Using real-time continuous glucose monitoring (rtCGM) in primary care: Introducing the Dexcom ONE

What is rtCGM?

Until recently, self-monitoring of blood glucose was mostly conducted via capillary glucose tests, which only offer a snapshot of current glucose levels. Additional information, such as glycaemic trends and trajectories, was only available if a person performed several tests over a short period of time. Unfortunately, capillary glucose monitoring is invasive and often painful, which limits the willingness of people living with diabetes to intensively monitor this information.

Real-time continuous glucose monitoring (rtCGM) measures the glucose level of the interstitial fluid (the fluid in between the cells) via an enzyme-coated filament attached to a sensor that is fixed to the skin of the upper arm or abdomen (in children aged 2–17 years the sensor can be attached to the upper buttock area). A reading is taken every 5 minutes (i.e.: 288 tests in 24 hours); this information is then transmitted in real time to a platform that displays the glucose profile – most frequently to the person's phone. In the event that a person's phone is incompatible with the system, a dedicated reader can also be made available for use.[1] In addition to the current glucose level, this platform displays the glucose trends over variable time periods and the predicted trajectory thereof. This information provides a comprehensive picture of glucose excursion — something that capillary glucose monitoring is unable to provide. Access to this information allows corrective action to be taken, with the aim to maximise the duration of normoglycaemia (glucose levels between 3.9 and 10.0 mmol/L).[2]

What is the evidence to support the use of CGM?

The development of CGM devices represents a significant advance in convenient, data-driven diabetes management.[3] Studies have demonstrated the cost-effectiveness of CGM devices compared to self-monitoring of blood glucose (SMBG) and the associated improvement in glycaemic variability and subsequent reduction in A1C without increasing the risk of hypoglycaemic events.[4–9]

People who are less engaged with SMBG have higher A1C levels and could benefit from CGM as an alternative monitoring strategy, as hyperglycaemia is associated with an increased risk of target organ damage, including an increased risk of cardiovascular comorbidities.[6,10]

Conversely, a downshift of glycaemic threshold for endocrine and symptomatic counterregulatory responses may result from frequent hypoglycaemic episodes. This can lead to impaired hypoglycaemia awareness, increased hypoglycaemic episodes and a higher rate of complications, which may include increased mortality from any cause, particularly cardiovascular complications.[7,11]

Guidelines indicate that optimal diabetes care should strive to achieve individualised glycaemic targets without simultaneously increasing the risk of hypoglycaemic episodes.[7,11] Unfortunately, maintaining strict blood glycaemic control often comes at the cost of an elevated risk of hypoglycaemia, making the attainment of the above treatment goals challenging.[7]

CGM systems alert the affected user when critically low glucose levels have

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Citation: Down S, Malik N (2023) Using real-time continuous glucose monitoring (rtCGM) in primary care: Introducing the Dexcom ONE. *Journal of Diabetes Nursing* **27**: JDN284

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developed, thus prompting the user to take action.[7] More advanced rtCGM systems alert their user before low values are reached by means of algorithms that predict glycaemic trajectory.[7] It should be noted that although CGM alerts users to glucose fluctuations, there is a requirement for a subsequent response, whether pharmacological or modification in behaviour, hence the importance of patient support and education regarding self-management of glucose levels.[7] The ALERTT1 study looked at adults living with type 1 diabetes (T1D) using intermittently scanned CGM (isCGM), another form of interstitial fluid glucose monitoring, and found that even in this cohort, switching to rtCGM could lead to further reductions in A1C whilst also reducing the rate of severe hypoglycaemia.[12]

The population of older adults living with diabetes is increasing because of advancements in care leading to longer life expectancies.[13] Randomised controlled trials such as the DIAMOND study have demonstrated consistent benefit in A1C levels and the efficiency of rtCGM across the age range of 26 to 73 years, although rtCGM utilisation decreased with increasing age.[4,5,6] Older adults, particulary those living with long-standing diabetes, are susceptible to a decline in hypoglycaemia awareness due to the nature of the illness.[13] In addition to acute changes in mental status, severe hypoglycaemia can cause seizures; falls, which lead to fractures; cognitive impairment; and cardiac arrhythmias, which may result in sudden death.[6,12,14] Consequently, the NICE guidelines for older adults living with diabetes emphasises the minimisation of hypoglycaemia by allowing for less stringent A1C targets.[15,16] Results from the WISDM study – a six-month trial in older adults (≥60 years) living with T1D – demonstrated that rtCGM users spent less time in a hyperglycaemic state compared to users of SMBG, with a subsequent 2.1 hours more spent within the target range. Additionally, there was improved adherence mirroring and increased treatment satisfaction compared with other cohorts.[6,12]

In contrast to other trials, the GOLD study had no upper limit of A1C for inclusion, which is important to note, since a directly proportional relationship exists between higher A1C levels and diabetic complications.[6] With the support of rtCGM, not only was mean A1C reduced compared to that of patients using conventional SMBG but also, fewer patients had very high A1C levels (250 mg/dL, 13.9 mmol/mol, 10.4%) during rtCGM.[6] The GOLD study presents convincing evidence of glycaemic improvements in patients on multiple daily injection therapy and is the first major study to show improvements in key quality of life measures; patient satisfaction was higher during rtCGM-use and they reported less hypoglycaemia-related fear.[6]

Potential limitations of these studies include that individuals who may be less likely to perform CGM compared to the studied cohort may have been excluded during the informed consent process and the run-in phase.[5] Although, it is notable that people living with diabetes who struggle with medication-taking and monitoring are also those who may derive the greatest benefit from the use of this technology. Future work should explore patterns in CGM use and severe hypoglycaemia, diabetic ketoacidosis, and healthcare utilisation over a user's lifespan and socioeconomic status of users, while addressing health inequalities.[4]

When does NICE recommend rtCGM?

In 2022, the National Institute for Health and Care Excellence (NICE) updated their guidance for both T1D and type 2 diabetes (T2D). The guideline for T1D (NG17) states that all people living with T1D should be offered access to CGM.[15]

For the first time, the NICE T2D guideline (NG28) makes provision for some of those people living with T2D using insulin therapy to be provided access to this technology.[16]

*Very high A1C was defined as 250 mg/dL (13.9 mmol/mol, 10.4%).[6]

The guidance has initially set restrictions on the use of CGM for people living with T2D, in that they should be on a minimum of twice-daily insulin and have one or more of the following[16]:

- recurrent or severe hypoglycaemic episodes
- impaired awareness of hypoglycaemia
- a learning disability or cognitive impairment (limiting their ability to self-monitor)
- a need to otherwise monitor their blood glucose at least 8 times a day.

In addition to this cohort, the recommendation is to "offer CGM to adults living with insulin-treated T2D who would otherwise need help from a care worker or healthcare professional to monitor their blood glucose."[16]

Notably, when this technology was first offered on prescription to those living with T1D, similar restrictions were put in place, limiting initial availability to 20% of people living with T1D.[17] NICE took the step to make this technology available to all patients living with T1D after the results of studies demonstrated improvements in A1C levels and reductions in hypoglycaemia.[15] Therefore, it is likely that the current restrictions will be relaxed to allow more people living with T2D to benefit from this technology in the future.

What is Dexcom ONE?

A rtCGM device that recently became available is the Dexcom ONE system. Dexcom ONE is a discreet rtCGM device that provides a new glucose reading every five minutes without requiring any calibration before use.[1] It can be worn in three different areas of the body and the accompanying app provides ease-of-use options, such as customisable glucose thresholds, glucose alerts and the ability to "snooze" the first alert.[1] Healthcare professionals can utilise the dedicated Clarity software to remotely access and evaluate historical CGM data for all patients using Dexcom ONE from a single clinical account.

Conclusion

With the increasing accessibility of rtCGM devices, such as the Dexcom ONE, there is a real and urgent need for primary care professionals to become confident in the use of these devices and the interpretation of data to effectively support the self-management of diabetes.

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LBL-1002971 Rev001 | March 2023

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