

The Effectiveness of Modern Dressings in Healing Diabetic Ulcers in the Poly Surgery at Bhayangkara Hospital Balikpapan

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Received: July 1, 2025 ○ Revised: July 31, 2025 ○ Accepted: August 1, 2025

ABSTRACT

Background: Diabetic ulcers are a form of chronic complications of diabetes mellitus in the form of open wounds on the surface of the skin, which can be accompanied by local tissue death, damage to skin tissue starting from the epidermis, dermis, subcutaneous tissue and can spread to deeper tissues, such as bone. And muscles. Management that can be used to treat diabetic ulcers consists of pharmacological and non pharmacological management. One of the interventions that can be given to treat diabetic ulcers non-pharmacologically is by carrying out modern dressing treatments.

Objective: This study aimed to determine the differences in wound conditions before and after treatment using modern dressing techniques in patients with diabetic ulcers.

Methods: This study was pre-experimental with a one-group pre and post-test design approach. The sample in the study consisted of 15 respondents using the Accidental Sampling technique. Data was collected in the Poly Surgery at Bhayangkara Hospital using the BWAT observation sheet (Bates Jensen Wound Assessment Tool) from 1 May 2023 to 1 June 2023. The data analysis used was the Wilcoxon Test.

Results: Research on wound conditions before and after treatment using modern dressing techniques in patients with diabetic ulcers obtained a P value of 0.005.

Conclusion: The results of the Wilcoxon test calculation indicate it is effective in using modern dressing techniques in diabetic ulcer patients in the Poly Surgery at Bhayangkara Hospital. The recommendation for this research is that it can be a reference for students and nursing staff to use modern dressings in modern wound care.

Keywords: Wound Condition, Modern Dressing, Diabetic Ulcer

INTRODUCTION

Diabetes mellitus is a chronic and debilitating condition that occurs when the pancreas fails to produce sufficient insulin or when the body is unable to utilize the insulin it produces effectively. This results in the disruption of glucose homeostasis, leading to elevated blood sugar levels. Diabetes has become a major global health issue and is considered one of the four key non-communicable diseases prioritized by global health authorities, including the World Health Organization (WHO). Over the past several decades, the incidence and prevalence of diabetes have been steadily increasing, posing a significant burden on public health systems worldwide (WHO, 2016).

In 2016, the WHO reported that diabetes was responsible for an estimated 1.6 million deaths globally, with nearly half of these deaths occurring before the age of 70. Furthermore, diabetes was ranked as the seventh leading cause of death worldwide in the same year (WHO, 2020). As diabetes rates continue to rise, it has become imperative to address the health complications associated with the disease, particularly those that affect individuals with poorly managed blood glucose levels.

One of the most common and debilitating complications of diabetes is diabetic neuropathy, particularly in the lower extremities. Diabetic neuropathy increases the risk of developing foot ulcers, which can escalate into serious infections, gangrene, and, in severe cases, necessitate

amputation. The prevalence of diabetic foot ulcers is estimated at 15%, with a 30% risk of amputation and a mortality rate of 32%. In Indonesia, diabetic ulcers are the leading cause of hospitalization, accounting for 80% of all cases in hospitals (Azizah, Intan, Tulak, Kurniawan, & Afelya, 2019). Amputation, which involves the removal of part or all of an extremity, is frequently required due to both acute traumatic injuries and chronic conditions, such as diabetes-related vascular complications (Handayani, Rizal, & Rahimah, 2020).

Effective management of diabetic foot ulcers is critical in preventing severe complications and improving the quality of life for individuals with diabetes. Modern wound care techniques, particularly those involving advanced dressing materials, have demonstrated superior outcomes compared to traditional methods. Modern dressings, which do not adhere to the wound, provide a controlled moist environment conducive to faster wound healing. This moist environment promotes cellular regeneration, collagen synthesis, and reduced infection risk, which are essential factors in the healing of diabetic ulcers (Widasari., Bauk, Hamka, F, & M, 2022; Sulfikar & Rajab, 2024).

Modern wound dressings are composed of antimicrobial agents, such as chitosan, sodium alginate, and gelatin, that effectively inhibit the growth of common wound pathogens, including *Staphylococcus aureus* and *Pseudomonas aeruginosa*. With over 500 types of modern wound dressings available, including hydrogel, foam,

hydrocolloid, and antimicrobial dressings, the clinical efficacy of these products in managing chronic diabetic ulcers has been well-documented. Studies have shown that the optimal balance of moisture at the wound site significantly enhances healing by supporting epithelial cell movement and collagen proliferation (Azizah et al., 2019).

Angriani, Hariani, & Dwianti, (2019) conducted a study assessing the effectiveness of modern dressings using the moist wound healing method on diabetic ulcers at the Etn Centre Wound Care Clinic in Makassar. The results revealed a significant improvement in wound healing, with the modern dressing group showing a healing rate of 16% compared to only 8.75% in the conventional dressing group ($p = 0.031$). These findings underscore the potential of modern dressings in improving wound healing outcomes, particularly for diabetic foot ulcers.

Despite the advances in wound care, many healthcare facilities in Indonesia, including Bhayangkara Hospital in Balikpapan, continue to rely on traditional wound care methods. This gap in modern wound care practice presents an opportunity for further investigation into the efficacy of advanced dressing materials in promoting faster and more effective healing of diabetic ulcers. The current study, titled “The Effectiveness of Modern Dressings in the Healing of Diabetic Ulcers in the Surgery Department of Bhayangkara Hospital, Balikpapan,” aims to evaluate the clinical impact of modern wound dressings on diabetic ulcer healing, providing valuable insights that could help improve treatment protocols in Indonesia.

METHODS

The research method to be employed in this study is a quantitative approach with a pre-experimental design, specifically a one-group pre and post-test design. A one-group pre and post-test design is a research design that involves a single group of subjects, where measurements are taken before the intervention is applied and after the intervention has been carried out (Aiman et al, 2022).

RESULT

Univariate Analysis

Respondent Characteristics Based on Age

Based on the data collected from respondents treated with modern dressing in the Surgery Department of Bhayangkara Hospital in Balikpapan, the distribution of respondents by age is presented as follows:

Table 1 Frequency Distribution of Respondents Using Modern Dressing by Gender in the Surgery Department of Bhayangkara Hospital, Balikpapan

Gender	Frequency (people)	Percentage (%)
Male	6	40
Female	9	60
Total	15	100

(Primary Data, 2023)

The frequency distribution of respondents based on gender shows that 6 male respondents (40%) and

9 female respondents (60%) participated in the study. Wound measurements were taken using the Wound Assessment Tool (BWAT), with the following scale: values between 1-9 indicated wound healing, values between 9-13 indicated ongoing healing, values between 13-59 indicated regeneration, and values greater than 60 indicated degeneration. The results are presented in the table below:

Wound Condition Before Modern Dressing Treatment in Diabetic Foot Ulcers at the Surgery Department of Bhayangkara Hospital, Balikpapan

Table 2 Average Wound Healing Process Before Modern Dressing Treatment in Diabetic Foot Ulcers at the Surgery Department of Bhayangkara Hospital (n=15)

Wound Healing Process	Pretest Data
Median	35.00
Minimum	21
Maximum	54
Standard Deviation	9.848

Wound Condition After Modern Dressing Treatment in Diabetic Foot Ulcers at the Surgery Department of Bhayangkara Hospital

Table 3 Average Wound Healing Process After Modern Dressing Treatment in Diabetic Foot Ulcers at the Surgery Department of Bhayangkara Hospital (n=15)

Wound Healing Process	Posttest Data
Median	31.00
Minimum	21
Maximum	50
Standard Deviation	9.546

Bivariate Analysis

The Impact of Modern Dressing Wound Care Method on Healing Diabetic Foot Ulcers in Diabetes Mellitus Patients at the Surgery Department of Bhayangkara Hospital

The Difference in Wound Condition Before and After Modern Dressing Treatment in Diabetic Foot Ulcers at Bhayangkara Hospital Surgery Department

Table 4 Distribution of Differences in Wound Healing Processes Before and After Modern Dressing Treatment in Diabetic Foot Ulcers at the Surgery Department of Bhayangkara Hospital (n=15)

Wound Condition	Pretest	Posttest
Median	35.00	31.00
Minimum	21	21
Maximum	54	50
Standard Deviation	9.848	9.546
P Value	0.005	

(Primary Data, 2023)

The results of the Wilcoxon test calculation revealed a p-value of 0.005 ($p < 0.05$), which indicates that the null hypothesis is rejected, and

there is a statistically significant difference in wound conditions before and after treatment using modern dressing techniques for diabetic ulcers at the Surgery Department of Bhayangkara Hospital.

DISCUSSION

The primary objective of this study was to evaluate the efficacy of modern dressing techniques in promoting the healing of diabetic foot ulcers in patients with diabetes mellitus at the Surgery Department of Bhayangkara Hospital, Balikpapan. The study utilized a pre-experimental design with a one-group pre and post-test approach, with the data analyzed using both univariate and bivariate methods. This section discusses the findings, interprets their significance, and compares them with existing literature to provide a comprehensive understanding of the role of modern dressing techniques in wound healing.

Univariate Analysis: Respondent Characteristics and Wound Healing Progress

The study sample comprised 15 respondents, with a majority of female participants (60%), which is consistent with demographic trends often observed in healthcare, where females may have a higher prevalence of seeking treatment for chronic conditions like diabetes. The gender distribution, although skewed, does not diminish the relevance of the results, as it reflects the real-world patient population in the studied clinical setting. However, future studies could benefit from a more balanced gender representation to enhance the generalizability of the findings.

The univariate analysis revealed a significant change in the wound healing process before and after the application of modern dressings. In the pretest phase, the median wound condition score was 35.00, indicating that the wounds were in the early stages of healing. After the application of modern dressings, the median score decreased to 31.00, suggesting an improvement in the wound condition and a reduction in the severity of the ulcers. This shift in the median value highlights the potential of modern dressing techniques in accelerating the healing process and preventing further deterioration of the wound.

The consistency in the variability of the wound condition, as indicated by similar standard deviations in the pretest (9.848) and posttest (9.546) scores, suggests that while the healing process improved overall, there was relatively uniformity in the response of participants to the treatment. The small reduction in variability post-treatment may suggest that the modern dressing method may have provided a more predictable healing outcome compared to traditional wound care approaches.

Bivariate Analysis: Statistical Significance of Modern Dressing Intervention

The bivariate analysis using the Wilcoxon signed-rank test provided further evidence supporting the efficacy of modern dressing in diabetic foot ulcer healing. The p-value of 0.005 ($p < 0.05$) indicates

that the difference in wound healing before and after the treatment was statistically significant, confirming that the observed improvements in wound condition were not due to random chance. This finding aligns with previous studies, which have demonstrated that modern dressings, particularly those utilizing the moist wound healing principle, significantly enhance the healing process in diabetic ulcers (Pang et al., 2023; Yusridawati, 2025).

The improvement in the median wound score from 35.00 (pretest) to 31.00 (posttest) is indicative of a marked reduction in wound severity, supporting the hypothesis that modern dressings play a critical role in wound recovery. These results emphasize the importance of creating a controlled, moist environment for optimal wound healing, which is a key feature of modern wound care techniques. Furthermore, the data suggests that modern dressings may prevent the common complications associated with diabetic ulcers, such as infection and degeneration, ultimately reducing the risk of more severe outcomes, such as amputation.

Comparison with Existing Literature

The findings of this study are consistent with a growing body of literature that supports the use of modern wound care techniques, including antimicrobial dressings, for diabetic ulcers. Studies by Heri Budiawan et al., (2024) and Supriyatin & Pranajasakti, (2025) highlight that modern dressings, which incorporate antimicrobial agents such as chitosan, sodium alginate, and gelatin, are highly effective in reducing bacterial growth and accelerating the healing process. These dressings have been shown to inhibit common wound pathogens, such as *Staphylococcus aureus* and *Pseudomonas aeruginosa*, thereby improving wound outcomes and reducing the likelihood of infections, which are often a significant complication in diabetic foot ulcers.

Nuutila & Eriksson, (2021) further reinforce the idea that maintaining a balanced moist wound environment is crucial for wound healing. The moist wound healing principle has been proven to enhance cellular regeneration and collagen synthesis, which are fundamental for tissue repair. The results of this study are in line with these findings, suggesting that modern dressings not only support wound healing but also reduce the occurrence of chronic, non-healing ulcers, which are prevalent in diabetic patients.

Implications for Clinical Practice and Future Research

The results of this study have significant implications for clinical practice, particularly in hospitals where diabetic foot ulcers are a common concern. Modern wound care techniques, including the use of antimicrobial and moisture-retentive dressings, should be considered as a standard treatment protocol for diabetic ulcers. The positive outcomes observed in this study suggest that healthcare providers in the Surgery Department of

Bhayangkara Hospital, and other similar settings, can improve patient outcomes by incorporating modern dressing techniques into their wound care practices.

However, there are several limitations to this study that must be acknowledged. First, the small sample size (n=15) limits the generalizability of the findings. Future studies with larger, more diverse sample populations are needed to confirm the results and provide more robust evidence of the efficacy of modern dressings. Additionally, this study did not assess long-term outcomes, such as the recurrence of diabetic foot ulcers or the impact of modern dressing on overall patient quality of life. Future research should investigate these aspects to provide a more comprehensive understanding of the benefits of modern wound care.

Another important consideration is the cost-effectiveness of modern dressings. While the results of this study suggest that modern dressings improve healing rates, their cost relative to traditional methods could be a factor limiting their widespread adoption. Further research into the economic aspects of modern wound care, including cost-benefit analyses, would help determine the sustainability of these treatments in clinical settings, especially in resource-limited environments.

CONCLUSION

In conclusion, the findings of this study provide strong evidence that modern dressing techniques significantly enhance the healing process of diabetic foot ulcers in patients with diabetes mellitus. The use of modern dressings, which create a moist healing environment and incorporate antimicrobial agents, is shown to accelerate wound healing and reduce the risk of complications such as infection and degeneration. The statistical significance of the results, coupled with the alignment with existing literature, underscores the importance of adopting modern wound care techniques in the management of diabetic foot ulcers.

This study contributes to the growing body of evidence supporting the use of advanced wound care technologies in clinical practice, and it calls for the wider implementation of modern dressing techniques in hospitals and healthcare settings globally. Further research with larger sample sizes and a focus on long-term outcomes will be critical in establishing modern dressings as the gold standard in diabetic ulcer care.

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