Continuous Glucose Monitoring

Information for health professionals about fully-subsidised CGM for people with type 1 diabetes under the age of 21

What is Continuous Glucose Monitoring?

Continuous glucose monitors are small wearable devices that measure and display glucose levels throughout the day and night.

They can be programmed to sound alarms and send warnings if glucose levels move outside an individually set target range. Continuous Glucose Monitoring (CGM) devices also display arrows to show whether the glucose level is rising, falling or remaining steady. CGM data can be reviewed to look for patterns and trends in blood glucose levels.

CGM devices have three main components:
- **The sensor** sits on the skin with a small electrode inserted just under the skin (usually on the abdomen) in a similar way to inserting an insulin pump cannula. It measures the level of glucose in the fluid between the cells. A new sensor needs to be inserted every 6 to 7 days, depending on the device.
- **The transmitter** is attached to the sensor and sends glucose readings to the wireless receiver, insulin pump or compatible smartphone. Transmitters need to be replaced every three to 12 months, depending on the device.
- **The receiver** allows the user to view their glucose data. The receiver may be a standalone device, insulin pump or compatible smartphone via an app. The receiver also stores glucose data, which can be uploaded for you to review to make informed decisions regarding changes to insulin doses or pump settings.

CGM has many benefits for individuals with diabetes, including a reduced need for blood glucose monitoring. However, it is not a replacement for blood glucose monitoring. CGM systems still need to be calibrated at least twice per day, by monitoring blood glucose levels and entering the reading into the CGM device. Only one device (Dexcom G5 Mobile) currently produces results of sufficient accuracy to be approved for self-adjustment of insulin levels.

With the other devices, confirmatory blood glucose monitoring is still recommended before making treatment decisions. It is also essential for the wearer to understand that CGM measures glucose levels in the interstitial fluid and not the blood. There is a lag time of about 6-12 minutes between these, which can be greater when glucose levels are rising or falling rapidly. CGM readings are generally within 15-20% of blood glucose readings, with greater differences during times of rapid changes in glucose levels.

The Australian Government provides access to fully-subsidised CGM products through the National Diabetes Services Scheme (NDSS) to eligible children and young people aged under 21 years, living with type 1 diabetes. See page 3 for more details or visit ndss.com.au/CGM

NDSS Helpline 1300 136 588  ndss.com.au

The National Diabetes Services Scheme is an initiative of the Australian Government administered with the assistance of Diabetes Australia.
Benefits of and barriers to the use of CGM

Research has shown that regular use of CGM can reduce HbA1c and mean glucose levels, lower the risk of hypoglycaemia and hyperglycaemia, reduce glycaemic variability, and improve quality of life\(^1,2,3\).

While there is some evidence that CGM use is more effective at lowering HbA1c levels in adults with diabetes and least effective in adolescents and young adults, this appears to be largely due to the frequency of CGM use\(^4,5\). The JDRF CGM studies found that near-daily use was more common in adults than children and adolescents, but similar improvements in HbA1c were seen in all age groups with near-daily use of CGM\(^4,5\).

Importantly, CGM use appears to reduce the risk of, and time spent in, hypoglycaemia, and may reduce the risk of severe hypoglycaemia in those with impaired awareness of hypoglycaemia (IAH)\(^3,6\).

Despite the benefits, there are some potential barriers to CGM use in children and adolescents\(^7\). In young children, there can be difficulties with limited body surface area and insufficient subcutaneous tissue for sensor insertion, particularly when the child is also using an insulin pump\(^7\). Keeping the sensor attached to the skin can also be problematic in children who are very active and those who spend a lot of time in the water\(^7\); however, there are adhesive tapes which can overcome this problem. Pain of insertion can also cause anxiety for both the parent and child\(^7\).

It appears some teenagers may like the option of being able to check their glucose levels discretely on their smartphone, and this could facilitate self-care, but others may find the constant reminders of their glucose levels overwhelming and unwanted\(^7\). The option of remote monitoring by parents may provide benefits and reassurance for parents as their teenager spends more time away from home\(^7\). However, some teens may be less willing for their parents to be following their glucose levels remotely, as they become more independent\(^7\).

A recent systematic review investigating the impact of CGM on life with type 1 diabetes is useful reading for health professionals\(^8\). The paper describes how CGM use affects physical, emotional and relational aspects of life\(^8\). Themes explored in the article include interacting with CGM, the burden of living with CGM, feeling different from others, feeling empowered, and the impact on relationships\(^8\). Some users of CGM feel more empowered, but there are also many physical and emotional burdens associated with CGM use\(^8\). These include the pain and discomfort of wearing CGM, the impact on sleep, dealing with alarms and the constant nature of CGM feedback\(^8\). For children and young people, supportive parental behaviours are important, particularly being non-judgemental and avoiding making the child feel like their CGM is ‘spying’ on them\(^8\).

All of these factors need to be taken into account when assessing the suitability of a child or young person (and their parents/carers) for CGM use, and in setting realistic goals and expectations for use.
Eligibility for subsidised CGM products

Since April 2017, the Australian Government has been providing access to fully-subsidised CGM products to eligible children and young people aged under 21 years, living with type 1 diabetes, through the National Diabetes Services Scheme (NDSS).

To access CGM products through the NDSS, the child or young person needs to meet certain criteria, as outlined below. They will need to see an authorised health professional who can confirm their eligibility and ensure that the use of CGM will help as part of their diabetes management.

The health professionals who can perform these assessments include endocrinologists, credentialed diabetes educators, and other health professionals specialising in diabetes (physician, paediatricians or nurse practitioners).

The health professional will need to complete the Continuous Glucose Monitoring Eligibility Assessment form, which can then be submitted to the state or territory NDSS Agent for processing.

The subsidy is only available for CGM devices which have alarms that alert the user when blood glucose levels are getting too low or too high. This includes the Dexcom (G4 Platinum or G5 Mobile) and Medtronic (Guardian Connect, Guardian Link and Minilink) CGM devices. The Freestyle Libre is not subsidised under this program as it does not have this alarm functionality.

The subsidy covers the full cost of sensors and transmitters (i.e. there is no co-payment) but the cost of the receiver needs to be paid by the person with diabetes or their family if they choose to use a receiver rather than their pump or smartphone.

Eligibility Criteria

To be eligible to access fully-subsidised CGM products through the NDSS, the child or young person must meet the criteria in one of the following categories, depending on their age.

Category A – for children 10 years or younger.
A child with type 1 diabetes aged 10 years or younger needs to meet all of the following criteria to be eligible for the subsidy:

- the child is aged up to 10 years of age with type 1 diabetes
- the child is expected to benefit clinically from the use of CGM
- the family/carer is willing and capable of using CGM
- the family/carer is willing to actively participate in a diabetes management plan which incorporates CGM

NOTE: A child who has been accessing CGM products through the initiative will continue to have subsidised access after they turn 11. They won’t need to be reassessed under Category B.

Category B – for children and young people aged 11 to less than 21 years
A child or young person with type 1 diabetes aged from 11 years to less than 21 years needs to meet all of the following criteria to be eligible for the subsidy:

- the individual is expected to benefit clinically from the use of CGM
- the individual or family/carer is willing and capable of using CGM
- the individual or family/carer is willing to actively participate in a diabetes management plan which incorporates CGM

PLUS one or more of the following criteria:

- frequent significant hypoglycaemia—more than one episode a year of significant hypoglycaemia requiring external, third-party assistance
- impaired awareness of hypoglycaemia
- an inability to recognise, or communicate about, symptoms of hypoglycaemia
- significant fear of hypoglycaemia for the child/young person or a family member/carer which is seriously affecting the health and well-being of the child or young person or contributing to hyperglycaemia as a reaction to this fear

For young people in either category, subsidised access to CGM products will cease once they reach 21 years of age.
Setup and ongoing access to CGM products

Once the child or young person’s assessment form has been processed, they will be contacted by the NDSS to confirm their eligibility for access to fully-subsidised CGM products.

If they are a new user of CGM or are changing to a different CGM device, a starter kit (including one box of sensors, one transmitter and related materials and product information) will be sent to the health professional nominated on the assessment form. Health professionals will be responsible for helping the child/young person and their parents/carers to set up and learn how to use their new CGM device (see below). After the initial set up, ongoing access to CGM products will be available from any NDSS Access Point (usually a community pharmacy).

If the child/young person is already using CGM and is continuing with the same device, they will then be able to access CGM products through any NDSS Access Point.

CGM devices have two components subsidised under the NDSS: sensors and transmitters. Sensors are supplied in boxes of four or five depending on the model.

Transmitters are supplied individually. As CGM products are highly specialised, NDSS Access Points will not keep stock on hand. However, they will usually be able to order and have products delivered within 48-72 hours.

Changing a CGM device or opting out

A child or young person (and their parents/carers), together with a certified health professional, may submit the Type 1 Diabetes Continuous Glucose Monitoring Update or Termination form to change their current CGM device or to opt out of the initiative.

To download the Type 1 Diabetes Continuous Glucose Monitoring Update or Termination form visit ndss.com.au/cgm

Product lifespan and access

Each of the CGM transmitters and sensors available through the NDSS has a product usage lifespan. This means the amount of time that each product can be used will vary depending on the CGM device.

All NDSS Access Points receive alerts about the quantity and frequency of supply of CGM products through the NDSS.

These alerts are in place to make sure each young person is using their CGM device according to product guidelines. If someone accesses more than the recommended annual limit for their CGM products through the NDSS they will be unable to order more subsidised products until one year passes from the date of their first order.

As this is the case, it is important that the lifespan of CGM products is understood. If CGM products are ordered according to the product’s lifespan the individual should not encounter any difficulties when accessing CGM products through NDSS Access Points. For more information on CGM product lifespan please see page 6.

Faulty devices

If someone accesses a faulty CGM sensor or transmitter through an NDSS Access Point they should contact AMSL for Dexcom products (1300 851 056) or Medtronic for Medtronic products (1800 777 808) in the first instance. Contacting the supplier rather than ordering more supplies may mean they are able to receive a replacement product from AMSL or Medtronic, without affecting their annual product supply limits.

CGM education and training

Health professionals who help the child/young person and their parents/carers to set up and learn how to use their new CGM device will need to provide detailed education and ensure correct understanding of the following topics:

- How and where to insert a new sensor.
- How to remove and dispose of an old sensor.
- The lifespan of CGM products and the importance of regularly replacing the sensors to avoid the risk of infection.
- The use of additional tape and barrier creams to help keep the sensor attached, if required.
- How and when to calibrate the device.
- How to set and change high and low glucose alerts.
- How to understand and interpret CGM data.
- How to respond to alerts and trend arrows.
- How to upload and share data with you using the device’s software programs.
- How to order CGM products.
There are currently five CGM devices available through the NDSS. The choice of device for a particular child or young person will depend on a number of factors including whether they use an insulin pump, whether or not they have (or wish to purchase) a compatible smartphone, whether they would like the option of other features including data sharing and automated insulin pump suspension for low glucose levels, and personal preference.

**Dexcom G4 Platinum**

The Dexcom G4 Platinum device works with the Animas Vibe insulin pump but can also be used without a pump by purchasing the Dexcom G4 Platinum receiver. It consists of a sensor (replaced every 7 days), transmitter (replaced every 6-months) and insulin pump or receiver.

If the child or young person is eligible for fully-subsidised CGM, the sensors and transmitters are provided free through the NDSS, but if they don’t use the Animas Vibe pump, the receiver needs to be purchased.

**Dexcom G5 Mobile**

The Dexcom G5 Mobile works with a compatible iOS (Apple) or Android smartphone, or the Dexcom G5 Mobile receiver. It consists of a sensor (replaced every 7 days), transmitter (replaced every 3 months) and compatible smartphone or receiver. If the child or young person is eligible for fully-subsidised CGM, the sensors and transmitters are provided free through the NDSS but if they don’t have a compatible smartphone, the receiver needs to be purchased.

If used with a compatible smartphone, glucose data can be shared with up to five people (‘followers’) via a Carelink account. Care partners can access Carelink Connect from any device with internet connectivity (e.g., a computer, phone or tablet) to view glucose data remotely. They can also choose to receive an SMS message notifying them of any CGM alerts or alarms, either immediately, or after a chosen delay period to give the child or young person time to take action to bring their blood glucose level within range before they are notified.

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**Find out more at amsldiabetes.com.au**

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**Medtronic Guardian Connect**

The Medtronic Guardian Connect works with a compatible iOS (Apple) smartphone. It consists of a sensor (replaced every 6 days), transmitter (replaced every 12 months) and compatible iOS smartphone. If the child or young person is eligible for fully-subsidised CGM, the sensors and transmitters are provided free through the NDSS.

If used with a compatible smartphone, glucose data can be shared with up to five people (‘care partners’) via a Carelink account. Care partners can access Carelink Connect from any device with internet connectivity (e.g., a computer, phone or tablet) to view glucose data remotely. They can also choose to receive an SMS message notifying them of any CGM alerts or alarms, either immediately, or after a chosen delay period to give the child or young person time to take action to bring their blood glucose level within range before they are notified.

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**Medtronic Guardian Link Transmitter**

The Medtronic Guardian Link Transmitter works with the Medtronic Minimed 640G insulin pump and includes SmartGuard, which can predict when the wearer is approaching a low glucose level and automatically stop insulin delivery from the pump, resuming delivery when glucose levels recover. It consists of a sensor (replaced every 6 days), transmitter (replaced every 12 months) and insulin pump. If the child or young person is eligible for fully-subsidised CGM the sensors and transmitters are provided free through the NDSS.

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**Medtronic Minilink Transmitter**

The Medtronic Minilink Transmitter works with the Medtronic Paradigm Veo or Paradigm Real-Time insulin pumps and includes the Low Glucose Suspend feature which will suspend insulin delivery from the wearer’s pump if they don’t respond to low glucose alerts. It consists of a sensor (replaced every 6 days), transmitter (replaced every 12 months) and insulin pump. If the child or young person is eligible for fully-subsidised CGM the sensors and transmitters are provided free through the NDSS.

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**Find out more at medtronic-diabetes.com.au**
## CGM device summary

<table>
<thead>
<tr>
<th>Device</th>
<th>Works with</th>
<th>Provided free through NDSS subsidy</th>
<th>Product lifespan</th>
<th>Other features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dexcom G4</strong></td>
<td><strong>Platinum</strong></td>
<td>Dexcom G4/G5 Platinum Sensor</td>
<td>Sensor – 7 days</td>
<td></td>
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<tr>
<td></td>
<td><strong>OR</strong></td>
<td><strong>Dexcom G4 Platinum Transmitter</strong></td>
<td>Transmitter – 6 months</td>
<td></td>
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<tr>
<td></td>
<td><strong>OR</strong></td>
<td><strong>Dexcom G4 Platinum Receiver</strong></td>
<td></td>
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<tr>
<td><strong>Dexcom G5</strong></td>
<td><strong>Mobile</strong></td>
<td><strong>Compatible iOS (Apple) or Android smartphone or smart device</strong></td>
<td>Sensor – 7 days</td>
<td><strong>Dexcom Share feature allows up to 5 people to follow the user’s glucose data using the Dexcom Follow App on their mobile phone or smart device.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>OR</strong></td>
<td><strong>Dexcom G5 Mobile Transmitter</strong></td>
<td>Transmitter – 3 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>OR</strong></td>
<td><strong>Dexcom G5 Mobile Receiver</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Medtronic</strong></td>
<td><strong>Guardian Connect</strong></td>
<td><strong>Compatible iOS (Apple) smartphone or smart device</strong></td>
<td>Sensor – 6 days</td>
<td><strong>SMS messages can be sent to up to 5 people to notify them of alerts and alarms on the user’s CGM device.</strong></td>
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<tr>
<td></td>
<td><strong>OR</strong></td>
<td><strong>Medtronic Guardian Connect Transmitter</strong></td>
<td>Transmitter – 12 months</td>
<td></td>
</tr>
<tr>
<td><strong>Medtronic</strong></td>
<td><strong>Guardian Link</strong></td>
<td><strong>Medtronic Minimed 640G insulin pump</strong></td>
<td>Sensor – 6 days</td>
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<tr>
<td></td>
<td><strong>Medtronic Minilink</strong></td>
<td><strong>Medtronic Paradigm Veo or Paradigm Real-Time insulin pumps</strong></td>
<td>Sensor – 6 days</td>
<td><strong>Low Glucose Suspend feature will suspend insulin delivery from the pump if the user doesn’t respond to low glucose alerts.</strong></td>
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<tr>
<td></td>
<td><strong>OR</strong></td>
<td><strong>Medtronic Minilink Transmitter</strong></td>
<td>Transmitter – 12 months</td>
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</tr>
</tbody>
</table>
Compatibility Flowchart

How do you want to connect to your CGM device?

With my pump
- Which pump do you use?
  - Animas Vibe
  - Medtronic Paradigm Veo or Paradigm Real-time
  - Medtronic Minimed 640G
  - Dexcom G4 Platinum Receiver
  - Dexcom G5 Platinum Receiver
  - Android Phone with Dexcom G5 Mobile app
  - iOS (Apple) Phone with Dexcom G5 Mobile app OR Medtronic Guardian Connect app

With a CGM receiver
- Are you using an Android or iOS (Apple) device?
  - With my smart phone
  - Medtronic Minilink Transmitter
  - Medtronic Guardian Link Transmitter
  - Dexcom G4 Platinum Transmitter
  - Dexcom G5 Platinum Transmitter
  - Dexcom G5 Mobile Transmitter

With a CGM receiver
- Are you using an Android or iOS (Apple) device?
  - With my smart phone
  - Medtronic Minilink Transmitter
  - Medtronic Guardian Link Transmitter
  - Dexcom G4 Platinum Transmitter
  - Dexcom G5 Platinum Transmitter
  - Dexcom G5 Mobile Transmitter

With my pump
- Which pump do you use?
  - Animas Vibe
  - Medtronic Paradigm Veo or Paradigm Real-time
  - Medtronic Minimed 640G
  - Dexcom G4 Platinum Receiver
  - Dexcom G5 Platinum Receiver
  - Android Phone with Dexcom G5 Mobile app
  - iOS (Apple) Phone with Dexcom G5 Mobile app OR Medtronic Guardian Connect app

With a CGM receiver
- Are you using an Android or iOS (Apple) device?
  - With my smart phone
  - Medtronic Minilink Transmitter
  - Medtronic Guardian Link Transmitter
  - Dexcom G4 Platinum Transmitter
  - Dexcom G5 Platinum Transmitter
  - Dexcom G5 Mobile Transmitter

With my pump
- Which pump do you use?
  - Animas Vibe
  - Medtronic Paradigm Veo or Paradigm Real-time
  - Medtronic Minimed 640G
  - Dexcom G4 Platinum Receiver
  - Dexcom G5 Platinum Receiver
  - Android Phone with Dexcom G5 Mobile app
  - iOS (Apple) Phone with Dexcom G5 Mobile app OR Medtronic Guardian Connect app

With a CGM receiver
- Are you using an Android or iOS (Apple) device?
  - With my smart phone
  - Medtronic Minilink Transmitter
  - Medtronic Guardian Link Transmitter
  - Dexcom G4 Platinum Transmitter
  - Dexcom G5 Platinum Transmitter
  - Dexcom G5 Mobile Transmitter

1 For information about compatible Apple iOS and Android devices for use with the Dexcom G5 Mobile visit: dexcom.com/ous-compatibility-page
2 For information about compatible Apple iOS devices for use with the Guardian Connect visit: medtronic-diabetes.com.au/guardian-connect
3 The Dexcom G4 Platinum and Dexcom G5 Mobile receivers are an alternative to using a compatible iOS or Android device and do not require cellular data or Wi-Fi connectivity. They are not subsidised through the NDSS Initiative and can be purchased separately through AMSL. For more details, visit amsldiabetes.com.au/shop.
4 The Medtronic Guardian Connect and Dexcom G5 Mobile transmitters must be synced to a compatible Apple iOS or Android device with Bluetooth connectivity. After syncing the apps will function without cellular data or Wi-Fi connectivity. However, for sharing services to work you will need access to regular cellular data or Wi-Fi connectivity.
More information

Visit the Department of Health website for more information about access to fully-subsidised CGM products through the NDSS, including a fact sheet and FAQs for health professionals.
health.gov.au

Visit the NDSS website for more information about the initiative, including eligibility criteria.
drss.com.au

Visit the Diabetes Australia website for more information about diabetes.
diabetesaustralia.com.au

More information on the CGM devices available through the NDSS can be found by visiting the supplier websites:
- AMSL Diabetes (for Dexcom products)
  amsl.com.au
- Medtronic
  medtronic.com.au

References