

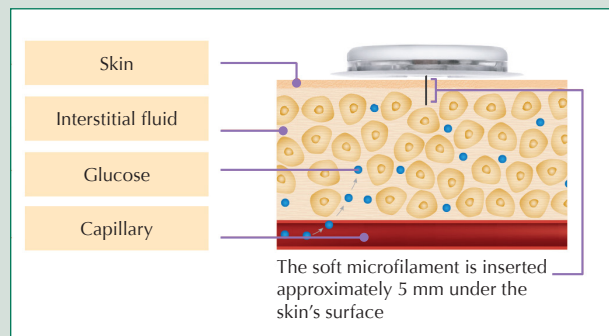


What and why

- Flash glucose monitoring is a way of measuring glucose levels without the need for routine finger-prick testing. The FreeStyle Libre system is the only currently licensed flash device.
 - Freestyle Libre is indicated for people aged ≥ 4 years with type 1 diabetes, including pregnant women.
 - When used by a child aged 4–12 years, a caregiver who is at least 18 years old must supervise, manage and help the child to use the system and interpret its readings.
 - It comprises a sensor and a reader and measures glucose levels via interstitial fluid (see box to right).
 - The sensor automatically measures glucose levels every minute and stores them at 15-minute intervals in a rolling 8-hour log. The sensor lasts up to 14 days.
 - Users can view their glucose levels by passing the reader or a compatible smartphone over the sensor. To get a complete glucose profile, the sensor should be scanned at least every 8 hours.
- Citation:**
Milne N (2020) How to support flash glucose monitoring. *Diabetes & Primary Care* 22: 29–30

Interstitial fluid vs blood glucose

- Blood glucose and sensor glucose levels are closely related but not identical.
- The glucose measured by the FreeStyle Libre system lags behind a finger-prick blood glucose reading by about 5–10 minutes.
- In times of rapidly changing blood glucose levels (e.g. after eating or exercise), or when symptomatic of hypoglycaemia, a finger-prick blood glucose measurement is therefore indicated.



Potential benefits

- Reduction in finger-prick testing.
- Trends in glucose variation can be identified.
- Easier and less invasive identification of night-time hypos.
- Data supports decision-making relating to glucose control.
- May aid self-management and user engagement.
- Carers and parents can access readings and data.
- Full glycaemic picture, if sensor is scanned every 8 hours.
- Data can be uploaded to share online with healthcare professionals (HCPs) through the LibreView system.
- An app enables the sensor to be scanned with a smartphone. Data can be viewed and shared.

Possible disadvantages

- Data overload can confuse or worry some users.
- Interstitial fluid glucose has a time lag of >5 minutes: a finger-prick test is required in periods of rapidly changing glucose (see above).
- It should not be prescribed without an individual being able to use blood glucose monitoring (BGM) when needed.
- There may be sensor problems relating to insertion, skin irritation or loss of adherence.
- The system currently used in the UK does not have an alarm to alert users to rapidly changing readings. It is not appropriate for those with hypoglycaemia unawareness.

Eligibility for NHS funding

Flash glucose monitoring is available on prescription in the UK, although the four nations have different criteria that need to be met. Usually recommendation by a secondary care or specialist team is required before primary care can prescribe.

England

One or more of the NHS England criteria must be met, followed by a number of other requirements. Details can be found at: <https://bit.ly/3dyiToS>

Wales

One of the criteria set by NHS Wales must be met. Details can be found at: <https://bit.ly/2RhQmcG>

Scotland

Criteria vary across individual Health Boards. Their published criteria can be found at: <https://bit.ly/2tUMTZE>

Northern Ireland

There are no strict criteria, but a list of things to take into account before granting a 3–6-month trial. Following the trial, improvements in management are reviewed before a decision is made on an annual prescription: <https://bit.ly/2NkbQEL>

For those not eligible for a prescription, FreeStyle Libre can be bought directly from the manufacturer.

Interpreting the reader data

After the sensor is scanned, the reader generates the user's readings. A typical display is shown to the right.

Additional information that can be displayed includes daily patterns (requiring at least 5 days of data), low-glucose events and time spent in the target glucose range. The user can also add notes on food, exercise and insulin doses.

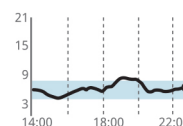
CURRENT GLUCOSE READINGS:

Based on the most recently updated glucose value (updated every 1 minute)

6.2^{mmol/L}

8-HOUR HISTORY:

The graph is made up of 15-minute readings stored over the last 8 hours (updated every 15 minutes)



TREND ARROW:

The trend arrow shows the direction glucose is heading along with rate of change. The glucose trend arrow may not always appear with the reading.

- ↑ **GLUCOSE RISING QUICKLY**
(more than 0.1 mmol/L per min)
- ↗ **GLUCOSE RISING**
(between 0.06 and 0.1 mmol/L per min)
- **GLUCOSE IS CHANGING SLOWLY**
(less than 0.06 mmol/L per min)
- ↘ **GLUCOSE FALLING**
(between 0.06 and 0.1 mmol/L per min)
- ↓ **GLUCOSE FALLING QUICKLY**
(more than 0.1 mmol/L per min)

For further information on interpreting results of the FreeStyle Libre system, refer to www.FreeStyleLibreAcademy.co.uk.

Useful to know

Sensor care

- The sensor should be worn only on the upper arm.
- The user will see a notification when the sensor needs replacing after 14 days.
- Dispose of applicator and sensor via a sharps bin.
- Replacement of any sensor that falls off during the 14-day period is via the customer care line: 0800 170 1177.
- The sensor can be worn when showering, bathing or swimming.
- Do not apply sprays, patches or creams under the sensor, as it may affect performance. Review local skin irritation and reactions on an individual basis.

- **Sensors should not go through airport X-ray or full-body scanners. Spare sensors should be removed from hand luggage and airport security staff informed. Regular "arch" metal detectors are safe for sensors to pass through.**

Scanning

- No calibration is required.
- It is recommended to scan the sensor at least 10 times/day, with times recommended as waking, before meals, 2–3 hours after meals and before bed.
- **Scanning at least once every 8 hours is required for a continuous record of glucose levels.**

Driving

- Flash glucose monitoring can be used for DVLA requirements for group 1 drivers. Drivers must pull over to scan. Finger-prick blood-testing equipment must be carried to confirm blood glucose levels when:
 - glucose level is ≤ 4 mmol/L
 - symptoms of hypoglycaemia are experienced or the flash reading is inconsistent with the symptoms being experienced.
- Group 2 drivers still need to use finger-prick testing. For further information: <https://bit.ly/2wALLAg>
- In the Republic of Ireland, advice is to use blood glucose monitoring: <https://bit.ly/2QH5Aca>

How to assess effectiveness of flash glucose monitoring for individual users

Fewer significant events:

- Reduction in episodes of severe/non-severe hypoglycaemia.
- Reduction in episodes of diabetic ketoacidosis (DKA).
- Reduction in admissions to hospital.

Glucose and quality-of-life measures:

- Achievement of target HbA_{1c}.
- Less variability in glucose readings.
- Improved quality of life.

Self-management and awareness:

- Improved awareness of hypoglycaemia.
- Appropriate use of glucose and ketone test strips.
- Commitment to regular scans and their use in self-management.
- Greater confidence in managing diabetes and adjusting medication in response to data.

Resources

For HCPs and people with diabetes:

- Diabetes Technology Network UK: A range of resources for HCPs: <https://abcd.care/dtn/resources>
- Abbott:
 - Webinars covering all aspects of the FreeStyle Libre system: <https://bit.ly/2RFpMdr>
 - Freestyle Libre Academy provides education for healthcare professionals and people with diabetes: <https://bit.ly/2RBUW5N>
 - Understanding FreeStyle Libre data, including the enriched information available through the LibreView diabetes management system: <https://bit.ly/2RBIByt>