

Name: Arooba Malik

Student number: 2331703

Module code: BMHP5023

Module title: Introduction to Physiology

Assignment title: Component 1: Written Assignment

Lecturer name: Gillian Weaver

Word Count: 2115

Case Study 1

Introduction

Diabetes is a long term metabolic health condition which affects how our bodies can control blood sugar glucose levels. Type 2 Diabetes Mellitus and has been found to make up 95% of all diabetes cases (Galaviz 2014). Our bodies need glucose as our main source of energy which comes from our diet (foods like sugars and carbohydrates in them like fruit, bread and rice). To transport glucose from our blood into our cells, we need a specific hormone called insulin and this is made by the pancreas. If we cannot make enough insulin or if our insulin is not working properly then glucose levels will build up in our blood and instead of being used for our energy it will cause high blood sugar levels (hyperglycaemia) which increases the risk of both short and long term health complications (Antar 2023).

Type 2 diabetes represents about 90% of all diabetes cases in the UK (Goyal 2023) and is connected to the lifestyle factors a person has such as diet, age, smoking, ethnicity, physical inactivity. In type 2 Diabetes our body becomes resistant to insulin and that means the body cells cannot respond to insulin properly. The pancreas struggles to make more insulin to cope, it cannot keep up and that will cause the sugar levels in our blood to rise. The risk of having high sugar levels can cause blood vessels and nerves to get damaged and this increases the chances of serious health problems like eyesight, kidney disease and nerve damage on heart disease (Egan 2022).

Patients must understand that risk factors for diabetes can include things like having an unhealthy diet, unhealthy sleep habits, smoking, alcohol, being overweight and not doing enough physical activity. Certain ethnic groups and family history have risks of developing diabetes. Moreover, high blood pressure, depression, cholesterol and chronic stress can also raise blood sugar levels and affect the body's metabolism and the overall health condition of the heart (Ismail 2021). Eating healthy foods high in processed sugar also increase the risk of developing diabetes (Samant 2025). Therefore, it is essential for all people to know what diabetes is, its effects and encourage patients to look after their wellbeing, diets and health to eliminate chances of diabetes.

The purpose of this report is to provide patients in the case study with a clear understanding of Type 2 diabetes, its effects on the body and why monitoring blood sugar levels is important to manage the condition. It will explain how the body regulates blood glucose and how glucose produces energy. The report will provide evidence-based recommendations to patients as a practitioner nurse and what lifestyle changes can help patients in my practice better manage their diabetes and reduce the risk of complications.

Blood sugar levels maintenance:

Our body is very careful in controlling our blood sugar levels to make sure that we have enough energy to function. According to Litwack 2022, the pancreas releases the hormones insulin and glucagon and our brains need glucose to work efficiently. When we eat, our body breaks down carbohydrates into glucose and this enters our bloodstream. This spike in blood sugar tells the pancreas to release insulin which helps move the glucose from the blood into our cells. The pancreas has special beta cells that release insulin to blood. Insulin lets glucose move from blood to the fat cells, liver and muscles and it's either used straight away for energy or is stored for later use. So when the blood glucose levels fall during exercise or between meals, the alpha cells in the pancreas release glucagon and this helps to make new glucose in order to prevent our sugar level from falling too low. This helps to prevent hypoglycaemia and provides a continuous supply of energy for vital organs like the brain (Bansal 2008). People with type 2 diabetes have the problem of the body not being able to respond to insulin properly because their pancreas makes more insulin to compensate and can't keep up. That is why in their bloodstream glucose will remain instead of entering the cells and it is important to keep a healthy range for blood sugar because it can lead to health problems linked to the heart, poor eyesight and other organs (American Diabetes Association 2014).

How oxygen and glucose are used to produce energy through cell metabolism:

Our body needs oxygen and glucose so that our cells can make energy. With the help of insulin after food enters our body glucose is broken down inside the cells and this process is known as cellular respiration. The glucose is firstly broken down into much smaller molecules which

produce energy and then oxygen is used to create a large amount of energy. The mitochondria cell organelles help oxygen and glucose to regulate insulin sensitivity and when it is disrupted it can lead to diabetes. These energy sources are really important because it helps our body function like keeping our organs working, maintaining nerve signals and managing muscles. (Qin 2025) However people with type 2 diabetes can easily respond well to insulin as the glucose is not able to enter the body cells properly. Because of this people may end up feeling hungry, tired and low in energy(Szablewski 2024).

Management, recording and tracking blood sugar levels to safely manage conditions:

Primary care such as the GP Practice in this case study is the main setting for diabetes diagnosis, education, explanation and management for patients. In the practice, patients will be routinely called in for meetings about diabetes and how they can be helped to better understand how to manage their condition. This is because evidence shows that patients need and benefit from review appointments, recall systems and access to GP staff like nurses to answer their questions (Pilic 2025). Firstly patients need a diagnosis visit to explain what diabetes is, how its identified and why early treatment is important because unclear or delayed diagnosis makes diabetes management more complicated (Khattab 2025). The practice can help patients detect diabetes through their symptoms like increased hunger and urination, fatigue, thirst and blurred vision (Pavlovic 2021). Additionally, as a nurse I would conduct primary care assessments of family history of patients as part of diabetes risk finding at the practice because family history is one of the strongest risk indicators that are available in primary care. This is because studies have found that patients with a sibling or parent with diabetes had four times the odds of diabetes (Annis 2005).

Additionally, teaching patients to record and track blood glucose levels in the case study is a necessary part of this education as it helps them understand how their diabetes is being controlled. Many machines and tests exist to detect blood glucose readings to control and identify glucose patterns. Patients can use a fingerprick or blood glucose meter to check sugar levels or an aura sensor that is attached to the body also known as a Continuous Glucose Monitor GCM (Manov 2023). A practice nurse has a role in teaching people with diabetes and families how to manage the condition which includes checking blood glucose levels with a glucometer and using insulin. The nurse then reviews the readings taken over a set duration to

assess the treatments effectiveness and decide to make amendments to medications or diet. This person centered collaborative approach will encourage patients to have an active role in managing their diabetes as it empowers them (Anderson 2005). Moreover, nurses also encourage regular check-ups, build trusting relationships with patients and the education provided is tailored to each patient's gender, age, health condition, eating habits, cultural or religious beliefs (Pavlovic 2021).

Furthermore, as a nurse I would also encourage patients to log data and information in notebooks or spreadsheets about their lifestyle and diet because when patients are able to physically see the effects of their habits on glucose levels then that would identify exactly what needs to change or improve (Didyuk 2020). For instance I would encourage them to note down their blood sugar levels before and after eating, and also check their glucose levels after changing to a better diet, exercising or cutting out excess sugar, alcohol and smoking consumption. By tracking and noting these things down it can be shared with staff and helps to manage diabetes and patients can adjust their diets and lifestyles accordingly (Pasquale 2023).

Recommendations on how lifestyle changes could help improve their condition:

According to Chacko 2020, there are lots of lifestyle changes that patients can make to help manage their diabetes and blood sugar levels. With the correct care and regular practice, diabetes can be prevented, controlled and possibly even reversed by introducing healthy eating and exercising habits. I would advise my patients to meal plan, do nutrition sequencing and have enough exercise to monitor and improve blood sugar control in the body(Saldarriaga-Callejas 2025). Firstly, it is essential to eat healthy and nutritious balanced meals which include more lean protein, healthy fats and vegetables and less carbohydrates which is why I would recommend patients in the case study to visit a nutritionist or dietician. This is because NICE 2026 recommends that patients with Type 2 diabetes should receive individualised nutritional advice from healthcare professionals with specific expertise in nutrition. This will help prevent big glucose spikes in the blood after eating. It's also recommended to eat more carbohydrates early on in the day and less that dinner to improve the insulin spike in blood. Additionally a health practice known as nutrient sequencing has also been found to be quite beneficial as this includes eating vegetables and proteins first in a meal and then eating carbohydrates later on. Secondly, exercise is vital to maintain the body's glucose effectively and lower blood sugar especially if done moderately after meals. All patients are recommended to

exercise as it improves HbA1c and insulin sensitivity and exercises like aerobic, resistance, combined, and HIIT all help as a core therapy (Syeda 2023). Therefore this essentially means there must be an intervention and change in behaviour patterns when it comes to lifestyle choices managing diabetes (Wu 2014).

Moreover, I would encourage my patients to take medications on time and be consistent with the treatment plan that has been provided and quit excessive alcohol and smoking as smoking worsens insulin resistance (Campagna 2019). That is why as guided by NICE, I will give patients a range of interventions like referral to the NHS stop-smoking services which will provide specialist behavioural support (NICE 2025). Furthermore, stress management would be recommended to my patients like increasing physical activity, practising relaxation techniques, maintaining sleep habits and talking openly about worries affecting their diabetes. I would provide emotional support and refer them to the NHS Talking Therapies or other services if needed (Sturt 2015). This can support an individual's overall health and by improving their mental and psychological health it will support their physical health as well (Ahmad 2023).

Conclusion:

Diabetes type 2 is a condition that affects many people around the world and needs to be controlled in order to live a healthy lifestyle. Patients at a general practice can be informed, guided and supported by the staff and nurses. Certain risk factors of diabetes play a big role in the development of diabetes and the progression of it. In order to look after our health and overall well-being it is extremely important to regulate our blood glucose levels and ensure that we have regular and efficient cellular energy. Both oxygen and glucose are needed for cell energy and glucose breakdown, and we need to ensure that there is no excess glucose in the bloodstream.

With the help and guidance of practice nurses and healthcare practitioners, patients can track and record blood glucose levels through different tests like finger prick, Continuous Glucose Monitor GCM and blood glucose meter to understand the impact of their lifestyle and diet on their health and prevent further complications. This way they know what changes are necessary and work for themselves and their lifestyle. They can share these findings with healthcare staff to create a well-managed plan and be referred to the relevant NHS services. Managing diabetes

is not just about taking medicines prescribed but it is also about simple lifestyle changes like taking personal responsibility by regularly monitoring blood glucose levels, attending routine healthcare appointments, improving diets, eating nutritious foods, nutritional sequence diets, increasing physical activity and reducing smoking and alcohol intake significantly.

Practice nurses no doubt have an essential responsibility and role in educating, supporting and supporting patients with diabetes. Through evidence based advice and constant monitoring, using person centered care they can empower patients to take responsibility for managing their condition and improve their overall wellbeing.

References:

Anderson, R.M. and Funnell, M.M. (2005) Patient empowerment: Reflections on the challenge of fostering the adoption of a new paradigm. *Patient Education and Counseling*, 57(2), pp. 153–157. Available at: <https://pubmed.ncbi.nlm.nih.gov/15911187/> [Accessed on 14 July 2026]

Annis A, Caulder M.S, Cook M, et al (2005). Family History, Diabetes, and Other Demographic and Risk Factors Among Participants of the National Health and Nutrition Examination Survey 1999–2002. *Preventing Chronic Disease*, 2. Available at: <https://pubmed.ncbi.nlm.nih.gov/15888230/> [Accessed on 14 July 2026]

Ahmad F, Joshi S.H (2023) ‘Self-care practices and their role in the control of diabetes: A narrative review’, *Cureus*, 15(7). Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC10402910/> [Accessed on 11 February 2026]

American Diabetes Association (2014) Diagnosis and classification of diabetes mellitus, *Diabetes Care*, 37 (Supplement 1), pp. S81–S90. Available at: https://diabetesjournals.org/care/article/37/Supplement_1/S81/37753/Diagnosis-and-Classification-of-Diabetes-Mellitus [Accessed on 11 February 2026]

Antar S.A, Ashour N.A, Sharaky M (2023) ‘Diabetes mellitus: Classification, mediators, and complications; A gate to identify potential targets for the development of new effective treatments’, *Biomedicine & Pharmacotherapy*, 168, Article 115734. Available at: <https://www.sciencedirect.com/science/article/pii/S0753332223015329> [Accessed on 17 February 2026]

Bansal P, Wang Q (2008). Insulin as a physiological modulator of glucagon secretion. *American Journal of Physiology-Endocrinology and Metabolism*, 295(4), E751–E761. Available at: <https://pubmed.ncbi.nlm.nih.gov/18647881/> [Accessed on 18 July 2026]

Barry E, Blane D, Ross J, et al (2024). Conversations matter: improving the diagnosis experience for people with type 2 diabetes.. The British journal of general practice : the journal of the Royal College of General Practitioners, 74 748, pp. 489-490. Available at: <https://bjgp.org/content/74/748/489> [Accessed on 16 July 2026]

Campagna D, Alamo A, Pino A, et al (2019). Smoking and diabetes: dangerous liaisons and confusing relationships. Diabetology & Metabolic Syndrome, 11. Available at: <https://pubmed.ncbi.nlm.nih.gov/31666811/> [Accessed on 15 July 2026]

Chacko E, Signore C (2020).Five Evidence-Based Lifestyle Habits People With Diabetes Can Use. Clinical Diabetes. 273-284. American Diabetes Association. Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC7364446/> [Accessed on 9 February 2026]

Didyuk, O., Econom, N., Guardia, A., Livingston, K. and Klueh, U. (2020) 'Continuous glucose monitoring devices: past, present, and future focus on the history and evolution of technological innovation', Journal of Diabetes Science and Technology, 15(3), pp. 676–683. Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC8120065/> [Accessed on 15 February 2026]

Egan A.M, Dinneen S.F(2022) 'What is diabetes?', Medicine Journal, Volume 50, Issue 10. pp. 615–618. Available at: [https://www.medicinejournal.co.uk/article/S1357-3039\(22\)00179-7/abstract](https://www.medicinejournal.co.uk/article/S1357-3039(22)00179-7/abstract) [Accessed on 12 February 2026]

Galaviz K.I, Narayan K.M.V, Lobelo F at al (2015) 'Lifestyle and the prevention of Type 2 diabetes: a status report', American Journal of Lifestyle Medicine, 12(1), pp. 4–20. Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC6125024/> [Accessed on 17 February 2026]

Goyal R, Singhal M, Jialal I (2023) Type 2 Diabetes. In: StatPearls. Treasure Island (FL): StatPearls Publishing. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK513253/> [Accessed on 20 July 2026]

Ismail L, Materwala H, Al Kaabi J. (2021) 'Association of risk factors with type 2 diabetes: A systematic review', Computational and Structural Biotechnology Journal, 19, pp. 1759–1785. Available at: <https://www.sciencedirect.com/science/article/pii/S2001037021000751> [Accessed on 17 February 2026]

Khattab M, Assaad-Khalil S.H, Bassyouni A, et al (2025) From guidelines to practice: an Egyptian expert opinion on type 2 diabetes mellitus management in primary care settings. BMC Primary Care, 26. Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC12687541/> [Accessed on 19 July 2026]

Litwack, G (2022) Pancreatic hormones: insulin and glucagon. Hormones. Fourth Edition. Academic Press. Available at: <https://www.sciencedirect.com/science/chapter/monograph/abs/pii/B9780323902625000226?via%3DIihub> [Accessed on 16 July 2026]

Manov A.E, Chauhan S, Dhillon G et al (2023) The effectiveness of continuous glucose monitoring devices in managing uncontrolled diabetes mellitus: a retrospective study, Cureus, 15(7), e42545. doi: 10.7759/cureus.42545. Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC10460137/> [Accessed on 10 February 2026]

National Institute for Health and Care Excellence (NICE) (2026) Type 2 diabetes in adults: management (NG28). Available at: <https://www.nice.org.uk/guidance/ng28> [Accessed on 18 July 2026]

National Institute for Health and Care Excellence (NICE) (2025). Tobacco: preventing uptake, promoting quitting and treating dependence (NG209). Updated 4 February 2025. Available at: <https://www.nice.org.uk/guidance/ng209> [Accessed on 10 February 2026]

Pasquale A, Raffaele D, Gerardo C (2023) 3-Day food record: efficacy in patients with type 2 diabetes mellitus. Journal of Basic and Clinical Physiology and Pharmacology, 34, pp. 767 - 771. Available at: <https://pubmed.ncbi.nlm.nih.gov/37702297/> [Accessed on 16 July 2026]

Pavlović B (2021). Nurses' role in the multidisciplinary care of the patient with diabetes. International Journal of Integrated Care. Available at: <https://ijic.org/articles/10.5334/ijic.ICIC20249> [Accessed on 21 July 2026]

Pilic L, Molkentin K, Herrmann A, et al (2025). GPs' experienced challenges and strategies for supporting patient self-management in disease management programs for type 2 diabetes mellitus and coronary heart disease - a qualitative study. BMC Primary Care, 26. Available at: <https://pubmed.ncbi.nlm.nih.gov/40652160/> [Accessed on 15 July 2026]

Qin B, Wang Y and Ding J (2025) The role of mitochondrial function in the pathogenesis of diabetes. Front. Endocrinol. Volume 16:1607641. Available at: <https://www.frontiersin.org/journals/endocrinology/articles/10.3389/fendo.2025.1607641/full> [Accessed on 11 February 2026]

Saldarriaga-Callejas L.M, Ratan P, Pasqualotto E, et al (2025). Nutrient intake order on metabolic outcomes in type 2 diabetes: a systematic review and meta-analysis.. Acta diabetologica. Available at: <https://link.springer.com/article/10.1007/s00592-025-02586-0> [Accessed on 19 July 2026]

Samant AC, Jha H, Kamal P (2025) 'Systematic Review: Risk Factors for Developing Type 2 Diabetes Mellitus', European Journal of Cardiovascular Medicine, 15(1), pp. 382–390. Available at: <https://healthcare-bulletin.co.uk/article/systematic-review-risk-factors-for-developing-type-2-diabetes-mellitus-2743/> [Accessed on 16 February 2026]

Sturt J, Dennick K, Hessler D, et al (2015) Effective interventions for reducing diabetes distress: Systematic review and meta-analysis. International Diabetes Nursing, 12(2), 40–55. Available at: <https://www.internationaldiabetesnursing.org/index.php/idn/article/view/279> [Accessed on 13 July 2026]

Syeda U.A, Battillo D.J, Visaria A, et al (2023). The importance of exercise for glycemic control in type 2 diabetes. American Journal of Medicine Open, 9. Available at: <https://pubmed.ncbi.nlm.nih.gov/39035065/> [Accessed on 13 July 2026]

Szablewski L (2024) Changes in Cells Associated with Insulin Resistance. International Journal of Molecular Sciences, 25. Available at: <https://pubmed.ncbi.nlm.nih.gov/38397072/> [Accessed on 19 July 2026]

Wu Y, Ding Y, Tanaka Y et al (2014) 'Risk Factors Contributing to Type 2 Diabetes and Recent Advances in the Treatment and Prevention', International Journal of Medical Sciences, 11(11), pp. 1185–1200. Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC4166864/> [Accessed on 17 February 2026]