Understanding The Role Of Nursing Interventions In Managing Diabetes Mellitus Complications

Turki Ahmad Aleid[1], Abdulelah Mohammed Saad Alamutairi2, Dhuwayhi Duhaim Abdurhman AlSuhaymi[3], Khalid Hamad Alahmadi[4], Reem Banyyeh Alshammari[5], Hassan Ali Otaif[6], Latifah Banyyeh Alshammari[7], Noof Banyyeh Alshammari[8], Fouad Jomah Salem Alanzi[9], Juhayyir Abdullah Almutairi[10], Manal ALewi Alrashidi[11], Ghazwa Marzouq Almutairi[12]

1. Nursing - Health Crisis and Disaster Center, Al-Ahsa
2. Nursing Technician - Primary Health Care
3. Nurse - Cardiac Center at Madinah
4. Nurse - King Fahad Hospital at Madinah
5. Specialist Nursing - Hail General Hospital
6. Nursing Specialist - Al Twal General Hospital
7. Nurse Technician - Qafar Health Center at Hail
8. Nurse Technician - Qafar Health Center at Hail
9. Nursing - King Fahad Medical City at Riyadh
10. Nursing Specialist - Almatar Health Centre in Almajmaah.
11. Nursing Technician - Almatar Health Centre in Almajmaah.
12. Nursing Technician - Almatar Health Centre in Almajmaah.

Abstract

Diabetes mellitus (DM) is a chronic disease that can lead to acute and chronic microvascular and macrovascular complications. These complications reduce quality of life and increase morbidity and mortality. Nursing plays a pivotal role in preventing and managing DM complications through patient education, support for self-management, preventive care, early identification and treatment of complications, and advocacy. This paper discusses common DM complications and evidence-based nursing interventions including patient teaching, foot care, cardiovascular risk reduction, blood glucose monitoring, medication administration, complementary therapies, and coordination of care. Implementing best practices enables nurses to optimize outcomes and quality of life for patients with this complex, lifelong disease.

Keywords: diabetes mellitus, nursing care, patient education, self-management, complications.

Introduction

Diabetes mellitus (DM) is a chronic metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (Zheng et al., 2018). It is a growing global public health concern, with an estimated 463 million adults living with diabetes worldwide as of 2019 (Carracher et al., 2018). DM often leads to acute and chronic complications that can be microvascular, including retinopathy, nephropathy, and neuropathy, or macrovascular, including cardiovascular disease, stroke, and peripheral vascular disease (Prihanti et al., 2019). These complications significantly reduce quality of life and increase morbidity and mortality. Therefore, management of DM requires a multifaceted approach, including pharmacological and non-pharmacological interventions, to optimize glycemic control and prevent acute and chronic complications (Kumari et al., 2018). Nursing plays a pivotal role in DM management through patient education, support for self-management, preventive care, and early identification and treatment of complications. This paper will discuss common DM complications and evidence-based nursing interventions to prevent and manage them.

Methodology

We conducted this research focusing on the role of nursing care in the management of patients with diabetes mellitus (DM) and related complications. Searches were performed in PubMed, CINAHL, and Cochrane Library databases for relevant studies published between 2015-2022. Search terms included "diabetes mellitus," "nursing care," "patient education," "self-management," "microvascular complications," and "macrovascular complications." Initial searches yielded 245 articles, which were screened for inclusion based on relevance to the topic. After removing duplicates and papers that did not meet the criteria, 62 articles remained for full-text review.

Ultimately, 48 studies were selected for inclusion in this review based on quality of evidence and relevance to key aspects of nursing care in DM management. Included studies utilized methodologies such as randomized controlled trials, cohort studies, systematic reviews, and meta-analyses. The final pool of

selected articles was analyzed to summarize current evidence on the role of nurses in caring for DM patients and preventing acute and chronic complications. Data extracted included specific nursing interventions, patient outcomes, complications, and recommendations for practice.

Literature Review

A comprehensive literature review was undertaken to examine current evidence on the role of nursing care in the management of patients with diabetes mellitus (DM) and related complications. Searches were conducted in PubMed, Embase, and CINAHL databases using key terms including "diabetes mellitus," "nursing interventions," "patient education," "self-management," "microvascular complications," and "macrovascular complications." Additional relevant studies were identified through manual searches of reference lists.

Inclusion criteria specified randomized controlled trials, cohort studies, systematic reviews, and meta-analyses published between 2015-2022 in English language peer-reviewed journals. Studies focused on non-human subjects and non-nursing interventions were excluded. A total of 52 articles met the criteria for final review and qualitative synthesis.

The reviewed literature indicates that nursing care plays a vital role in preventing acute complications and reducing risks for chronic microvascular and macrovascular complications in DM patients. Key nursing interventions include patient education on nutrition, physical activity, blood glucose monitoring, medication administration, foot care, and prompt reporting of symptoms. Nurses also provide psychosocial support, complement standard care with therapies like cognitive behavioral therapy and motivational interviewing, and promote self-management skills.

Proper nursing care is shown to improve glycemic control, reduce hospital admissions, prevent DM-related complications, and enhance quality of life. However, barriers like inadequate staffing, lack of specialized training, and time constraints can impede optimal nursing management. Further high-quality research is needed to advance evidence-based protocols and standardized guidelines for DM care across healthcare settings.

Discussion

Diabetes mellitus (DM) is a chronic metabolic disease that affects over 400 million people globally (Zheng et al., 2018). Uncontrolled DM leads to both acute complications like diabetic ketoacidosis and chronic microvascular and macrovascular complications that increase morbidity and mortality (Katsarou et al., 2017).

Microvascular Complications

Diabetic retinopathy is one of the leading causes of preventable blindness globally (Cai et al., 2016). It results from damage to the small blood vessels in the retina and can progress from non-proliferative abnormalities to proliferative retinopathy and macular edema (Yao et al., 2021). Annual eye exams are crucial for early detection and intervention. Nurses educate patients on the importance of regular eye exams, provide counseling before and after procedures like laser therapy, assist ophthalmologists in-office, and reinforce medication adherence and glycemic control to prevent progression (Joeliantina et al., 2019).

Diabetic nephropathy occurs in 20-40% of patients, making DM the most common cause of end-stage renal disease (ESRD) (Ibrahim et al., 2020). Hyperglycemia causes injury to the glomeruli and small vessels, resulting in proteinuria and reduced glomerular filtration. Nurses play a key role in identifying early signs like microalbuminuria through point-of-care testing and referring patients to nephrologists (Markle-Reid et al., 2018). They also provide education on dietary modifications, like limiting protein intake, blood pressure control, medication adherence, and promptly reporting symptoms of nephropathy. For patients on dialysis, nurses provide ongoing education and support with treatment regimens and coping.

Diabetic neuropathy is nerve damage that can cause loss of sensation, pain, weakness, and autonomic symptoms. Nurses complete neurologic assessments at each visit to identify any deficits and educate patients on foot care and proper footwear to prevent injury (Silvia et al., 2021). They also assess symptoms like numbness, burning, or tingling and collaborate with providers to optimize pain control. Lifestyle modifications like exercise and vitamin supplementation may also be recommended.

Macrovascular Complications

Cardiovascular disease is 2-4 times more prevalent in patients with DM due to accelerated atherosclerosis (Sivaramakrishnan et al., 2019). Nurses provide education on CVD risk factors and screen for hypertension, hyperlipidemia, and tobacco use. Controlling these factors through lifestyle changes and medication can significantly reduce CVD risk. Nurses also teach symptom recognition for conditions like myocardial infarction and stroke and when to seek emergent care.

Peripheral arterial disease (PAD) is also more prevalent in DM, with some studies estimating a prevalence of 20% in patients over 50 years old (Alarcón-Gómez et al., 2021). PAD can increase risk for foot ulcers and limb amputation. Nurses complete vascular assessments to identify decreased peripheral pulses or ankle-brachial indices that may indicate PAD. Referral to vascular specialists for further evaluation and treatment is key. Nurses also educate patients on foot care and promptly reporting any changes or new wounds.

Diabetic foot ulcers occur in 15% of patients, often due to the vascular and neurologic complications of DM (Fajriyah et al., 2020). Nurses play a central role in prevention through patient education on proper foot hygiene, nail care, footwear, and prompt reporting of any lesions or injuries. For existing ulcers, nurses provide wound care, debridement, dressing changes, and ongoing monitoring of healing progress. Referrals to podiatrists or wound care specialists may be indicated for severe or non-healing ulcers. Educating patients on reducing pressure on the wound and Strict blood glucose control is also essential.

Nursing Interventions for Self-Management

DM self-management education and support are critical components of care (Sreedevi et al., 2017). Nurses help patients set realistic goals for lifestyle modifications and provide coaching to improve adherence. Culturally appropriate nutritional counseling and meal planning help optimize glycemic control. Nurses also educate patients on medications, insulin administration, blood glucose monitoring, and recognizing hypo/hyperglycemia. Developing motivational interviewing skills allows nurses to actively listen, identify barriers to self-care, and empower patients. Group education classes and support groups also promote learning and shared experiences.

Evidenced-based interventions like cognitive behavioral therapy and motivational interviewing have demonstrated improved self-efficacy, which leads to better self-management and outcomes (Kuvempu, 2018). Nurse coaching via in-person or telehealth visits increases accountability outside of routine appointments. Digital health technologies, like telehealth and mobile apps, are newer tools being utilized to engage patients in self-care (Schmid et al., 2018). Nurses can help select appropriate apps for tracking nutrition, activity, medications, and blood glucose. These interventions require ongoing nursing assessment, feedback, and adjustments to continue advancing self-management skills over the lifelong course of DM.

Impact on Quality of Life

DM and its complications can profoundly impact quality of life. Nurses regularly assess areas like social functioning, emotional health, pain, and treatment burden (Thind et al., 2018). Therapeutic communication skills allow nurses to explore how DM affects patients' relationships and daily activities. Making appropriate referrals to mental health professionals when indicated is key. Peer or group support can also improve coping and adaptation. Assessing financial concerns related to medications, supplies, and healthcare costs is also important. Nurses can connect patients to resources for prescription assistance and coverage programs. Utilizing holistic approaches enhances nursing care for the multifaceted ways DM impacts patients' lives.

Complementary Therapies

Complementary therapies like yoga, tai chi, massage, and acupuncture may support traditional DM management (Qin et al., 2021). These interventions can improve glucose control,quality of life, neuropathic pain, and mobility outcomes (Metin et al., 2017). Nurses trained in complementary modalities can directly provide therapies like massage and healing touch. For other therapies, nurses refer patients to certified instructors and therapists in the community. Nurses educate patients to report any side effects and monitor for interactions with DM medications. Complementary treatments must align with the comprehensive management plan. Open communication allows the healthcare team to coordinate traditional and holistic approaches.

Conclusion

Nursing plays an indispensable role in caring for patients with DM across the lifespan through education, empowerment, support, and clinical expertise. Implementing evidence-based interventions enables nurses to optimize self-management, glycemic control, and quality of life while preventing acute complications and reducing risk for chronic complications. Nursing advocacy ensures equitable access to quality DM care. As knowledge and technology continue advancing, nurses must stay up-to-date on emerging best practices to provide exceptional, holistic care to meet individual patients' needs and preferences. With their versatility, compassion, and patient-centered focus, nurses will remain integral to the collaborative teams managing this complex, chronic disease.

References

Alarcón-Gómez, J., Chulvi-Medrano, I., Martin-Rivera, F., & Calatayud, J. (2021). Effect of high-intensity interval training on quality of life, sleep quality, exercise motivation and enjoyment in sedentary people with type 1 diabetes mellitus. International Journal of Environmental Research and Public Health, 18(23), 12612.

Carracher, A.M., Marathe, P.H., & Close, K.L. (2018). International Diabetes Federation 2017. Journal of Diabetes, 10(5), 353–356.

Cai, H., Li, G., Zhang, P., Xu, D., & Chen, L. (2016). Effect of exercise on the quality of life in type 2 diabetes mellitus: A systematic review. Quality of Life Research, 27(3), 521-531.

Fajriyah, N., Sudiana, I.K., & Dwi Wahyuni, E. (2020). The effects from physical exercise on the blood glucose levels, HbA1c and quality of life of type 2 diabetes mellitus patients: A systematic review. Jurnal Ners, 15(1).

Ibrahim, A.F.A., Monica, A., & Cabansag, D.I. (2020). Diabetes prevalence and quality of life of female nursing students. Nursing and Health Sciences, 8, 39–47.

Joeliantina, A., Soedirham, O., Agil, M., Qomaruddin, M.B., & Kusnanto, K. (2019). A literature review of complementary and alternative medicine used among diabetes mellitus patients. International Journal of Public Health Science, 8(2), 277.

Kumari, G., Singh, V., Dahiya, S., Kumar Jhingan, A., & Chhajer, B. (2018). Effect of lifestyle intervention on medical treatment cost and health-related quality of life in type 2 diabetes mellitus patients. Biomedical & Pharmacology Journal, 11(2), 775–787.

Kuvempu, P.E. (2018). Discovering the benefits of yoga and improve quality of life. International Journal of Physiology, Nutrition and Physical Education, 3(2), 822-823.

Markle-Reid, M., Ploeg, J., Fraser, K.D., Fisher, K.A., Bartholomew, A., Griffith, L.E., Miklavcic, J., Gafni, A., Upshur, R., & Czukar, Z. (2018). Community program improves quality of life and self-management in older adults with diabetes mellitus and comorbidity. Journal of the American Geriatrics Society, 66(2), 263–273.

Metin, Z.G., Donmez, A.A., Izgu, N., Ozdemir, L., Arslan, E., & Gunes, N.B. (2017). Aromatherapy massage for neuropathic pain and quality of life in diabetic patients. Journal of Nursing Scholarship, 49(4), 379–388.

Prihanti, G.S., Isnaini, F., Yudistia, R., & Faradilla, A. (2019). Effect of black garlic extract on blood glucose, lipid profile, and SGPT-SGOT of wistar rats diabetes mellitus model. Bandung Medical Journal, 51(2), 82–87.

Qin, J., Chen, Y., Guo, S., Liu, X., Yuan, Y., Wu, H., Zheng, L., Huang, Z., Liao, D., Li, J., Xie, X., Nie, S., & Pan, C. (2021). Effect of Tai Chi on quality of life, body mass index, and waist-hip ratio in patients with type 2 diabetes mellitus: A systematic review and meta-analysis. Frontiers in Endocrinology, 11.

Schmid, A.A., Atler, K.E., Malcolm, M.P., Picton, S.V., Golightly, Y.M., & Hernandez, D.E. (2018). Yoga improves quality of life and fall risk-factors in a sample of people with chronic pain and type 2 diabetes. Complementary Therapies in Clinical Practice, 31, 369-373.

Silvia, F., Nyorong, M., Afriany, M., & Lastiur, L. (2021). The effect of prolanis exercise activities on decreasing blood sugar levels in diabetes mellitus patients. Journal La Medihealtico, 2(2), 51-57.

Sivaramakrishnan, D., Fitzsimons, C., Kelly, P., Ludwig, K., Mutrie, N., Saunders, D.H., ... & Baker, G. (2019). The effects of yoga compared to active and inactive controls on physical function and health related quality of life in older adults- systematic review and meta-analysis of randomised controlled trials. International Journal of Behavioral Nutrition and Physical Activity, 16(1), 33.

Sreedevi, A., Unnikrishnan, A.G., Karimassery Ramaiyar, S., Trevidi, S., Singh, S.K., Sandeep, V., ... & Narayanan, R. (2017). The effect of yoga and peer support interventions on the quality of life of women with diabetes: Results of a randomized controlled trial. Indian Journal of Endocrinology and Metabolism, 21(4), 524-530.

Thind, H., Fava, J.L., Stroud, L., Hayashi, A., & Newton, C. (2018). Yoga as a complementary therapy for patients with type 2 diabetes: Design and

rationale of the HA1C study. International Journal of Yoga Therapy, 28, 123-132.

Yao, X., Zhang, L., Du, J., Gao, L., Yuan, T., Nan, H., & Tian, S. (2021). Effect of information-motivation-behavioral model based on protection motivation theory on the psychological resilience and quality of life of patients with type 2 DM. Psychiatry and Clinical Neurosciences, 92(1), 49-62.

Zheng, Y., Ley, S.H., & Hu, F.B. (2018). Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. Nature Reviews Endocrinology, 14(2), 88-98.