Case Report

Comparison to Quality of Care in the UK vs Turkiye: A Case Report on an Elderly Patient with Type 2 Diabetes and Dementia

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Abstract
Diabetes is one of the leading chronic and life-threatening diseases affecting a substantial part of the global population. Previous studies have shown that higher rates of obesity are registered among men. Subsequently, men are more at risk of developing type 2 diabetes than women. However, as lifestyles continue to degrade, type 2 diabetes prevalence has increased among young people, hence, cross-cutting obesity is leading a risk factor for type 2 diabetes in all ages. The growing prevalence of diabetes elevates the urgent need for effective interventions and comprehensive management. This case report shows how to tackle obese patients with type 2 diabetes and dementia and improve their quality of life. This case also emphasizes the differences in the quality of diabetes care management between the UK and Turkiye by offering new insights into diabetes development and management approaches that improve patient outcomes.

Keywords: Type 2 diabetes, dementia, quality of care, nursing

Introduction

Diabetes is one of the leading chronic and life-threatening diseases affecting a substantial part of the global population. The pervasiveness of diabetes among individuals over 18 has almost doubled from 4.7 per cent in 1980 to 8.5 per cent in 2014 (WHO, 2020). Projections indicate that 578 million people will have diabetes by 2030, while the year 2045 will set a record with 700 million individuals globally (Saeedi et al., 2019).

Diabetes is a chronic illness that develops when an individual's pancreas cannot release an adequate amount of insulin, or the body cannot effectively use the produced insulin (RCN, n.d.). While there are many types of diabetes, diabetes type 1 and type 2 are the most prevalent forms. Type 2 diabetes is a form where the produced insulin does not work effectively – a situation called "insulin resistance" (Diabetes UK, 2017). People living with type 2 diabetes have their sugar levels high because the body fails to work effectively to deliver glucose into the cells that need it (NHS, 2019). Type 2 diabetes is associated with obesity, overweight, and physical inactivity.

Case Report

The case study focuses on the management of a 67-year-old person named Demir living with type 2 diabetes for the last 11 years. Demir suffers a prevalent type of diabetes, representing 90-95% of diabetes cases (Rojas et al., 2018). A report on diabetes by PHE (2016) asserts a higher prevalence in men than women. The patient's case analysis will explore the pathophysiology of type 2 diabetes and the best care for the critical issues that affect Demir's daily life.

Demir was seeking medication to manage his type 2 diabetic condition that was developed 11 years ago. The primary cause of type 2 diabetes in Demir was the dysfunctional pancreas due to the destruction of beta cells that secrets insulin. The damage of these cells resulted in low insulin levels resulting in high blood sugar levels in Demir's bloodstream

(Lee & Halter, 2017). Type 2 diabetes results from the destruction of beta cells resulting in a total lack of insulin secretion to combat sugar levels.

Demir's history resonates with the circumstances that permit metabolic disorder in an individual. Demir had managed to live an independent life with the condition until two years ago when his condition worsened. Demir suffered from hypertension, dementia, hypercholesteraemic, obesity, new wound on the right foot and peripheral artery disease. Demir was hypertensive because of the BP values which were 140/90 or higher (NHS, 2019). The patient was under Amlodipine and Ramipril medications to suppress the symptoms of the condition. Patients with diabetes struggle to control their glucose levels alongside their blood pressure to sustain their lives. The situation requires regular and timely checks and adherence to prescribed medication to keep the blood sugars and blood pressure in check to prevent sudden deaths (NICE, 2016).

An extensive consultation patient-nurse talk occurred to understand Demir's physical signs and symptoms, latest physical examination, emotional, and social circumstances. While one can develop type 2 diabetes at any age, the occurrence of type 2 diabetes occurs at the age of 45 years and beyond, likewise, Demir developed the condition at the age of 56 years. The age bracket with the highest prevalence of diabetes type 2 is 45-64, while the prevalence is almost equal for persons in brackets (18-45 years) and those over 65 years (CDC, 2020).

Over the years, Demir attended regular reviews until 2016. However, stopped attending the annual examinations, a situation that resulted in complexity in the detection of the poor management of the Demir's diabetes and it is an issue common among most diabetic patients (Karinja et al., 2019). A lack of check-ups impacts timely interventions to manage the symptoms of diabetes. Review by Care Quality Commission noted that most patients within the age of 18-65 years are receiving acceptable yearly check-ups according to the guidelines (CQC, 2017). Diabetes UK (2017) found that the management of elevated glucose levels significantly reduces the occurrence of diabetic retinopathy and possible deaths from multiple long-term complications. Diabetes Specialist Nurses reviewed Demir's condition, after assessing the health, gave recommendations to manage the disease. However, there is a need for enhanced coordination between patients' primary and secondary settings to ensure diabetic patients manage their health (Nazar et al., 2016).

As highlighted by WHO (2011) glycated haemoglobin (HbA1c) can be used as a diagnostic test for type 2 diabetes and for monitoring blood glucose level. Diabetes UK (2018) illustrates that an ideal HbA1c level is 48mmol/mol (6.5%). Demir's HbA1c recorded in 2018 was 65- mmol/mol which was high level. Thus, the nurses regularly took weekly glucose profiles while maintaining a close collaboration with the diabetes specialist nurses due to the occasional hyperglycaemia, especially in the evenings that needed close monitoring and timely intervention (NICE, 2016). After hospitalization, for Demir, there was a need for education which helped him self-monitoring at home. According to NICE (2016), when a diabetic patient use therapy of insulin, the patient should monitor himself.

The use of proper therapy is an imperative approach in curbing potential long term microvascular and macrovascular consequences of diabetes (Diabetes UK, 2010). Therefore, the doctor prescribed Byetta (exenatide) 5 micrograms twice a day as well as metformin for the glycaemic control in Demir (NICE, 2019). Guo (2016) and Bridges et al. (2020) reported that the use of Byetta results in safe to the proper use of exenatide with metformin among type 2 diabetic patients. Additionally, the use of the Byetta presents side effects like hypoglycaemia, anxiety, nausea, headache, and dizziness (NICE, 2019). Therefore, there is a need for monitored use to prevent the side effects causing severe health problems.

Demir's condition had deteriorated, causing other diseases, particularly, a condition characterised by an accumulation of fats, cholesterol, and other materials in the artery walls. According to Beckwith (2014), people living with diabetes have accelerated atherosclerosis, with many patients exhibiting vascular lesions. According to Kovatchev

(2017), the condition is caused by the fluctuating glycaemia concentration and imbalances of lipids that occur in the body. The impaired fluid intake and instances of dehydration orchestrated by excess water used to dilute excess glucose in the urine are putting Demir at risk of kidney ailments. According to Nazar et al., (2016), the use of effective therapy among diabetic patients helps in lowering high glucose and high blood pressure (BP) and managing diabetes complications. As a result, Demir takes oral chlorthalidone diuretics. As Shah et al. (2014) mentioned, diuretics medication stimulates the braking phenomenon that supports sodium retention. The retention of sodium is critical in lowering glucose levels and, therefore, reducing the symptoms of diabetes (Brands & Manhiani, 2012). Notably, during the 11 years Demir had lived with diabetes, and was at risk of suffering tissue damages that needed timely treatment to avoid likely occurrence of blindness, foot ulceration that could necessitate amputation, heart failure, and death (NICE, 2016).

Regarding Demir's body mass index (BMI) (35) is obese as defined by WHO (n.d.) a body mass index (BMI) of equal to or over 30. Therefore, Demir's condition worsened by the fact that obesity was a contributory factor for general morbidity and premature death (RCN, 2019). The case of hyperglycaemia forced the nurse to maintain a constant low carb diet to keep Demir's glucose levels in an acceptable range. As reported by Diabetes.co.uk (2019) that carbohydrate has the greatest impact in terms of raising blood sugar levels. For this reason, lowering carb levels can benefit people with diabetes. On the other hand, as reported by Diabetes.co.uk (2019) Mediterranean diet can prevent developing of type 2 diabetes particularly with regular exercise. However, as suggested by NHS (2011), there is a need for more evidence related to the Mediterranean diet to reduce diabetes disease. Nevertheless, the complexity that Demir's condition posed made it challenging to manage the disease in community settings, he managed the monitoring of Demir's glucose levels and ensure Demir complies with the set dietary recommendations.

Slow wound healing is often observed among diabetic patients. Such wounds are usually painful and produce odour due to the oozing pus (Okonkwo & DiPietro, 2017). Demir had a new wound on his right foot that would lead to a foot ulcer. Therefore, the patient was regularly treated with wound care during hospital process and given footwear advice (NICE, 2016). Demir suffered from peripheral artery disease (PAD) as well. PAD impacts blood flow to the extremist body parts resulting in deficient blood supply to areas like the legs. Hyperglycaemia is one of the causes of PAD since high glucose levels result in neuropathy that damages the nerves that supports blood vessels (Thiruvoipatiet al., 2015). According to Scott (2015), hyperglycaemia leads to hyperosmolality, which then results in decreased perfusion and decreases oxygen enation. Furthermore, high glucose levels impede oxygen flow to energise the cells, which results in inflammation in the cells and compromises immunity to function efficiently to speed up wound healing (Diabetes.co.uk, 2019).

Hyperglycaemic patients require proper and timely care for their wounds to prevent secondary infections (NICE, 2019). Due to Demir's dementia, there was close monitoring of his movements to prevent him from inflicting injury that could result in wounds that were challenging to heal; thus, Demir's family was informed about advanced complications. Management of hyperglycaemia is critical in reducing the occurrence of PAD in type 2 diabetic patients (Thiruvoipati et al., 2015). Patients as well need to lower their blood pressure levels and cholesterol levels to minimise fat deposits in the vascular blood vessels (NICE, 2016). Having suffered PAD, Demir had been under a treatment plan to keep his glucose levels under control while adhering to a recommended nutrition plan that supplies essential nutrients (Kamil et al., 2019). Overall, hyperglycaemia management has shown to prevent wound development because the body immune system can heal wounds (Strbo et al., 2014).

The past nine years saw Demir managed his diabetes before the interjection by the nurses was sought to help Demir. The services by the registered nurse (RN), however, seem to have negated Demir's independence on managing his diabetic health condition. There was extensive discussion concerning the dynamics

and other aspects of Demir's health with the Diabetic Specialist Nurses, particularly the fact that Demir could self-administer insulin dosages on his arms and abdomen. The points of administration show signs of fatty lumps – lipohypertrophy, which are signs of body exhaustion from the excessive insulin injections from the areas (Meece, 2016). Health providers need to heed to the guidelines on consent and ensure there is the use of ethics guidelines in mental assessment on people without the capacity to make decisions on their health (NHS, 2019). Demir underwent all the procedural guidelines on consent to prevent patient rights' violation.

One of the concerns was the occasional manifestation of elevated symptoms of vascular dementia when Demir was away from home and delayed the insulin injection. Demir took precautionary measures by taking the insulin along whenever he went out of the house. The lead nurse, however, remained doubtful since they could not ascertain if Demir administered insulin promptly and timely as prescribed. Cases of missed insulin intakes among diabetic patients with dementia often result in dangerous double medications as the patients attempt to compensate for the missed dosages (TREND-UK, 2013). The situation informed the decision to lock Demir's insulin only to release it at the time when administration coupled with a close monitoring framework to ensure to prevent potential misses. CQC (2017) says that there is a need to have a plan to assist diabetic patients like Demir on insulin therapy to self-manage and oversee their individual needs.

There was mutual engagement with Demir to develop a personalised care framework that allows for excellent planning to facilitate the management of Demir's condition in a way that guarantees his safety and that of the community (CQC, 2017). The decision on the safe management of diabetes was taken during a meeting among the case stakeholders, particularly social workers, care managers, and diabetes specialist nurses. All parties agreed to collaborate in handling Demir's case to help live a quality life despite living with a life-threatening illness. The collaboration concentrated on three main aspects: timely medication, self-management of the disease, and improvement of social interactions.

Diabetes Quality Improvement

Diabetes has been a core target for many healthcare systems across the world as nations strive to reduce the burden of diabetes. In the UK, for example, diabetes costs the country colossal funds running into billions yearly (Diabetes UK, 2014). UK healthcare system, however, works intensely to reduce risk factors like obesity to minimise the risk of obesity. Like the UK, Turkiye spends significant amounts of money to manage the health of patients living with type 2 diabetes. However, despite the milestones made in the management of diabetes, Turkiye faces three fundamental issues in quality diabetes care management. These include resources and environmental barriers, patients' and clinicians' knowledge inadequacy, and lack of elaborate professional roles and identity (Rushforth et al., 2016). These issues collectively impact care improvement in diabetes management. There are set Quality Standards on diabetes management to ensure that there is enhanced care and service delivery for diabetic patients such as NICE guidance (2016). Quality improvement strategies for diabetes should, therefore, aim to address three key barriers the health system, healthcare provider, and patient levels.

Health systems can function as a barrier to quality care for diabetic patients. Healthcare organisations should invest in the necessary resources required to appropriately diagnose and treat type 2 diabetes, as well as implement routine management of clients (Haw et al., 2015). Hospitals should ensure that they have the right number of staff to provide care to patients. Additionally, hospitals can expand professional roles to ensure that practitioners have more active duties in the monitoring or adjustment of medication regimens (Watts & Sood, 2016). Having an electronic patient registry is also crucial for the effective management of medical records and tracking patients with diabetes. Information systems should also enhance coordination and communication between clinicians for effective care (Brumm et al., 2016). Optimising the healthcare system is thus an effective strategy that can be employed to achieve care quality improvement for patients with diabetes.

The second strategy focuses on the healthcare provider. Healthcare professionals should have the competencies required to effectively diagnose and manage diabetes (Gold et al., 2015). By focusing on the competence of healthcare professionals, healthcare organisations will ensure that patients receive care that meets their needs and requirements (Haw et al., 2015). For instance, professional competence enhances the ability of nurses to correctly diagnose diabetes and recommend the appropriate treatment (TREND-UK, 2013). Competent nurses will also support patients to implement self-care strategies.

The third strategy focuses on the patient. A patient-centred approach to care will improve the quality of care outcomes because such an approach to treatment helps to identify what patients need and expect (Mukerji et al., 2019). Focusing on the patient is also crucial due to the implementation of self-care in the management of diabetes (Russell et al., 2017). Healthcare professionals should identify the activities that patients can engage in at their level to reduce the adverse effects of the health condition. Such activities can only be identified when healthcare practitioners take a patient-centred approach to diabetes management.

Quality Diabetes Care Management Issues UK Vs Turkiye

Resources and Environmental Barriers

One issue in quality diabetes care management is environmental and resources limitations. Clinicians in Turkiye complain about insufficient resources and care setting constraints on the management of diabetes. Cases of large workloads create time pressure and, in turn, impede healthcare professionals' ability and capacity to deliver satisfactory diabetes care services (Rushforth et al., 2016). The lack of adequate staffing can also impact the quality of care in a complex setting where patients face high mortality risks. Having a sufficient number of healthcare professionals within a healthcare setting means that patients that require more attentive and specialised care will receive it. Staff shortage also hinders opportunistic risk screening for the potential of developing type 2 diabetes especially at the community level (Thoopputra et al., 2016).

Conducting risk assessment increases awareness concerning the condition and reduces the disease burden according to NICE (2016) Quality statement 1 that focuses on the prevention of Type 2 diabetes. However, without adequate staffing, healthcare institutions cannot provide risk assessment within local communities. Overall, poor staffing lowers the quality of care provided to patients with type 2 diabetes (Bailie et al., 2016). An increase in the number of healthcare professionals will ensure that the needs and requirements of patients are dealt with (Watts and Sood, 2016). Without adequate staffing, the disease burden of type 2 diabetes and the health risks posed by the disease is likely to increase. Healthcare organisations in Turkiye must, therefore, invest in human resources.

The UK scores higher than Turkiye in diabetes care management with an elaborate and efficient healthcare system in which the healthcare system supports electronic care delivery. For instance, UK diabetic care centres have web-enables glucose meters that alert inpatients' nurse teams about dangerous blood glucose levels for inpatients in the wards (NaDIA, 2019). The remote blood glucose monitoring (BGM) reduces casualties that could result from forgetfulness or wrong insulin readings. As well, there are effective electronic prescribing systems (EPS) that detect, record and minimise insulin dosage errors. According to Slight et al. (2019), EPS has significantly reduced some type of errors and the potential adverse effects of medications. Ratanawongsa et al. (2017), in contrast, suggest that EPS creates challenges for patients with limited literacy and English due to the complex nature of diabetes care. There is increased care for diabetes in primary care settings (Rushforth et al., 2016). However, overworked care personnel make numerous referrals for patients seeking specialised care services. The referrals delay the delivery of services, an aspect that could worsen the conditions of patients who suffer frequent hyperglycaemia. These incapacities are less in the UK. For example, using telehealth approach, nurse educators make dose adjustment for normal eating to help both inpatient and outpatient to control their glucose levels naturally (Ciemins, et al., 2011). Likewise, telemedicine is used in

Turkiye; however, according to Rutledge et al. (2017), there is a need improvement that nurse practitioners' knowledge and practical skills to significant raise innovations in telehealth. According to Smith-Strøm et al. (2016), healthcare practitioners providing care to diabetic patients and especially those that require wound care need to be knowledgeable about various technologies and approaches used in diabetes care management. Training of nurses and expansion of electronic health system would offer the nurses the necessary skills and build their competency to enable to improve the diabetes care management in Turkiye.

Lack of Adherence to Professional Roles and Identity

Turkiye is transforming its healthcare sector. The changes have seen more diabetes care treatments getting integrated into the primary care system and nurses taking central roles. The integration has resulted in uncertainties and rifts regarding nurses and physician roles in the various care elements in both primary and secondary care (Rushforth et al., 2016). According to McBain et al. (2016), role ambiguity creates monitoring challenges due to confusion concerning the staff responsible for the duty. Ambiguity in work roles is also a cause of stress at work and this limits the motivation of nurses to deal with patients properly (Hansen et al., 2018). Clinicians in Turkiye as well have reservations on the patients' readiness to embrace self-management roles. The problem impacts the time patients take before they get prescriptions and the overall period they spend in hospitals during regular check-ups. Unlike Turkiye, the UK has a more developed healthcare system with well-defined roles and protocols that minimise confusion and medical errors (NHS, 2017). For example, lower-ranked nurses can process the patients, and specialist diabetes nurses proceed to make prescriptions and make referrals (Diabetes UK, 2014).

Discussion

Diabetes is a complex process that affects people's quality of life, and even more difficult in patients with dementia. For Demir, the occurrence of type 2 diabetes resulted from a sedentary lifestyle, obesity. In normal circumstances, the body needs glucose levels to be within the right narrow range to maintain metabolism. In addition, management of hyperglycaemia requires regular blood glucose monitoring and timely medication treatment. Demir's diabetes who also has dementia had their quality of life impacted due to the inability to self-care. Therefore, Demir's care needs to educate self-care which has a significant impact on diabetic patient development. There is also a need for regular administration of high blood pressure medications and effective care for wound associated with diabetes. An individualised care plan for Demir would help guide the nurse's goals and evaluation.

Conclusion: This report has crucial implications for nursing as it offers broad knowledge of diabetes risk factors, related diseases, and holistic care strategies for improved patients' experience. An important recommendation for future practice is that healthcare systems should concentrate on nursing capacity building and conducive work environments that support holistic care to improve diabetes care management to reduce the mortalities.

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References

Bailie, J., Laycock, A., Matthews, V and Bailie, R. (2016). System-level action required for wide-scale improvement in quality of primary health care: synthesis of feedback from an interactive process to promote dissemination and use of aggregated quality of care data. Frontiers in Public Health, 4, 86.

Beckwith, S. (2014). The relationship between diabetes and atherosclerosis. British Journal of Cardiac Nursing, 9(5), 237-242.

Brands, M.W. and Manhiani, M.M. (2012). Sodium-retaining effect of insulin in diabetes. American Journal of Physiology-Regulatory, Integrative and Comparative Physiology, 303(11), R1101-R1109.

Bridges A, Bistas KG and Jacobs TF. (2020). Exenatide. In: StatPearls (2020). Treasure Island (FL): StatPearls Publishing. Available at: https://www.ncbi.nlm.nih.gov/books/NBK518981/ [Accessed 10 April 2024].

Brumm, S., Theisen, K. and Falciglia, M. (2016). Diabetes transition care from an inpatient to outpatient setting in a veteran population:

quality improvement pilot study. The Diabetes Educator, 42(3), 346-353.

Care Quality Commission (CQC) (2017). My diabetes, my care: community diabetes care review. [Online] Available at: http://www.cqc.org.uk/publications/themed-work/my- diabetes-my-care-community-diabetes-care-review [Accessed 22 March 2024].

Centers for Disease Control and Prevention (CDC) (2020). National Diabetes Statistic Report 2020. [pdf] US: Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics- report.pdf [Accessed 10 April 2024].

Ciemins, E., Coon, P., Peck, R., Holloway, B. and Min, S. (2011). Using telehealth to provide diabetes care to patients in rural Montana: findings from the promoting realistic individual self-management program. Telemedicine journal and e-health : the official journal of the American Telemedicine Association, [e-journal] 17 (8), pp.596-602. Available through: ARU Library website library.aru.ac.uk [Accessed 8 March 2024].

Diabetes UK (2010). Key Statistics on Diabetes. [Online] Available at: https://www.diabetes.org.uk/resources-s3/2017-11/diabetes_in_the_uk_2010.pdf [Accessed 10 March 2024].

Diabetes UK (2017). Differences between type 1 and type 2 diabetes. [Online] Available at: https://www.diabetes.org.uk/diabetes-the-basics/differences-between-type-1-and- type-2-diabetes [Accessed 15 March 2024].

Diabetes.co.uk (2019). Low Carb. [Online] Available at: https://www.diabetes.co.uk/diet/low-carb-diabetes-diet.html [Accessed 6 April 2024].

Diabetes.co.uk (2019). Mediterranean Diet. [Online] Available at: https://www.diabetes.co.uk/diet/mediterranean-diet.html [Accessed 1 April 2024].

Diabetes.co.uk (2019). Slow Healing of Cuts and Wounds. [Online] Available at: https://www.diabetes.co.uk/symptoms/slow-healing-of-wounds.html [Accessed 9 March 2024].

Gold, R., Nelson, C., Cowburn, S., Bunce, A., Hollombe, C., Davis, J., Muench, J., Hill, C., Mital, M., Puro, J. and Perrin, N. (2015). Feasibility and impact of implementing a private care system's diabetes quality improvement intervention in the safety net: a cluster-randomised trial. Implementation Science, 10(1), 83.

Guo X. H. (2016). The value of short- and long-acting glucagon-like peptide-1 agonists in the management of type 2 diabetes mellitus: experience with exenatide. Current medical research and opinion, 32(1), 61–76. https://dx.doi.org/10.1185/03007995.2015.1103214

Hansen, Å.M., Grynderup, M.B., Rugulies, R., Conway, P.M., Garde, A.H., Török, E., Mikkelsen, E.G., Persson, R. and Hogh, A. (2018). A cohort study on self-reported role stressors at work and poor sleep: does sense of coherence moderate or mediate the associations? International Archives of Occupational and Environmental Health, 91(4), 445-456.

Haw, J.S., Venkat Narayan, K.M. and Ali, M.K. (2015). Quality improvement in diabetes—successful in achieving better care with hopes for prevention. Annals of the New York Academy of Sciences, 1353(1), 138-151.

International Diabetes Federation (IDF) (2020). Diabetes Facts and Figures. [Online] Available at: https://www.idf.org/aboutdiabetes/what-is-diabetes/facts-figures.html [Accessed 8 March 2024].

Kamil, S., Sehested, T.S., Carlson, N., Houlind, K., Lassen, J.F., Bang, C.N., Dominguez, H., Pedersen, C.T. and Gislason, G.H. (2019). Diabetes and risk of peripheral artery disease in patients undergoing first-time coronary angiography between 2000 and 2012–a nationwide study. BMC Cardiovascular Disorders, 19(1), 234. doi: 10.1186/s12872-019-1213-1.

Karinja, M., Pillai, G., Schlienger, R., Tanner, M. and Ogutu, B. (2019). Care-seeking dynamics among patients with diabetes mellitus and hypertension in selected rural settings in Kenya. International Journal of Environmental Research and Public Health, 16(11), 2016. doi: 10.3390/ijerph16112016.

Kovatchev, B.P. (2017). Metrics for glycaemic control — from HbA1c to continuous glucose monitoring. Nature Reviews Endocrinology, 13(7), 425-436.

Lee, P.G. and Halter, J.B. (2017). The pathophysiology of hyperglycemia in older adults: clinical considerations. Diabetes Care, 40(4), 444-452.

McBain, H., Mulligan, K., Lamontagne-Godwin, F., Jones, J., Haddad, M., Flood, C., Thomas, D. and Simpson, A. (2016). Implementation of recommended type 2 diabetes care for people with severe mental illness–a qualitative exploration with healthcare professionals. BMC Psychiatry, 16(1), pp.222.

Meece, J. (2016). Lipohypertrophy: the educator's role in treatment and prevention. AADE IN Practice, 4(6), pp. 56-59.

Mukerji, G., Halperin, I., Segal, P., Sutton, L., Wong, R., Caplan, L., Whitham, D. and Gilmour, J.A. (2019). Beginning a diabetes

quality improvement project. Canadian Journal of Diabetes, 43(4), pp.234-240.

NaDIA (2019). National diabetes inpatient audit hospital characteristics, 2018. [pdf] Available at: <https://files.digital.nhs.uk/D9/2BEDFE/NaDIA%202018%20-%20Full%20Report%20V1.0.pdf> [Accessed 5 April 2024].

National Health Service (NHS) (2019). Diabetes. [Online] Available at: <https://www.nhs.uk/conditions/diabetes/> [Accessed 1 March 2024].

National Institute for Health and Care Excellence (NICE) (2016). Quality Statement 1: Preventing Type 2 Diabetes | Diabetes in Adults. Quality Standards. [Online] Available at: <https://www.nice.org.uk/guidance/qs6/chapter/Quality-statement-1- Preventing-type-2-diabetes> [Accessed 1 March 2024].

National Institute for Health and Care Excellence (NICE) (2016). Diabetes in adults, NICE quality standard, Draft for consultation. [pdf] Available at: <https://www.nice.org.uk/guidance/qs6/documents/draft-quality-standard> [Accessed 8 March 2024].

Nazar, C.M.J., Bojerenu, M.M., Safdar, M. and Marwat, J. (2016). Effectiveness of diabetes education and awareness of diabetes mellitus in combating diabetes in the United Kigdom; a literature review. Journal of Nephropharmacology, 5(2), p.110.

Okonkwo, U.A. and DiPietro, L.A. (2017). Diabetes and wound angiogenesis. International Journal of Molecular Sciences, 18(7), p.1419.

Ratanawongsa, N., Chan, L.L.S., Fouts, M.M. and Murphy, E.J. (2017). The Challenges of Electronic Health Records and Diabetes Electronic Prescribing: Implications for Safety Net Care for Diverse Populations. Journal of Diabetes Research, [e-journal] 2017. Available through: ARU Library website <library.aru.ac.uk> [Accessed 9 March 2024].

Royal College of Nursing (RCN), n.d. Diabetes. [Online] Available at: <https://www.rcn.org.uk/clinical-topics/diabetes> [Accessed 1 April 2024].

Rojas, M., Salazar, J., Garicano, C. and Velasco, M. (2018). Pancreatic beta cell death: novel potential mechanisms in diabetes therapy. Journal of Diabetes Research, (1): 1-19.

Rushforth, B., McCrorie, C., Glidewell, L., Midgley, E. and Foy, R. (2016). Barriers to effective management of type 2 diabetes in primary care: qualitative systematic review. Br J Gen Pract, 66(643), pp.e114-e127.

Russell, N.M., Vess, J., Durham, C. and Johnson, E. (2017). Text-messaging to support diabetes self-management in a rural health clinic: a quality improvement project. OnLine Journal of Nursing Informatics, 21(2), pp.17-20.

Saeedi, P., Petersohn, I., Salpea, P., Malanda, B., Karuranga, S., Unwin, N., Colagiuri, S., Guariguata, L., Motala, A.A., Ogurtsova, K., Shaw, J.E., Bright, D. and Williams, R. (2019). Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes research and clinical practice, [e-journal] 157. Available through: ARU Library website <library.aru.ac.uk> [Accessed 8 March 2024].

Scott, A.R. (2015). Management of hyperosmolar hyperglycaemic state in adults with diabetes. Diabetic Medicine, [e-journal] 32(6), pp.714-724. Available through: ARU Library website <library.aru.ac.uk> [Accessed 8 March 2024].

Shah, P.B., Soundararajan, P., Sathiyasekaran, B.W. and Hegde, S.C. (2014). Diuretics for people with chronic kidney disease. Cochrane Database of Systematic Reviews, 10(6), pp.19-25.

Slight, S.P., Tolley, C.L., Bates, D.W., Fraser, R., Bigirumurame, T., Kasim, A., Balaskonis, K., Narrie, S., Heed, A., Orav, E.J. and Watson, N.W. (2019). Medication errors and adverse drug events in a UK hospital during the optimisation of electronic prescriptions: a prospective observational study. The Lancet Digital Health, [e- journal] 1 (8), pp.e403-e412. Available through: ARU Library website <library.aru.ac.uk> [Accessed 8 March 2024].

Smith-Strøm, H., Iversen, M.M., Graue, M., Skeie, S. and Kirkevold, M. (2016). An integrated wound-care pathway, supported by telemedicine, and competent wound management—essential in follow-up care of adults with diabetic foot ulcers. International Journal of Medical Informatics, 94, pp.59-66.

Strbo, N., Yin, N., & Stojadinovic, O. (2014). Innate and Adaptive Immune Responses in Wound Epithelialization. Advances in wound care, [e-journal] 3(7), pp.492–501. https://dx.doi.org/10.1089/wound.2012.0435.

Thoopputra, T., Pongmesa, T., Newby, D.A., Schneider, J. and Li, S.C. (2016). Opportunistic risk screening for type 2 diabetes: exploring of application of diabetes risk assessment tool in community pharmacy in Australia and Thailand. Value in Health Regional Issues, 9, pp.1-7.

Training, Research and Education for Nurses in Diabetes- UK (TREND-UK) (2013). Diabetes and dementia guidance on practical management. [pdf] Available at:

<https://diabetes-resources-production.s3-eu-west-1.amazonaws.com/diabetes-storage/2017 08/Diabetes_And_Dementia_Guidance_2013. pdf> [Accessed 25 March 2024].

Training, Research and Education for Nurses in Diabetes- UK (TREND-UK) (2017). An Integrated Career and Competency Framework for Diabetes Nursing. [pdf] Available at: https://trend-uk.org/wp-content/uploads/2017/02/TREND_4th-edn-V10.pdf [Accessed 1 April 2024].

Thiruvoipati, T., Kielhorn, C.E. and Armstrong, E.J. (2015). Peripheral artery disease in patients with diabetes: epidemiology, mechanisms, and outcomes. World Journal of Diabetes, 6(7), pp.961.

Watts, S.A. and Sood, A. (2016). Diabetes nurse case management: Improving glucose control: 10 years of quality improvement follow-up data. Applied Nursing Research, [e- journal] 29, pp.202-205. Available through: ARU Library website <library.aru.ac.uk> [Accessed 3 March 2024].

World Health Organization (WHO) (2020). Diabetes: key facts. [Online] Available at: <https://www.who.int/news-room/fact-sheets/detail/diabetes> [Accessed 19 March 2024].