Technoleg Iechyd Cymru
Health Technology Wales

# Topic Exploration Report [1]

## Real-time continuous glucose monitoring for people with diabetes who require treatment with insulin

### What is a Topic Exploration Report?

Topic Exploration Reports are not health technology assessments. These reports provide a high-level briefing on new topics submitted to Health Technology Wales and are not based on exhaustive or systematic literature searches. Instead, they rely on a focussed scan of key resources.

### What evidence is used in a Topic Exploration Report?

Priority is given to summarising the most relevant or useful evidence, rather than covering all possible evidence. Information reported is typically based on abstracts and study authors' own conclusions, rather than detailed scrutiny of full texts.

### What are the aims of a Topic Exploration Report?

Topic Exploration Reports offer an overview of the available evidence on a topic and aim to highlight any uncertainties or gaps in the evidence. These reports outline the quantity and type of evidence found, but no critical appraisal or formal evidence synthesis is conducted.

### How should a Topic Exploration Report be used?

Topic Exploration Reports can be used to indicate what evidence may be available for a topic, and do not provide definitive guidance on how a technology should be used. The evidence presented within the reports should be interpreted with caution.

[1] Cyfieithu dogfennau HTW wedi'u cyhoeddi o'r Saesneg i'r Gymraeg
Translation of published technical HTW documents from English into Welsh

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| **Topic exploration report number** | TER620 |
| **Topic** | Real-time continuous glucose monitoring for people with diabetes who require treatment with insulin |
| **Summary of findings** | Diabetes requires monitoring of glucose levels to ensure correct management. Continuous glucose monitoring (CGM) includes intermittently scanned (isCGM) or real-time (rtCGM) systems. FreeStyle Libre 2, the only isCGM device available in the UK, has been discontinued as of August 2025 and rtCGM has largely supplanted its use.<br><br>Health Technology Wales (HTW) researchers searched for evidence on the clinical and cost effectiveness of rtCGM in people with diabetes who require treatment with insulin. HTW has previously issued guidance recommending rtCGM use in pregnant women with type 1 diabetes, and four NICE guidelines on diabetes were identified. These covered adults with type 1 diabetes, adults with type 2 diabetes, diabetes in pregnancy, and diabetes in children and young people, respectively. All four guidelines recommend considering or offering rtCGM to the populations of the guidance. A recent Scottish Intercollegiate Guidelines Network (SIGN) guideline also recommends offering CGM to pregnant people with diabetes and medical technology guidance from Singapore's Agency for Care Effectiveness recommends CGM for children and adults with type 1 diabetes. A rapid health technology assessment by Ireland's Health Information and Quality Authority found rtCGM offers some improvement in outcomes over self-monitoring of blood glucose, but economic outcomes were mixed, ranging from not cost effective to cost effective.<br><br>Four recent systematic reviews of CGM with meta-analyses were identified. One examined type 1, type 2 and diabetes in pregnancy, whilst the other three reviews included only one of these types of diabetes each. Continuous glucose monitoring was found to lead to improvement in some outcomes over self-monitoring of blood glucose.<br><br>There are multiple populations that CGM can be used with, and there appears to be a lack of evidence on children with type 2 diabetes and people with type 2 diabetes on once-daily insulin. It is unclear whether some evidence sources have reported results from isCGM and rtCGM separately or whether recommendations referring to 'CGM' include both device types. All guidelines and guidance were published before the announcement that isCGM devices would no longer be available in the UK. |

## Introduction and aims

Diabetes mellitus is a metabolic condition in which glucose levels are unusually elevated. There are four main diabetes classifications: type 1 diabetes, type 2 diabetes, gestational diabetes, and other diabetes types due to specific causes. Diabetes can be life-threatening if it is not managed appropriately.

Self-monitoring of blood glucose is the most common method of blood glucose monitoring, involving a finger-prick and the measurement of capillary glucose via a blood glucose meter. Continuous glucose monitoring uses a sensor under the skin to continually assess glucose levels and includes intermittently scanned continuous glucose monitoring (isCGM) or real-time continuous glucose monitoring (rtCGM) systems. In the former, glucose levels are measured continuously by the sensor, however the results are accessible only when the sensor is scanned by a reading device. Real-time continuous glucose monitoring systems continuously display glucose levels on a screen and notify the user of glucose fluctuations. The information displayed can also be downloaded to a computer or smartphone.

Health Technology Wales has previously issued guidance (GUI004-2) recommending the use of FreeStyle Libre 2, an isCGM device, in people with diabetes who require treatment with insulin (HTW 2021). However, FreeStyle Libre 2 has been discontinued as of August 2025 (Abbott 2025), and this was the only isCGM device available in the UK (NHS 2024). Topic experts have therefore asked HTW to reassess its guidance on continuous glucose monitoring devices due to this change in availability and, also, due to rtCGM use having largely supplanted isCGM.

Health Technology Wales researchers searched for evidence on the clinical and cost effectiveness of rtCGM in people with diabetes who require treatment with insulin.

## Evidence overview

This topic was the subject of a previous HTW topic exploration report: TER363 (HTW 2022). This TER into rtCGM for people with type 1 and type 2 diabetes identified several recently updated NICE guidelines (NG3, NG17, NG18 and NG28) and four technology appraisals undertaken to support the updates to guidance. Due to the recency of these updates at the time, HTW did not progress this topic to full appraisal.

### Guidance

HTW has previously issued guidance on the use of CGM in pregnant women with type 1 diabetes (HTW 2019). Based on evidence from four randomised controlled trials (RCTs), one economic study and de novo economic modelling, HTW recommended that adopting CGM for this population was supported by the evidence.

All four NICE guidelines included in TER363 were identified in searches for the current report and no new NICE guidelines were identified. Three of these guidelines have not been updated since the original TER:

- NG3 Diabetes in pregnancy: management from preconception to the postnatal period (NICE 2020). Updated 16 December 2020, recommends offering rtCGM to all pregnant women with type 1 diabetes.
- NG17 Type 1 diabetes in adults: diagnosis and management (NICE 2022a). Updated 17 August 2022, recommends adults with type 1 diabetes should be offered the choice of rtCGM based on their individual characteristics, preferences, needs, and the functionality of the devices available. If several devices meet the individual's needs and preferences, the device with the lowest cost should be offered.

## Evidence overview

- NG28 Type 2 diabetes in adults: management (NICE 2022b). Updated 29 June 2022, recommends considering rtCGM as an alternative to isCGM for adults with insulin-treated type 2 diabetes, if it is available for similar or lower cost and, in cases when the individual person is offered rtCGM but cannot or does not want to use it, self-monitoring of blood glucose should be offered.

The NICE guideline (NG18) on diagnosis and management of type 1 and type 2 diabetes in children and young people (NICE 2023) was last updated on 11 May 2023, after the publication of TER363. Existing recommendations prior to the 2023 update include offering rtCGM to all children and young people with type 1 diabetes, alongside education to support children and young people, and their families and carers, to use it; and offering a choice of rtCGM device, based on their individual preferences, needs, characteristics, and the functionality of the devices available. Further recommendations were added in the update to offer rtCGM to children and young people with type 2 diabetes if any of the following apply:

- they have a need, condition or disability (including a mental health need, learning disability or cognitive impairment) that means they cannot engage in monitoring their glucose levels by capillary blood glucose monitoring,
- they would otherwise be advised to self-monitor at least 8 times a day,
- they have recurrent or severe hypoglycaemia.

The guideline also recommends considering rtCGM for children and young people with type 2 diabetes who are on insulin therapy. Due to the limited evidence base on children and young people with type 2 diabetes, these recommendations were based on the evidence for children with type 1 diabetes and adults with type 2 diabetes.

The Scottish Intercollegiate Guidelines Network (SIGN) has published clinical guidelines on the management of diabetes in pregnancy (SIGN 2024). Recommendations include ensuring that all women with type 1 diabetes have access to CGM during pregnancy and consider CGM in pregnant women with type 2 diabetes. However, these recommendations do not distinguish between rtCGM and isCGM.

Singapore's Agency for Care Effectiveness (ACE) has published medical technology guidance on the use of CGM for children and adults with type 1 diabetes and recommends CGM systems can be considered for children and adults who, despite optimal use of insulin therapy and conventional blood glucose monitoring to achieve target HbA1c levels, experience disabling or problematic hypoglycaemia, or have unacceptably high HbA1c levels (at 7.5% or above), or are unable to recognise or communicate symptoms of hypoglycaemia (ACE 2024). It is not clear whether this recommendation applies to both rtCGM and isCGM.

### Health technology assessment

A rapid health technology assessment by Ireland's Health Information and Quality Authority (HIQA) of CGM in adults with type 1 diabetes was identified (HIQA 2023). Giving precedence to evidence used to inform NICE guideline NG17, as well as performing targeted additional searches, a search for economic evaluations and conducting a budget impact analysis, HIQA concluded that rtCGM offers some improvement in outcomes over self-monitoring of blood glucose and economic outcomes were mixed based on findings from 11 studies, ranging from not cost effective to cost effective at €20,000 per quality-adjusted life year (QALY).

### Secondary evidence

Four recent systematic reviews were identified. A systematic review and meta-analysis of CGM for type 1 diabetes, type 2 diabetes, and diabetes in pregnancy included studies up to October 2024 (Rizos et al. 2025). Sixty-four RCTs were included, though some of these assessed rtCGM

## Evidence overview

devices that differ from those considered in this report, such as professional systems that do not provide data to users. The review found rtCGM was superior to self-monitoring of blood glucose for outcomes including reduction in HbA1c, time in range, and decreased time above range, for both type 1 and type 2 diabetes. For diabetes in pregnancy, rtCGM was only superior to self-monitoring for time in range.

The three other systematic reviews all assessed CGM use for one type of diabetes only. For adults with type 1 diabetes, Alfadli et al. (2025) searched for comparative studies published up to April 2025 and included 27 studies, covering a range of CGM systems. They found that CGM significantly reduced HbA1c compared to self-monitoring. Real-time CGM was also found to be better than isCGM for time in range and hypoglycaemia reduction. For type 2 diabetes, a systematic review searched for evidence published up to August 2023 and included 17 RCTs comparing rtCGM to self-monitoring (Seidu et al. 2024). Meta-analyses found rtCGM reduced HbA1c, glycaemic medication effect score and user satisfaction compared with self-monitoring but increased the risk of adverse events. A systematic review and meta-analysis of CGM use in people with diabetes who are pregnant (including type 1, type 2 and gestational diabetes) included evidence published up to August 2024. Six studies comparing rtCGM to self-monitoring were included. However, it does not appear that results have been reported separately for the different types of CGM.

**ADDENDUM**

**Type 2 diabetes managed with once-daily insulin injection**

Stakeholders have raised that current NICE guidelines do not recommend use of rtCGM for people with type 2 diabetes treated with once-daily insulin. This population was felt to have access to isCGM in Wales under HTW GUI004-2. Therefore, some stakeholders are also concerned that withdrawal of this guidance will lead to this population no longer having access to CGM. So, we conducted an additional high-level literature search (on 6 January 2026) for evidence specifically on the clinical and cost effectiveness of rtCGM for people with type 2 diabetes using once-daily insulin. The aim of this search was to determine whether evidence existed that could be used to evaluate rtCGM in this specific population. However, no studies reporting the effectiveness of rtCGM solely or separately for people with type 2 diabetes who receive once-daily insulin were identified.

## Areas of uncertainty

- There are various types of diabetes, and so there are multiple populations that can use rtCGM. There appears to be evidence available for adult populations, and children with type 1 diabetes, but little for children with type 2 diabetes or people with type 2 diabetes who receive once-daily insulin.
- As HTW guidance on isCGM is now redundant, it will need to be withdrawn. However, consideration needs to be given as to whether this leaves a gap in provision of CGM for people in Wales.
- Recent guidance from NICE and SIGN is available that covers rtCGM across a range of types of diabetes. It is not known if NICE or SIGN plan to review any of their guidance in light of isCGM devices no longer being available in the UK.
- Some evidence sources were unclear whether they had analysed outcomes for isCGM and rtCGM separately.
- From high-level searches, it is unclear whether there is evidence comparing various rtCGM devices to each other.

## Literature search results

### Health technology assessments and guidance

ACE. (2024). Continuous glucose monitoring systems for children and adults with type 1 diabetes mellitus. Medical technologies guidance. Agency for Care Effectiveness. Available at: https://www.ace-hta.gov.sg/healthcare-professionals/ace-technology-guidances/medical-technology-guidance/continuous-glucose-monitoring-systems-for-children-and-adults-with-type-1-diabetes-mellitus/ [Accessed 19 August 2025].

HIQA. (2023). Rapid Health Technology Assessment of Continuous Glucose Monitoring in Adults with Type 1 Diabetes Mellitus. Health Information and Quality Authority. Available at: https://www.hiqa.ie/sites/default/files/2023-09/T1D-Report-September-2023.pdf [Accessed 19 August 2025].

HTW. (2019). Continuous glucose monitoring in pregnant women with type 1 diabetes. Guidance GUI012. Health Technology Wales. Available at: https://healthtechnology.wales/wp-content/uploads/2019/10/GUI012-Continuous-glucose-monitoring-in-pregnant-women-with-type-1-diabetes-English-3.pdf [Accessed 19 August 2025].

HTW. (2021). Freestyle Libre flash glucose monitoring for the management of diabetes. Guidance GUI004-2. Health Technology Wales. Available at: https://healthtechnology.wales/wp-content/uploads/2021/09/GUI004-FlashGM-FINAL.pdf [Accessed 19 August 2025].

HTW. (2022). Real-time continuous glucose monitoring of people with type 1 and 2 diabetes. Topic exploration report TER363. Health Technology Wales. Available at: https://healthtechnology.wales/wp-content/uploads/2023/01/TER363-Dexcom-ONE-v0.5-EG-web.pdf [Accessed 19 August 2025].

NICE. (2020). Diabetes in pregnancy: management from preconception to the postnatal period. NICE guideline NG3. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/guidance/ng3 [Accessed 19 August 2025].

NICE. (2022a). Type 1 diabetes in adults: diagnosis and management. NICE guideline NG17. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/guidance/ng17 [Accessed 19 August 2025].

NICE. (2022b). Type 2 diabetes in adults: management. NICE guideline NG28. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/guidance/ng28 [Accessed 19 August 2025].

NICE. (2023). Diabetes (type 1 and type 2) in children and young people: diagnosis and management. NICE guideline NG18. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/guidance/ng18 [Accessed 19 August 2025].

SIGN. (2024). Management of diabetes in pregnancy. Clinical guideline SIGN 171. Scottish Intercollegiate Guidelines Network. Available at: https://www.sign.ac.uk/media/2205/sign-171-management-of-diabetes-in-pregnancy.pdf [Accessed 19 August 2025].

### Evidence reviews and economic evaluations

Alfadli SF, Alotaibi YS, Aqdi MJ, et al. (2025). Effectiveness of continuous glucose monitoring systems on glycemic control in adults with type 1 diabetes: A systematic review and meta-analysis. Metabolism Open. 27: 100382. doi: https://doi.org/10.1016/j.metop.2025.100382

Burk J, Ross GP, Hernandez TL, et al. (2025). Evidence for improved glucose metrics and perinatal outcomes with continuous glucose monitoring compared to self-monitoring in diabetes during

pregnancy. American Journal of Obstetrics and Gynecology. Online ahead of print. doi: https://doi.org/10.1016/j.ajog.2025.04.010

Rizos EC, Markozannes G, Charitakis N, et al. (2025). Continuous glucose monitoring in type 1 diabetes, type 2 diabetes, and diabetes during pregnancy: a systematic review with meta-analysis of randomized controlled trials. Diabetes Technology and Therapeutics. 27(7): 537-52. doi: https://doi.org/10.1089/dia.2024.0599

Seidu S, Kunutsor SK, Ajjan RA, et al. (2024). Efficacy and safety of continuous glucose monitoring and intermittently scanned continuous glucose monitoring in patients with type 2 diabetes: a systematic review and meta-analysis of interventional evidence. Diabetes Care. 47(1): 169-79. doi: https://doi.org/10.2337/dc23-1520

**Background information**

Abbott. (2025). The FreeStyle Libre 2 system. Abbott. Available at: https://www.freestyle.abbott/uk-en/products/freestyle-libre-2.html [Accessed 19 August 2025].

NHS. (2024). Continuous glucose monitoring and hybrid closed loop for diabetes. NHS England. Available at: https://www.nhs.uk/tests-and-treatments/cgm-and-hcl-for-diabetes/ [Accessed 19 August 2025].

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| **Date of search** | August 2025 (partially updated January 2026) |
| **Concepts used** | Real-time continuous glucose monitoring, rtCGM, CGM, diabetes, diabetes mellitus, DM, insulin |

# Proposed research question and evidence selection criteria (if selected)

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| **Proposed Research question** | **What is the clinical and cost effectiveness of real-time continuous glucose monitoring in people with diabetes who require treatment with insulin?** |

| | Inclusion criteria | Exclusion criteria |
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| **Population** | Adults and children with type 1 or type 2 diabetes treated with insulin | |
| **Intervention** | Real-time continuous glucose monitoring<br>See CGM comparison chart for list of devices currently available in the UK | • Flash/intermittently scanned continuous glucose monitoring<br>• Hybrid closed loop systems<br>• 'Professional' monitoring systems, such as those that only make data available to healthcare professionals and not to system users |
| **Comparison/ Comparators** | • Self-monitoring of blood glucose<br>• Flash glucose monitoring<br>• Comparison between different rtCGM devices (if evidence allows) | |
| **Outcome measures** | • HbA1c<br>• Glucose levels<br>• Time in range<br>• Hypoglycaemia – frequency; duration<br>• Hyperglycaemia/diabetic ketoacidosis – frequency; duration<br>• Fear of hypoglycaemia (worry)<br>• Diabetes distress<br>• Patient satisfaction<br>• Adverse events from testing or treatment<br>• Frequency of glucose monitoring (SMBG of continuous glucose monitoring)<br>• Health care utilisation (including hospital admissions)<br>• (Patient-reported) usability<br>• Health related QoL<br>• Resource use<br>• Economic outcomes | |

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| **Proposed speciality** | Endocrine, nutritional and metabolic |