reduced mortality in older-onset Type 1 diabetes patients: a target trial emulation study within the Veterans Health Administration. Diabetes Care. 2026;49(9):1589-98.
2. Rawshani A et al. Excess mortality and cardiovascular disease in young adults with Type 1 diabetes in relation to age at onset: a nationwide, register-based cohort study. Lancet 2018; 392(10146):477-86.
3. Lind M et al. Continuous glucose monitoring vs conventional therapy for glycemic control in adults with Type 1 diabetes treated with multiple daily insulin injections: the GOLD randomized clinical trial. JAMA. 2017;317(4):379-87.
4. Ruedy KJ et al. Continuous glucose monitoring in older adults with Type 1 and Type 2 diabetes using multiple daily injections of insulin: results from the DIAMOND trial. J Diabetes Sci Technol. 2017;11(6):1138-46.
5. Hernán MA et al. The target trial framework for causal inference from observational data: why and when is it helpful? Ann Intern Med. 2025;178(3):402-7.