Free Style Libre

Education Session

NHS
Greater Glasgow and Clyde

Glasgow, June/July 2018

Welcome to GGC Libre introduction and education session.

Acknowledgements

- Dr Fraser Gibb – Consultant,
  Edinburgh Royal Infirmary
- The whole GGC Paediatric Diabetes Team –
  for all the hard work

NHS
Greater Glasgow and Clyde

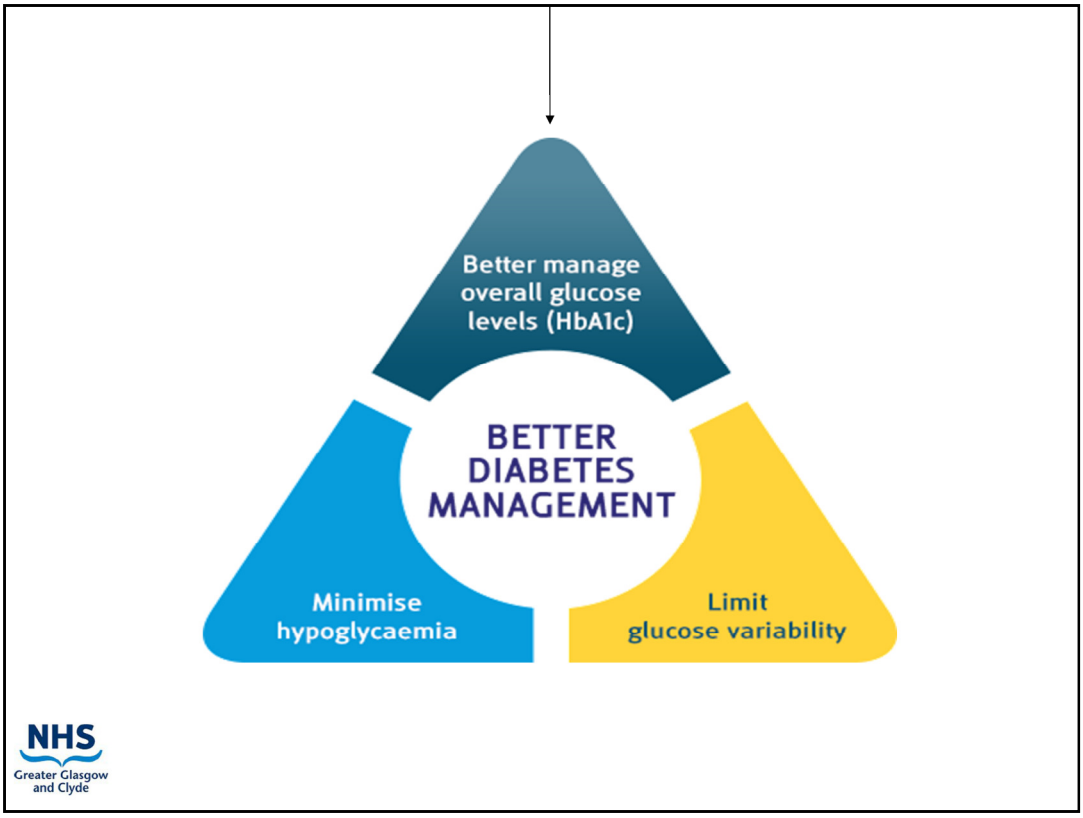
Part of material was used based on ideas and experience of Dr Fraser Gibb from Edinburgh where they started Libre use slightly earlier.

Introduction

- Why glucose is important

NHS
Greater Glasgow and Clyde

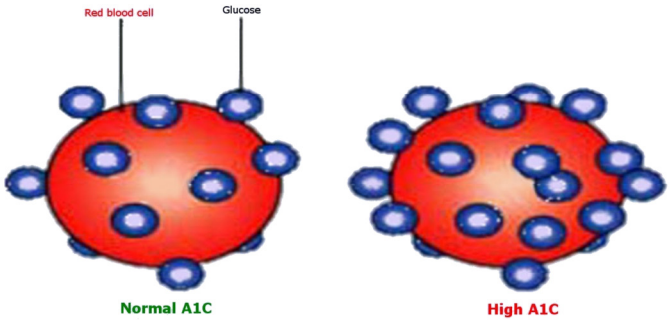
We trust that you are well aware of how and why glucose control is so important, yet a short review will help in further explorations.



For many years HBA1c was used to evaluate the diabetes control – it was the best known and fairly easily applicable measure.

HbA1c

What is it and why is it important?



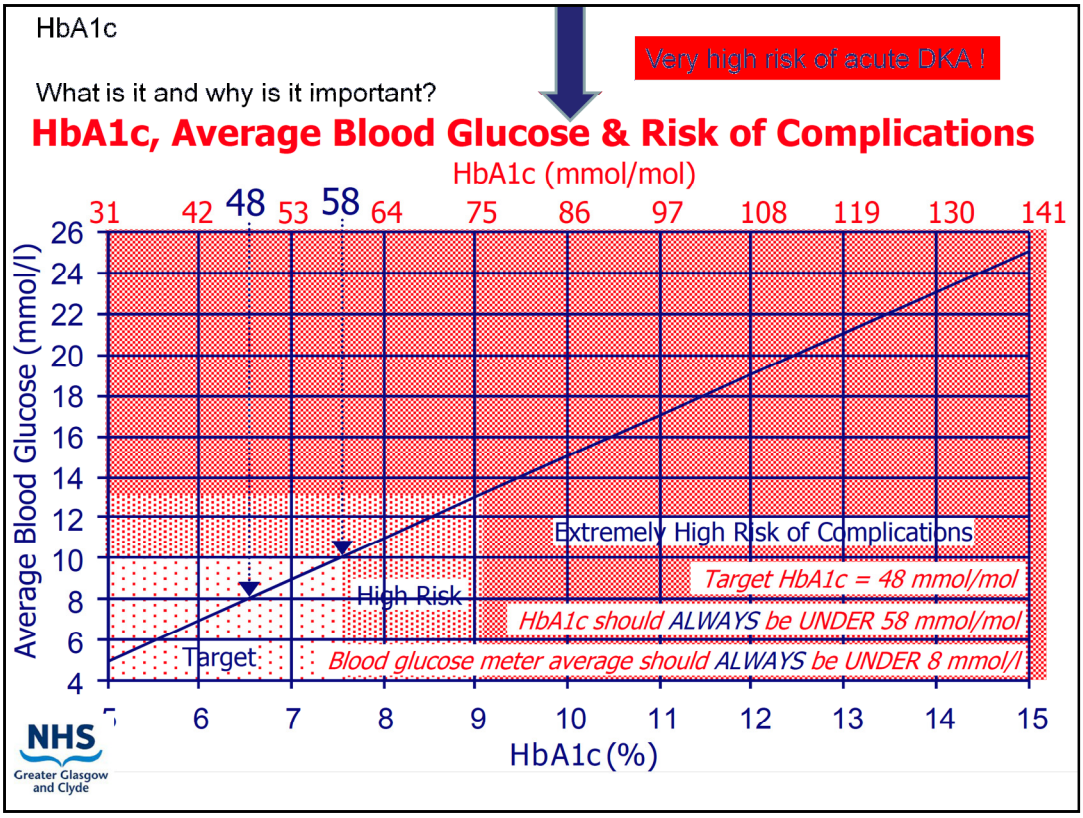
Good : Less than **58** mmol/mol

Ideal*: Less than 48 mmol/mol

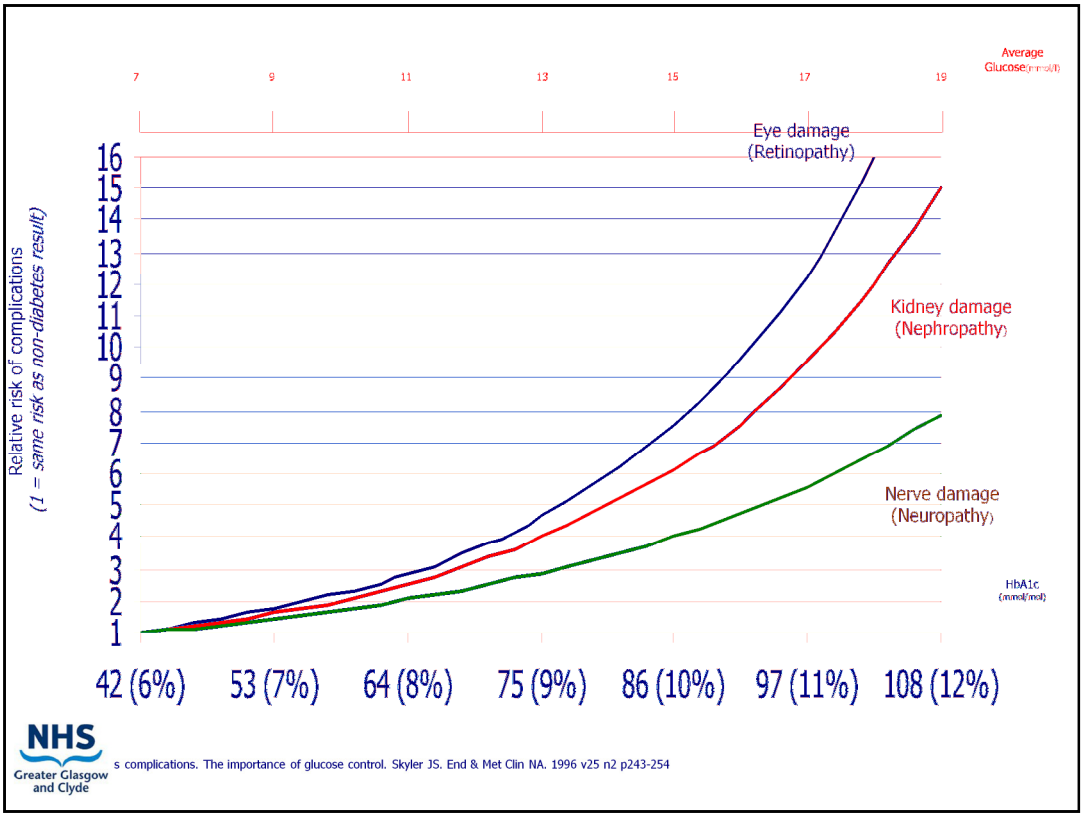
*Only if it can be achieved without significant hypoglycaemia

NHS Greater Glasgow and Clyde

It is a normal process that glucose present in the blood attaches to the protein haemoglobin on the red blood cells, however the more glucose is present the more 'glycated' RBC becomes.



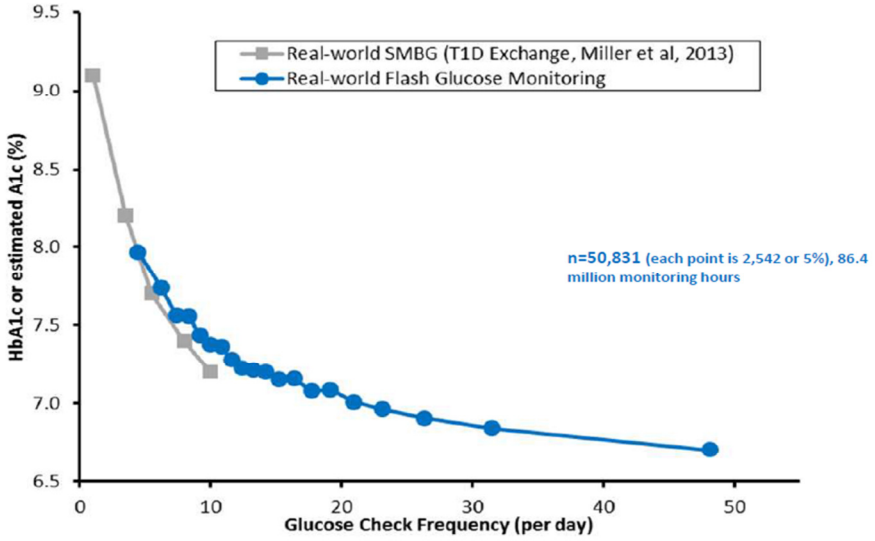
Extensive studies on complications related to diabetes showed a significant and very clear correlation of HbA1c and the risk of complications. A person's whose HbA1c is below 48 risk to develop complications is fairly similar to the person without diabetes, whereas someone whose HbA1c above 75 has a very high risk of complications in fairly short period of time. In addition, a person whose HbA1c is above 86 mmol/mol is at risk of DKA at any point in time.



Same studies have shown that eyes are most sensitive to overload of glucose, kidneys being next on a row of complications followed by nerve damage in fingers and feet. An example – a person whose HbA1c is 58 mmol/mol has a double risk for retinopathy compared to a person without diabetes.

More glucose data

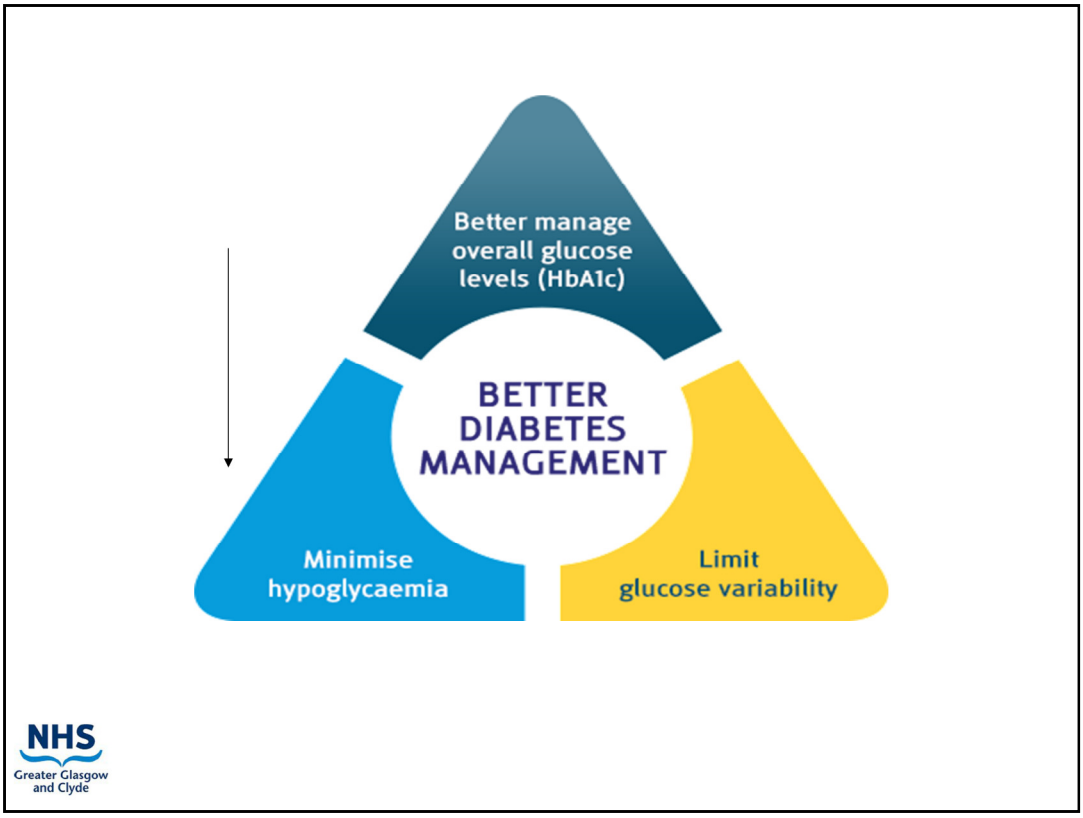
Lower HbA1c



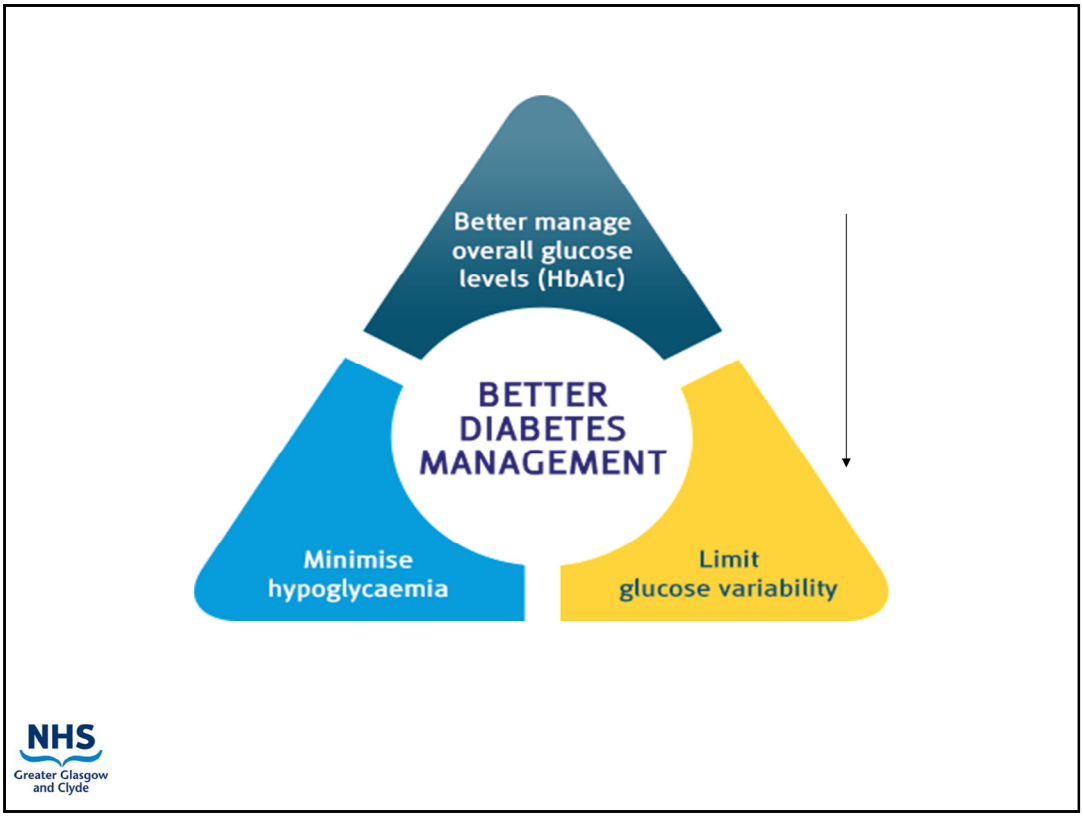
NHS Greater Glasgow and Clyde

iller, et al. "Evidence of a strong association between frequency of self-monitoring of blood glucose and hemoglobin A1c levels in T1D ic registry participants," *Diabetes Care* 36:2009–2014, 2013

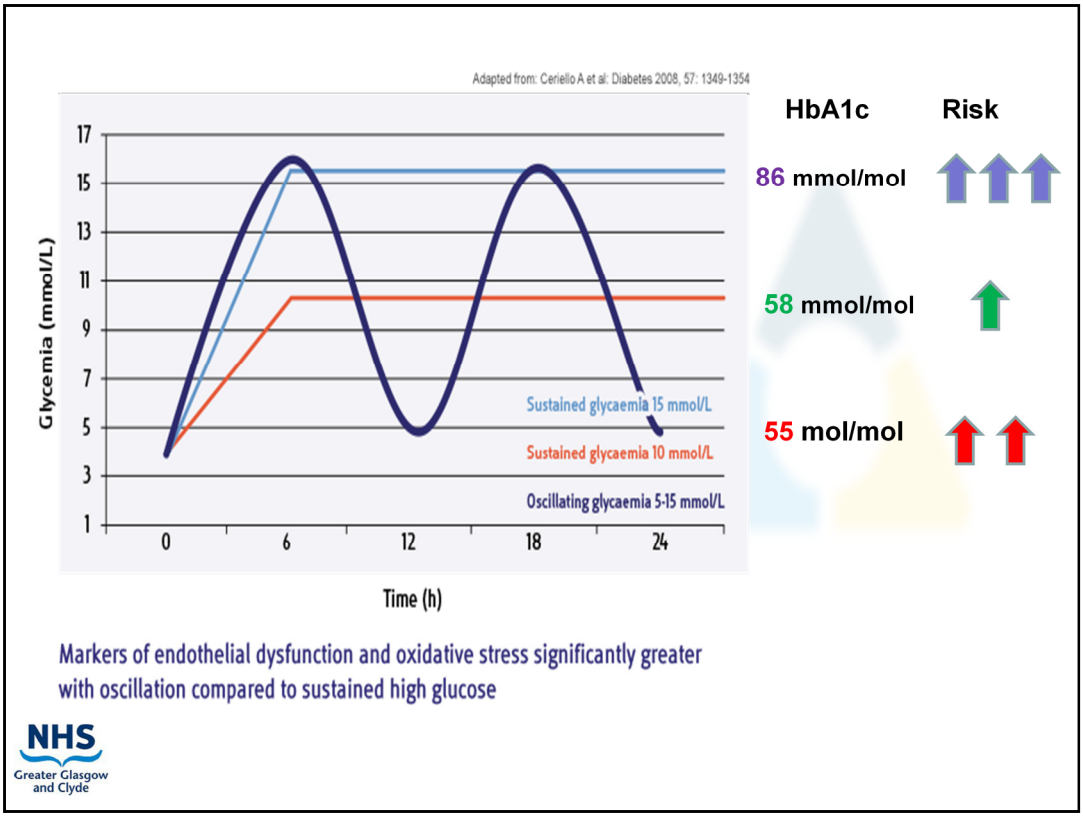
Another correlation observed by clinicians and researchers was that increasing number of BG checks a day decreases HbA1c – well, given the fact that a person **is reacting** on the current BG readings.



Another important aspect of diabetes control is hypoglycaemia management. In efforts to reduce the BG levels there is a flipside which might be acute and very dangerous – too low BG. Minimizing the number of hypoglycaemia events and their severity means a good control, not just purely low HBA1c.



Until recently the third and very important aspect of diabetes control was not much discussed, mainly because the data has become available due to new technology recently. Having CGM and Libre more recently is giving a way more extensive picture of glucose excursions than several screenshots of BG testing.



This might look as a complicated scientific graph but this will give a good insight why not only glucose levels but also their excursions and variations are important. A person with persistent BG of 15 mmol will present with HbA1c of approx 86 mmol/mol. A person with persistent BG of 10 mmol/mmol will likely present with HbA1c of 58 mmol/mol. A person whose BG varies in rollercoasting between 5 and 15 mmol/l will also present with HbA1c of 58 mmol/mol, however the latter case will have much higher risk for complications due to damage to the cells done by variations of glucose.

NHS
Greater Glasgow and Clyde

The BG excursions in the previous slide may remind you of the peaks of Himalayas.

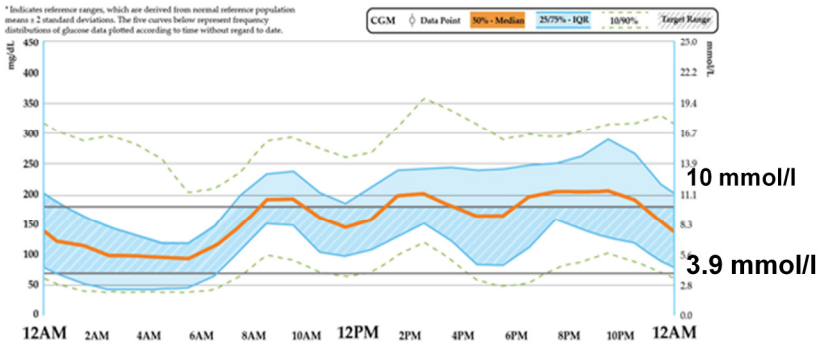


Fig. 2: Classical Glycemic Variability (GV) 24 hour graph

However we much prefer the soft line of Scottish munros. It means way healthier outcome in relation to complications.

Free Style Libre

NHS
Greater Glasgow and Clyde

We get to the more specific part which you all are familiar with as you all have graduated from Libre Academy online.

Glucose monitoring system,
that measures glucose levels
in **interstitial tissue**
continuously.

NHS
Greater Glasgow and Clyde

A quick review of few things you may know.

NHS
Greater Glasgow and Clyde

This is the kit you will be presented with today.

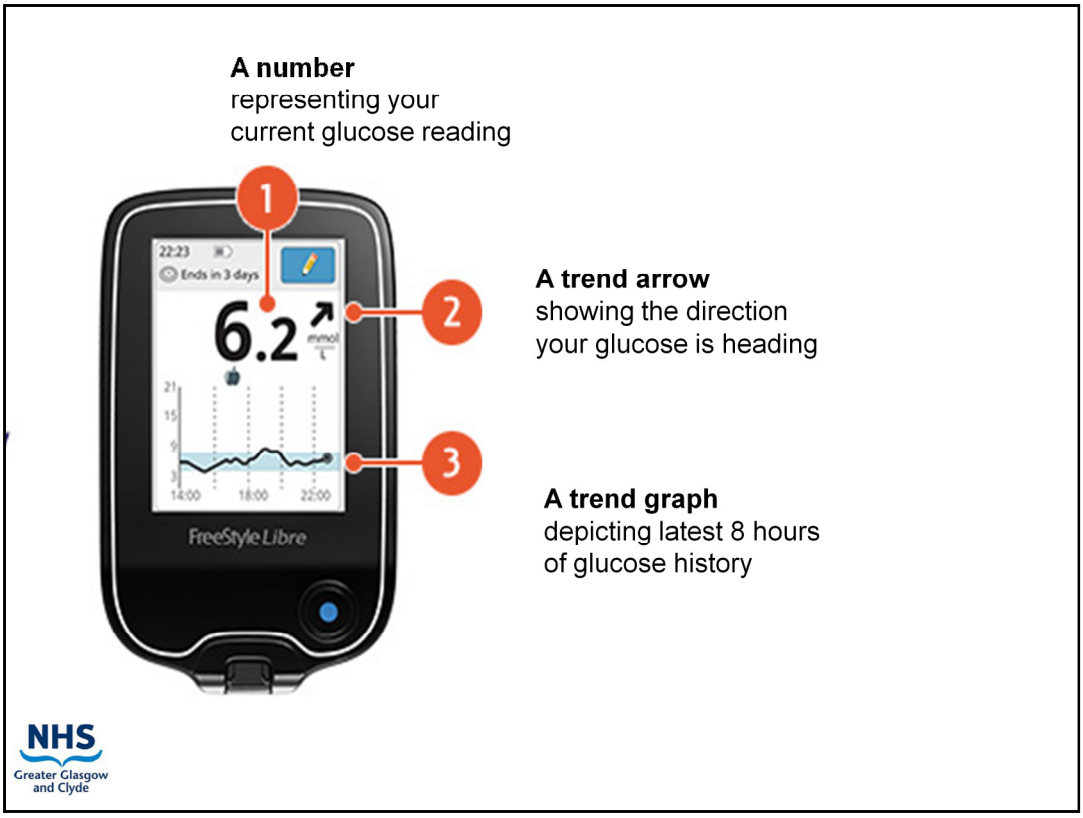
0.2 in (5 mm) subcutaneous sensor

Up to 30 min water resistant

Worn for 2 weeks

NHS
Greater Glasgow and Clyde

A sensor is about 2 p coin size, inserted at the back of the arm and can be worn for 2 weeks.



The reader has more information than a usual BG meter: it does show glucose reading, the trend arrow in which direction glucose is changing and the graph of the last 8 hours readings.

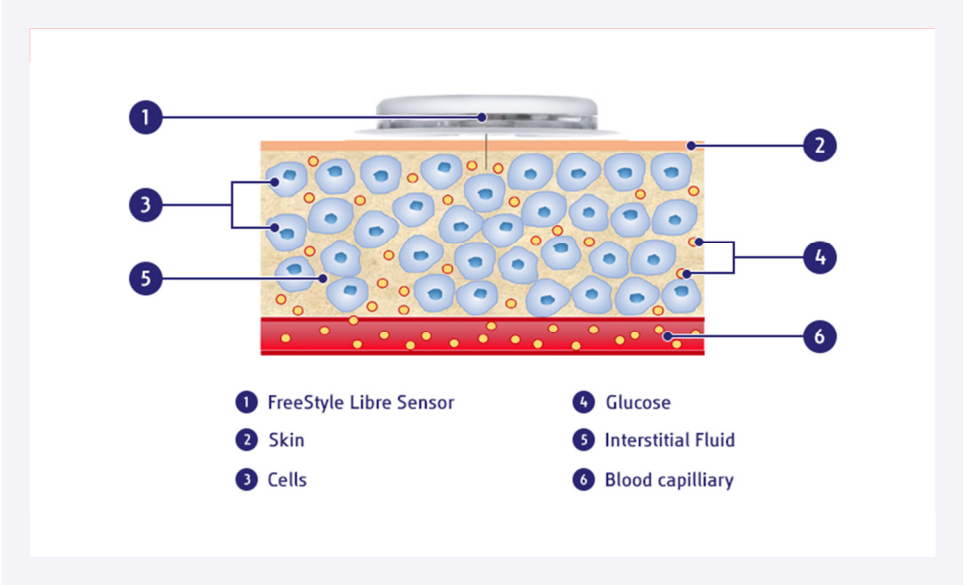
Application

First reading
1 hour after sensor inserted

NHS
Greater Glasgow and Clyde

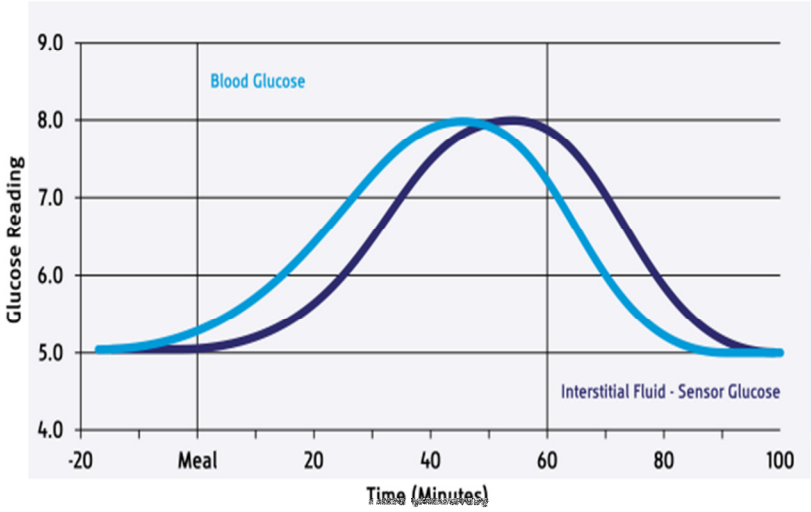
Application of sensor is uncomplicated. What is important to remember is that scanner needs at least 1 hour to adjust, although some patients may notice that readings are not consistent for the first 24 hours.

Can you spot the difference?



NHS
Greater Glasgow and Clyde

This illustrates the difference between measuring glucose in interstitial tissue by Libre and measuring BG by any standard BG meter – and so explains the difference between the readings.



Average lag time 5 - 10 min.

The levels of glucose in interstitial tissue reach similar to those in the blood about 5 to 10 min later. The lag may be even greater if hypoglycaemia is present at the time of check as the blood flow becomes slower. This would explain the fact that if you detect readings lower than 3.9 mmol on Libre very likely that hypo was present for at least 10-15 min already.

The arrows are fairly self explanatory.

That's how changes in BG look on the graph reflected by the arrows on the reader.

In approximately 10 minutes

↑	Glucose will increase by at least 1 mmol/l
↗	Glucose will increase by 0.5 -1 mmol/l
→	Glucose will stay the same
↘	Glucose will fall by 0.5 – 1mmol/l
↓	Glucose will fall by at least 1 mmol/l

NHS Greater Glasgow and Clyde

It is calculated that a fast change may change your BG at about 1 mmol per 10 min, whereas moderate change changes between 0.5 and 1 mmol/l per 10 min.

Calculating projected glucose

What will glucose be in 10 minutes?

NHS
Greater Glasgow and Clyde

Based on these observations it is possible to predict what may happen with your current glucose levels within next 10 or 20 min.

What will be BG reading in 10 min?

↑ Glucose will increase by at least 1 mmol/l

↗ Glucose will increase by 0.5 -1 mmol/l

→ Glucose will stay the same

↘ Glucose will fall by 0.5 – 1mmol/l

↓ Glucose will fall by at least 1 mmol/l

NHS Greater Glasgow and Clyde

Lets look at some examples.

What will be BG reading in 10 min?

1.	13.0	↗	Approx	13.5 - 14.0
2.	10.6	↑		11.6
3.	5.8	↗		6.3 - 6.8
4.	5.8	↓		4.8
5.	8.4	↘		7.9 - 7.4
6.	3.4	↑		4.4

KEY

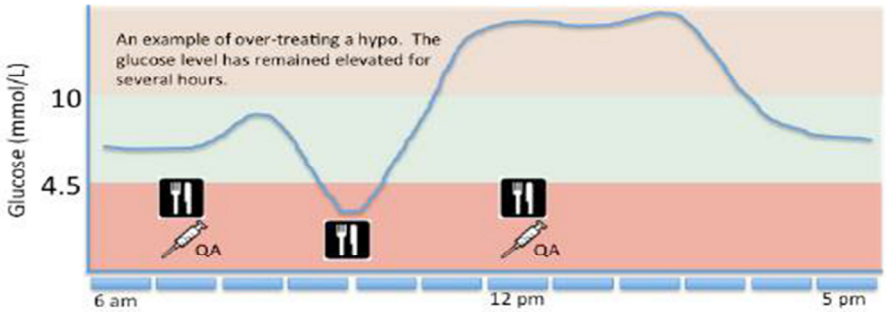
↑	Increases by 1 mmol/l (in 10 minutes)
↗	Increases by 0.5 -1 mmol/l
→	Stays the same
↘	Falls by 0.5 – 1 mmol/l
↓	Falls by 1 mmol/l

Action needed ?

NHS Greater Glasgow and Clyde

Treating hypos appropriately

Avoid over-treatment

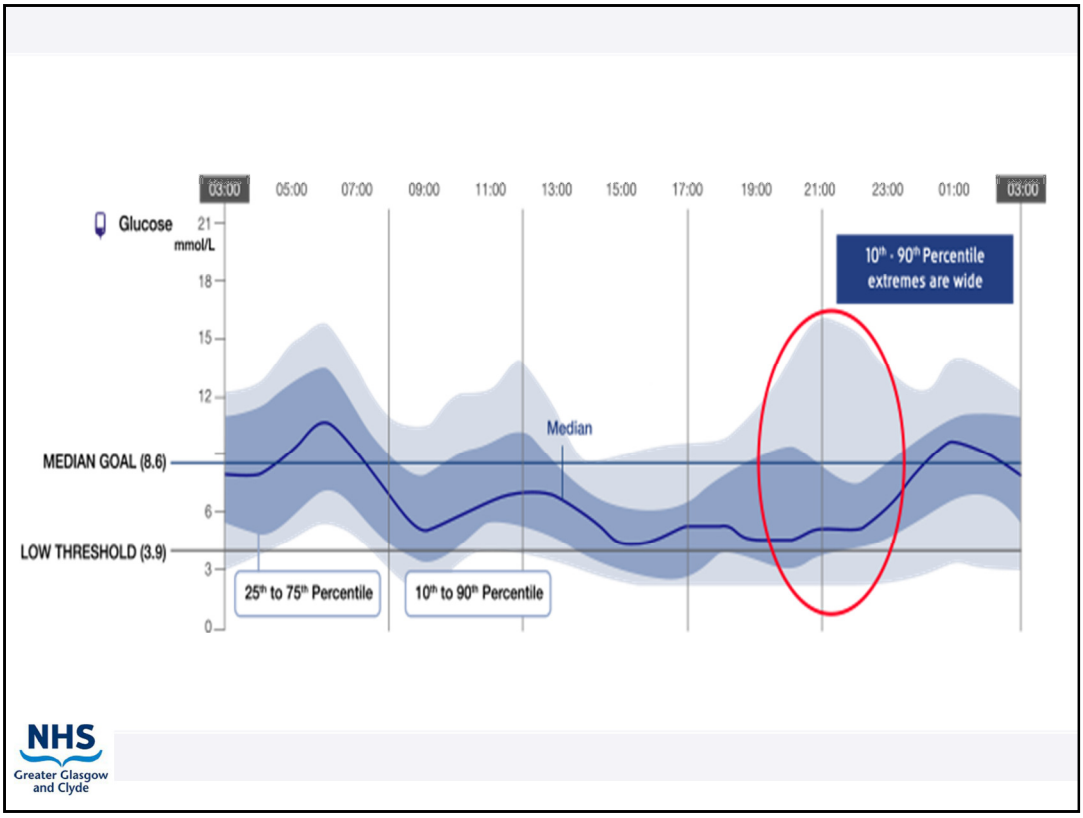


NHS Greater Glasgow and Clyde

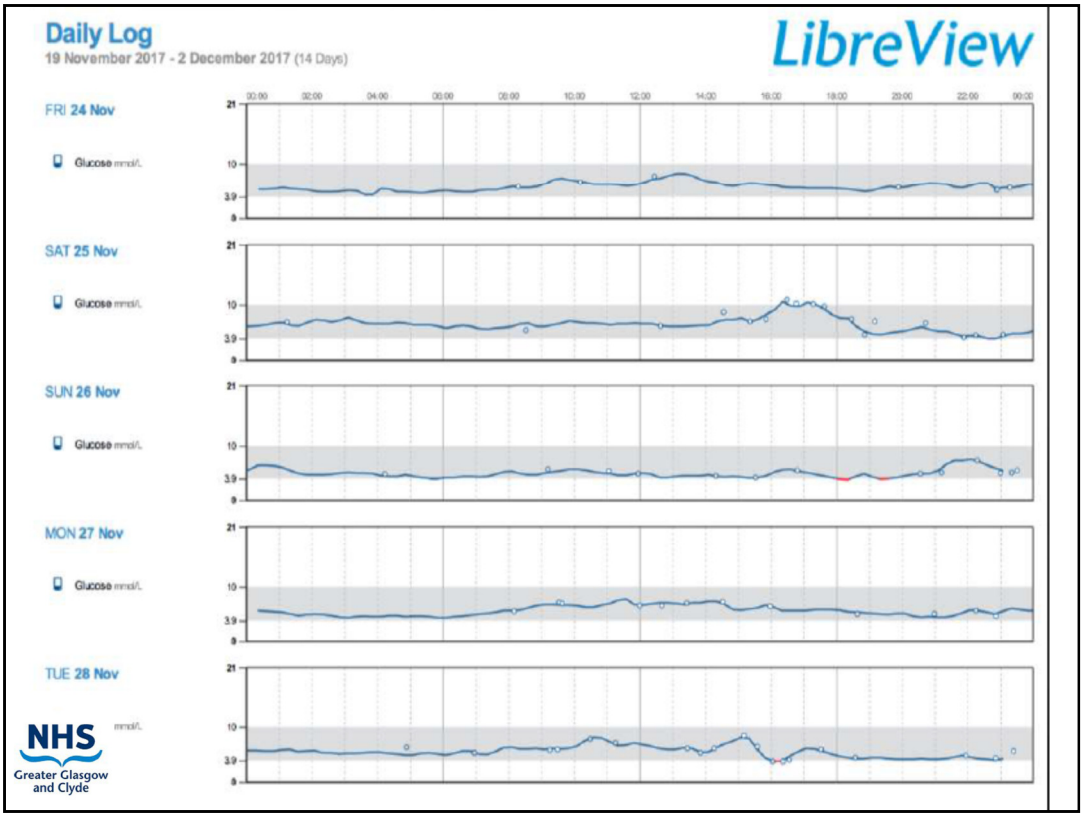
If glucose close to hypo and arrows ↓ or ↘ you may have the chance to avoid a hypo by taking a small amount of carb (1 glucose tab) or, in pump users, by putting a temporary reduction in basal rate

One of the beauties and benefit of Libre trends would be reacting timely on the trend which indicates possible hypo – and not overtreating it as it does happen when actual hypo happens.

Looking at trends lets you react at the problem areas such as high readings on most mornings;



… or react at high variations at certain times of the day.



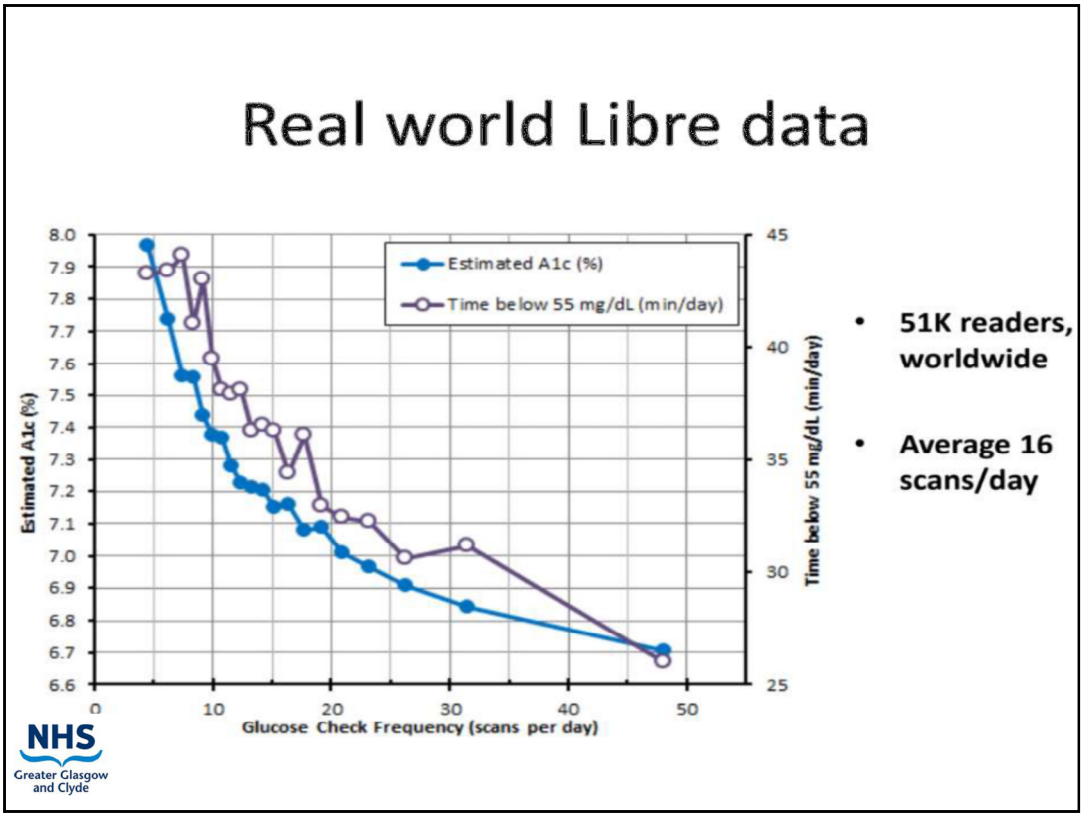
Ideally, this is what we are aiming to observe and achieve. This is not a demo, but a real person's with diabetes graphs.

How frequently / When is it best to scan?

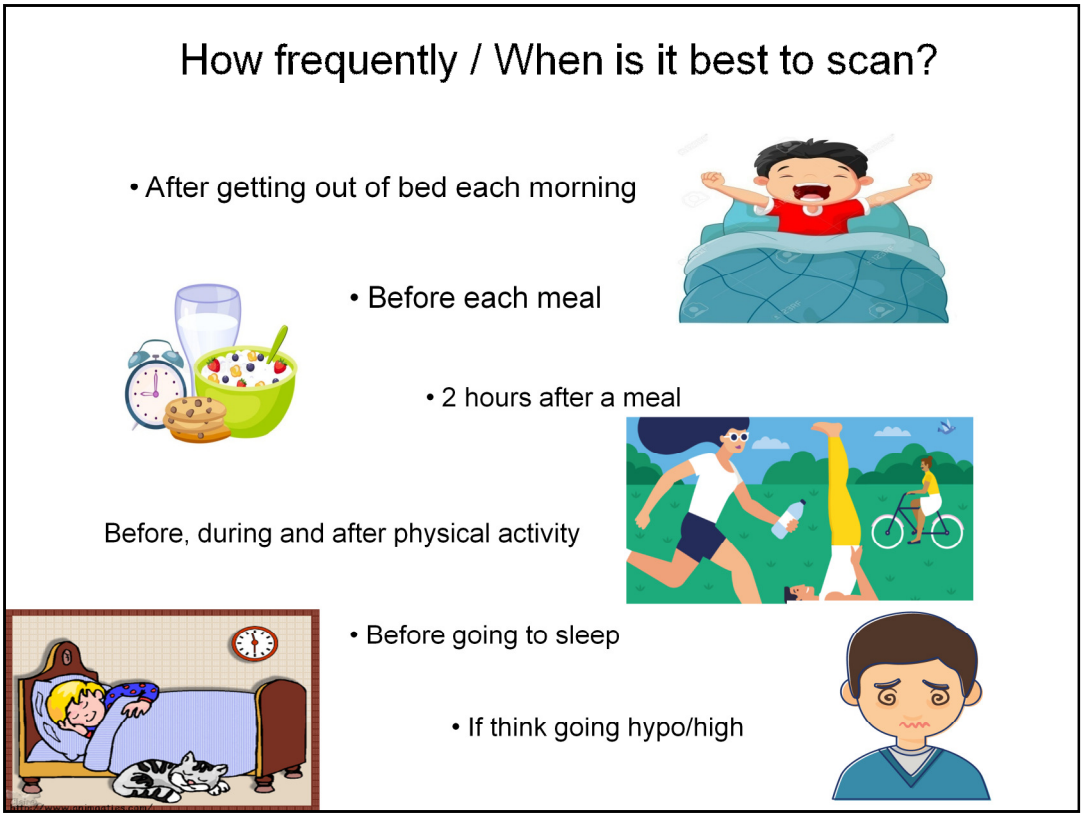
At least 10 times a day

NHS Greater Glasgow and Clyde

Knowing your current glucose levels and trends is not only clinical value, but also learning experience which is very individual – every person reacts differently to certain foods or certain types of exercises. Scan frequently, learn your own experience and share it with us. Make adjustments based on your experience if you can.



Why are we annoying with so many scans a day? This is the graph similar to the one you've seen earlier and it once again confirms the benefit of frequent checking.



This is not only clinical value, but also learning experience which is very individual – every person reacts differently to certain foods or certain types of exercises. Scan frequently, learn your own experience and share it with us. Make adjustments based on your experience if you can.

Before meals

Scan Result	Trend Arrow	Is Fingerprick test required	Action
Over 14	Any direction	Yes	-Check for ketones – follow guidelines -Give insulin for food -Consider giving correction / ketone dose -If on insulin pump go to pump guidance
5 - 14	Any direction	Yes	-Give insulin for food -Consider giving correction dose
4 - 5	↗ ↑	Yes	-Give insulin for food only
4 - 5	→	Yes	-Give insulin for food only
4 – 5	↘ ↓	Yes	-If fingerprick below 3.9 treat as hypo -Give insulin for food only
Under 4	Any direction	Yes	-If fingerprick below 3.9 treat as hypo -If fingerprick 3.9 or above give insulin for food only - do not include hypo remedy

NHS Greater Glasgow and Clyde

Some practical notes. We have prepared simplified guidelines for actions necessary based on Libre scanning: Until you get used to a new technology and getting confident in relying on its results we do advise to back up with BG finger prick tests.

Before exercise

Scan Result	Trend Arrow	Is Finger-prick required	Action
Over 14	Any direction	Yes	- Check for ketones – follow guidelines - If ketone dose required DO NOT exercise - No snack required - If on insulin pump go to pump guidance
8 -14	➡ ↗ ↑		-No snack required
8 -14	↘ ↓		-Snack required
Under 8	Any direction	Yes	-If fingerprick below 3.9 treat as hypo -If fingerprick 3.9 and over give 10g snack without insulin

NHS Greater Glasgow and Clyde

Any other time

Scan Result	Trend Arrow	Is Finger-prick required	Action
Over 14	Any direction	Yes	- Check for ketones – follow guidelines - If on insulin pump go to pump guidance
5 - 14	Any direction		-No action
4 - 5	↗ ↑		-No action
4 - 5	→		-Scan again in 15 mins
4 - 5	↘ ↓	Yes	-If fingerprick below 3.9 treat as hypo -If fingerprick 3.9 and over give 10g snack without insulin
Under 4	Any direction	Yes	-If fingerprick below 3.9 treat as hypo - If fingerprick 3.9 and over give 10g snack without insulin

NHS
Greater Glasgow and Clyde

- Needs BG finger prick tests:
  - **Low BG**
  - **Fast trends ↑ or ↓**
  - **Symptoms ≠ readings**

On occasions when health professionals judge BG check is necessary

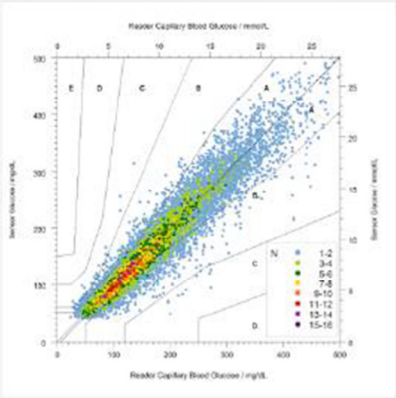
Try to check at least once a day to ensure sensor reliabl

NHS Greater Glasgow and Clyde

Even if you feel absolutely confident (and despite any earthquake that possibly may happen in Scotland!) these are the times when it is absolutely essential to back up Libre results with actual BG check.

Does it have to be on the arm?

Can it be used on the abdomen?



- Libre is very accurate when assessed against finger-prick testing
- 86% of Libre ARM readings fall within category A (most accurate)
- Only 64% of Libre ABDOMEN readings fall within category A

NHS Greater Glasgow and Clyde

eced

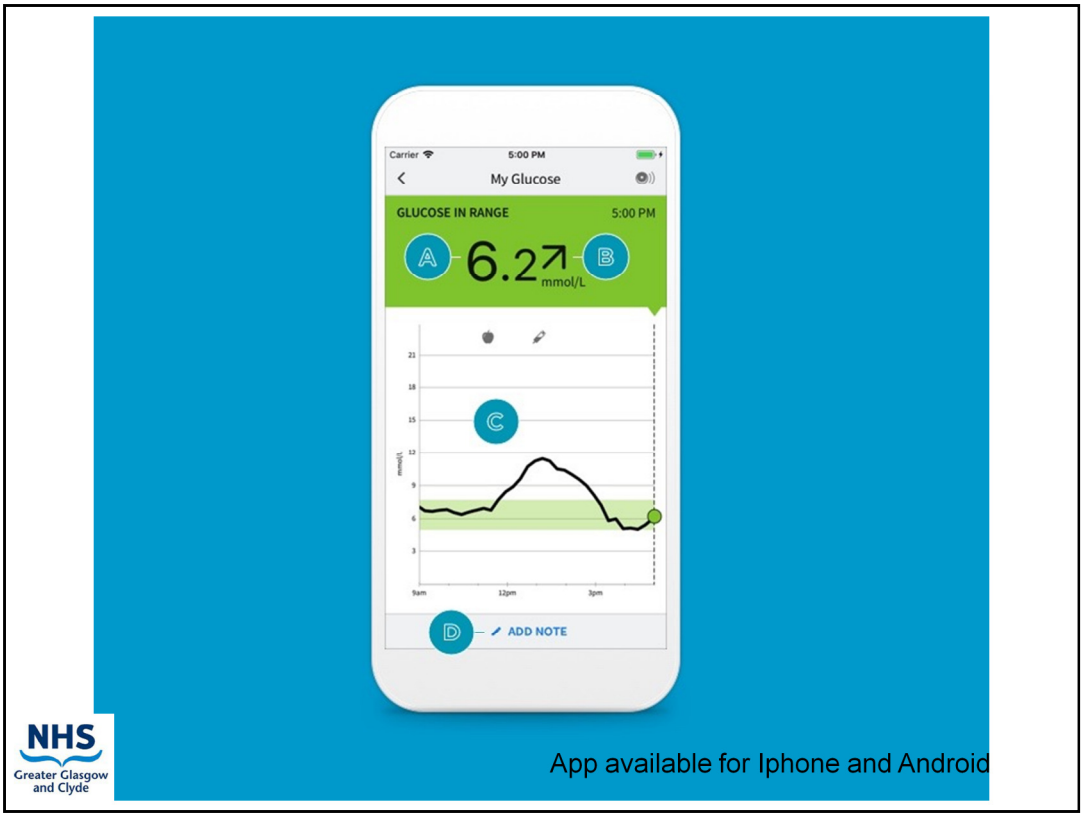
betes Research and Care 2017;5:e000320. doi:10.1136/bmjdrc-2016-000320

Skin reactions with Libre

How common and how to avoid

- Just under 10% of people in the largest Libre study – severe in 5%
- Since then changes have been made to the sensor
- Often responds to barrier sprays (Cavilon) or zinc ointment / hydrocortisone cream or change in position of sensor

NHS
Greater Glasgow and Clyde



Libre App is available for smart phones (Iphone version 7 or higher) and provides even more information than a reader.

App gives a wider variety of information compared to the factory reader.

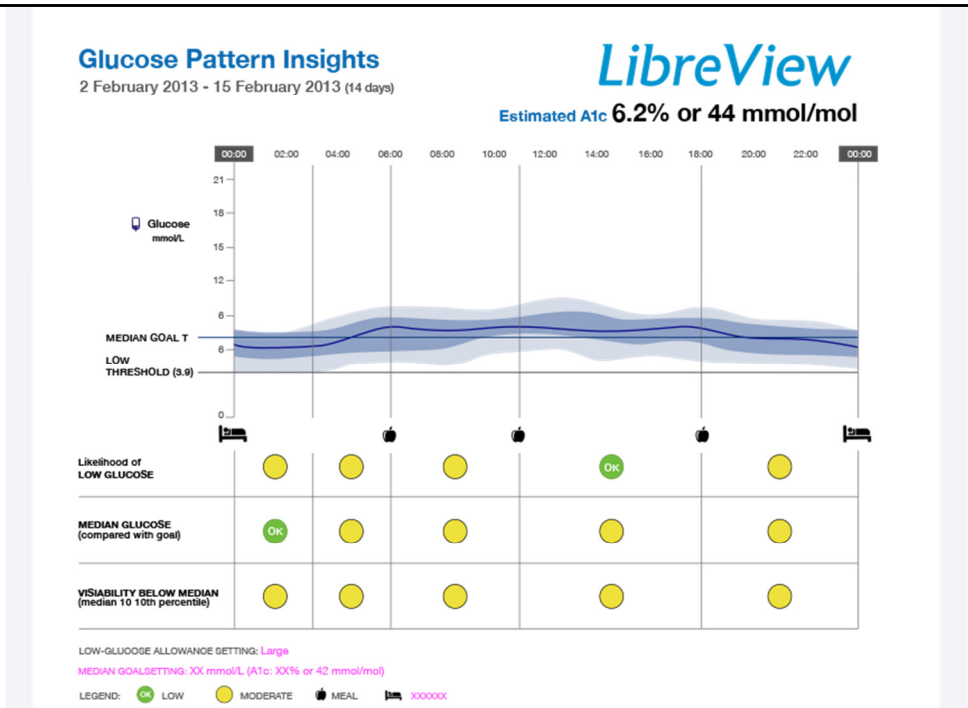
The practicality of the app is that it can also be shared with other family members or carers for a child and viewed in real time.

Using LibreView and sharing the data is one of the conditions for funding patients on Libre

NHS
Greater Glasgow and Clyde

Practise ID code is 08571477

As a part of the contract we asked each individual Libre user to set up a Libre view account so that both you at home and we at the clinic would be able to review the trends.



NHS Greater Glasgow and Clyde

Learning and recognising patterns/trends

Make informed decisions around insulin dose adjustments.

It is essential that you look at the patterns on the Libre reader and Libre view and make adjustments to your insulin regiment accordingly. The programme will give an opportunity to look into weekly and monthly trends.

The GP will be prescribing 2 sensors a month. If the sensor is faulty the company will replace it however if it falls off or cannot be used due to accident it will not be replaced.

Getting Libre on prescription

26/06/2018

Dear Doctor

Re: Stick Label Here

Abbott Freestyle Libre – Request for GP Prescription

Your patient has been assessed as eligible to receive the Abbott Freestyle Libre and has completed education in its use.

The Libre is a glucose monitoring technology which provides glucose results without a finger prick. Some finger pricking will still be required but a dramatic reduction is envisaged. The system comprises of an adhesive sensor (worn for two weeks at a time) and a hand-held reader (which is swiped or 'flashed' over the sensor to provide the reading). At the education session, your patient was provided with the reader and a single sensor.

The purpose of this letter is to ask you to prescribe future sensors.
Faulty sensors will be replaced by Abbott so the prescription should cover 26 sensors per year. If patients require significantly more this should prompt a conversation. We recommend a prescription for four sensors at a time so repeat prescriptions will only be required every two months.

We have explained to patients about when they must do capillary glucose testing and this will include before driving as the DVLA still mandate this. Some patients may request a change to Abbott strips so that they can do capillary tests on the same device but many patients will prefer to keep using their previous meter for capillary testing so please do not automatically discontinue supplies.

Continued funding by GGC Health Board is contingent upon proper use and this will be assessed regularly at clinic.

If you have any questions please call us on 0141 201 0331 or e-mail childrenwithdiabetes@ggc.scot.nhs.uk

Your faithfully

Dr Kenneth J Robertson
Consultant Paediatrician.

NHS
Greater Glasgow and Clyde

You will be getting this letter to take to your GP after the session.

NHS Greater Glasgow and Clyde

Start Libre – GGC Children's Diabetes Service

This form will be used to generate the letter to your GP recommending prescription of Freestyle Libre sensors. For those people who have previously been using Freestyle Libre, we would appreciate some information on how long you have been using the system. Please ensure you complete the form in full **WITH THE PATIENT'S DETAILS** (in BLOCK CAPITALS).

First Name

Family Name

Date of Birth

Postcode

Have you previously **self-funded** use of Freestyle Libre? Yes / No

If yes, when did you start using Libre?* Month: _____ Year: _____

If yes, roughly how many sensors have you purchased?* _____

*If unsure, please enter a best estimate

Criteria for NHS-funded Freestyle Libre sensors

Be at least 4 years old
Have a GP in the GGC Health Board area
Be using intensive insulin therapy (this means multiple daily injections [typically 4 or 5 per day]or insulin pumps)
Agree to attend a locally provided Libre education session
Agree to scan glucose levels no less than ten times per day
Agree to share glucose data with their diabetes clinic
Your diabetes team are satisfied you have the required diabetes self-management skills
FINALLY you **must** complete the online teaching modules in Libre Academy and provide a completion certificate **prior to attending the local teaching**

I have read and understand the approved criteria for NHS GGC funded Freestyle Libre sensors:

Signed: X_____ Date: X_____

PLEASE TURN OVER...

NHS Greater Glasgow and Clyde

NHS Greater Glasgow and Clyde

Your clinic

Which of our diabetes clinics do you currently attend?

West Glasgow ACH (old Yorkhill) ☐ Paisley ☐ Inverclyde Royal ☐

Email contact

We may wish to contact you with updates related to diabetes care. Please be aware that NHS GGC's email system is secure but we cannot guarantee the security of your own email server. It is suggested, for this reason, that emails are considered 'like a postcard' so do not include any sensitive information. If you are happy for us to contact you by email, please leave your email address and sign below to give us permission to contact you.

EMAIL ADDRESS: _____

I confirm I am happy to be contacted by the GGC Children's Diabetes Team :

Signed: _____

Before you receive the Libre kit we will ask you to sign a consent form and hand it to us – it is within your information package.

Conclusions

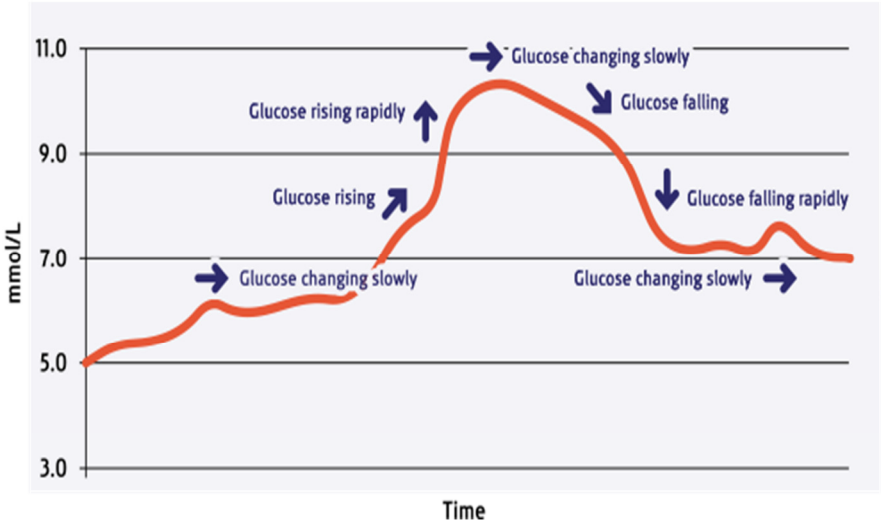
Scan frequently, *at least* **10** times day

Check for discrepancy when most of the times arrow ➡ at least once a day

Observe how different foods, different activities, stress, temperature, climate affects not only **glucose** readings but also **trends**.

Learn to **predict** and **act**

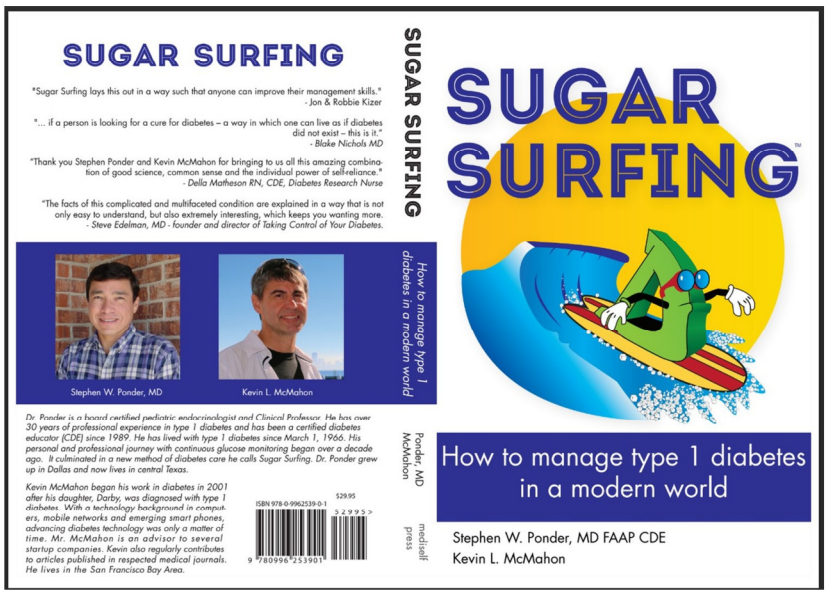
NHS Greater Glasgow and Clyde



NHS
Greater Glasgow and Clyde

You may become professionals. On predicting. On acting. Does it remind you of something?

Further reading



NHS
Greater Glasgow and Clyde

QUESTIONS ?

NHS
Greater Glasgow
and Clyde

Inserting sensor and scanning videos

Go to Freestyle Libre Academy

↓

Click on “Freestyle Libre System” tab

↓

Click on Tutorials

Criteria for NHS-funded Freestyle Libre sensors

- Be at least 4 years old
- Have a GP in the GGC Health Board area
- Be using intensive insulin therapy (this means multiple daily injections [typically 4 or 5 per day] or insulin
- pumps)
- Agree to attend a locally provided Libre education session
- Agree to scan glucose levels no less than ten times per day
- Agree to share glucose data with their diabetes clinic
- Your diabetes team are satisfied you have the required diabetes self-management skills
- FINALLY you **must complete the online teaching modules in Libre Academy and provide a completion**
- certificate **prior to attending the local teaching**