Continuous
GLUCOSE MONITORING

A guide to using CGM for children and young people with type 1 diabetes
This booklet explains all the important things you need to know about accessing Continuous Glucose Monitoring (CGM) products through the NDSS.

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What is CGM

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. CGM systems also display arrows to show whether the glucose level is currently rising, falling or remaining steady. The graphs on the CGM receiver can be reviewed to look for patterns and trends in glucose levels.

Continuous glucose monitors have three main parts:

- The **sensor** sits on the skin with a small electrode inserted just under the skin on the tummy. It measures the level of glucose in the fluid between your 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 are reusable but need to be replaced every 3-12 months, depending on the device.

- The **receiver** allows you to view your 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 and your diabetes team to review, to help in making decisions about changes to insulin doses or pump settings.
Receivers

Transmitters

Sensors

Inserter
Benefits of CGM

CGM has a number of benefits:

- **24/7 readings.** CGM allows you to see glucose levels across the day, rather than just at a single point in time. The CGM graphs may help in learning how different things, such as food and exercise, affect glucose levels. Reviewing these graphs for patterns may help you to balance food, exercise and insulin doses.

- **Trend arrows.** As well as showing glucose levels at any point in time, CGM shows whether glucose levels are rising, falling or stable and how fast they’re changing.

- **Alarms.** You can set the CGM device to sound an alarm on your receiver or smartphone, if the glucose level rises above or drops below the individually set target levels. The alarm allows you to act before glucose levels rise too far above or drop too far below your target range. The alarms may be especially useful for people who can’t always tell when they’re having a hypo (hypoglycaemia or low blood glucose level).

- **Overnight monitoring.** CGM devices measure glucose levels throughout the night without the need to wake up and do finger prick checks. Calibrations may sometimes be needed overnight but can usually be timed to avoid this. Alerts can be set on your receiver or smartphone, to wake you if glucose levels drop below or rise above your target range and need treatment.

- **Reduced need for finger prick checks.** CGM doesn’t completely replace the need to do finger prick checks but it does reduce the number needed. The devices still need to be calibrated at least twice per day (according to manufacturers’ instructions) by doing a finger prick blood glucose check and entering the result. This is important to ensure the accuracy of the readings from the CGM device. It is also recommended that readings above or below your target range are confirmed with a finger prick blood glucose check before treatment.
• **Peace of mind.** Being able to see glucose levels at any time, and having high and low glucose alerts if levels go outside the individually set target range, can provide reassurance and reduce anxiety.

• **Data sharing.** Some CGM devices have the option of sharing glucose data with up to five other people via an app on their smartphone or smart device, or SMS messages to notify them of alerts and alarms. This can be particularly useful if you are a parent or carer of a young child as it allows you to monitor your child’s glucose levels when you are not with them. Data can also be downloaded to share with your diabetes team.

• **Insulin pump integration to prevent hypos.** Some devices work with a compatible insulin pump and can temporarily suspend insulin delivery from the pump if glucose levels drop below your target range or if the sensor predicts the glucose level will become too low. Insulin delivery from the pump starts again once glucose levels start rising again. This may help to prevent hypos or to make them easier to manage. Less food may also be needed to treat a hypo.
Potential downsides of CGM

- **Doesn’t replace finger prick blood glucose monitoring.** While using CGM can reduce the number of finger prick checks needed, CGM devices still need calibrating at least twice per day, by entering a finger prick blood glucose reading. Finger prick checks are also recommended when glucose levels are changing rapidly, to confirm a hypo, before giving a correction dose for high glucose levels, and when symptoms don’t match the CGM reading.

- **Lag time.** CGM devices measure glucose levels in the interstitial fluid (the fluid between your cells) rather than the blood. Because glucose travels to the blood first and then to the interstitial fluid, CGM and blood glucose levels won’t usually be exactly the same. When glucose levels are stable, the readings should be close, but there will be a greater difference when glucose levels are rising or falling quickly.

- **You need to stay close to the receiver.** Your smartphone, pump or receiver needs to be within six metres of your sensor/transmitter to receive data.
• **Being attached.** Some people don’t like wearing the sensor and transmitter, particularly if they are using an insulin pump, as they then have two different devices attached to their body. In children it can also be difficult to find suitable sites to insert the sensor, particularly if they don’t have much body fat. Your health professional can help with working out the best sites for wearing the sensor.

• **Staying attached.** It can be difficult for some people to keep the sensor and transmitter attached, particularly if they spend a lot of time in water and/or sweat a lot during exercise. The sensor might also be knocked off while playing or during sport and sometimes while sleeping. Unfortunately, if they come off they can’t be reused but this can usually be prevented by using extra tape to keep the sensor attached. Your health professional can provide advice on the available options and which tape might be best for you.

• **Information overload.** While the additional information CGM provides can be useful, it can also be overwhelming to see what blood glucose levels are doing all the time. Your health professional can help you to learn how to use and interpret this information so that it can be used to improve diabetes management rather than becoming something else to worry about, particularly if glucose levels are often out of target.

• **Alarm fatigue.** While the CGM alarms can be very helpful, if they are occurring often, some people can find them annoying and disruptive and may even start to ignore some of the alarms. For this reason, it’s important to speak to your health professional about setting the right targets, so you are alerted when you need to take action to correct high or low glucose levels.

• **Cost.** For those who aren’t eligible for subsidised CGM products through the NDSS, CGM is costly and is not covered by private health insurance.
Available devices

There are currently five CGM devices available through the NDSS.

The device you choose will depend on:
- whether the CGM will be used in conjunction with an insulin pump, a compatible smartphone or separate receiver
- whether you want the option of sharing CGM data
- personal preference.

Speak with your diabetes health professional for help in choosing a device which best suits you.
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<td>Animas Vibe insulin pump OR Dexcom G4 Platinum Receiver</td>
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<tr>
<td>Compatible iOS (Apple) or Android smartphone OR Dexcom G5 Mobile Receiver</td>
<td>Dexcom G4/G5 Platinum Sensor</td>
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<td>Dexcom Share feature allows up to 5 people to follow the user's glucose data using the Dexcom Follow App on their mobile phone.</td>
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Starting CGM

If you have just applied for CGM, you’ll be contacted by the NDSS to confirm whether you are eligible for access to subsidised CGM products.

What happens next will depend on whether you have already been using CGM or are a new user.

New to CGM?

If you haven’t used CGM until now, a starter kit (including one box of sensors, one transmitter and related materials and product information) will be sent to your nominated health professional. Your health professional will help you to set up and learn how to use your new CGM device. You will need to contact them to discuss the arrangements for your set up and training. Depending on your diabetes service, there may be a charge for seeing your health professional for education.

After the initial set up, ongoing access to CGM products will be available from any NDSS Access Point (usually a community pharmacy).
Changing CGM device?

If you’ve been using CGM but are switching 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 your nominated health professional. Your health professional will help you to set up and learn how to use your new CGM device. You will need to contact them to discuss the arrangements for your set up and training.

After the initial set up, ongoing access to CGM products will be available from any NDSS Access Point (see page 14).

Already using CGM?

If you’re already using CGM and are continuing with the same device, you are now able to access CGM products through any NDSS Access Point (see page 14).

You can find your nearest NDSS Access Point by visiting osd.ndss.com.au/search
Ordering supplies

CGM products will be available through NDSS Access Points and can be ordered in the same way as other NDSS products, such as insulin pen needles, blood glucose testing strips and insulin pump consumables.

You can find an NDSS Access Point near you using the NDSS Online Services directory osd.ndss.com.au/search

Your CGM device has two components subsidised under the NDSS: sensors and transmitters. Sensors are provided 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 can usually order and have products delivered for you to collect within 48-72 hours.

It’s therefore recommended that you contact your NDSS Access Point once you’re using your second last sensor to ensure enough time for product ordering and delivery. A new transmitter should be ordered when the battery charge begins to decrease, as explained in the information from the supplier (transmitter expiry times vary with each model from 3 to 12 months).

Speak with your NDSS Access Point about your ongoing needs for CGM products and to work out a suitable arrangement for ordering and to collect your products.
Faulty devices

If you access a faulty CGM sensor or transmitter through an NDSS Access Point you 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 you are able to receive a replacement product from AMSL or Medtronic, without affecting your annual product supply limits.

There are alerts about the quantity and frequency of supply of CGM products through NDSS Access Points. These alerts are based on the recommended product usage lifespan for each device.

If you reach the recommended annual limit for CGM products through the NDSS you will be unable to order more subsidised products until one year passes from the date of your first order. If you are using CGM products according to the product's lifespan you should not encounter any difficulties when accessing CGM products through NDSS Access Points.

For more information on CGM product lifespans please see the table on page 11.
Set-up and training

For those who are new to CGM there’s quite a bit to learn.

You’ll need to know:
- How and where to insert a new sensor
- How to remove an old sensor
- How and when to calibrate your 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 your data with your health professional using the device’s software programs.
Depending on the device you choose, you may also need to learn:

- How to use the Low Glucose Suspend or Smartguard features, if using your device with a Medtronic pump
- How to use the Dexcom Follow feature to share glucose data, if using the Dexcom G5 with a compatible smartphone
- How to use the Medtronic Carelink Connect to share glucose data.

Your nominated health professional will organise an education and training session for you, before you get started on CGM.

It may also be helpful to watch the online training videos in CGM use, available on your CGM manufacturers’ website:

### AMSL Diabetes (for Dexcom products)

- **Dexcom G4 Platinum**
  amsldiabetes.com.au/item/Dexcom-g4-platinum/

- **Dexcom G5 Mobile**
  amsldiabetes.com.au/item/dexcom-g5-mobile/

### Medtronic

- **Introduction to Continuous Glucose Monitoring**

- **Introduction to Guardian Connect**
Using CGM

So you’re ready to start using your CGM device. What now?

Your health professional will have covered all the important things you need to know but there’s a lot to remember. If you feel you need more support or information, contact your health professional. Here’s a quick summary of the main things you need to keep in mind.

CGM is different to blood glucose monitoring

CGM reduces the number of finger prick blood glucose checks you need to do. However, CGM is not a direct replacement. You will still need to calibrate the CGM at least twice per day (see below), by doing a finger prick blood glucose check and entering the reading into the device. There is also only one device (Dexcom G5 Mobile) which is currently approved for self-adjustment of insulin doses. With the other devices, a finger prick reading is still recommended before making decisions about adjusting insulin doses.

CGM and blood glucose readings won’t always match

CGM measures glucose levels in the interstitial fluid (the fluid surrounding your body’s cells) and not the blood, and there is a time delay between these. For this reason, the number on a CGM device will rarely match a finger prick blood glucose level, but will usually be close. If blood glucose levels are rising or dropping rapidly, there is more likely to be a difference. When rising quickly, the blood glucose reading will likely be higher than the CGM. When dropping quickly, the blood glucose reading will likely be lower than the CGM.

Blood glucose levels will fluctuate throughout the day

It’s typical for blood glucose levels to rise and fall throughout the day, particularly after meals. The aim is not to achieve a flat line, but for the rise and fall to stay mostly within an individually set target range. Your diabetes health professionals will help you determine the right target range for you.
Use CGM to look for patterns

CGM provides a lot of information about glucose levels that you previously did not see. It is normal for glucose levels to change throughout the day due to what you eat, activity levels, stress and other factors. It can be tempting to worry about every glucose level that is above or below target. Instead, it is better to use this information to detect patterns and learn how the body reacts to different aspects of life. You can then work with your diabetes team to make any necessary adjustments to your diabetes management plan. For parents and carers, it is important not question your child for every reading that is above or below target, as this can cause unwanted tension and stress between you and your child.

Calibrating is key

The accuracy of your device depends on correct calibrations, so make sure you:

- follow the directions from your device manufacturer (they vary for each device) as to when and how often to calibrate
- use the same blood glucose meter for all calibrations
- wash your hands before doing a calibration finger prick reading
- only calibrate when blood glucose levels are between 2.2 and 22.2mmol/L – the devices can’t be calibrated above or below this range.

Alerts can be changed

When you first get started, you may find the frequent alarms and alerts annoying, frustrating or stressful. Remember, they are designed to help you, but if they’re causing distress they can be changed or turned off so you’re only alerted when it’s important to you. Speak with your health professional about this. These settings can be changed as you become more familiar with CGM.
You need to stay in range of your receiver or smartphone

Your smartphone, pump or receiver needs to be within six metres of your sensor/transmitter. With some devices, the transmitter will hold data for a certain period of time, 3 to 10 hours. After this, there will be a ‘data gap’. With other devices there will be a gap for the entire time the receiver and sensor/transmitter are out of range.

Some medications may affect your readings

Medications containing acetaminophen (paracetamol) can affect the accuracy of Dexcom CGM devices. If you take these medications, CGM readings may be falsely high for up to 8 hours after taking the medication. Speak to your health professionals about alternatives. If you do take these medications, it’s important to be aware of the effect on CGM results and not to use CGM readings to make decisions about insulin dose adjustment while taking the medication.

The sensor and transmitter are waterproof

The sensor and transmitter are waterproof and can be worn in the shower, bath and swimming pool, but the receiver is not waterproof or water resistant. The Animas pump (which works with the Dexcom G4) and Medtronic 640G (but not Medtronic Veo) are both waterproof, but most people choose to remove their pump when they swim. If you spend a lot of time in the water you might find that the tape around the sensor starts to come loose. If this happens you’ll need extra tape to keep it secure. There are a number of options available, depending on the CGM device and skin sensitivity. Speak with your health professional about the best option for you.
It’s okay to take a break

While the greatest benefits from CGM come from wearing it full-time, that doesn’t mean you can’t take a break. Whether it’s due to feeling overwhelmed by all the data, getting tired of the alarms or finding CGM uncomfortable to wear, speak to your health professionals about whether having some time off CGM would help. They may also be able to suggest some other solutions for dealing with these issues.

Tips for getting the most from CGM

You will get the most benefit from CGM if you work with your diabetes health professionals to use the information it provides. Engage with your diabetes team regularly, particularly if you:

- need multiple correction doses each day due to high glucose levels
- are having frequent hypos
- are using a pump with integrated CGM and it is suspending regularly due to low or predicted low glucose levels.

Changing devices

If you are thinking about changing to a different CGM device, discuss your needs with your diabetes health professional first. If you change devices while eligible for the NDSS subsidy, you’ll need to get an authorised health professional (usually your endocrinologist, credentialled diabetes educator or nurse practitioner) to complete the Type 1 Diabetes Continuous Glucose Monitoring Update or Termination form. Once the change has been approved, you can then contact your health professional to organise a time for them to help you set-up and learn how to use the new device.
Transitioning off CGM

Whether it’s because you no longer wish to use CGM or you’ve reached 21 years and are no longer eligible for subsidised CGM supplies through the NDSS, there are a few things to consider when you transition off CGM.

You no longer wish to use CGM

You or your health professional will need to complete the Type 1 Diabetes Continuous Glucose Monitoring Update or Termination form.

You’ve turned 21 years of age

The government is providing subsidised CGM products for children and young people under 21 years. This means that once you turn 21 years of age, you’re no longer eligible for subsidised CGM products through the NDSS. You can choose to continue using CGM but will need to pay the full price for the products. You can contact the supplier directly or speak to your diabetes team to find out the pricing and how to order your products. Details about pricing can be found at the following links:

Dexcom:
amsldiabetes.com.au/shop

Medtronic:

Part-time CGM?

If you can’t afford the cost of using CGM full-time you could consider using it on-and-off, particularly at times when it would be more helpful to know what glucose levels are doing, such as when you are travelling, during exams or during the sporting season.
Living without CGM

Here are some tips to help in the transition:

- Always carry your blood glucose meter with you, so you can check your blood glucose levels when needed.

- Use the information you gained from using CGM. For example, if you now know that there are certain times of the day when you’re more likely to have high or low readings, or that certain activities are more likely to lead to hypos, these would be good times to do finger prick blood glucose checks.

- Doing regular finger prick blood glucose checks are important for those who have difficulty detecting the symptoms of a hypo. In particular, at times where hypos are more likely to occur, and before activities such as driving, where having a low blood glucose level can be more dangerous.

- If anxiety or fear about hypos is an issue, particularly now that you no longer have the reassurance provided by CGM, speak to your health professional who can help you with some ways to reduce this fear.

- If living without CGM is causing significant stress or anxiety, speak with your health professional who can help you with some ways to manage this anxiety.
More information

For further information about access to CGM products through the NDSS visit the NDSS website (ndss.com/cgm).

You can also call the NDSS Helpline on 1300 136 588.

More information on the CGM systems that are available through this initiative can be found at the following websites:

**AMSL Diabetes (for Dexcom products)**

Website: amsldiabetes.com.au  
Phone: 1300 851 056

**Medtronic**

Website: medtronic-diabetes.com.au  
Phone: 1800 668 670

Diabetes Australia would like to thank all of the young people with type 1 diabetes and their carers who provided feedback for this booklet.