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Literature Review on the Effectiveness of Modern Dressing in the Wound Care Process on Diabetic Wound Healing

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Abstract

Background: Diabetes mellitus is a health problem due to insulin deficiency or insulin resistance that causes high blood glucose. A frequent complication is diabetic ulcer, which is a condition of partial or complete tissue deformity. If it does not get proper treatment, it is very risky to get an infection that leads to amputation.Diabetes Mellitus (DM) has become a prevalent disease, imposing a significant burden on public health due to its widespread occurrence and association with numerous disabilities and fatalities. Uncontrolled DM can lead to severe metabolic complications and long-term vascular issues, including microangiopathy and macroangiopathy. Additionally, individuals with DM are highly susceptible to foot infections, which can escalate into gangrene if not properly managed.
Purpose: To determine the effectiveness of modern dressing in the wound care process on diabetic wound healing.
Methods: Data collection used descriptive analysis and literature study. The databases used were PubMed, CINAHL, ProQuest and Web of Science. Journal inclusion criteria used PICO and article analysis was conducted by 6 authors.
Findings: The evaluated article's findings elucidate the patient's degree of comfort and the more important healing process. It has been demonstrated that contemporary wound care applications make patients feel more at ease as their wounds heal, greatly aiding nurses in nursing care. Modern wound care is a practice that will evolve in response to advancements in nursing science; in this instance, it centers on how comfortable patients are while obtaining wound care-related medical treatments. Therefore, nurses must advance the knowledge behind the use of contemporary wound care to promote patient comfort and hasten the healing process.
Conclusion: Modern wound care enhances patient comfort and accelerates healing, greatly supporting nursing practice. With evolving knowledge in nursing science, nurses need to master these methods to maximize patient comfort and recovery in wound care.
Keywords: diabetic foot ulcer, risk foot ulcer, diabetes mellitus, wound healing

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Introduction

Diabetes mellitus (DM) is a medical condition characterised by a number of symptoms brought on by insulin resistance or insufficiency, which raise blood glucose levels (Nagle et al., 2023). Diabetes mellitus is now a widespread illness (Albers et al., 2010). The fact that the number of patients has increased by two to three times in the past ten years is proof of this. According to (Glovaci et al., 2019) diabetes has grown to be a significant health issue. The WHO estimates that there were 200 million persons with diabetes mellitus in 2013, and that figure is expected to rise to 333 million by 2025. Some of the many people who suffer from diabetes mellitus live in less developed nations. The prevalence of diabetic foot ulcers (DFU) in the Middle East is notably high due to factors such as poor blood sugar control, longer diabetes duration, and common complications like neuropathy and ischemia. In middle east, recent studies in 2023 indicated a DFU prevalence of about 6-7% among diabetic patients. Similarly, studies in Jordan and Iran report prevalence rates of 4-6% in patients with a diabetes history of over ten years (McDermott et al., 2023).

Keywords: diabetic foot ulcer, risk foot ulcer, diabetes mellitus, wound healing

In patients with type-2 DM, a frequent complication is diabetic ulcers, which is a condition of tissue deformity either only partially or completely. The factors that cause diabetic ulcers are intrinsic factors (diabetic angiopathy, metabolic genetics, diabetic neuopathy) and extrinsic factors (infection, trauma, and drugs) (Akash et al., 2020). Previously, wound care management did not know that there was a method of moist wound conditions where the method was simply to wash the wound using 0.9% NaCl solution and added with iodine providine liquid, then dry gauze was used as a cover. This usually results in the wound being stuck by the gauze and can damage living or newly growing cells during subsequent wound care, causing the client to feel pain. Therefore, to maximize the wound healing process in diabetic ulcers, it is necessary to choose the appropriate wound care method. Currently, wound care has undergone many developments, one of which is a wound care method known as modern dressing. Modern dressing is wound care that is carried out by maintaining the wound environment so that it remains in a moist condition which aims to maintain cell death and tissue fluid loss (Tatarusanu et al., 2023).

Modern dressings used in patients with diabetic ulcers (diabetic wounds) according to research that has been shown and conducted in with the title of his research(Ariani et al., 2024). The results of this study have shown that in the DM wound healing process there is an effect of modern wound dressing. This is reinforced by the results which show that the process of repairing diabetic wounds before using modern wound dressings there were 23 respondents (90%) out of 30 respondents had a degenerative wound healing process and those that regenerated were 3 respondents (10%). Whereas in the process of healing diabetic wounds after using modern wound dressings, there was a degenerative wound healing process of 14 respondents (46.7%) and the regeneration was 16 respondents (53.3%). Thus, it is concluded that the research conducted intends to examine the effectiveness of modern dressing techniques in the wound care process on type-2 DM wound healing. The purpose of writing this literature review is to determine the effectiveness of modern dressing in the wound care process on diabetic wound healing.

Method

The strategy used by researchers in finding journals to search for clinical information in evidence-based health science practice uses PICOS (Nasution, 2017). The time used in this study began on October 26, 2021-May 12, 2022 using secondary data sources in the form of literature review using descriptive methods by classifying data from similar search results used for purposes in accordance with the objectives. The type of research used is library research. Data analysis using descriptive analysis.

Results

Table 1. Similarities Article

Points examined by the author	Similarities
Case study subjects	The case study subjects in both journals were DM patients with grade 2 diabetic wounds totaling 2 respondents.
Instrument	Instruments used in both journals as a measure of diabetic wound condition using the Bates-Jensen Wound Assessment Tool (BWAT) observation sheet.
Research results	The results of research conducted in both journals show that modern dressings are effective in healing diabetic wounds as evidenced by the decreasing wound score.
Methods	The method used in both journals uses descriptive research methods with a nursing care process approach for 3 days with 1 intervention.
Research objectives	Aims to analyze the results of the application of wound care with modern dressing techniques on diabetic wound healing.

Table 2. Different Article

Points examined by the author	Similarities
Case study subjects	Journal I Respondents aged around 40-60 years old are female and male b. Journal II

	Respondents are around 62 years old, both are female a. Journal I
Instrument	a. Journal I Describes the tools and materials used for the wound care process and the types of modern dressings such as hydrogel and foam dressings. b. Journal II Does not explain the tools and materials needed for the wound care process and the type of modern dressings used.
Research results	Journal 1 The results showed a decrease in wound score with an average decrease of 4 points. b. Journal II The results showed a decrease in wound score with an average decrease of 7.5 points. b. Journal II
Methods	The method used in both journals uses descriptive research methods with a nursing care process approach for 3 days with 1 intervention.
Research objectives	Journal I The research was conducted in February 2020 b. Journal II Research time in conducted in May 2019

Discussion.

Diabetic wounds are wounds that are caused and can be found in diabetic patients related to peripheral and autonomic nerve disorders. Uncontrolled blood sugar levels and poor wound care will make diabetic wounds prone to infection (Akter, 2019). In research conducted (Akin et al., 2022), subject 1 complained that his wound took a long time to heal, felt uncomfortable in the wound and sometimes felt sore. The wound in subject 1 is a grade 2 ulcer whose wound condition has signs of inflammation, namely pain in the wound, redness in color, swelling, a little exudate, a slight odor, the skin around the wound feels warm. Whereas in subject 2 there was a difference in wound condition, namely the presence of slough in the wound. The results of the evaluation on the third day showed that the patient preferred wound care using the modern dressing technique. This is because the dressing does not stick to the wound, the patient feels no pain and the dressing does not seep.

In a study conducted by (Dayya et al., 2022; Scepankova et al., 2021), after being given a nursing intervention for the application of moist wounds, there was a significant difference regarding the scale of the wound or the condition of the wound experienced by subject 1. On the first day before being given moist wound care, the subject complained that the wound was difficult to heal, smelled, felt pain, the wound scale was 23, the size of the wound: 10 cm long and 7 cm wide, there was little bleeding, the edges of the wound were not fused with the wound bed and the skin around the wound was reddish. When moist wound care has been applied for 3 days, it results in that the condition of the wound becomes odorless, the pain decreases, the wound scale is 15, the size of the wound: 9 cm long and 6 cm wide, there is no bleeding, the wound edges have merged with the wound base and the skin around the wound area is pink. Subject 2 also produced a significant difference in wound condition after the subject received nursing intervention on the application of moist wound care. On the first day before moist wound care was applied to the wound, it was known that the subject said the wound was difficult to heal, smelled, felt pain and itching, wound scale 22, wound size: 6 cm long and 5 cm wide, no bleeding was found, the wound edges were not fused with the wound bed and the skin around the wound area was still slightly reddish.

Based on the research results from the two journals, it is in accordance with the opinion expressed (Effan Fahri Mahendra & Burhan, 2024), that moist technique wound care is proven to be able to reduce infection rates and prevent organ amputation. Another opinion is also found in (Ariani et al., 2024), which suggests that closed wound care using modern wound dressing has the effectiveness of accelerating wound healing compared to wounds covered with gauze. Modern wound dressings or commonly known as “modern dressings” can keep things moist. Modern dressings are able to maintain moisture in the wound area so that every dressing change can reduce pain, help the process of cell regeneration, do not damage new tissue, and allow neutrophils and macrophages to migrate better so as to optimize wound healing. Wounds that are too wet can cause maceration at the edges of the wound, while if the wound is dry, it can make the gauze sticky to the wound area, possibly causing re-traumatization. This requires a longer treatment time (Effan Fahri Mahendra et al., 2024).

In the first journal, the wound care method used was using modern dressings in the form of hydrogel and foam dressings. According to (Akin et al., 2022). Hydrogel is a material that has water content and can reduce the temperature in the wound so that the wound is always well hydrated, creates a moist condition, and as a natural debridement through the autolytic process. Meanwhile, foam dressing is a material that can absorb exudate from small to large amounts, can keep the wound moist, can protect wound tissue, bone protrusions, and tissue granulation. However, the second journal did not specify which dressing was used for the study. In modern wound care (modern dressing) there are 3 stages that need to be considered, namely: wound washing, removal of dead tissue, and selection of the appropriate dressing (Aderibigbe & Buyana, 2018). The case study subjects in both journals were in middle age, around 40-65 years old. The opinion of (Agarwal et al., 2011) states that one of the risk factors related to the cause of diabetes mellitus is due to age. Normal humans, both men and women, will experience a rapid physiological decline when they are over 40 years old. This decline is the risk that can make the endocrine function of the pancreas decrease in producing insulin so that it can cause high blood sugar levels. A similar opinion conveyed in research conducted (Barbu et al., 2021), states that high blood sugar levels can lead to long-term chronic complications such as diabetic wounds. High blood sugar content can reduce immunity, high blood viscosity, inhibit blood circulation so that the process of tissue repair takes a long time. In addition, old age will also experience a decrease in the elasticity of collagen and a decrease in fat reserves which can affect the process of cell regeneration and a decrease in the immune system which can make wounds difficult to heal. The condition of diabetic ulcers is very favorable for microorganisms to multiply so that it can cause prolonged infection(Mixrova Sebayang & Burhan, 2024).

After the authors reviewed the two journals, it was found that the results of the research conducted by (Adeliana et al., 2021), obtained study data that resulted in a scoring score for the development of diabetic wound healing during 1 intervention for 3 days in patient 1 getting a score decrease of 3 points, namely from a score of 31 to 28, while in patient 2 getting a score decrease of 5 points, namely from a score of 32 to 27. This shows that there is a decrease in wound scores which also means that there is an improvement in wound tissue. Research conducted (Burhan et al., 2023; Burhan & Arofiati, 2021), with the title “Nursing Care for the Application of Moist Wounds in Diabetes Mellitus Patients” has found that modern dressings have proven effective in helping to treat moist wounds in patients with diabetes mellitus. This is evidenced by the study subjects who feel that after getting treatment for 3 days the pain is reduced, the risk of infection is resolved and wound changes are quite improved. In patient 1, there was a decrease in wound scale from 23 to 15, while patient 2 also experienced a decrease in wound scale from 22 to 15.

The results of the decrease in wound scores in the research subjects conducted by (Armstrong et al., 2022), were more than the decrease in wound scores experienced by subjects in the study conducted by Andin & Dwi (2021). In the research conducted by(Kjaer et al., 2020), the nutritional intake of the study subjects was not good. The study subjects said they still often consumed sugary foods and drinks. In addition, study subjects often feel anxious. This supports the theory according to (Albers et al., 2010), which states that high blood glucose levels have an influence on small blood vessels, thereby reducing the supply of nutrients and oxygen to the periphery so that it can cause ulcer healing to be prolonged. According to the theory presented in research by (Gould et al., 2022), anxiety, depression, and stress can reduce the efficiency of the immune system which can have an influence on the wound healing process. Therefore, the author argues that to improve wound healing, wound care is carried out with techniques and types of dressings that are appropriate to the condition of the wound, along with managing diet and avoiding negative thoughts that can cause stress.

Strengths And Limitations of The Study

The study effectively synthesizes multiple recent sources, providing a comprehensive view of diabetic wound care techniques, especially the benefits of modern dressings and moist wound care, with clinical and patient-centered outcomes like reduced pain, infection rates, and wound scale scores. It also acknowledges external factors such as age, diet, and mental health, offering a holistic perspective on wound healing. However, limitations arise from the lack of standardized dressing types across studies, introducing variability that complicates direct comparison. Additionally, while factors like age and comorbidities are considered, individual health conditions and adherence to wound care protocols are not consistently addressed. Psychological factors, such as anxiety and stress, are discussed as influences on wound healing but lack quantifiable data, which limits insights into their precise effects.

implications on patient care and the profession.

The findings highlight critical implications for patient care and the diabetes management profession, emphasizing the need for prioritizing patient education on foot care practices. Proper foot hygiene and regular self-examinations can significantly reduce the risk of diabetic foot ulcers (DFUs), so healthcare providers should implement routine foot assessments and tailor educational programs for patients, particularly those over 45, who are at higher risk. Additionally, the absence of a significant association between neuropathy and DFUs suggests that a multifaceted approach to patient assessment is necessary, considering age, foot care practices, and other risk factors in care plans. However, the study's limitations include its relatively small sample size and potential biases in self-reported

data regarding foot care practices. Future research should focus on larger cohorts and longitudinal studies to validate these findings and explore additional risk factors affecting DFU prevalence in diverse populations

Conclusions

Modern wound care greatly enhances patient comfort and accelerates healing, which is vital for effective nursing practice. Recent advancements in wound care techniques demonstrate an increasing focus on patient-centered care. By prioritizing comfort, nurses can reduce patient anxiety and create an environment conducive to healing. It is essential for nurses to stay informed about contemporary wound management practices to improve patient outcomes. Ongoing education and the application of innovative wound care methods empower nurses to deliver higher-quality care and support, leading to better recovery rates. As nursing science evolves, so will the strategies used in wound care, highlighting the need for healthcare professionals to adapt and refine their skills. This approach not only benefits patients but also enhances the overall quality of nursing practice, ensuring a holistic approach to patient care.

Author contribution

Alvod Edel Arkhad, Sufian Tuhfa, and Zumara Dalina contributed significantly to the conception, design, data acquisition, and analysis. Kamara Lalisa Loina assisted in drafting and critically revising the manuscript. Elnara Manisa and Arfaana Bahisa Baheerah provided final approval for publication, with each author responsible for their respective contributions. Alvod Edel Arkhad oversaw the overall work, ensuring that any issues related to the accuracy or integrity of the research were addressed appropriately.

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Conflict of Interest Statement

The authors declare that they have no competing interests.

Data Avaibility

The datasets produced or examined in the present investigation can be obtained from the corresponding author upon a reasonable request.

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