

Module A

Principles of Diabetes

4 Blood glucose and urine monitoring

Learning aims

To understand the importance of blood and urine monitoring to a resident's individualised diabetes management plan

To be familiar with the guidance for quality assurance, safety and waste management

To understand the two main methods of monitoring glucose levels: urine monitoring and blood monitoring, and how to make sense of the readings

Urine monitoring

- ① Urine testing determines if there is sugar (glucose) present in the urine.
- ① If blood glucose levels are too high for the kidney to process, it will cause an overflow and glucose will spill into the urine.
- ① In most individuals this is likely to occur when the blood glucose level (BGL) exceeds 10mmol/l.

Urine monitoring

- ① Urine tests can be recommended by your GP or community nurse and administered at the care home.
- ① The test should be completed daily, preferably in the morning 30 minutes after emptying the bladder but before breakfast.
- ① Urine tests are not an ideal way to monitor diabetes control but when used regularly, it can offer some help with diabetes management within a care home.
- ① Urine testing strips can be used to detect glucose as well as a substance called ketones which could indicate very poor diabetes control (e.g. due to acute illness such as covid-19) and requires you to seek advice from a GP or community nurse.
- ① **Ketones** should be tested for in acutely unwell residents when glucose levels exceed 11 mmol/l; if blood ketones are >3.0 mmol/l or > 2+ on urine testing, inform your manager immediately and seek medical advice

Urine monitoring

- ① The results are determined through a colour change in comparison to a strip on the container.
- ① Remember that this test does not warn of hypoglycaemia and is not accurate at the time the test is completed as the urine may have been produced several hours earlier.
- ① Urine testing for glucose is unlikely to be helpful in those taking a class of glucose-lowering therapies called SGLT2 inhibitors (e.g. canagliflozin, empagliflozin) as these medications work by increasing the excretion of glucose via the urine

Blood glucose monitoring (BGM)

- ① The most common and accurate approach to testing BGL is through finger prick testing.
- ① This test should be carried out on people taking insulin or sulphonylureas.
- ① The timing and frequency of testing should be agreed between the resident with diabetes and the clinician(s) managing their diabetes.
- ① In many cases, residents with diabetes will still be able to self-monitor



Blood monitoring

- ⊙ This test is more accurate than a urine test as it determines BGL at that time and can indicate a high or low blood glucose.
- ⊙ Target ranges may differ from one person to the next and take into account: age, duration of diabetes, type of medication and any other medical illnesses.
- ⊙ On slide 10 is a guide for BGL ranges but your GP or community nurse may advise you about individualised targets.
- ⊙ Some people with diabetes (usually those with type 1 diabetes) have a **blood ketone meter** as a way of alerting them to a significant rise in blood ketones (which may be a sign of developing diabetic ketoacidosis) – care staff can be trained to use a blood ketone meter if necessary since many residents may not have the ability to monitor this themselves.
- ⊙ BGM

Other methods of Glucose Monitoring -1

Two other methods of glucose monitoring are available but there is little experience of their use in care home residents with diabetes:

- ① **Continuous glucose monitoring (CGM):** by wearing a small device (a sensor) under the skin, continuous recordings of glucose in the fluid surrounding the cells can be obtained.
- ① This provides continuous information on what someone's sugar levels are which is transmitted to a hand-held device.
- ① CGM is often used as a means to assist a person with diabetes who is vulnerable to marked hypoglycaemia (low blood sugar).
- ① CGM may not yet be a practical procedure in most care home settings

Other methods of Glucose Monitoring -2

Another method that is available is flash glucose monitoring which may have a role in due course in managing frail older residents with diabetes:

- ⊙ **Flash Glucose Monitoring (FGM)** involves wearing a small sensor under your skin which measures the amount of sugar in the fluid bathing the cells.
- ⊙ The person with diabetes needs to scan the sensor at times during the day to know what their sugar levels have been like throughout the day.
- ⊙ FGM is available on prescription for certain groups of individuals particularly those with type 1 diabetes.
- ⊙ Correct use of FGM may help to prevent dangerous hypoglycaemia (low blood sugar state).
- ⊙ Local Clinical Commissioning Groups (CCGs) should be encouraged to consider adopting FGM for some residents in care homes

General targets for glycaemic control within care homes

Situation or measure	Ideal targets where stated
Before meals	6 – 9mmol/l (minimizes risk of hypos*)
2 hours after food	7 – 12 mmol/l (to avoid surges in glucose)
BGL less than 4.0mmol/l	– strictly AVOID – hypoglycaemia* (hypo)
HbA1c range	53-70 mmol/mol (7-8.5%) – depending on health status of resident

- ⊙ Recording daily readings is an important way to monitor blood glucose levels and ensure the recommended targets are being met.
- ⊙ Record daily BGL readings in a glucose testing diary to allow medical practitioners to assess progress and make any necessary recommendations or changes.
- ⊙ If a resident with diabetes becomes unwell, it will be necessary to test blood sugars more frequently and it may be necessary to measure ketones in the blood or urine.
- ⊙ Consider liaising with the community nurses or GP when these situations arise.

Targets for glycaemic control

It is important that care staff looking after residents with diabetes understand:

- ① the importance of giving optimal treatment to avoid acute complications of diabetes such as infections, foot care problems, hypoglycaemia and severe hyperglycaemia.
- ① that if blood glucose readings are highly variable and inconsistent over a number of days and the resident feels unwell, they should contact the GP and/or community nurse for advice.

Importance of Safety and Quality Assurance

- ③ Ensure quality assurance and safety standards are being met when handling sharps or taking glucose or urine readings.
- ③ Gloves should always be worn during any blood or urine monitoring.
- ③ Your employer will have a Waste Disposal Policy which is in line with Waste Legislation - *you should familiarise yourself with this.*



Safety Issues

- ① Use a sharps disposal bin after the use of finger pricking devices, lancets, pen needles or insulin syringes.
- ① Never place any sharps items in a regular bin.
- ① Bins must be taken for disposal regularly and at least every three months, even if they are not full.
- ① Your employer will arrange for the safe disposal of sharps: see: *Handling sharps in adult social care*. Available at: cqc.org.uk

Learning points

LP

Able to administer both blood 'finger pricking' and urine testing with appropriate training.

LP

Able to understand the test results obtained and identify any abnormal readings.

LP

To be alert to safety issues at all times to protect residents and the care staff

Further reading

🎯 For further instructions on how to administer both tests visit this website:

<http://www.diabetes.org.uk/Guide-to-diabetes/Monitoring/Testing/>

🎯 For further reading on the safe management of healthcare waste:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf

Further reading

- © For further reading on CGM and flash glucose monitoring (FGM):

<https://www.diabetes.org.uk/Guide-to-diabetes/Managing-your-diabetes/Testing/Continuous-glucose-monitoring-CGM>

And

<https://www.diabetes.org.uk/guide-to-diabetes/managing-your-diabetes/testing/flash-glucose-monitoring>

And

<https://www.diabetesonthenet.com/journals/issue/583/article-details/innovative-use-flash-glucose-monitor-frail-elderly-patients-case-series>

Questions

Q1. Which of the following groups of people should have their blood glucose levels monitored?

- A. People who are taking insulin
- B. People treated with diet alone
- C. People treated with Sulphonylureas
- D. People treated with metformin
- E. People who are acutely unwell

Questions

Q1. Which of the following groups of people should have their blood glucose levels monitored regularly?

- A. People who are taking insulin**
- B. People treated with diet alone
- C. People treated with Sulphonylureas**
- D. People treated with metformin
- E. People who are acutely unwell**

Questions

Q2. If a blood glucose reading is 3.6 mmol/l, which of the following statements are true?

- A. All readings under 4 are classified as hypoglycaemia whether or not the person is experiencing symptoms
- B. They need to take appropriate foods or drinks immediately to increase blood glucose level
- C. If the person feels well there is no need to take any action
- D. Each person has their own level of hypoglycaemia but caution should be taken where blood glucose levels are less than 4 mmol/l

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Questions

Q3. When taking blood measurements on a person with diabetes, what safety precautions should the person taking the blood ensure?

- ⊙ A. Gloves, safety glasses, long sleeve t-shirts are being worn before handling any BGL monitoring equipment and surfaces are covered with disposable towels and a sharps bin is nearby
- ⊙ B. Gloves are being worn before handling any BGL monitoring equipment, ensure that surfaces are covered with disposable towels, and a sharps disposals bin is within reach
- ⊙ C. Gloves are being worn before handling any BGL monitoring equipment, that the person with diabetes has been sitting for at least 5 minutes before the test is administered, ensure all surfaces around the person with diabetes is covered with disposable towels and a sharps disposal bin is in the room
- ⊙ D. Nothing, just make sure extra caution is taken and if blood lands on any foreign objects that it is thoroughly cleaned with appropriate cleaning aids

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- ⊙ D. Nothing, just make sure extra caution is taken and if blood lands on any foreign objects that it is thoroughly cleaned with appropriate cleaning aids

Questions

Q4. What steps should be taken when carrying out BGL testing for another person with diabetes?

- ⊙ A. Wash hands thoroughly, ask the person with diabetes to sit or lie down, use the lancet/needle to prick the site of finger, wait 5 seconds for blood to rise to the fingertip, hold the test strip against the blood until the monitor signals its reading, apply pressure to stop blood flow at the site of prick, dispose of sharps in the sharps bin, take reading and record. Place all necessary waste that has been in contact with the administration of monitoring in a waste disposal bins
- ⊙ B. Wash hands thoroughly, wear appropriate safety equipment, alcohol swab the site of finger prick, place a test strip into the meter, use the lancet/needle to prick the site of finger, lightly massage/squeeze the finger and wipe away the first drop of blood with a tissue, hold the test strip against the second drop of blood until the monitor signals its reading, apply pressure to stop blood flow at the site of prick, take reading and record. Place all necessary waste that has been in contact with the administration of monitoring in a waste disposal bins
- ⊙ C. Wash hands thoroughly, wear appropriate safety equipment, place the test strip in the meter, ask the person with diabetes to prick their own finger, lightly massage the fingertip until blood rises to the surface, hold the test strip against the drop of blood until the monitor signals its reading, ask the person with diabetes to place a tissue over the site of prick to stop blood flow, you take the reading and record and dispose of sharps in the sharps bin and throw away all necessary waste that has been in contact with the administration of monitoring in a waste disposal bins

Questions

Q4. What steps should be taken when carrying BGL testing for another person with diabetes?

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- ⊙ **B. Wash hands thoroughly, wear appropriate safety equipment, alcohol swab the site of finger prick, place a test strip into the meter, use the lancet/needle to prick the site of finger, lightly massage/squeeze the finger and wipe away the first drop of blood with a tissue, hold the test strip against the second drop of blood until the monitor signals its reading, apply pressure to stop blood flow at the site of prick, take reading and record. Place all necessary waste that has been in contact with the administration of monitoring in a waste disposal bins**
- ⊙ C. Wash hands thoroughly, wear appropriate safety equipment, place the test strip in the meter, ask the person with diabetes to prick their own finger, lightly massage the fingertip until blood rises to the surface, hold the test strip against the drop of blood until the monitor signals its reading, ask the person with diabetes to place a tissue over the site of prick to stop blood flow, you take the reading and record and dispose of sharps in the sharps bin and throw away all necessary waste that has been in contact with the administration of monitoring in a waste disposal bins

Questions

Q5. Which of the following statements is correct?

- A. Lancets/needles should never be used for more than one person
- B. It is acceptable to place used blood monitoring strips in any bin
- C. Urine testing is the best method of testing because the patient can assess their BGL over a longer period of time which gives a more accurate description of their daily BGL management
- D. Finger prick testing is the best method of testing as it provides an average BGL over 24 hours

Questions

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Learning completed