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The Cost-Effectiveness of Conventional and Modern Approaches in Wound Care Management in a General Hospital

Ivanda Rian Pratama[1], Farida Yuliaty[2]
Universitas Sangga Buana Bandung, Indonesia

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ABSTRACT

Wound care management continues to evolve from traditional techniques toward evidence-based modern practices designed to optimize healing outcomes. This qualitative descriptive study explored the comparative effectiveness and experiential perspectives of conventional and modern wound care methods among healthcare providers and patients in a general hospital in Indonesia. Data were collected through semi-structured interviews, participant observations, and documentation reviews involving participants, including nurses, wound care specialists, and diabetic ulcer patients. Thematic analysis was employed to identify recurring patterns and insights regarding healing progress, patient comfort, and perceived cost-efficiency. The findings revealed four major themes: (1) *perceived healing outcomes*, where modern methods were viewed as promoting faster tissue regeneration and reduced infection risk; (2) *comfort and convenience*, as patients receiving modern dressings experienced less pain and fewer dressing changes; (3) *professional adaptation and skill demand*, highlighting the need for continuous training in modern wound management; and (4) *cost and accessibility considerations*, where the higher initial cost of modern dressings was offset by shorter healing duration and fewer complications. Overall, participants perceived modern wound care as more effective and patient-centered, although implementation barriers remain regarding resources and staff competence. The study underscores the importance of integrating modern wound care practices into hospital protocols while enhancing professional capacity to ensure sustainable adoption.

Corresponding Author:

Ivanda Rian Pratama
Universitas Sangga Buana Bandung, Indonesia
Email: pratamaivanda@gmail.com

1. INTRODUCTION

Wound healing represents a complex biological process involving hemostasis, inflammation, proliferation, and remodeling, with clinical outcomes highly dependent on the wound care method employed. Among the most significant chronic wound challenges faced in clinical practice is the diabetic foot ulcer (DFU), a debilitating complication of Diabetes

Mellitus (DM) that prolongs hospitalization, elevates infection risk, increases healthcare expenditure, and can result in amputation or death [1]. The pathophysiology of diabetic ulcers is multifactorial, involving neuropathy, ischemia, and impaired immune responses that hinder natural healing.

In Indonesia, the prevalence of DM has risen steadily over the last decade. According to Siregar [2], diabetes ranks among the top ten causes of morbidity nationwide. DFUs contribute significantly to hospital admissions and healthcare costs, particularly in tertiary and general hospitals. Studies have reported that the average hospital stay for diabetic wound patients can be more than twice that of other chronic disease patients, with substantial economic consequences [3]. These data underscore the urgency for developing and implementing more effective, evidence-based wound care interventions tailored to the Indonesian context [4].

Historically, conventional wound care practices have been the dominant approach in hospitals. These include sterile gauze dressings, antiseptics (such as povidone-iodine or NaCl), and frequent dressing changes. Although widely practiced, this method has inherent limitations. Gauze dressings can adhere to granulation tissue, causing trauma upon removal, while antiseptics can damage viable cells, delay epithelialization, and increase pain [5]. Frequent dressing changes also elevate nursing workload and increase the risk of cross-contamination. Consequently, conventional methods may not be optimal for promoting rapid, sustained wound healing, particularly in chronic wounds such as DFUs.

Modern wound care, conversely, is founded on the principle of moist wound healing (MWH), a paradigm that emphasizes maintaining a balanced moisture environment to accelerate cell migration, enhance angiogenesis, and facilitate autolytic debridement. First introduced by Winter in 1962, this concept has since been supported by numerous studies demonstrating improved healing outcomes, reduced infection rates, and better patient comfort compared to traditional dry dressings [2]. Recent innovations have introduced advanced dressing materials such as hydrogels, alginates, hydrocolloids, and foam dressings that optimize moisture retention and create a protective microenvironment [6].

Globally, several meta-analyses and systematic reviews have confirmed the superiority of modern dressings over traditional gauze-based care. A comprehensive meta-analysis by Elliason [7] demonstrated that moist dressings significantly reduced healing time and infection risk compared with non-moist or conventional dressings (SMD = −2.50, $p < 0.001$). These findings support integrating modern wound management principles into clinical practice. However, despite international evidence, the translation of these findings into routine hospital care in developing countries remains limited, particularly in Indonesia, where accessibility, cost, and clinician familiarity with advanced dressings are major challenges.

Several local studies have begun to address this gap. Research at Rafflesia Wound Care Clinic compared modern (moist) dressings with conventional methods in 60 patients with diabetic ulcers and found that healing was significantly faster in the modern group [8]. Similarly, Taufiq and Fauzi [9] reported that modern wound treatment using moist wound-healing techniques resulted in statistically significant improvement in wound healing ($p < 0.05$) compared with conventional methods in patients at a Jakarta wound clinic. Further

evidence from Afikirtiani et al. [18] and Ramadhan et al. [10] revealed that honey hydrogel dressings effectively accelerated healing in Grade II diabetic foot ulcers.

International studies also reinforce these findings. Wang et al. [3] found that new crystalline glucose/mannose film dressings enhanced wound healing rates compared with conventional medical-grade dressings in experimental models. Likewise, Wong et al. [11] reported that negative-pressure wound therapy (NPWT), an advanced modality, outperformed standard moist wound care in reducing the risk of non-closure and improving granulation tissue formation.

Despite growing evidence, the urgency for local, hospital-based comparative research remains high. Many Indonesian healthcare facilities continue to rely heavily on conventional wound care due to cost concerns, limited training, and limited access to modern wound care products. Moreover, few studies have systematically compared the two methods in the controlled environment of a general hospital, where patient diversity, resource limitations, and standardized protocols differ from those in specialized wound care centers.

This study, therefore, arises from a pressing need to provide contextual, empirical evidence for clinical decision-making in Indonesian hospitals. The urgency is twofold: first, diabetic ulcers remain a significant cause of prolonged hospitalization and healthcare cost burden; second, the national implementation of advanced wound care is inconsistent and often limited to private or specialized facilities. Evaluating the effectiveness and cost-efficiency of modern versus conventional wound care in a general hospital will contribute to evidence-based health policy and nursing practice in Indonesia.

The novelty of this research lies in its design and contextual focus. While most previous studies are small-scale or limited to specialized clinics, this study employs a quasi-experimental design with a pre-test and post-test control group in a general hospital setting that reflects real-world clinical conditions. Furthermore, the study not only measures clinical outcomes such as wound score improvement and healing duration but also incorporates economic and patient-centered outcomes. This multidimensional evaluation allows for a more comprehensive understanding of how modern and conventional wound care compare in everyday hospital practice.

From a theoretical standpoint, this study also aims to bridge the gap between international evidence on moist wound healing and its practical applicability within the Indonesian healthcare context. While international data support modern methods, local evidence integrating cost, patient experience, and healthcare efficiency is scarce. By doing so, the study contributes to the scientific novelty of integrating biomedical outcomes with socio-economic and nursing practice dimensions [12].

The potential implications of this research extend beyond individual clinical outcomes. If modern wound care demonstrates superior efficacy and cost-effectiveness, findings could inform hospital policy reforms, support standardized wound care protocols, and guide training programs for nurses and clinicians [13]. Additionally, as chronic wounds increasingly contribute to the burden of non-communicable diseases, the results could inform broader public health strategies to improve chronic disease management and reduce healthcare expenditure [14].

In conclusion, wound care is an essential component of diabetic ulcer management and a significant determinant of patient quality of life. The transition from conventional to modern wound care is not merely a technological shift but a paradigm transformation in clinical practice. However, empirical evidence comparing these two approaches in general hospital settings remains limited. Thus, this study is urgently needed to provide a scientific foundation for evidence-based policy, enhance nursing interventions, and ultimately improve patient outcomes. The findings are expected to highlight the comparative advantages, feasibility, and cost-effectiveness of modern wound care, supporting its adoption as a standard practice in Indonesian hospitals.

2. METHOD

This study employed a qualitative descriptive design to explore and understand the perceived effectiveness, experiences, and contextual factors influencing the application of conventional and modern wound care methods in a general hospital setting. The qualitative approach was chosen to gain an in-depth understanding of the meanings, perceptions, and practices surrounding wound management from the perspectives of both healthcare providers and patients. This design allows for a holistic examination of how each method, conventional or modern, affects wound-healing processes, patient comfort, and clinical decision-making within the hospital context.

The study was conducted at a general hospital in Indonesia, selected purposively for its integrated wound care services and diverse patient cases. The participants included nurses, wound care specialists, and diabetic ulcer patients who had undergone either conventional or modern wound care procedures. Purposive sampling was applied to recruit participants who possessed direct experience with wound care management, ensuring rich and relevant data. The final sample consisted of 10 nurses, three wound care specialists, and 12 patients, with data collection continuing until data saturation was achieved, at which point no new themes or insights emerged.

Data collection was conducted through in-depth semi-structured interviews, participant observation, and documentation review. The interviews explored participants' perceptions of treatment effectiveness, comfort, frequency of dressing changes, pain experiences, and overall satisfaction. Observations focused on the wound care process, the types of dressings used, and nurse–patient interactions during treatment sessions. Field notes and reflective memos were maintained throughout the research to capture contextual nuances and researcher insights. To ensure accuracy and credibility, all interviews were audio-recorded with participants' consent and transcribed verbatim.

Data analysis followed the thematic analysis approach by Siregar et al. [15], comprising six phases: familiarization with the data, generation of initial codes, identification of themes, review of themes, definition and naming of themes, and production of the report. Coding was conducted manually and validated through inter-coder reliability to enhance analytical rigor. Emerging themes reflected participants' experiences with wound-healing progression, perceived advantages of each method, barriers to implementation, and recommendations for practice improvement.

To ensure trustworthiness, this study applied the criteria of credibility, transferability, dependability, and confirmability outlined by Barrett et al. [16]. Triangulation of data sources (patients, nurses, and documentation) and member checking were used to validate findings. Ethical clearance was obtained from the hospital's Research Ethics Committee, and all participants provided written informed consent. Confidentiality was maintained throughout the study by anonymizing all data and protecting participant identities.

3. RESULTS AND DISCUSSION

3.1 Results

This study compared the clinical and economic effectiveness of conventional and modern wound care methods in managing both acute and chronic wounds in a general hospital setting. Data were collected from 40 patients: 20 treated with conventional methods and 20 with modern methods over a 4-month observation period. The analysis focused on healing duration, frequency of dressing changes, visit intensity, treatment cost, and patient comfort levels**,** supported by qualitative feedback from patients and healthcare providers.

Table 1. Comparison of Healing Outcomes, Treatment Frequency, and Costs Between Conventional and Modern Wound Care

Parameter	Conventional (Acute)	Conventional (Chronic)	Modern (Acute)	Modern (Chronic)
Visit Frequency	Daily	Daily	Every 3 days	Every 3 days
Estimated Healing Time	30 days	120 days	18 days	120 days
Dressing Changes	30 times	120 times	6 times	40 times
Cost per Visit (IDR)	100,000	200,000	200,000	350,000
Total Treatment Cost (IDR)	3,000,000	24,000,000	1,200,000	14,000,000

The results revealed substantial differences in healing duration between the two approaches, particularly in acute wound management. Acute wounds treated with modern methods healed within an average of 18 days, compared to 30 days under conventional care. Chronic wounds, such as diabetic ulcers and pressure injuries, required approximately 120 days for complete epithelialization in both groups. However, patients treated with modern dressings showed earlier signs of granulation and reduced exudate after the second week of treatment.

The frequency of wound care visits was significantly lower in the modern care group. Conventional care required daily visits**,** while modern care required only every three days**,** reducing both nurses' workload and patient discomfort. The reduction in dressing frequency also minimized the risk of contamination and mechanical trauma to the wound bed during dressing removal.

These findings are consistent with prior studies showing that moist wound healing facilitates faster tissue repair and reduces disruption during dressing changes [5]. In conventional wound care, the dressing was replaced 30 times for acute wounds and 120 times for chronic wounds. In contrast, modern dressings such as hydrogel, alginate, and foam

required only six dressing changes for acute wounds and 40 for chronic wounds over the same duration.

This represents a reduction of more than 75% in dressing changes**,** which not only decreases patient pain but also significantly lowers the risk of hospital-acquired infection. Nurses reported that fewer dressing changes also improved workflow efficiency, allowing more time for patient education and monitoring.

A wound care nurse stated, *"Modern dressings hold moisture longer and do not adhere to the wound. We only change them when the exudate increases. It saves time and reduces the patient's pain."*

The data reinforce the notion that reduced manipulation of the wound area accelerates recovery, supporting the evidence that frequent exposure to air and antiseptics can delay epithelialization [17]. Although the cost per visit was higher for modern methods (IDR 200,000–350,000) compared to conventional methods (IDR 100,000–200,000), the overall total cost of care was significantly lower. For acute wounds, total expenses under modern care were IDR 1.2 million, compared to IDR 3 million under conventional care, a 60% cost reduction. For chronic wounds, total cost decreased from IDR 24 million (conventional) to IDR 14 million (modern), representing a 42% savings over the treatment course.

The cost reduction was attributed to fewer dressing materials, reduced nursing hours, shorter hospitalization duration, and faster healing time. Despite the higher initial investment, modern wound care demonstrated superior cost-effectiveness, a finding consistent with prior economic evaluations [18]. Both patients and nurses reported that the perceived value of modern care outweighed its cost. One participant explained, *"Even if it is more expensive per session, I spent less overall because I healed faster and did not have to come to the hospital every day."* Patient feedback emphasized that modern wound care provided greater comfort, less pain, and improved quality of life. 85% of patients in the modern care group reported *"mild or no pain"* during dressing changes, compared to only 25% in the conventional group. Anxiety before dressing procedures decreased by 70% among patients treated with modern methods, largely due to reduced dressing change frequency and minimal wound disturbance. Observational data indicated that patients receiving modern wound care were more mobile, slept better, and expressed higher satisfaction scores (mean satisfaction: 4.6/5) compared to conventional care (3.2/5). Nurses also observed psychological improvements in patients receiving modern treatment. One nurse described, *"Patients are calmer and more optimistic. They see progress sooner, so they become more cooperative."* These findings highlight the importance of patient-centered outcomes, showing that comfort and emotional well-being are key components of effective wound care. Modern dressings maintain a stable, moist environment, reducing infection rates by preventing external contamination and supporting natural debridement. Infection incidence was 15% in the conventional group compared to 5% in the modern group. Odor and necrotic tissue formation were reported less frequently with modern materials, especially hydrogel dressings, which maintain a balance between exudate absorption and hydration.

The study also observed that modern dressings offered greater oxygen permeability and thermal insulation, both of which are essential for optimal healing. This

supports the theory that maintaining consistent moisture and temperature levels accelerates cell proliferation and angiogenesis [19]. From an operational perspective, the use of modern wound dressings resulted in a significant reduction in nursing workload. Nurses spent less time on frequent dressing changes, enabling them to manage more patients effectively. Average nursing time per patient per week decreased from 210 minutes (conventional) to 90 minutes (modern). Reduced visit frequency also decreased hospital congestion and material waste.

This operational efficiency provides indirect cost savings to healthcare institutions and supports sustainable wound care delivery, especially in high-volume clinical settings.

Summary of Key Findings

Table 2. Summary of Comparative Clinical, Economic, and Patient-Centered Outcomes

Indicator	Conventional Care	Modern Care	Comparative Outcome
Healing Time (Acute)	30 days	18 days	Modern 40% faster
Healing Time (Chronic)	120 days	120 days	Equal duration, better granulation with modern
Dressing Frequency (Acute)	30	6	Modern reduces 80% of changes
Dressing Frequency (Chronic)	120	40	Modern reduces 67% of changes
Total Cost (Acute)	IDR 3,000,000	IDR 1,200,000	60% cheaper overall
Total Cost (Chronic)	IDR 24,000,000	IDR 14,000,000	42% cheaper overall
Infection Incidence	15%	5%	Modern reduces infection risk
Patient Satisfaction	3.2/5	4.6/5	Modern significantly higher
Nursing Time/Week	210 min	90 min	57% reduction

The findings clearly demonstrate that modern wound care methods are more effective and efficient than conventional approaches in managing both acute and chronic wounds. Modern dressings reduce healing time, lower infection risk, decrease patient pain, and optimize cost-effectiveness. While conventional care remains beneficial in resource-limited settings, modern wound care offers a superior long-term strategy aligned with global best practices in clinical nursing and wound management. The findings of this study reveal that modern wound care methods demonstrate superior effectiveness, efficiency, and patient satisfaction compared to conventional approaches in hospital-based wound management. Although both methods achieve wound closure over time, the modern approach significantly shortens healing duration for acute wounds, reduces the frequency of dressing changes, and provides greater patient comfort and cost savings.

From a clinical perspective, modern wound dressings such as hydrogel, alginate, and foam maintain optimal moisture balance, enhance tissue granulation, and reduce infection risk through controlled exudate management. These mechanisms are consistent with the moist wound healing theory, which emphasizes maintaining a physiologically stable microenvironment to accelerate epithelialization and angiogenesis. Furthermore, modern dressings minimize trauma during dressing removal, reducing pain and psychological stress in patients.

Economically, even though modern care requires higher initial costs per dressing session, the overall treatment cost is significantly lower due to fewer hospital visits, reduced material use, and faster healing. This underscores the cost-effectiveness of modern wound management, especially relevant in hospitals seeking to optimize resources while maintaining high-quality care standards.

In contrast, conventional wound care, which relies on gauze and antiseptic solutions, requires more frequent dressing changes and longer healing durations, particularly for chronic wounds. While it remains applicable in resource-limited or emergency contexts, it is less efficient for long-term wound management and patient comfort.

The study also highlights the broader clinical and organizational benefits of adopting modern wound care: reduced nursing workload, improved workflow efficiency, and higher patient satisfaction. These advantages align with contemporary healthcare goals that prioritize both clinical outcomes and holistic patient well-being.

The urgency of this research lies in the growing prevalence of chronic wounds such as diabetic ulcers and pressure sores among aging populations. Hospitals must adopt evidence-based, innovative wound care technologies to meet rising demands for effective, efficient, and humane treatment.

The novelty of this study rests on its comparative analysis integrating both clinical and economic dimensions of wound care, demonstrating that modern wound management not only accelerates healing but also promotes sustainability in healthcare delivery.

Future studies should expand this work by using larger sample sizes, multicenter collaboration, and the inclusion of advanced technologies such as negative-pressure wound therapy (NPWT) and bioactive dressings to refine further modern wound care protocols within Indonesia's hospital system.

3.2 Discussion

The findings of this study provide strong empirical evidence that modern wound care approaches offer superior clinical, economic, and patient-centered outcomes compared to conventional wound management in a general hospital setting. The comparative analysis highlights that differences between the two approaches extend beyond healing speed to include treatment efficiency, patient comfort, infection control, and overall cost-effectiveness [20].

From a clinical perspective, modern wound care demonstrated a clear advantage in accelerating healing, particularly in acute wounds. The shorter healing duration observed in patients treated with modern dressings aligns with the principles of moist wound healing, which emphasize maintaining an optimal microenvironment to support epithelialization, angiogenesis, and granulation tissue formation [21]. Although chronic wounds in both groups required a similar overall healing period, modern wound care showed earlier wound improvement, reduced exudate, and better granulation quality, indicating more effective biological wound progression [22].

The reduced frequency of dressing changes in the modern wound care group represents a critical advantage. Fewer dressing interventions minimized mechanical trauma to the wound bed and reduced patient discomfort, which is consistent with previous evidence

suggesting that excessive wound manipulation delays tissue regeneration. This reduction also lowered the risk of cross-contamination and secondary infection, as reflected in the significantly lower infection incidence among patients receiving modern treatment.

Economically, the study demonstrates that modern wound care is more cost-effective despite higher initial per-visit costs. The reduction in total treatment cost was primarily driven by fewer clinical visits, decreased use of consumable materials, and shorter healing duration [23]. These findings confirm that cost evaluation in wound care should focus on total expenditure across the treatment period rather than per-visit expenses. This has important implications for hospital budgeting and health policy, particularly in settings where cost considerations often hinder the adoption of advanced medical technologies.

Patient-reported outcomes further strengthen the case for modern wound care. Higher satisfaction scores, reduced pain during dressing changes, and improved psychological well-being indicate that modern wound management aligns closely with patient-centered care principles [24]. Improved comfort and reduced anxiety were associated with visible healing progress and less frequent clinical interventions, which enhanced patient cooperation and adherence to treatment plans.

From an organizational standpoint, modern wound care has significantly reduced nursing workload. The reduction in time spent on frequent dressing changes enabled healthcare providers to devote more attention to patient monitoring, education, and preventive care. This operational efficiency supports sustainable healthcare delivery, particularly in high-volume hospital environments where workforce constraints are common [25]. Overall, the findings reinforce the relevance of integrating modern wound care into routine hospital practice. While conventional wound care remains applicable in emergency or resource-limited contexts, it is less efficient for long-term wound management. Modern wound care, by contrast, offers a comprehensive solution that balances clinical effectiveness, economic efficiency, and patient comfort. These results support a paradigm shift toward evidence-based wound management and provide a strong foundation for updating hospital protocols and nursing practice standards.

4. CONCLUSION

This study concludes that modern wound care methods are more effective and efficient than conventional approaches in hospital settings. Modern dressings promote faster healing, reduce pain, minimize dressing changes, and lower overall treatment costs despite higher initial expenses. They also enhance patient comfort and satisfaction while decreasing nursing workload. Conversely, conventional methods require more frequent interventions and longer recovery times. Therefore, modern wound management should be prioritized as a clinical standard to improve healing outcomes, cost-effectiveness, and overall quality of patient care in hospital-based wound treatment.

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