Continuous Glucose Monitoring (CGM) Training for Healthcare Professionals and Patients Medtronic Minimed 640G™
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STEP 1

- You must attend the first 4 training sessions to ensure you know how to use the Medtronic Minimed 640G™ Glucose Monitoring System.
- There are 4 leaflets to remind you of the 4 step training.
- You will be asked to write down your reasons for using the CGM and what your targets are.
- Further training will be arranged following completion of these first 4 steps.
- As you get older the way you look after your diabetes will need changing.
- Ongoing education is an essential part of your diabetes care to make sure you reach your targets.
Aims for STEP 1:

- Getting started with CGM system - Minimed 640G™
- Understanding the basic knowledge of your CGM system
- Learn to identify trends and patterns

Aims for STEP 2:

- Further understanding of trend arrows
- Learn to actively use target glucose range

Aims for STEP 3:

- Optimise the effect of CGM using trend arrows
- How to use the total dose percentage adjustment tool
- How to use the insulin sensitivity factor tool (ISF)

Aims for STEP 4:

- How to use the CareLink Professional and CareLink Personal
**Getting started with your Minimed 640G™**

What are your reasons for using the Minimed 640G™?

Tick the statement/s below that you agree with.

<table>
<thead>
<tr>
<th>Suggestions for using the CGM</th>
<th>Tick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevent hypos (low blood glucose levels)</td>
<td></td>
</tr>
<tr>
<td>Prevent high blood glucose levels</td>
<td></td>
</tr>
<tr>
<td>Manage blood glucose better when playing sport</td>
<td></td>
</tr>
<tr>
<td>Would like more information about blood glucose levels</td>
<td></td>
</tr>
<tr>
<td><strong>Any other reasons? Write below</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Aims for using Minimed 640G™**

What are your aims for using the Medtronic 640G?

Discuss these with your educator and make a note below:

<table>
<thead>
<tr>
<th>Aims for using the CGM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

---

**Remember!**

Look out for this symbol to remind you of the main messages in each step.
Minimed Medtronic 640G™ with SmartGuard - **STEP 1** - Patient information

Understanding the Minimed 640G™ equipment

**A**
This is the sensor which measures the glucose level in the tissues. See page 9 for more details. It may be worn for 7 days before it needs replacing. It needs to be at least 1 inch away from the pump infusion set.

**B**
This is the transmitter which collects the messages from the sensor and sends it to the insulin pump. It needs charging every 7 days and takes 20 mins. The transmitter and sensor have to be worn together with the pump.

**C**
The insulin pump accepts the glucose level results and displays the information in the screen with the insulin levels. The pump and the glucose sensor work together to help prevent hypoglycaemia.
Understanding the receiver screen

3 hour trend graph
The 3 hour trend graph will be displayed automatically but it may be changed to 1, 6, 12, 24 hour display.

Yellow and red lines
Red lines show your alert settings (to be discussed in step 2)
The receiver is programmed with an urgent low alarm set at 3.1 mmol/L. First warning is 4 vibrations followed by 4 beeps every 5 mins until you confirm it by pressing the select button.

Glucose target range
This is the area between your upper and lower target range. This will be set up in **STEP 2**

Battery life
The battery will last for approximately 7-21 days then it will need replacing

Wireless symbol
The wireless symbol is displayed when the transmitter and receiver are connected

Current glucose level
This is the glucose level in the tissues over the past 5 mins

Trend arrow
The trend arrows show which direction the glucose is travelling and how fast see page 30 for more details
Getting started with your Minimed 640G™

You will be shown how to insert your sensor and what the information on the pump screen means. For the first 2 weeks you will be asked to simply watch the display to see how the pump records your glucose and the use of the arrows.

You must use your blood glucose meter alongside the CGM readings. Keep a record of:

- Glucose level before and 2 hours after a meal
- Glucose during illness or stress
- The effect of physical activity on your glucose reading
- What your arrow trend is overnight
- The effect of meal insulin doses
- The timing of your meal time insulin in relation to the time of your meal or snack
- How often does the auto suspend feature happen?

Note: Although the Minimed 640G™ is not licensed to make changes to treatment many people do. You should confirm the sensor reading with a blood glucose.

<table>
<thead>
<tr>
<th>Record the start date and expiry date of your sensor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start date</td>
</tr>
<tr>
<td>Change date</td>
</tr>
</tbody>
</table>

During your first 2 weeks you must also:

Download your data at least once a week to bring to the STEP 2 training session and to start to think about how to assess your glucose control.

To help get used to the CGM check a blood glucose:

- To confirm a low (4 mmol/L) or high (14 mmol/L) sensor glucose reading.
- If Glucose levels are falling rapidly ↓↓↓ or rising rapidly ↑↑↑
- If CGM readings do not match your clinical symptoms
- If you are making changes to insulin doses

💡 Remember!

Your sensor will need changing in 6 days.

The transmitter needs charging every 6 days when you change the sensor.

Each new sensor will need calibrating twice a day.

The sensor glucose will take 2 hours to stabilise.

Record glucose levels from your CGM alongside your usual blood glucose.

Do not alter insulin doses using your CGM, use your finger blood glucose test until STEP 2 is completed.
Why is checking the glucose levels important?

Researchers in America have proven that keeping glucose levels in single figures most of the time reduces the chance, for some people, of getting problems with the eyes, kidneys, nerves and blood vessels.

This is why there are many different devices available to help children, young people and adults monitor their glucose levels.

However simply recording glucose levels is not enough. Any obvious patterns showing a need to change insulin treatment or revision of carbohydrate counting needs to be acted upon.

Continuous education is essential

There are 2 types of meter that read glucose levels but in a different way:

1. Blood glucose meter
2. Interstitial glucose meter or continuous glucose monitoring system (CGM)

What is the difference between blood glucose monitoring and interstitial glucose readings CGM?

- Blood glucose (BG) monitoring is taken using a finger pricker and meter. This gives the glucose value at the moment it is taken
- Interstitial glucose (CGM) monitoring. This measures the glucose between the tissues via an indwelling sensor
- There is a time delay between the true blood glucose level and the glucose level in the tissues using CGM
- This is called the lag time. (See page 10). It means the glucose level in the tissues will always be a few minutes behind the true glucose level
- There are different symbols called trend arrows on the pump screen to help you to decide how to interpret the results this will be discussed in STEP 2

Remember!

Choosing to use the CGM with the insulin pump means a new way of glucose and insulin dose adjustment due to the low suspend feature.

Trend arrows help in the decision making alongside blood glucose.

Training is essential to interpret the increased number of glucose readings and relationship to the insulin deliver system.
The lag time is the difference in measurement between the actual blood sugar level and the interstitial glucose level. The time difference can vary between 6-12 mins.

- If your values are falling rapidly, your blood glucose value might initially be lower than the sensor reading (see diagram).
- If the values are rising rapidly the blood glucose value might be higher than the sensor reading but then the sensor reading will go higher than your blood glucose value (see diagram below).

![Differences – plasma vs sensor](image)
What the trend arrows mean on your pump screen

The trend arrow shows (circled in yellow):

- If the glucose is rising or falling
- How fast this change is happening

<table>
<thead>
<tr>
<th>Arrow</th>
<th>Description of trend arrow</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
<td>Rising: Glucose is going up. It could go up by 1.0 - 2.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↑↑</td>
<td>Rising quicker: Glucose is going up quickly. It may go up by 2.0 - 3.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↑↑↑</td>
<td>Rising rapidly: Glucose is rapidly rising. It may go up by 3.0 mmol/L or more in 20 mins</td>
</tr>
<tr>
<td>↓</td>
<td>Glucose falling: Glucose is going down slowly. It may go down by 1.0 - 2.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↓↓</td>
<td>Falling quicker: Glucose is going down quickly. It could fall by 2.0 - 3.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↓↓↓</td>
<td>Falling rapidly: Glucose is going down rapidly. It could go down by more than 3.0 mmol/L in 20 mins</td>
</tr>
</tbody>
</table>

Medtronic Minimed 640G™ with SmartGuard - Trend arrows - **STEP 1** - Patient information

What the trend graphs mean on your Medronic 640G with SmartGard

The trend graph is a time frame for you to look at your glucose levels in more detail.

It can be set at 3, 6, 12 or 24 hour intervals (this example is set at 3 hours)

You can switch between these times if you need to.

Over the next 2 weeks you will be asked to look at the different trend graphs and work out which one you prefer.

Think about why you want to use the CGM with pump delivery and which method of looking at your glucose levels is better for you.

But do not use the sensor results for altering your insulin dose until you have completed **STEP 2**, supported by your blood glucose measurement.
**Trend graphs**

Trend graphs shown below are examples with suggestions when they may be used.

**3 hour trend**

Good to use for:
- Mealtimes and after
- During exercise
- A daily trend

**6 hour trend**

Good to use for:
- Checking your basal or background insulin dose
- Checking the effect of insulin on meals containing large amounts of fat
- Checking effects of exercise

**12 hour trend**

Good to use for:
- Checking overnight glucose levels
- Looking at the glucose level during the night

**24 hour trend**

Good to use for:
- Looking at the whole day
- Checking for any highs or lows during the day
- Comparing with other days to see for patterns when glucose is out of target range

**Remember!**

The trend graphs can help you pick out any times your glucose level is out of range.

They can give you a quicker idea about how quickly the glucose is changing.
Medtronic MINmed 640G™ with SmartGuard - Trend graphs - **STEP 1** - Patient information

**Home screen showing a suspend by sensor event**

Shown here is the Home screen during a Suspend before low event.

The graph will display a gold shaded area to show any time when insulin was suspended by SmartGuard.

When the SmartGuard icon is displayed, the patient knows a suspend feature is on. The icon will flash while insulin is suspended.

Note:
Medtronic Minimed 640G™ with SmartGuard - **STEP 1** - Patient information

**General information**

- Sensor needs to be changed every 6 days
- Change position of sensor to prevent problems with the sensor site
- Sensor worn around the abdomen but 1 inch away from pump
- The transmitter charge will last 6 days and should be charged when the sensor is changed
- Calibration is needed for every sensor change and every 12 hours to ensure accuracy once initial calibration is completed
- The first reading may be taken 2 hours after changing the sensor
- Do not use any alerts for the first 2 weeks (to be discussed further in **STEP 2**
- HOWEVER if you are unsure of hypo you may set an alert for a low glucose for first 2 weeks. Your educator will help with this
- The Minimed 640G™ is not licensed to replace blood glucose testing but it can be used alongside your blood glucose results. The CGM gives you more information related to how quickly the glucose level is changing.
- The CGM has the extra benefit of the low glucose suspend, switching off the insulin delivery from your pump if glucose levels are too low.

- It has predictive low glucose suspend switching off insulin if the software predicts a low blood glucose within the next 30 mins
- Insulin delivery is resumed when the sensor glucose predicts a return to your target glucose level
- Check the adhesive patch is firmly in place before going in water and the sensor and transmitter are firmly attached. They are waterproof for 30 mins up to 2.4m
- Review data by downloading once a week
- To get the benefit from CGM, You must wear it at least 70% of the time
- You must check a blood glucose to confirm a low or high sensor glucose reading

**Remember!**

Evidence from CGM suggests sensors should be worn 70% of the time.

Download data once a week to review glucose control.

Calibration is needed to receive sensor glucose readings.

CGM does not replace blood glucose monitoring.

It is not licensed to replace blood glucose testing but it can be used alongside your blood glucose results.

If your basal insulin is suspended any bolus dose given will still be working. Therefore still at risk of a hypo.
Medtronic Minimed 640G™ - **STEP 1** - Patient information

**What to practise for next session - STEP 2**
For the first 2 weeks watch the display to see how the pump reader records your glucose and the observe the direction of trend arrows and use the trend graphs.

**You** must keep using your blood glucose meter. Until you attend the second training session **(STEP 2)** keep a record of:

- Glucose level before and 2 hours after a meal
- Glucose during illness or stress
- The effect of physical activity on your glucose reading
- What your trend arrow is doing overnight
- The effect of meal insulin doses on your glucose level
- Note what time you take your insulin and what time you eat your meal or snack

**You must also:**

- Check the glucose trend again within 10mins if the trend arrow is pointing straight up or down
- Download your data at least once a week and bring to the **STEP 2** training session
- Think about how you will use the CGMS glucose readings
- Check a **blood glucose** to confirm a low (4 mmol/L) or high (14 mmol/L) sensor glucose reading or if glucose levels are falling rapidly ↓↓↓ or rising rapidly ↑↑↑

**Date for STEP 2 training:**

_____________________________________________________

_____________________________________________________

**Notes:**

Do not use your Minimed 640G™ for changes to your insulin doses until you have completed **STEP 2** and without confirming a blood glucose.

At your next session your blood glucose results and CGM results will be discussed.

After **STEP 2** training you will start to use your CGM readings to consider treatment changes.

If the low suspend is set it only switches off the basal insulin the bolus insulin will still be working.
STEP 2

- You must attend the first 4 training sessions to ensure you know how to use the
- There are 4 leaflets to remind you of the 4 step training
- You will be asked to write down your reasons for using the CGM and what your targets are
- Further training will be arranged following completion of these first 4 steps
- As you get older the way you look after your diabetes will need changing
- Ongoing education is an essential part of your diabetes care to make sure you reach your targets
Aims for STEP 1:

- Getting started with CGM system - Minimed 640G™
- Understanding the basic knowledge of your CGM system
- Learn to identify trends and patterns

Aims for STEP 2:

- Further understanding of trend arrows
- Learn to actively use target glucose range

Aims for STEP 3:

- Optimise the effect of CGMS using trend arrows
- How to use the total dose percentage adjustment tool
- How to use the insulin sensitivity factor tool (ISF)

Aims for STEP 4:

- How to use the CareLink Professional and CareLink Personal
Setting alerts for high and low glucose readings

Your glucose target range is set to make sure you know what the best glucose level to aim for is.

The alerts are your warning signs that your glucose control is not within this ideal target range. These can be personally preset set.

It may take time to achieve glucose levels within your target range most of the time but the alerts can be set so that you gradually improve your glucose levels without having too many high or low events.

Regularly checking your receiver means you are not relying on the alerts to manage your glucose levels. This means you can set your alerts higher or lower.

Reasons for using the CGMS:

1. Prevent high glucose levels

If your goal is to prevent a high glucose but are unsure of the CGM then start by setting the high alert higher than you would want to.
You can also set alerts to warn you as you are approaching your high alert limit.

To decide how high look at your blood glucose results over the past 2 weeks and work out with your diabetes educator an upper alert.

Once you have used this for couple of weeks and you start to use the CGM alerts to make decisions on your diabetes management slowly start to reduce the upper alert.

2. SmartGuard suspend on low

This is a feature whereby the sensor communicates with the pump. It will stop all the insulin (basal and any bolus being given) if the glucose level reaches the lower limit.

This is a feature whereby the sensor communicates with the pump. It will stop all the insulin (basal and any bolus being given) if the glucose level reaches the lower limit.

Alerts may be set to tell you when this is about to happen.

3. SmartGuard suspend before low

“SmartGuard suspend before low.” You can also set this feature to suspend the insulin delivery before the lower limit is reached.

If this is switched on the software will stop insulin if it predicts that you might go low within the next 30 mins.

It will automatically switch insulin back on when glucose levels are satisfactory again.
Medtronic Minimed 640G™ - **STEP 2** - Alert settings - Patient information

**There are 3 settings:**

1. **Suspend on low.** Insulin will be switched off when you reach your low threshold e.g. If threshold set at 3.2 mmol/L pump switches off at 3.2 mmol/L.

2. **Suspend before low.** Insulin will be switched off before you reach your low threshold e.g. If threshold is 3.2 mmol/L the pump software will predict when the glucose will reach 3.2 mmol/L and switch the insulin off before this level.

3. **Alarms** will only alarm and not switch off insulin.

**Remember!** NEVER turn off your alerts.

The alerts and trend arrows (how fast your glucose is falling) will give you the information you need to pick up on any patterns about when you go low. It will help you to start to recognise your signs and symptoms.

The glucose level in your blood falls before the glucose in your tissues.

You can set multiple alerts on the Minimed 640G™ but do not start with too many at first.

Plan your upper and lower alert and only one other warning.

You can set up to 8 per day.
Medtronic Minimed 640G™ - **STEP 2** - Alert settings - Patient information

**HbA1c and setting alerts**

- The HbA1c is taken in clinic every 3 months
- The result is the average blood glucose level over 10-12 weeks
- The CGM readings give an average glucose reading continually
- This can be used to help set alerts to warn when glucose levels are travelling too low or too high

**HbA1c target**

The target for the HbA1c is 48 mmol/mol or 6.5%.

Look at the chart below to help you to work out how to achieve this goal by setting alerts on the CGMS.

<table>
<thead>
<tr>
<th>Estimated average glucose over 2 weeks</th>
<th>Suggested high alert level setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 8.0 mmol/L</td>
<td>11.0 mmol/L</td>
</tr>
<tr>
<td>8.1 - 10.0 mmol/L</td>
<td>11.0 mmol/L</td>
</tr>
<tr>
<td>10.1- 12 mmol/L</td>
<td>14.0 mmol/L</td>
</tr>
<tr>
<td>&gt; 12 mmol/L</td>
<td>14.0 mmol/L</td>
</tr>
</tbody>
</table>

**Write down your HbA1c:**

Current: _______________________

Target: _______________________

**Remember!**

- If you are choosing to use the CGM to improve your glucose control use the first few weeks to get used to the extra information the CGM gives you
- Set realistic alert settings based on your current glucose levels and gradually aim for the target level
- The CGM does not replace blood glucose monitoring it is offering you extra information to base your insulin dose adjustment on
- These are only suggested levels you will need to work with your educator to find out the level which suits you
- The suspend feature on the SmartGuard will stop the basal insulin when the glucose reaches or is close to the low alert limit
**Setting glucose alerts**

Look back at your aims for using the Minimed 640G™. Discuss these with your educator and make any new notes below:

__________________________

__________________________

__________________________

Look at your glucose profiles you have recorded over the last 2 weeks alongside your blood glucose readings. Discuss with your educator what your glucose alerts should be set at.

💡 Think about:
1. How often were your hypo?
2. Is there a pattern to the time and day?
3. Did you count your carbohydrate correctly?
4. Were you unwell?
5. What time had you taken your insulin?
6. Had you had a correction dose with your meal?
7. Did you do any exercise planned or unplanned that may have caused the hypo?

**Setting lower glucose alert**

Look at your the lower glucose results on the CGM and compare with your blood glucose levels taken at the same time and any notes you made about your signs and symptoms.

<table>
<thead>
<tr>
<th>TIME:</th>
<th>TIME:</th>
<th>TIME:</th>
</tr>
</thead>
</table>

CGM

BG

Discuss the difference between the readings and any action you took. Discuss with your educator the setting of your glucose alert settings. Write down what the lower glucose alert is set at.

What is your lower alert setting?

What is your lower alert setting?

There is a delay (see **STEP 1** leaflet) between your symptoms and what is shown on your CGM so it is important to understand at what point you should think about treating a low sugar level and when you should set your alert.

Write down how you will treat a low glucose level

__________________________
**Setting higher glucose alerts**

Look at your the higher glucose results on the CGM and compare with your blood glucose levels taken at the same time and any changes you made to your insulin dose.

<table>
<thead>
<tr>
<th>TIME:</th>
<th>TIME:</th>
<th>TIME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discuss the difference between the readings and any action you took.

💡 Think about:
1. How often were you out of target range?
2. Is there a pattern to the time and day?
3. Did you count your carbohydrate correctly?
4. Were you unwell?
5. What time had you last taken your insulin?
6. Did you need a correction dose?
7. Did the correction dose bring you back down into your target range?

What is your higher glucose alert?

Write down how you will respond to a high glucose level

_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
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_____________________________________________________
_____________________________________________________
_____________________________________________________

Medtronic Minimed 640G™ - **STEP 2** - Alert settings - Patient information
**Medtronic Minimed 640G™ - STEP 2 - Alerts and trend arrows - Patient information**

### Setting alerts and using trend arrows for rising glucose levels

There are 2 options for “high alerts”:

1. **Alert before high.** If high alert set at 13.8 mmol/L it will alert before glucose reaches 13.8 mmol/L. You can adjust the timing of the alert before you are high e.g. 5-30 mins. ACDC recommend 15 mins. (See example below)

2. **Alert on high.** If set at 13.8 mmol/L it will only sound when the glucose is at 13.8 mmol/L.

3. **Rise alert.** Alert will sound when the glucose is rising rapidly regardless of how high the glucose is.

<table>
<thead>
<tr>
<th>00:00 - 24:00</th>
<th>13.8 mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert before high</td>
<td>On</td>
</tr>
<tr>
<td>Time before high</td>
<td>15 mins</td>
</tr>
<tr>
<td>Alert on high</td>
<td>Off</td>
</tr>
<tr>
<td>Rise alert</td>
<td>Off</td>
</tr>
</tbody>
</table>

High limit set at 13.8 mmol/L

<table>
<thead>
<tr>
<th>Glucose reading</th>
<th>Rise rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.9 mmol/L</td>
<td>Alert on high</td>
</tr>
<tr>
<td>4 mmol/L</td>
<td>Alert before high</td>
</tr>
</tbody>
</table>

The time before high can be set to alert between 5-30 mins. This example is set at 15 mins before.

### Rise Alert

Using trend arrows to set alerts for a rise in glucose that is equal or faster than Rate Alert

<table>
<thead>
<tr>
<th>Arrow Trend</th>
<th>Description of trend arrow</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
<td>Rising: Glucose is going up by 0.056 mmol/L per min. It could go up by 1.0 - 2.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↑ ↑</td>
<td>Rising quicker: Glucose is going up quickly. 0.111 mmol/L per min. It may go up by 2.0 - 3.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↑ ↑ ↑</td>
<td>Rising rapidly: Glucose is rapidly rising. 0.167 mmol/L per min. It may go up by 3.0 mmol/L or more in 20 mins</td>
</tr>
<tr>
<td>Custom</td>
<td>Or you can set your own alert rate</td>
</tr>
</tbody>
</table>

Example of high alerts with a high alert limit of 13.9 mmol/L

**CGMS Alert settings**
**Setting alerts and using SmartGuard for low glucose levels**

There are 3 alert levels in SmartGuard:

1. **Insulin suspend before low.** The sensor software predicts when you are likely to go hypo and switches off both basal and bolus insulin before it happens eg. If threshold set at 3.2 mmol/L it will switch off basal insulin before you reach 3.2 mmol/L and an alarm will sound (if you have set it). The insulin will be suspended 30 minutes before it predicts a hypo. You don’t usually need to give carbs if insulin is switched off by the predictive function.

2. **Insulin suspends when low.** If low threshold is set at 3.2 mmol/L it will switch off basal insulin at 3.2 mmol/L so you may still dip below that level depending on how quickly the glucose is falling. You would need to give carbs at this point.

3. **Alarms only.** The pump will not stop insulin delivery but will alarm for you. You would need to consider giving carbs.

<table>
<thead>
<tr>
<th>00:00 - 24.00</th>
<th>3.2 mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suspend before low</strong></td>
<td>On</td>
</tr>
<tr>
<td>Alert before low</td>
<td>Off</td>
</tr>
<tr>
<td>Suspend on low</td>
<td>Off</td>
</tr>
<tr>
<td>Alert on low</td>
<td>On</td>
</tr>
</tbody>
</table>

Low limit set at 3.2 mmol/L

**NOTE:** Suspend before low is on which means the alert on low is automatically set on.

Below is an example of high and low alert setting with low suspend.
Points to remember when using suspend and alerts

- Low setting alerts or SmartGuard suspend may be set to prevent or warn of possible hypo or suspend basal insulin
- Suspend and alarm functions can be set separately
- You can only set one suspend feature during each time frame
- You cannot set suspend before low and suspend on low at the same time
- If you are 3.9 mmol/L above the low limit set it will suspend insulin delivery
  
  For example:
  
  If limit set at 3.2 mmol/L
  
  The pump will not suspend until <7.1 mmol/L
- A low alert of between 2.8 - 5.0 mmol/L may be set
- Up to 8 may be set at different times of the day
- When starting with the suspend option for low glucose levels try setting it at 3.4 mmol/L before gradually reducing to 3.2 mmol/L.

- When suspended the insulin will be off for a minimum of 30 mins. It can stay suspended for a maximum of 2 hours (if the glucose remains low). Then it will restart.
- When suspend before low is switched on insulin delivery will start again automatically once the glucose level rises above the threshold you set.
- Once the suspend has been used and the pump has resumed insulin delivery, SmartGuard will not be active again for a minimum of 30 mins.

💡 Remember after 2 hours the basal will restart no matter what the glucose level is

**Write down your starting alerts and glucose threshold**

Even if suspend function has been activated you can still go hypo i.e. due to your bolus dose
Medtronic Minimed 640G™ - **STEP 2** - Patient information

**What to practise for next session - STEP 3**

Look at the settings in your Minimed 640G™ and choose the alarms to use.
Don’t try and set too many alerts at the beginning

Think about:
- Are the alerts setting right for you?
- Do they give you time to prevent a hypo?
- Look at the trend arrows alongside the glucose level. Before making a change

Think about:
- When did you last take insulin?
- When did you last take a meal or drink containing carbohydrate?
- When did you last do any exercise or are you about to do some?
- Are there any other factors affecting your glucose levels i.e. exams, illness, stress
- Is a blood glucose reading needed?
- Do you have any symptoms that don’t reflect your glucose level

**Date for STEP 3 training:**

________________________

**Notes:**

**Remember!**

Alerts are used to help you to manage your glucose levels not to be annoying.
Do not turn off your alerts. They are there to help you.
It takes time to find out which alerts work for you over a 24 hour period.
Alerts are to help you to achieve your target glucose range.
STEP 3

- You must attend the first 4 training sessions to ensure you know how to use the
- There are 4 leaflets to remind you of the 4 step training
- You will be asked to write down your reasons for using the CGM and what your targets are
- Further training will be arranged following completion of these first 4 steps
- As you get older the way you look after your diabetes will need changing
- Ongoing education is an essential part of your diabetes care to make sure you reach your targets
Aims for STEP 1:

- Getting started with CGM system - Minimed 640G™
- Understanding the basic knowledge of your CGM system
- Learn to identify trends and patterns

Aims for STEP 2:

- Further understanding of trend arrows
- Learn to actively use target glucose range

Aims for STEP 3:

- Optimise the effect of CGM using trend arrows
- How to use the total dose percentage adjustment tool
- How to use the insulin sensitivity factor tool (ISF)

Aims for STEP 4:

- How to use the CareLink Professional and CareLink Personal
Medtronic Minimed 640G™ - **STEP 3** - Target glucose range - Patient information

**Recap on setting target glucose range**

Do you have any new aims for using the Minimed 640G™? Discuss these with your educator and make a note below:

_________________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

Look at your glucose profiles you have recorded since your last session.

Discuss with your educator if your glucose target range is set correctly.

What is your lower target level set at now?  

What is your upper level set at now?  

**Recap on trend arrows and what they mean?**

Trend arrows on the CGMS give you an idea as to how fast or slow your glucose is rising or falling.

Don’t forget the blood glucose level will be lower than the CGMS result. If arrows straight up or down check blood glucose.

<table>
<thead>
<tr>
<th>Arrow Trend</th>
<th>Description of trend arrow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Rising</strong>: Glucose is going up. It could go up by 1.0 - 2.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td></td>
<td><strong>Rising quicker</strong>: Glucose is going up quickly. It may go up by 2.0 - 3.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td></td>
<td><strong>Rising rapidly</strong>: Glucose is rapidly rising. It may go up by 3.0 mmol/L or more in 20 mins</td>
</tr>
<tr>
<td></td>
<td><strong>Glucose falling</strong>: Glucose is going down slowly. It may go down by 1.0 - 2.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td></td>
<td><strong>Falling quicker</strong>: Glucose is going down quickly. It could fall by 2.0 - 3.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td></td>
<td><strong>Falling rapidly</strong>: Glucose is going down rapidly. It could go down by more than 3.0 mmol/L in 20 mins</td>
</tr>
</tbody>
</table>
**Insulin adjustment tools?**

There are 2 methods for adjusting insulin which use the trend arrows to help you to make decisions to your insulin dose.

Each method gives a different insulin dose adjustment, Your educator will discuss the best method for you.

There are 2 occasions when the arrows may be used:

1. At meal times
2. In between meals and snacks (when you are NOT eating a meal)

**The 2 methods you can use are:**

**Method 1 (page 31)**

Total insulin dose percentage adjustment tool

**Method 2 (page 35)**

Insulin sensitivity factor tool (ISF)

This how much 1 unit of insulin drops the blood glucose by i.e. 1:3 means 1 unit of quick acting insulin brings the blood glucose down by 3 mmol/l

Write down your ISF  ___________________________

---

**Method 1**

A) With meals

Work out the carbohydrate value of your meal

Look at the trend arrow and work out whether you need to increase or decrease the total insulin dose by 10-30% BUT if a correction dose is needed the increase or decrease of insulin (depending on the direction of the arrow will be worked out with the correction dose).

**NOTE:** If using the bolus advisor in a meter you will have to work out the 10-30% dose and add it on or take off yourself because the handset will not do it for you.

B) In between meals or snacks

If extra insulin is needed in between meals (at least 2 hours after last insulin dose) the adjustment tool will be worked out on your usual correction dose ratio i.e. increase correction dose by 10-30% and recheck in 2 hours and repeat if needed.

**NOTE:** This may coincide with meal time

These tools are only a guide. There may be other things that you need to think about before making the correct decision about your insulin dose for example:

- Are you unwell?
- When did you last exercise?
- Are you doing exams so feeling worried or stressed?
- When did you last take an insulin dose?
### Method 1 - Total insulin dose percentage adjustment

This table helps you to decide how much insulin to give by using the glucose level and the direction of the trend arrow before a meal. If using the bolus wizard you will have to add or take away the percentage of insulin from your insulin dose. **These amounts are only suggestions you have to see what works for you.**

<table>
<thead>
<tr>
<th>Arrow Trend</th>
<th>Description of trend arrow</th>
<th>Action needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
<td>Rising: Glucose is going up. Glucose could go up by 1.0 - 2.0 mmol/L in 20 mins</td>
<td>Add 10% extra to recommended bolus wizard calculated dose</td>
</tr>
<tr>
<td>↑↑</td>
<td>Rising quicker: Glucose is going up quickly. Glucose may go up by 2.0 - 3.0 mmol/L in 20 mins</td>
<td>Add 20% extra to recommended bolus wizard calculated dose</td>
</tr>
<tr>
<td>↑↑↑</td>
<td>Rising rapidly: Glucose is rapidly rising. Glucose may go up by 3 mmol/L or more in 20 mins</td>
<td>Add 20-30% extra to recommended bolus wizard calculated dose. If glucose &gt;8 mmol/L consider 30% but if &lt;8mmol/L consider 20%</td>
</tr>
<tr>
<td>↓</td>
<td>Glucose falling: Glucose is going down slowly. Glucose may go down by 1.0 - 2.0 mmol/L in 20 mins</td>
<td>Take off 10% from recommended bolus wizard calculated dose</td>
</tr>
<tr>
<td>↓↓</td>
<td>Falling quicker: Glucose is going down quickly. Glucose may fall by 2.0 - 3.0 mmol/L in 20 mins</td>
<td>Take off 20% from recommended bolus wizard calculated dose</td>
</tr>
<tr>
<td>↓↓↓</td>
<td>Falling rapidly: Glucose is going down rapidly. Glucose could go down by more than 3.0 mmol/L in 20 mins</td>
<td>Take off 20 - 30% from recommended bolus wizard calculated dose</td>
</tr>
<tr>
<td>No Arrows</td>
<td>Give dose as calculated by bolus wizard</td>
<td></td>
</tr>
</tbody>
</table>

**How to work out 10% of your meal time dose:**

10% of meal time insulin = meal time insulin ÷ 10

This amount will either be added to your meal time dose or taken off your meal time dose.

**How to work out 20% of your meal time dose:**

20% of meal time insulin = meal time insulin ÷ 5

This amount will either be added to your meal time dose or taken off your meal time dose.

**How to work out 30% of your meal time dose:**

30% of meal time insulin = meal time insulin ÷ 100 x 30

This amount will either be added to your meal time dose or taken off your meal time dose.
**Medtronic Minimed 640G™ - STEP 3 - Using trend arrows and percentage tool- Patient information**

**Total insulin dose percentage adjustment example 1**

1. Count how much carbohydrate you are going to eat
2. Write down your meal time dose
3. What is your glucose level?
4. Do you need a correction dose? (Example below uses 1:3)
5. Write down your meal time dose + correction dose if needed.
6. Look at the direction of the arrows on your meter and find the arrow below. Use this line to work out what insulin to have.

<table>
<thead>
<tr>
<th>1 Meal carbs</th>
<th>2 Meal insulin units (ratio 1:10)</th>
<th>3 Glucose reading before food</th>
<th>4 Correction dose (if needed)</th>
<th>5 Meal time dose + correction dose units</th>
<th>6 Which trend arrow do you have?</th>
<th>7 Insulin dose increased or decreased by 10% 20% or 20 - 30% from bolus wizard dose</th>
<th>8 Insulin dose to be given</th>
<th>9 Glucose reading after 2 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>10</td>
<td>6.0 mmol/L</td>
<td>none</td>
<td>10 + 0</td>
<td>↑</td>
<td>10% increase 10 ÷ 10 = 1 unit</td>
<td>10 + 1 = 11 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>6.0 mmol/L</td>
<td>none</td>
<td>10 + 0</td>
<td>↑ ↑</td>
<td>20% increase 10 ÷ 5 = 2 unit</td>
<td>10 + 2 = 12 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>6.0 mmol/L</td>
<td>none</td>
<td>10 + 0</td>
<td>↑ ↑ ↑</td>
<td>20-30% increase 10 ÷ 5 = 2 unit Glucose &lt;8 mmol/L consider 20% initially</td>
<td>10 + 2 = 12 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>6.0 mmol/L</td>
<td>none</td>
<td>10 + 0</td>
<td>↓</td>
<td>10% decrease 10 ÷ 10 = 1 units</td>
<td>10 - 1 = 9 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>6.0 mmol/L</td>
<td>none</td>
<td>10 + 0</td>
<td>↓ ↓</td>
<td>20% decrease 10 ÷ 5 = 2 units</td>
<td>10 - 2 = 8 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>6.0 mmol/L</td>
<td>none</td>
<td>10 + 0</td>
<td>↓ ↓ ↓</td>
<td>20-30% decrease 10 ÷ 5 = 2 unit Glucose &lt;8 mmol/L consider 30% initially</td>
<td>10 - 2 = 8 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>6.0 mmol/L</td>
<td>none</td>
<td>10 + 0</td>
<td>No arrows</td>
<td>Give dose as calculated by bolus wizard</td>
<td>6.0 - 8.0 mmol/L</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
</tbody>
</table>

7. Do you need to increase total insulin or decrease your total insulin dose?
8. Insulin dose to be given? You will need to work this out from the bolus wizard suggested dose
9. Glucose reading after 2 hours should be no more the 2 mmol/L higher than pre meal value (if within target glucose range).
### Total insulin dose percentage adjustment - example 2

<table>
<thead>
<tr>
<th>Meal carb</th>
<th>Meal insulin units (ratio 1:10)</th>
<th>Glucose reading before food</th>
<th>Correction dose (if needed)</th>
<th>Meal time dose + correction dose units</th>
<th>Which trend arrow do you have?</th>
<th>Insulin dose increased or decreased by 10% 20% or 20 - 30% from bolus wizard dose</th>
<th>Insulin dose to be given</th>
<th>Glucose reading after 2 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>10</td>
<td>14.0 mmol/L</td>
<td>3 units</td>
<td>10 + 3</td>
<td>↑</td>
<td>10% increase 13 + 10 = 1.3 unit</td>
<td>13 + 1.3 = 14.3 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>14.0 mmol/L</td>
<td>3 units</td>
<td>10 + 3</td>
<td>↑ ↑</td>
<td>20% increase 13 + 5 = 2.6 units</td>
<td>13 + 2.6 = 15.6 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>14.0 mmol/L</td>
<td>3 units</td>
<td>10 + 3</td>
<td>↑ ↑ ↑ Glucose &gt;8 mmol/L consider 30% initially</td>
<td>20 - 30% increase 13 + 5 = 2.6 units 13 + 100 x 30 = 3.9 units</td>
<td>13 + 2.6 = 15.6 units 13 + 3.9 = 16.9 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>14.0 mmol/L</td>
<td>3 units</td>
<td>10 + 3</td>
<td>↓</td>
<td>10% decrease 13 + 10 = 1.3 unit</td>
<td>13 - 1.3 = 11.7 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>14.0 mmol/L</td>
<td>3 units</td>
<td>10 + 3</td>
<td>↓ ↓</td>
<td>20% decrease 13 + 5 = 2.6 units</td>
<td>13 - 2.6 = 10.4 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>14.0 mmol/L</td>
<td>3 units</td>
<td>10 + 3</td>
<td>↓ ↓ ↓ Glucose &gt;8 mmol/L consider 20% initially</td>
<td>20 - 30% decrease 13 + 5 = 2.6 units 13 + 100 x 30 = 3.9 units</td>
<td>13 - 2.6 = 10.4 units 13 - 3 = 9.1 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>14.0 mmol/L</td>
<td>3 units</td>
<td>10 + 3</td>
<td>No arrows</td>
<td>Give dose as calculated by bolus wizard</td>
<td>13 + 0 = 13 units</td>
<td>6.0 - 8.0 mmol/L</td>
</tr>
</tbody>
</table>
association of Children’s Diabetes Clinicians

Medtronic Minimed 640G™, STEP 3 - Using trend arrows - Patient information

**Practise how to work out insulin dose with trend arrows**

1. Use a typical meal example using your glucose reading on your CGMS to practise using the percentage adjustment tool.

2. Work out your insulin dose.

3. Use your glucose reading on your CGMS to practise using the percentage adjustment tool.

4. Is a correction dose needed?

5. Add meal insulin and any correction dose together.

6. Look at trend arrow graph. Do you need to increase or decrease your insulin dose by 10%, 20% or 20 - 30%?

7. Calculate the total insulin dose for your meal according to your trend arrow. Or look at the bolus wizard and increase or decrease the dose by the suggested percentage.

8. Write down your insulin dose to be given.

9. Write down your glucose reading 2 hours after you have taken your insulin. Are you still within target range? The glucose level should not rise more than 2 mmol/L after a meal.

Did 20%, 25% or 30% work better when you have ↑ ↑ ↑?

<table>
<thead>
<tr>
<th>Meal carbs</th>
<th>Meal insulin units (ratio 1:10)</th>
<th>Glucose reading before food</th>
<th>Correction dose (if needed)</th>
<th>Meal time dose + correction dose units</th>
<th>Which trend arrow do you have?</th>
<th>Insulin dose increased or decreased by 10% 20% or 20 - 30% from bolus wizard dose</th>
<th>Insulin dose to be given</th>
<th>Glucose reading after 2 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

No arrows
**Medtronic Minimed 640G™ - STEP 3 - Using trend arrows and ISF tool - Patient information**

**Method 2 - Insulin sensitivity factor tool (ISF)**

The Insulin sensitivity factor tool helps you decide how much insulin to add or take away from your total insulin dose without having to it work out.

**NOTE:**
- If arrows ↑↑↑ and glucose <8 mmol/L use lower end range in 3rd column and >8 mmol/L consider the higher range.
- If arrows ↓↓↓ and glucose <8 mmol/L reduce dose by higher range in the 3rd column and >8 mmol/L reduce by lower range.

<table>
<thead>
<tr>
<th>Insulin sensitivity factor</th>
<th>Direction of trend arrows</th>
</tr>
</thead>
<tbody>
<tr>
<td>The glucose is rising steadily, <strong>ADD the amount of units below to the total bolus amount</strong></td>
<td></td>
</tr>
<tr>
<td>The glucose is rising moderately, <strong>ADD the amount of units below to the total bolus amount</strong></td>
<td></td>
</tr>
<tr>
<td>The glucose is rising rapidly, <strong>ADD the amount of units below to the total bolus amount</strong> (See note above)</td>
<td></td>
</tr>
<tr>
<td>The glucose is falling steadily, <strong>TAKE OFF the amount of units below from the total bolus amount</strong></td>
<td></td>
</tr>
<tr>
<td>The glucose is falling moderately, <strong>TAKE OFF the amount of units below to the total bolus amount</strong> (See note above)</td>
<td></td>
</tr>
<tr>
<td>The glucose is falling rapidly, <strong>TAKE OFF the amount of units below to the total bolus amount</strong> (See note above)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulin sensitivity factor</th>
<th>The glucose is rising steadily, <strong>ADD the amount of units below to the total bolus amount</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>2.0</td>
<td>0.75</td>
</tr>
<tr>
<td>2.5</td>
<td>0.6</td>
</tr>
<tr>
<td>3.0</td>
<td>0.5</td>
</tr>
<tr>
<td>3.5 - 4.0</td>
<td>0.4</td>
</tr>
<tr>
<td>4.5 - 5.0</td>
<td>0.3</td>
</tr>
<tr>
<td>5.5 - 6.0</td>
<td>0.25</td>
</tr>
<tr>
<td>7.0 - 8.0</td>
<td>0.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulin sensitivity factor</th>
<th>The glucose is falling steadily, <strong>TAKE OFF the amount of units below from the total bolus amount</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>2.0</td>
<td>0.75</td>
</tr>
<tr>
<td>2.5</td>
<td>0.6</td>
</tr>
<tr>
<td>3.0</td>
<td>0.5</td>
</tr>
<tr>
<td>3.5 - 4.0</td>
<td>0.4</td>
</tr>
<tr>
<td>4.5 - 5.0</td>
<td>0.3</td>
</tr>
<tr>
<td>5.5 - 6.0</td>
<td>0.25</td>
</tr>
<tr>
<td>7.0 - 8.0</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**Before giving your insulin dose THINK are there any other reasons to make further changes to your bolus dose?**
Medtronic Minimed 640G™ - **STEP 3** - Using trend arrows and the ISF tool - Patient information

**Insulin sensitivity factor tool (ISF)**

Now fill in this chart with your educator to practice using the ISF tool page 35 using your own readings as examples.

1. Count how much carbohydrate you are going to eat
2. Write down your meal time dose
3. What is your glucose level?
4. Do you need a correction dose?
5. Write down your meal time dose + correction dose if needed.
6. Look at the direction of the arrows on your meter and find the arrow below. Use this line to work out what insulin to have.

7. Look at the ISF dose to be added or taken away from the total dose suggested by the bolus wizard
8. Insulin dose to be given?
9. Glucose reading after 2 hours should be no more than 2 mmol/L higher than pre meal value (if within target glucose range).

Did 20%, 25% or 30% work better when you have ↑ ↑ ↑?

<table>
<thead>
<tr>
<th>Meal carbs</th>
<th>Meal insulin units (ratio 1:10)</th>
<th>Glucose reading before food</th>
<th>Correction dose (if needed)</th>
<th>Meal time dose + correction dose units</th>
<th>Which trend arrow do you have?</th>
<th>Look at ISF and write down +/- insulin dose</th>
<th>Insulin dose to be given</th>
<th>Glucose reading after 2 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| ↑          | ↑ ↑                              | ↑ ↑ ↑                       | ↑ ↑ ↑                       | ↓                                      | ↓ ↓                           | ↓ ↓ ↓                               | ↑                        | ↑ ↑ ↑                       |

| No arrows  |                                 |                             |                             |                                        |                               |                                               |                          |                             |

---

**Table:**

<table>
<thead>
<tr>
<th>Meal carbs</th>
<th>Meal insulin units (ratio 1:10)</th>
<th>Glucose reading before food</th>
<th>Correction dose (if needed)</th>
<th>Meal time dose + correction dose units</th>
<th>Which trend arrow do you have?</th>
<th>Look at ISF and write down +/- insulin dose</th>
<th>Insulin dose to be given</th>
<th>Glucose reading after 2 hours</th>
</tr>
</thead>
</table>
Whether you use the total insulin dose percentage tool or the insulin sensitivity factor tool you must find out which treatment option is best for you.

Start by using the lowest suggested dose then gradually increase until you have the dose that works for you. This is especially important if glucose levels are falling rapidly i.e. 2 or 3 arrows down.

**How to work out 10% of your meal time dose:**
10% of meal time insulin = meal time insulin ÷ 10
This amount will either be added to your meal time dose or taken off your meal time dose

**How to work out 20% of your meal time dose:**
20% of meal time insulin = meal time insulin ÷ 5
This amount will either be added to your meal time dose or taken off your meal time dose

**How to work out 25% of your meal time dose:**
25% of meal time insulin = meal time insulin ÷ 4
This amount will either be added to your meal time dose or taken off your meal time dose

**How to work out 30% of your meal time dose:**
30% of meal time insulin = meal time insulin ÷ 100 x 30
This amount will either be added to your meal time dose or taken off your meal time dose

---

**Important!**
Find the tools that work for you!
Start with the lower suggested dose first.

**Notes:**
Which alteration tool will you use? (Please circle your choice)
Insulin sensitivity factor (ISF) or Total insulin dose percentage tool.

**ISF**
What is your ISF ....................................................

Write down your agreed starting ISF doses for each trend arrow

<table>
<thead>
<tr>
<th>Trend Arrow</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total insulin dose percentage tool**
Write down your agreed starting percentage doses for each trend arrow

<table>
<thead>
<tr>
<th>Trend Arrow</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For 3 arrows up or down think about:
If trend arrows are ↑↑↑ and glucose >10 mmol/L think about higher dose
If trend arrows are ↓↓↓ and glucose <10 mmol/L think about lower dose
## Correction dose adjustment using the trend arrows

**Example based on glucose of 12.0 mmol/L**

<table>
<thead>
<tr>
<th>Trend arrow</th>
<th>Maximum change in 20 mins</th>
<th>Glucose in 20 mins</th>
<th>Action needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No arrows</td>
<td></td>
<td></td>
<td>Give usual correction dose</td>
</tr>
<tr>
<td>↑</td>
<td>Glucose is rising by maximum of 2.0 mmol/L</td>
<td>14.0 mmol/L</td>
<td>Add 10% to correction dose</td>
</tr>
<tr>
<td>↑↑</td>
<td>Rising rapidly by maximum of 3.0 mmol/L</td>
<td>15.0 mmol/L</td>
<td>Add 20% to correction dose</td>
</tr>
<tr>
<td>↑↑↑</td>
<td>Rising very rapidly by more than 3.0 mmol/L</td>
<td>&gt;15.0 mmol/L</td>
<td>Add 20-30% to correction dose</td>
</tr>
<tr>
<td>↓</td>
<td>Falls by maximum of 2.0 mmol/L in 15 mins</td>
<td>10.0 mmol/L</td>
<td>Think do you need to wait until levelled off and glucose is stable</td>
</tr>
<tr>
<td>↓↓</td>
<td>Falls rapidly maximum of 3.0 mmol/L</td>
<td>9.0 mmol/L</td>
<td>Think do you need to wait until levelled off and glucose is stable</td>
</tr>
<tr>
<td>↓↓↓</td>
<td>Falling very rapidly by more than 3.0 mmol/L</td>
<td>&lt; 9.0 mmol/L</td>
<td>Think do you need to wait until levelled off and glucose is stable</td>
</tr>
</tbody>
</table>

**Write down your correction dose ratio:**

You may need to make a different decision if glucose not too high

<table>
<thead>
<tr>
<th>Trend arrow</th>
<th>Maximum change in 20 mins</th>
<th>Glucose in 20 mins</th>
<th>Action needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No arrows</td>
<td></td>
<td></td>
<td>Give usual correction dose</td>
</tr>
<tr>
<td>↑</td>
<td></td>
<td></td>
<td>Add 10% to correction dose</td>
</tr>
<tr>
<td>↑↑</td>
<td></td>
<td></td>
<td>Add 20% to correction dose</td>
</tr>
<tr>
<td>↑↑↑</td>
<td></td>
<td></td>
<td>Add 20-30% to correction dose</td>
</tr>
<tr>
<td>↓</td>
<td></td>
<td></td>
<td>Think do you need to wait until levelled off and glucose is stable</td>
</tr>
<tr>
<td>↓↓</td>
<td></td>
<td></td>
<td>Think do you need to wait until levelled off and glucose is stable</td>
</tr>
<tr>
<td>↓↓↓</td>
<td></td>
<td></td>
<td>Think do you need to wait until levelled off and glucose is stable</td>
</tr>
</tbody>
</table>
Using trend arrows to prevent or act on a low glucose level

- The trend arrows can help during exercise or any other time of increased activity.
- Look at the direction of the arrow along with your glucose level.
- Remember how quickly and by how much the glucose level can fall by in 20 mins.
- By acting early you may prevent a hypo.
- You may have to experiment to know at what point you need to take extra fast acting carbohydrate during exercise.
- Start by acting at a higher level than you would normally do until you have evidence as to the point at which you need to act.
- Suspend before low function enabled may help prevent a hypo.

Remember!
Temperature, type of activity, duration, all have a different effect on glucose levels so you may have a different plan for each activity. Altering daily doses may be an indicator your basal needs adjustment.

Notes:

Suggested action depending on glucose level:

<table>
<thead>
<tr>
<th>Trend arrow</th>
<th>Maximum change in 20 mins</th>
<th>Prevent or act on current glucose level of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>No arrow</td>
<td>Glucose is stable only changing up or down</td>
<td>4.8 mmol/L or lower</td>
</tr>
<tr>
<td></td>
<td>If active eat some carbohydrate to prevent hypo.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If sitting still or about to eat try waiting and monitor the trend.</td>
<td></td>
</tr>
<tr>
<td>↓</td>
<td>Falls by maximum of 2.0 mmol/L in 20 mins</td>
<td>5.5 mmol/L or lower</td>
</tr>
<tr>
<td></td>
<td>If active think about how long it will be before next meal/snack.</td>
<td></td>
</tr>
<tr>
<td>↓ ↓</td>
<td>Falls rapidly maximum of 3.0 mmol/L</td>
<td>6.5 mmol/L or lower</td>
</tr>
<tr>
<td></td>
<td>You may need to eat fast acting carbohydrate even if higher than 6.5 mmol/L and if active.</td>
<td></td>
</tr>
<tr>
<td>↓ ↓ ↓</td>
<td>Falling very rapidly by more than 3.0 mmol/L</td>
<td>6.5 mmol/L higher or lower</td>
</tr>
<tr>
<td></td>
<td>You will need to eat fast acting carbohydrate to prevent a hypo.</td>
<td></td>
</tr>
</tbody>
</table>

Frequent correction doses? Check basal insulin. Find out what works for you ...... gradually.
Medtronic Minimed 640G™ - **STEP 3** - Patient information

**What to practise for next session - STEP 4**

Trend arrows, with your sensor glucose level and blood glucose are to be used in helping you to decide:

- On insulin dose adjustment
- Whether or when to take carbohydrate to prevent a hypo

Over next few weeks look at the trend arrows and use the charts to help you to make the changes to your insulin dose or treat hyper or hypoglycaemia.

Start very cautiously and build up your experience to prevent unnecessary high or low glucose levels.

**Notes:**


**Diabetes team contact details:**


**Date for next CGMS review:**


**Remember!**

- Choosing to use the CGMS means a new way of glucose monitoring
- CGMS does not replace blood glucose monitoring
- Training is essential to interpret the increased number of glucose readings
- Trend arrows help to give you extra information about which direction your glucose is travelling in and how fast
- Insulin dose adjustment tools can help you decide how much total insulin to give
- The CGM has alerts to help you act on your glucose level. These MUST NOT be turned off
- You can set the suspend and alerts to help prevent hypos
- Is trend arrow ↑↑↑↑ or ↓↓↓↓ YES Check blood glucose
Medtronic Minimed 640G™ with SmartGuard Glucose Monitoring System

Patient leaflet

**STEP 4**

• You must attend the first 4 training sessions to ensure you know how to use the Minimed 640G™
• There are 4 leaflets to remind you of the 4 step training
• You will be asked to write down your reasons for using the CGM and what your targets are
• Further training will be arranged following completion of these first 4 steps
• As you get older the way you look after your diabetes will need changing
• Ongoing education is an essential part of your diabetes care to make sure you reach your targets
Aims for STEP 1:
- Getting started with CGM system - Minimed 640G™
- Understanding the basic knowledge of your CGM system
- Learn to identify trends and patterns

Aims for STEP 2:
- Further understanding of trend arrows
- Learn to actively use target glucose range

Aims for STEP 3:
- Recap the target glucose range
- Optimise the effect of CGMS using trend arrows
- How to use the total dose percentage adjustment tool
- How to use the insulin sensitivity factor tool (ISF)

Aims for STEP 4:
- How to use the CareLink Professional and CareLink Personal
Recap on setting target glucose range

Do you have any new aims for using the Minimed 640G™? Discuss these with your educator and make a note below:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Look at your glucose profiles you have recorded since your last session.

Discuss with your educator if your glucose target range is set correctly.

What is your lower target level set at now?

What is your upper level set at now?

Recap on trend arrows and what they mean?

Trend arrows on the CGMS give you an idea as to how fast or slow your glucose is rising or falling.

Don’t forget the blood glucose level will be lower than the CGMS result. If arrows straight up or down check blood glucose.

<table>
<thead>
<tr>
<th>Arrow</th>
<th>Description of trend arrow</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
<td>Rising: Glucose is going up. It could go up by 1.0 - 2.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↑↑</td>
<td>Rising quicker: Glucose is going up quickly. It may go up by 2.0 - 3.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↑↑↑</td>
<td>Rising rapidly: Glucose is rapidly rising. It may go up by 3.0 mmol/L or more in 20 mins</td>
</tr>
<tr>
<td>↓</td>
<td>Glucose falling: Glucose is going down slowly. It may go down by 1.0 - 2.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↓↓</td>
<td>Falling quicker: Glucose is going down quickly. It could fall by 2.0 - 3.0 mmol/L in 20 mins</td>
</tr>
<tr>
<td>↓↓↓</td>
<td>Falling rapidly: Glucose is going down rapidly. It could go down by more than 3.0 mmol/L in 20 mins</td>
</tr>
</tbody>
</table>
Medtronic Minimed 640G™ - **STEP 4** - trend data

**Introduction to CareLink Professional and CareLink Personal**

Your CGM device and the software with it CareLink Personal and CareLink Professional software (only used in your clinic) will give you lots of information which may be confusing. This session is to help you to understand the different graphs and how to use them to improve your glucose control, focusing on the CareLink Personal software you can use at home.

There are a number of ways of presenting your glucose data with CareLink Professional. One option is to look at the summary:
Medtronic Minimed 640G™ - **STEP 4** - looking at glucose levels

There are a lot of information on the Carelink summary. Focusing on when you are high and at risk of going low can be helpful.

- **15-18 mmol/L** always high here and outside target range

---

**Yellow area**
- glucose too high

**Red area**
- risk of hypo
Daily summary - example

This information is given as 1 day using 3 graphs including blood glucose monitoring, CGM reading, insulin use, carbohydrate intake and exercise information. You can also look at each individual day.

You may spot patterns or trends each day for example always low after games at school.
Daily summary - example

Insulin Delivery

![Graph showing insulin delivery with different insulin delivery types: pump alarm, bolus, square bolus, basal, and suspend.]

- **Pump Alarm**
- **Bolus**
- **Square Bolus**
- **Basal**
- **Temp Basal**
- **Suspend**
- **Suspend Before Low**

**Bolus Units / Hour**

- Sat 00:00
- Sat 02:00
- Sat 04:00
- Sat 06:00
- Sat 08:00
- Sat 10:00
- Sat 12:00
- Sat 14:00
- Sat 16:00
- Sat 18:00
- Sat 20:00
- Sat 22:00
- Sun 00:00

**Bolus Units**

- 0
- 2
- 4
- 6
- 8
- 10

**Insulin Delivery**

- **Basal Units / Hour**

**Summary**

- **Exercise Carbs**
- **Insulin**
- **Glucose**

**Total Minutes**

- 329

**Total Carbs (grams)**

- 44.7

**Total (U)**

- 6.8/6.8

**Average (mmol/L)**

- **High (mmol/L)**
- 29%
- 13.0

**Average Carbs (grams)**

- 11.2/14.0

**Average Minutes**

- 9

**# of Meals**

- 71%
- 31.7

**# of Readings**

- 1

**# of Episodes**

- 30.5

**# of BG Hypos**

- 1.2

**# of Injections**

- 8

**# Suspends Before Low**

- 8

**Total Suspends**

- 8

**Temp Basal Minutes**

- 1

**# of Alarms**

- 0

**# of Innjections**

- 8

**# Suspends Before Low**

- 8

**Total Suspends**

- 8

**Printed: 27/02/15, 20:07**

**Page: 1**
Modal day - example

Looking at hundreds of glucose results dotted onto a graph can be confusing. The Modal day graph includes all the glucose results over a 2 week period and displayed in one 24 hour time frame. There are 2 ways of viewing them below. The first chart shows the results from the lowest to highest at a certain point in time. The second shows the spread of glucose results and a summary.

*Medtronic Minimed 640G™ - STEP 4 - trend data*

### High / Low / Average by period (mmol/L)

- **Upper end of range**
- **Average range**
- **Lower end of range**

If bar falls below your target set here at 3.5 mmol/L you are at risk of a hypo and should make changes.

If bar goes above your target set here at 9.1 mmol/L you are often high so you need to adjust your insulin.

### Summary (BG in mmol/L)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Average / Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average BG</strong></td>
<td>5.4</td>
<td>5.8</td>
<td>7.5</td>
<td>7.2</td>
<td>6.5</td>
<td>7.5</td>
<td>6.6</td>
<td>7.1</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>High BG</strong></td>
<td>7.7</td>
<td>7.1</td>
<td>10.4</td>
<td>9.3</td>
<td>9.7</td>
<td>12.0</td>
<td>9.5</td>
<td>10.6</td>
<td>13.0</td>
</tr>
<tr>
<td><strong>Low BG</strong></td>
<td>4.0</td>
<td>4.4</td>
<td>4.6</td>
<td>5.0</td>
<td>4.5</td>
<td>4.4</td>
<td>4.9</td>
<td>5.2</td>
<td>4.0</td>
</tr>
<tr>
<td><strong>Standard Dev</strong></td>
<td>1.2</td>
<td>1.1</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>2.5</td>
<td>1.9</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td><strong># of Readings</strong></td>
<td>8</td>
<td>6</td>
<td>15</td>
<td>12</td>
<td>17</td>
<td>11</td>
<td>3</td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td><strong># of Hypos</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Medtronic Minimed 640G™ - **STEP 4** - trend data

**CareLink Professional and Personal** (you can only use this software in clinic with your diabetes team)

These graphs show different events linked to high and low glucose reading and how to treat them.

- **Hypoglycemia Episodes**
  - Threshold: ≤4.8 mmol/L
  - Graph showing various factors leading to hypoglycemia.

- **Hyperglycemia Episodes**
  - Threshold: ≥10.0 mmol/L
  - Graph showing various factors leading to hyperglycemia.

**Event Type Descriptions**

<table>
<thead>
<tr>
<th>Event Type Description</th>
<th>%</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boilus Wizard Food Bolus</td>
<td>80</td>
<td>Consider assessing the Boilus Wizard settings, counseling your patient on accurate carbohydrate counting, and/or the timing of insulin delivery with respect to carbohydrate intake.</td>
</tr>
<tr>
<td>Rapid Falling Sensor Rate Of Change</td>
<td>70</td>
<td>Consider counseling your patient to take action to avoid hypoglycemia.</td>
</tr>
<tr>
<td>Boilus with Falling Sensor Rate of Change</td>
<td>60</td>
<td>Consider counseling your patient to modify bolus amounts when sensor glucose values are falling (downward arrow is present).</td>
</tr>
<tr>
<td>Basal Rate Decrease</td>
<td>33</td>
<td>Consider assessing your patient's basal rate settings, including temporary basal rates and suspends.</td>
</tr>
<tr>
<td>Overcorrection of Hypoglycemia</td>
<td>33</td>
<td>Consider counseling your patient on the management of hypoglycemia.</td>
</tr>
<tr>
<td>Rising Sensor Rate of Change Without Bolus</td>
<td>31</td>
<td>Consider counseling your patient on bolus use with meals and/or correcting rapid glucose excursions.</td>
</tr>
</tbody>
</table>
Medtronic Minimed 640G™ - **STEP 4** - trend data

**How to use the CareLink Personal:**

1. Look at the median glucose over a 2 week period
2. How close are you to target?
3. What is the variability like i.e. how wide are the glucose levels
4. How often have you had a hypo or hyper or been close?

The profile will show a rise and fall of glucose levels at certain times of the day and whether you are consistently high, low or within target range.

**Start by looking at the risk of a hypo.**

Look at your graphs and see how often you go below target range.

If hypos are a problem look at the common time they occur or are likely to occur.

Think about:

- When did you last have insulin?
- Are you counting carbohydrate correctly?
- Are you within your target range overnight?

**Are your glucose levels high most of the time?**

Think about:

- Has insulin been omitted?
- Have you given insulin after a meal?
- Are you counting carbohydrates correctly? Are you over treating a hypo?
- Have you been unwell?
- Does it occur at certain times of the week?

**Remember!**

It may be difficult to find a pattern because the range of glucose levels are too wide. Therefore you may need to reduce variability first.

Look at a 2 week profile and focus on overnight glucose level being in or nearer target range.

Then review the profile and see if you can identify any times of the day you are too high or too low thinking about the points earlier.

CareLink Professional can only be used in clinic with your diabetes team.
Summary of glucose target aims

- Aim for an average glucose of 8 mmol/L, most of the time, you should then be close to the target HbA1c result of 6.5%
- Aim for a glucose level not rising more than 2 mmol/L after a meal
- Aim for very few hypos with improving control
- Continue to download your data with an educator to review your targets

**Remember!**

- Choosing to use the CGM means a new way of glucose monitoring
- CGM does not replace blood glucose monitoring
- Ongoing training and reviews are essential to interpret the increased number of glucose readings
- Trend arrows help to give you extra information about which direction your glucose is travelling in and how fast
- Insulin dose adjustment tools can help you decide how much total insulin to give
- **DO NOT** turn off your alerts they are there is help you.

Medtronic Minimed 640G™ - **STEP 4** - trend data

Date for next CGM review:

______________________________

______________________________

Diabetes team contact details:

______________________________

______________________________

**Diabetes control changes as you get older.**

**Ongoing education is the key to better glucose control**