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Evidence-Based Wound Care Management in Acute Hospital Settings

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Abstract

Effective wound care in acute hospital settings remains a critical determinant of patient outcomes, healthcare efficiency, and overall quality of care. This review aimed to synthesise current evidence on wound care management by examining key domains, including wound assessment, infection prevention, dressing selection, advanced therapeutic interventions, multidisciplinary collaboration, and the integration of emerging technologies. A structured narrative review approach was adopted, drawing on peer-reviewed literature, systematic reviews, and contemporary studies to provide a comprehensive and evidence-informed analysis of best practices.

The findings demonstrate that evidence-based wound care significantly improves healing outcomes, reduces complications such as surgical site infections, and enhances patient safety. Accurate and systematic wound assessment, combined with appropriate dressing selection and adherence to aseptic principles, forms the foundation of effective care. Advanced interventions, including negative pressure wound therapy and debridement techniques, further contribute to improved healing trajectories when applied appropriately. The review also highlights the critical role of multidisciplinary collaboration in ensuring coordinated and patient-centred care, as well as the growing impact of digital health technologies, artificial intelligence, and predictive analytics in enhancing clinical decision-making and monitoring.

Despite these advancements, several barriers persist, including variability in clinical practice, limited resources, and challenges associated with the implementation of technological systems. Addressing these issues requires targeted strategies such as strengthening clinical education, standardising protocols, and investing in data-driven healthcare solutions.

In conclusion, the integration of evidence-based practices with technological innovation and multidisciplinary approaches is essential for advancing wound care in acute settings. Future efforts should focus on improving accessibility, enhancing clinical training, and supporting ongoing research to optimise patient outcomes and healthcare delivery.

Keywords: Wound Care, Evidence-Based Practice, Infection Prevention, Acute Care, Multidisciplinary Care, Digital Health

1. Introduction

Wound care management is a fundamental component of acute hospital practice, directly influencing patient safety, clinical outcomes, and the overall efficiency of healthcare delivery systems. Acute wounds—arising from surgical interventions, traumatic injuries, or other medical procedures require prompt, systematic, and evidence-informed management to prevent complications such as infection, delayed healing, and extended hospitalisation. In contemporary healthcare environments characterised by increasing patient complexity and resource constraints, the need for standardised and evidence-based wound care practices has become more pronounced (Ubbink *et al*., 2015; Brölmann *et al*., 2012) [5].

Traditionally, wound care practices were often shaped by clinician experience, local customs, or institutional protocols, resulting in considerable variability in treatment approaches and patient outcomes. However, the growing emphasis on evidence-based medicine has led to a paradigm shift, promoting the integration of high-quality research evidence into clinical decision-making. Systematic reviews and meta-analyses have consistently demonstrated that evidence-based interventions particularly in areas such as wound dressing selection and infection prevention can significantly reduce complications and enhance healing outcomes (Walter *et al*., 2012; Chaby *et al*., 2007) [53, 7]. Furthermore, the synthesis of evidence across clinical

studies highlights the importance of combining local wound care strategies with systemic management approaches to optimise recovery (Brölmann *et al*., 2012) [5].

The burden of wounds within acute care settings extends beyond clinical implications, encompassing substantial economic and organisational challenges. Inadequate wound management is associated with prolonged hospital stays, increased readmission rates, and elevated healthcare costs. From both clinician and patient perspectives, effective wound care is recognised as a critical determinant of recovery quality and patient satisfaction (Walker *et al*., 2020) [52]. Moreover, the prevention of wound-related complications—particularly surgical site infections, remains a key priority in acute care, given their association with increased morbidity and resource utilisation. Evidence from systematic reviews underscores the central role of aseptic techniques and rigorous infection control practices in mitigating these risks (Haesler *et al*., 2016) [17].

Recent advancements in wound care technologies and therapeutic interventions have further enhanced the capacity to manage acute wounds effectively. Innovations such as advanced dressing materials, negative pressure wound therapy, and evidence-based perioperative care protocols have demonstrated measurable improvements in healing outcomes. For instance, meta-reviews of Cochrane evidence have identified critical pre-operative and post-operative strategies that contribute to improved wound healing and reduced complication rates (Gillespie *et al*., 2021) [16]. Additionally, specific interventions, including the use of foam dressings for pressure injuries, have been supported by robust evidence indicating their effectiveness across diverse clinical settings (Walker *et al*., 2018) [51]. The increasing adoption of prophylactic negative pressure wound therapy also reflects its value in reducing surgical site infections among high-risk patient populations (Formosa & Ebejer, 2024) [12].

Alongside these clinical advancements, the integration of digital health technologies is transforming the delivery of wound care in acute hospital environments. Telehealth services have expanded access to care and enabled remote monitoring of wound healing, thereby improving continuity of care beyond the hospital setting (Omotayo & Kuponiyi, 2020) [37]. In parallel, the application of business intelligence systems and predictive analytics has enhanced decision-making processes, resource allocation, and operational efficiency within healthcare institutions (Moyo *et al*., 2021) [33]. The emergence of artificial intelligence (AI) in healthcare further offers promising opportunities to support wound care through predictive modelling, risk stratification, and personalised treatment planning (Tafirenyika, 2023 [42]; Sagay *et al*., 2024). These technological innovations are increasingly aligned with the principles of evidence-based practice, enabling more precise and data-driven clinical interventions.

Despite these developments, challenges persist in the consistent implementation of evidence-based wound care practices across acute hospital settings. Variability in clinician knowledge, limited access to advanced resources, and organisational constraints can hinder the translation of research evidence into routine practice. Additionally, the rapid pace of technological advancement necessitates continuous professional development to ensure that healthcare providers remain equipped to apply emerging evidence and tools effectively. Addressing these barriers requires a coordinated approach involving multidisciplinary collaboration, institutional support, and the integration of standardised clinical guidelines.

This review aims to critically examine evidence-based wound care management within acute hospital settings, with a particular focus on integrating clinical evidence, technological innovations, and system-level strategies. The primary objective is to synthesise current literature on wound assessment, infection prevention, dressing selection, and advanced therapeutic interventions, while also exploring the role of multidisciplinary care and digital health technologies in enhancing clinical outcomes. The scope of the review encompasses both traditional evidence-based practices and emerging innovations, providing a comprehensive perspective on current challenges, best practices, and future directions in acute wound care management.

1.1 Definition and Classification of Wounds

Wounds are broadly defined as disruptions to the structural and functional integrity of the skin and underlying tissues, resulting from physical, surgical, or pathological processes. Within acute hospital settings, wounds are commonly classified into acute and chronic categories, a distinction that is critical for guiding clinical management and treatment strategies. Acute wounds, such as surgical incisions and traumatic injuries, typically progress through an orderly and timely healing process, whereas chronic wounds are characterised by delayed or impaired healing due to underlying physiological or systemic factors (Ubbink *et al*., 2015; Jones *et al*., 2007 [21]).

The classification of wounds is further refined based on aetiology, depth, contamination level, and healing intention. Surgical wounds, for instance, may be categorised as clean, clean-contaminated, contaminated, or infected, each requiring specific evidence-based interventions to minimise complications. In contrast, chronic wounds—including pressure injuries, diabetic ulcers, and venous leg ulcers—often necessitate long-term, multidisciplinary management approaches due to their complex pathophysiology (Jones *et al*., 2007) [21].

In acute care environments, accurate wound classification is essential for ensuring appropriate assessment, intervention selection, and monitoring of healing progress. Variations in wound care practices across clinical settings highlight the importance of standardised classification systems to promote consistency and improve patient outcomes (Gillespie *et al*., 2020) [15]. Ultimately, a clear understanding of wound types and classifications underpins effective, evidence-based wound care management.

1.2 Pathophysiology of Wound Healing

Wound healing is a complex, dynamic, and highly regulated biological process that restores the integrity of damaged tissue through a sequence of overlapping phases: haemostasis, inflammation, proliferation, and remodelling. Each phase is characterised by distinct cellular and molecular activities that must occur in a coordinated manner to achieve optimal healing. During haemostasis, vascular constriction and platelet aggregation occur to control bleeding and form a provisional matrix. This is followed by the inflammatory phase, where immune cells such as neutrophils and macrophages play a critical role in removing debris and preventing infection (Jones *et al*., 2017) [20].

The proliferative phase involves fibroblast activation, collagen deposition, angiogenesis, and re-epithelialisation, all of which contribute to tissue regeneration. Finally, the remodelling phase strengthens the wound through collagen reorganisation and maturation, restoring tensile integrity over time. Disruptions in any of these phases—often due to infection, poor perfusion, or underlying comorbidities—can lead to delayed healing or chronic wound formation (Jones *et al*., 2017) [20].

In acute care settings, the effectiveness of wound healing is closely linked to clinical practices and nursing interventions. Variability in wound care practices among healthcare professionals can influence healing outcomes, underscoring the need for standardised, evidence-based approaches (Gillespie *et al*., 2014) [14]. Furthermore, the experiences of acute care nurses highlight the importance of integrating clinical knowledge with evidence-based protocols to manage complex wounds effectively (Hulbert-Lemmel *et al*., 2024) [18].

1.3 Burden of Wounds in Acute Care Settings

The burden of wounds in acute care settings constitutes a significant clinical and organisational challenge, with profound implications for patient outcomes, healthcare resource utilisation, and overall system efficiency. Both acute and chronic wounds contribute substantially to morbidity, frequently resulting in prolonged hospitalisation, heightened risk of complications, and reduced quality of life. The complexity of wound management is further exacerbated in patients with underlying comorbidities, thereby necessitating the adoption of comprehensive, evidence-based approaches to optimise care delivery (Brölmann *et al*., 2012) [5].

From a healthcare systems perspective, wounds impose considerable economic strain due to extended treatment durations, recurrent clinical interventions, and the demand for specialised multidisciplinary care. Inefficiencies in wound management practices can amplify these challenges, leading to increased infection rates, delayed healing, and higher incidences of hospital readmissions. In this context, the integration of data-driven systems and predictive analytics has demonstrated potential in enhancing monitoring, improving resource allocation, and supporting timely clinical decision-making within hospital networks (Ajayi *et al*., 2022) [2]. Similarly, system-oriented approaches such as patient journey mapping have been shown to improve care coordination and treatment continuity, thereby addressing inefficiencies that contribute to the overall burden of wound care (Gado *et al*., 2022) [13].

Furthermore, chronic wounds—many of which may originate or deteriorate within acute care environments—represent a persistent and resource-intensive challenge due to their prolonged healing trajectories and susceptibility to complications. These wounds often require sustained, multidisciplinary management, further increasing healthcare utilisation and costs (Werdin *et al*., 2009) [54]. Evidence also indicates that the implementation of structured, evidence-based wound care models can significantly enhance skin integrity and reduce system-level burdens by promoting standardisation and adherence to clinical guidelines (Kohlhardt *et al*., 2024) [22].

1.4 Rationale for Evidence-Based Wound Care

The rationale for adopting evidence-based wound care in acute hospital settings is grounded in the need to enhance clinical outcomes, standardise practice, and ensure the efficient utilisation of healthcare resources. Variability in wound care approaches has historically led to inconsistent patient outcomes, highlighting the importance of aligning clinical interventions with the best available evidence. Studies examining wound care priorities from both clinician and patient perspectives emphasise the need for consistent, patient-centred, and outcome-driven practices that are informed by empirical research (Walker *et al*., 2020) [52].

Evidence-based wound care is particularly critical in reducing the risk of complications such as infection, which remains a major concern in acute settings. Systematic evaluations of aseptic techniques demonstrate that adherence to evidence-based infection control practices significantly improves wound healing outcomes and minimises the incidence of surgical site infections (Haesler *et al*., 2016) [17]. Furthermore, high-quality evidence from Cochrane reviews supports the effectiveness of specific interventions, such as foam dressings, in improving healing outcomes for pressure injuries across diverse care settings (Walker *et al*., 2018) [51].

In addition to clinical benefits, the integration of data-driven and technological approaches further strengthens the rationale for evidence-based practice. Advances in healthcare analytics and decision-support systems have enhanced the ability to implement and monitor evidence-based interventions at scale (Moyo *et al*., 2023; Tafirenyika *et al*., 2023) [32, 44]. Collectively, these factors underscore the necessity of embedding evidence-based principles into wound care to achieve optimal, safe, and efficient patient care.

2. Principles of Evidence-Based Wound Assessment

Evidence-based wound assessment constitutes a foundational component of effective wound management in acute hospital settings, serving as the basis for informed clinical decision-making and the selection of appropriate therapeutic interventions. Accurate and systematic assessment enables clinicians to identify wound characteristics, evaluate healing progression, and mitigate potential complications. Within an evidence-based framework, wound assessment is not merely observational but is guided by validated tools, clinical expertise, and the integration of best available research evidence (Ubbink *et al*., 2015; Brölmann *et al*., 2012 [5]).

A fundamental principle of evidence-based wound assessment is the adoption of a holistic and patient-centred approach. This involves not only evaluating the wound itself but also considering patient-specific factors such as comorbidities, nutritional status, perfusion, and overall health condition. These systemic factors significantly influence wound healing and must be incorporated into clinical assessment to ensure appropriate care planning (Brölmann *et al*., 2012) [5]. Evidence suggests that failure to account for these variables may result in suboptimal treatment outcomes and delayed healing.

In addition to patient-related factors, a comprehensive wound assessment requires detailed evaluation of wound-

specific characteristics. Key parameters include wound size, depth, tissue type, exudate level, presence of necrosis or infection, and condition of the wound edges and surrounding skin. The systematic documentation of these characteristics supports clinical monitoring and facilitates the evaluation of treatment effectiveness over time. Ubbink *et al*. (2015) emphasise that consistent and structured assessment practices are essential for ensuring continuity of care and enabling evidence-based decision-making across multidisciplinary teams.

The use of standardised assessment frameworks further strengthens the reliability and consistency of wound evaluation. Although various models exist, their shared objective is to provide a structured approach to assessing critical aspects of the wound environment. Such frameworks support clinicians in identifying key issues such as tissue viability, infection risk, moisture balance, and wound progression. By promoting consistency in assessment, these tools enhance communication among healthcare professionals and contribute to improved patient outcomes (Ubbink *et al*., 2015).

Infection assessment represents a particularly critical aspect of wound evaluation in acute care settings. Early identification of infection or microbial imbalance is essential to prevent complications such as surgical site infections and delayed healing. Evidence from systematic reviews highlights the importance of incorporating aseptic principles into wound assessment and management, ensuring that clinical practices minimise the risk of contamination (Haesler *et al*., 2016) [17]. Furthermore, distinguishing between colonisation and infection is vital, as inappropriate use of antimicrobial interventions can contribute to resistance and unnecessary healthcare costs.

Another key principle of evidence-based wound assessment is the alignment of assessment findings with appropriate intervention strategies. The selection of wound dressings and therapeutic approaches should be directly informed by the characteristics identified during assessment. For example, systematic reviews have demonstrated that the effectiveness of wound dressings varies depending on wound type, exudate levels, and risk of infection (Chaby *et al*., 2007; Walter *et al*., 2012) [7, 53]. Similarly, evidence supports the use of specific dressing types, such as foam dressings, in managing pressure injuries, highlighting the importance of tailoring interventions to individual wound needs (Walker *et al*., 2018) [51].

The role of clinical judgement and experience remains integral within an evidence-based assessment framework. While research evidence provides essential guidance, clinicians must interpret and apply this evidence in the context of individual patient circumstances. Studies exploring wound care priorities from both clinician and patient perspectives underscore the importance of integrating clinical expertise with patient preferences to achieve optimal outcomes (Walker *et al*., 2020) [52]. This collaborative approach enhances patient engagement and ensures that care is both evidence-informed and patient-centred.

Documentation and ongoing monitoring are also critical components of evidence-based wound assessment. Accurate and consistent recording of wound characteristics allows for the evaluation of healing progression and the timely identification of complications. Regular reassessment ensures that treatment plans can be adjusted in response to changes in the wound or patient condition, thereby optimising outcomes and preventing deterioration (Ubbink *et al*., 2015).

3. Infection Prevention and Control in Wound Care

Infection prevention and control represent central pillars of effective wound care management in acute hospital settings, given their direct influence on healing outcomes, patient safety, and healthcare resource utilisation. Wound infection remains one of the most significant complications associated with both acute and chronic wounds, often resulting in delayed healing, increased morbidity, and prolonged hospitalisation. Consequently, the application of evidence-based infection control strategies is essential to optimise wound healing and minimise adverse clinical outcomes (Ubbink *et al*., 2015; Jones *et al*., 2017 [20]).

A fundamental aspect of infection prevention in wound care is the understanding of the continuum between contamination, colonisation, and infection. While all wounds are exposed to microorganisms, not all microbial presence results in infection. The transition from colonisation to infection is influenced by factors such as bacterial load, host immunity, tissue perfusion, and the presence of necrotic tissue. Evidence-based wound management emphasises early identification of infection through clinical indicators such as increased exudate, erythema, pain, and delayed healing, enabling timely intervention (Jones *et al*., 2007; Jones *et al*., 2017) [21, 20].

Aseptic technique is a cornerstone of infection control in wound care, particularly within acute hospital environments where patients are at heightened risk of healthcare-associated infections. Systematic evidence underscores the importance of maintaining strict aseptic practices during wound assessment, dressing changes, and invasive procedures to reduce microbial contamination and prevent infection (Ubbink *et al*., 2015). Adherence to hand hygiene protocols, the use of sterile equipment, and appropriate wound cleansing techniques are critical components of this approach. However, variations in clinical practice have been observed, highlighting inconsistencies in the application of aseptic principles across healthcare settings (Gillespie *et al*., 2014; Gillespie *et al*., 2020) [14, 15].

The role of healthcare professionals, particularly nurses, is pivotal in implementing infection prevention strategies. Nurses are often responsible for routine wound care, including assessment, dressing changes, and monitoring for signs of infection. Evidence indicates that variability in knowledge, experience, and adherence to guidelines can influence infection control practices and, consequently, patient outcomes (Gillespie *et al*., 2014) [14]. Furthermore, qualitative insights into acute care nursing practice reveal that challenges such as time constraints, workload pressures, and limited access to resources can impact the consistent application of evidence-based infection control measures (Hulbert-Lemmel *et al*., 2024) [18]. These findings underscore the need for continuous education, training, and organisational support to ensure adherence to best practices.

In addition to aseptic technique, appropriate wound cleansing and debridement are essential for reducing microbial burden and promoting a healthy wound environment. The removal of devitalised tissue and contaminants facilitates the healing process and reduces the risk of infection. Evidence-based guidelines recommend the use of appropriate cleansing solutions and techniques

tailored to the wound type and clinical context, thereby minimising tissue damage while effectively reducing microbial load (Jones *et al*., 2017) [20]. The selection of wound care products, including dressings with antimicrobial properties, should also be guided by evidence and clinical assessment to ensure optimal outcomes.

Another critical component of infection prevention is the judicious use of antimicrobial therapies. Overuse or inappropriate use of antibiotics and antiseptics can contribute to antimicrobial resistance, a growing global health concern. Evidence-based wound care emphasises targeted antimicrobial use based on clinical indications, rather than routine or prophylactic application in the absence of infection (Jones *et al*., 2007) [21]. This approach aligns with broader antimicrobial stewardship principles aimed at preserving the efficacy of existing treatments while minimising unnecessary exposure.

Organisational factors also play a significant role in infection prevention and control. The implementation of standardised protocols, clinical guidelines, and quality improvement initiatives can enhance consistency in wound care practices and reduce infection rates. Comparative studies of wound care practices across acute care settings reveal that structured approaches to care, supported by institutional policies and multidisciplinary collaboration, are associated with improved adherence to infection control measures (Gillespie *et al*., 2020) [15]. These findings highlight the importance of system-level interventions in complementing individual clinical practices.

Moreover, patient-related factors must be considered in infection prevention strategies. Conditions such as diabetes, vascular disease, and immunosuppression can impair the body's ability to combat infection and delay wound healing. Therefore, effective wound care requires a holistic approach that addresses both local wound factors and systemic health conditions. Integrating patient education into wound care practices can also empower individuals to participate in infection prevention, particularly in post-discharge settings.

4. Evidence-Based Wound Dressing Selection

The selection of appropriate wound dressings is a critical component of evidence-based wound care, directly influencing healing outcomes, infection prevention, patient comfort, and overall treatment efficiency. In acute hospital settings, where patient conditions can be complex and rapidly changing, the use of evidence-informed dressing strategies is essential to ensure optimal wound healing and minimise complications. Evidence-based wound dressing selection involves aligning clinical judgement with research evidence, wound characteristics, and patient-specific factors to achieve the most effective therapeutic outcomes (Brölmann *et al*., 2012; Jones *et al*., 2017) [5, 20].

A fundamental principle underpinning dressing selection is the recognition that no single dressing is universally suitable for all wound types. Instead, dressings must be chosen based on a comprehensive assessment of the wound, including factors such as size, depth, exudate level, tissue viability, and risk of infection. Evidence-based frameworks emphasise the importance of maintaining a moist wound environment, which has been shown to facilitate cellular activity, promote tissue regeneration, and accelerate healing processes (Jones *et al*., 2017) [20]. Conversely, inappropriate dressing selection—such as the use of overly occlusive or excessively absorbent materials—can disrupt the wound environment and impede healing.

The diversity of available wound dressings reflects the complexity of wound care needs. Dressings may be broadly categorised into traditional and advanced types, including films, foams, hydrocolloids, alginates, and antimicrobial dressings. Each category offers distinct properties suited to specific wound conditions. For example, highly exuding wounds may benefit from absorbent dressings such as foams or alginates, while dry wounds may require hydrating dressings to maintain moisture balance. Evidence-based decision-making is therefore essential to match dressing characteristics with wound requirements, ensuring that treatment is both effective and efficient (Brölmann *et al*., 2012) [5].

In clinical practice, however, variability in dressing selection remains a persistent challenge. Surveys of acute care nurses have revealed inconsistencies in wound care practices, often influenced by individual experience, institutional protocols, or product availability rather than robust evidence (Gillespie *et al*., 2014) [14]. Such variability can lead to suboptimal outcomes and highlights the need for standardised guidelines and ongoing professional education. Furthermore, insights from clinical settings indicate that time constraints and workload pressures may limit the ability of healthcare professionals to consistently apply evidence-based principles in dressing selection (Hulbert-Lemmel *et al*., 2024) [18].

The importance of integrating evidence into dressing selection is further reinforced by studies examining wound management models and their impact on patient outcomes. Structured, evidence-based approaches to wound care have been shown to improve skin integrity, enhance healing rates, and reduce complications when compared to non-standardised practices (Kohlhardt *et al*., 2024) [22]. These models emphasise the use of clinical guidelines, interdisciplinary collaboration, and continuous evaluation to ensure that dressing choices are aligned with best practice.

In addition to wound-specific factors, patient-related considerations play a crucial role in dressing selection. Factors such as pain tolerance, mobility, comorbidities, and personal preferences must be taken into account to ensure that dressings are not only clinically effective but also acceptable and manageable for patients. For instance, dressings that require frequent changes may increase discomfort and disrupt healing, particularly in vulnerable patient populations. Evidence-based care therefore necessitates a patient-centred approach that balances clinical efficacy with quality of life considerations (Brölmann *et al*., 2012) [5].

Chronic and complex wounds present additional challenges in dressing selection due to their prolonged healing trajectories and susceptibility to complications. Evidence-based management strategies for such wounds emphasise the need for adaptable and responsive treatment plans that evolve in accordance with wound progression. This may involve transitioning between different dressing types as the wound environment changes, ensuring that each stage of healing is appropriately supported (Werdin *et al*., 2009) [54]. The dynamic nature of wound healing underscores the importance of ongoing assessment and reassessment in guiding dressing selection.

Moreover, the role of multidisciplinary collaboration in dressing selection cannot be overstated. Effective wound management often requires input from a range of healthcare

professionals, including nurses, physicians, and wound care specialists. Collaborative decision-making facilitates the integration of diverse expertise and ensures that dressing choices are informed by comprehensive clinical perspectives. Evidence suggests that such collaborative approaches contribute to improved adherence to evidence-based practices and better patient outcomes (Hulbert-Lemmel *et al*., 2024) [18].

Despite the availability of extensive research on wound dressings, gaps remain in the comparative effectiveness of different products, particularly in complex clinical scenarios. This underscores the need for continued research and high-quality clinical trials to strengthen the evidence base and guide practice. In the interim, clinicians must rely on the best available evidence, combined with clinical expertise and patient preferences, to inform dressing selection decisions.

5. Advanced Wound Care Interventions

Advanced wound care interventions have become increasingly integral to the management of complex wounds in acute hospital settings, particularly where conventional therapies prove insufficient. These interventions are designed to address the multifactorial nature of wound healing by targeting physiological, biochemical, and mechanical processes that influence tissue repair. The adoption of advanced therapies reflects the growing emphasis on evidence-based practice, whereby clinical decisions are guided by robust research evidence, patient needs, and contextual factors within healthcare systems (Ubbink *et al*., 2015; Jones *et al*., 2017 [20]).

A central component of advanced wound care is the use of debridement techniques, which involve the removal of devitalised tissue, necrotic material, and contaminants that impede healing. Debridement facilitates the transition of chronic or non-healing wounds into an active healing state by promoting a clean wound bed and reducing microbial burden. Evidence-based approaches recognise multiple debridement methods—including surgical, enzymatic, autolytic, and mechanical techniques—each selected according to wound characteristics and patient condition (Jones *et al*., 2007) [21]. The choice of debridement strategy must be guided by clinical assessment and supported by evidence to ensure both efficacy and patient safety.

Another key intervention in advanced wound care is the optimisation of the wound environment to support cellular activity and tissue regeneration. Maintaining appropriate moisture balance, controlling exudate, and ensuring adequate oxygenation are critical factors that influence healing outcomes. Advanced therapies often incorporate specialised dressings and adjunctive treatments that enhance these conditions, thereby accelerating the healing process. Evidence indicates that interventions targeting the wound microenvironment can significantly improve healing trajectories, particularly in complex or non-healing wounds (Jones *et al*., 2017) [20].

Negative pressure wound therapy (NPWT) represents one of the most widely adopted advanced interventions in acute care. This technique involves the application of controlled sub-atmospheric pressure to the wound surface, promoting tissue perfusion, reducing oedema, and facilitating the removal of exudate. NPWT has been shown to enhance granulation tissue formation and reduce the risk of infection, making it particularly valuable in surgical and traumatic wounds. Its integration into clinical practice reflects a broader trend towards technology-driven solutions in wound management, supported by evidence demonstrating improved clinical outcomes (Ubbink *et al*., 2015).

In addition to mechanical and environmental interventions, advanced wound care increasingly incorporates biological and regenerative therapies. These include the use of growth factors, skin substitutes, and other bioengineered products designed to stimulate cellular proliferation and tissue repair. While the evidence base for some of these therapies continues to evolve, they hold significant promise for addressing complex wounds that do not respond to standard treatments. Evidence-based frameworks emphasise the need for careful evaluation of such interventions to ensure their safety, effectiveness, and cost-efficiency (Jones *et al*., 2007) [21].

The implementation of advanced wound care interventions is closely linked to the role of healthcare professionals, particularly nurses, who are often responsible for delivering and monitoring these therapies. Studies examining wound care practices in acute settings highlight variability in the use of advanced interventions, reflecting differences in knowledge, training, and access to resources (Gillespie *et al*., 2014; Gillespie *et al*., 2020) [14, 15]. Furthermore, qualitative research into nursing experiences indicates that the successful application of advanced therapies requires not only technical competence but also critical thinking and adherence to evidence-based guidelines (Hulbert-Lemmel *et al*., 2024) [18]. These findings underscore the importance of ongoing professional development and institutional support in facilitating the effective use of advanced wound care techniques.

Multidisciplinary collaboration is another essential element in the delivery of advanced wound care. The complexity of modern wound management often necessitates input from a range of healthcare professionals, including surgeons, wound care specialists, nurses, and allied health practitioners. Collaborative approaches enable the integration of diverse expertise, ensuring that advanced interventions are appropriately selected and tailored to individual patient needs. Evidence suggests that such coordinated care models are associated with improved clinical outcomes and greater adherence to evidence-based practices (Gillespie *et al*., 2020) [15].

Despite the benefits of advanced wound care interventions, several challenges remain in their implementation. Resource constraints, cost considerations, and variability in access to specialised therapies can limit their widespread adoption, particularly in resource-limited settings. Additionally, the rapid evolution of wound care technologies necessitates continuous evaluation and adaptation to ensure that clinical practices remain aligned with the latest evidence. This highlights the need for robust clinical guidelines and decision-support systems to guide the appropriate use of advanced interventions.

Moreover, patient-centred considerations must be integrated into the application of advanced wound care therapies. Factors such as patient comfort, treatment adherence, and quality of life are critical in determining the overall effectiveness of interventions. Advanced therapies that are technically effective but poorly tolerated by patients may ultimately compromise outcomes. Therefore, evidence-based practice requires a balance between clinical efficacy and patient acceptability.

6. Multidisciplinary Approach to Wound Management

The management of wounds in acute hospital settings is inherently complex, requiring the integration of diverse clinical expertise, coordinated care pathways, and evidence-based interventions. A multidisciplinary approach to wound management has therefore become essential in addressing the multifaceted nature of wound healing, particularly in patients with complex comorbidities or high-risk surgical profiles. By fostering collaboration among healthcare professionals, multidisciplinary care enhances clinical decision-making, improves treatment outcomes, and ensures the delivery of comprehensive, patient-centred care.

At the core of multidisciplinary wound management is the collaboration between various healthcare professionals, including nurses, physicians, surgeons, wound care specialists, and allied health practitioners. Each discipline contributes unique expertise, enabling a holistic approach to patient care. For instance, nurses play a central role in wound assessment, dressing changes, and patient education, while surgeons and physicians are responsible for diagnostic evaluation and advanced interventions. Evidence from systematic reviews highlights that coordinated pre-operative and post-operative care significantly improves wound healing outcomes and reduces complications, underscoring the importance of interdisciplinary collaboration (Gillespie *et al*., 2021) [16].

The effectiveness of multidisciplinary care is further demonstrated in the implementation of advanced wound care interventions. Techniques such as negative pressure wound therapy require coordinated input from multiple professionals to ensure appropriate patient selection, application, and monitoring. Evidence indicates that such collaborative approaches contribute to reduced surgical site infections and improved healing outcomes (Formosa & Ebejer, 2024; Hulbert-Lemmel, Madhuvu & Team, 2024) [12, 18]. Similarly, the use of specialised dressings, including foam dressings for pressure injuries, benefits from interdisciplinary decision-making that aligns clinical assessment with evidence-based treatment options (Walker *et al*., 2018) [51].

Beyond clinical interventions, multidisciplinary approaches also encompass system-level coordination and patient pathway optimisation. The concept of patient journey mapping has emerged as a valuable tool in enhancing care continuity and identifying inefficiencies within healthcare systems. By analysing the patient journey from admission to discharge, healthcare teams can streamline processes, improve communication, and ensure that wound care interventions are delivered in a timely and coordinated manner (Gado *et al*., 2022) [13]. This systems-oriented perspective is particularly important in acute care settings, where fragmented care can lead to delays in treatment and suboptimal outcomes.

The integration of digital health technologies further strengthens multidisciplinary wound management by facilitating communication, data sharing, and decision support. Interoperability frameworks enable seamless exchange of patient information across different healthcare providers, enhancing coordination and reducing the risk of errors or omissions in care (Ezeh *et al*., 2023) [10]. Additionally, digital health frameworks aimed at expanding access to preventive and supportive services can improve continuity of care, particularly for patients transitioning between acute and community settings (Ojeikere *et al*., 2024) [34]. These technological advancements support a more connected and collaborative approach to wound management.

Artificial intelligence (AI) and predictive analytics are also increasingly being incorporated into multidisciplinary care models, offering new opportunities to enhance clinical decision-making. AI-driven systems can analyse patient data to predict healing trajectories, identify risk factors, and support personalised treatment planning. Such innovations enable healthcare teams to make more informed decisions and tailor interventions to individual patient needs, thereby improving outcomes and resource utilisation (Sagay *et al*., 2024). The integration of these technologies within multidisciplinary frameworks represents a significant advancement in evidence-based wound care.

Despite the clear benefits of multidisciplinary approaches, several challenges remain in their implementation. Barriers such as communication gaps, role ambiguity, and organisational constraints can hinder effective collaboration among healthcare professionals. Additionally, differences in training, experience, and access to resources may impact the consistency of care delivery. Addressing these challenges requires strong leadership, clear delineation of roles, and the establishment of standardised protocols to guide collaborative practice.

Education and training also play a crucial role in supporting multidisciplinary wound management. Healthcare professionals must be equipped with the knowledge and skills necessary to apply evidence-based practices and engage effectively in collaborative care. Continuous professional development and interdisciplinary training initiatives can enhance understanding of each discipline's contributions and promote a shared commitment to patient-centred care.

Furthermore, patient involvement is an essential component of multidisciplinary wound management. Engaging patients in their care plans, educating them about wound management practices, and encouraging adherence to treatment regimens can significantly improve outcomes. A collaborative approach that includes the patient as an active participant aligns with contemporary models of care that emphasise empowerment and shared decision-making.

7. Role of Technology in Wound Care

The integration of technology into wound care has significantly transformed clinical practice in acute hospital settings, enhancing the accuracy of assessment, efficiency of care delivery, and overall patient outcomes. As healthcare systems increasingly adopt digital innovations, technology has become a critical enabler of evidence-based wound management, facilitating data-driven decision-making, improving communication, and supporting personalised treatment strategies. These advancements align with broader healthcare trends that emphasise precision, efficiency, and patient-centred care (Tafirenyika, 2023) [42].

One of the most prominent technological developments in wound care is the expansion of telehealth services. Telehealth platforms enable remote monitoring, consultation, and follow-up care, thereby improving access to wound management services and reducing the need for frequent hospital visits. This is particularly beneficial in post-operative care, where timely assessment of wound healing can prevent complications and reduce readmissions. Evidence suggests that telehealth has enhanced continuity of

care and improved clinical outcomes by enabling early intervention and ongoing patient engagement (Omotayo & Kuponiyi, 2020) [37].

In addition to telehealth, the application of data analytics and business intelligence systems has strengthened the capacity for informed clinical decision-making in wound care. Advanced analytics tools can process large volumes of patient data to identify patterns, predict outcomes, and support resource allocation within healthcare systems. For instance, real-time risk assessment dashboards using machine learning have been shown to enhance monitoring and operational efficiency in hospital environments (Filani *et al*., 2022) [11]. Such systems allow clinicians to identify high-risk patients and implement targeted interventions, thereby improving both clinical and organisational outcomes.

Artificial intelligence (AI) represents a transformative force in wound care, offering advanced capabilities in predictive modelling, diagnostic support, and treatment optimisation. AI-driven systems can analyse complex datasets to predict wound healing trajectories, identify potential complications, and recommend personalised treatment plans. This enables healthcare professionals to make more accurate and timely decisions, ultimately improving patient outcomes (Sagay *et al*., 2024; Kuponiyi & Akomolafe, 2024). Furthermore, AI applications in healthcare have demonstrated significant potential in enhancing clinical accuracy and reducing variability in care delivery, thereby supporting the principles of evidence-based practice (Tafirenyika, 2023) [42].

The role of AI extends beyond predictive analytics to include diagnostic support and early detection of complications. Advanced AI models can assist in identifying subtle changes in wound characteristics, enabling earlier detection of infection or delayed healing. This capability is particularly valuable in acute care settings, where timely intervention is critical to preventing adverse outcomes. Evidence indicates that AI-based detection systems can enhance clinical assessment and improve the precision of wound care interventions (Sagay *et al*., 2024; Kuponiyi & Akomolafe, 2024).

Virtual reality (VR) technologies are also emerging as innovative tools in healthcare, with potential applications in wound care training, patient education, and pain management. VR-based systems can simulate clinical scenarios, allowing healthcare professionals to develop and refine their skills in a controlled environment. Additionally, VR interventions have been explored for their ability to reduce patient anxiety and discomfort during wound care procedures, thereby improving the overall patient experience (Kuponiyi, Akomolafe & Omotayo, 2023; Babatope *et al*., 2023 [4]). These applications highlight the expanding role of immersive technologies in enhancing both clinical practice and patient-centred care.

Another critical area of technological advancement is the use of digital health systems to support chronic disease management and integrated care. The development of digital health assistants and interoperable systems facilitates seamless communication between healthcare providers, ensuring continuity of care across different settings. Such systems enable the integration of patient data, supporting coordinated and multidisciplinary approaches to wound management (Ezeh *et al*., 2024 [9]; Kuponiyi & Akomolafe, 2024). This is particularly important in complex cases where multiple healthcare professionals are involved in patient care.

Technological innovations also play a vital role in improving the management and maintenance of medical equipment used in wound care. Predictive maintenance systems powered by AI can monitor equipment performance and identify potential issues before they result in failure. This ensures the reliability and availability of critical tools, thereby supporting uninterrupted delivery of wound care services (Kuponiyi & Akomolafe, 2024). Similarly, advancements in diagnostic technologies have enhanced the ability to accurately assess wound conditions and guide treatment decisions, further reinforcing the role of technology in evidence-based practice (Kuponiyi & Akomolafe, 2024).

The incorporation of nanotechnology into healthcare systems represents another promising development in wound care. Nanomaterials have been utilised to improve drug delivery systems, enabling targeted and controlled release of therapeutic agents. This innovation enhances the effectiveness of treatments while minimising side effects, offering new possibilities for managing complex wounds (Ike *et al*., 2022) [19]. Such advancements demonstrate the potential of emerging technologies to address longstanding challenges in wound care.

Despite the numerous benefits of technological integration, challenges remain in its implementation. Issues such as cost, infrastructure limitations, and the need for specialised training can hinder the widespread adoption of advanced technologies. Additionally, concerns related to data privacy and security must be addressed to ensure the safe and ethical use of digital health systems. Nonetheless, ongoing advancements and increasing investment in healthcare technology are expected to overcome these barriers over time.

8. Barriers to Evidence-Based Wound Care Implementation

The implementation of evidence-based wound care in acute hospital settings is widely recognised as essential for improving patient outcomes and ensuring consistency in clinical practice. However, despite the availability of robust research and clinical guidelines, numerous barriers continue to hinder the effective translation of evidence into routine care. These barriers are multifaceted, encompassing individual, organisational, and systemic factors that collectively impede the adoption of best practices in wound management.

One of the most significant barriers to evidence-based wound care is the variability in clinical knowledge, skills, and adherence to guidelines among healthcare professionals. Studies examining wound care practices have consistently identified inconsistencies in the application of evidence-based interventions, often influenced by individual experience, local traditions, or institutional norms rather than empirical evidence (Gillespie *et al*., 2014; Gillespie *et al*., 2020) [14, 15]. This variability can result in suboptimal care, delayed healing, and increased risk of complications. Furthermore, gaps in knowledge and limited access to continuing professional education may prevent clinicians from staying updated with the latest evidence and innovations in wound care (Jones *et al*., 2017) [20].

In addition to knowledge-related challenges, workload pressures and time constraints represent critical barriers in acute care environments. Healthcare professionals,

particularly nurses, often operate in high-demand settings where competing priorities limit the time available for comprehensive wound assessment and evidence-based decision-making. Qualitative insights into nursing experiences highlight that heavy workloads and staffing shortages can compromise the consistent application of best practices, leading to reliance on routine or expedient approaches rather than evidence-informed care (Hulbert-Lemmel *et al*., 2024) [18]. These constraints underscore the need for organisational strategies that support adequate staffing and resource allocation.

Organisational and structural barriers also play a pivotal role in limiting the implementation of evidence-based wound care. Inefficient workflows, fragmented care processes, and lack of standardised protocols can hinder the consistent delivery of high-quality care. For instance, challenges associated with digitising healthcare workflows and overcoming legacy system limitations have been identified as significant obstacles to the integration of evidence-based practices (Ezeh *et al*., 2022) [8]. Without effective systems to support data sharing, documentation, and clinical decision-making, the translation of evidence into practice becomes increasingly difficult.

Technological and infrastructural limitations further exacerbate these challenges. While advancements in digital health and data analytics offer significant potential to enhance wound care, their implementation is often constrained by issues related to cost, interoperability, and system integration. Complex technological frameworks, such as those used in health surveillance and predictive modelling, require substantial investment and technical expertise, which may not be readily available in all healthcare settings (Omolayo *et al*., 2024). Consequently, disparities in access to technology can contribute to inequities in the quality of wound care delivery.

Another critical barrier is the lack of effective communication and collaboration among multidisciplinary teams. Evidence-based wound care often requires coordinated input from various healthcare professionals, yet communication gaps and unclear role delineation can impede collaborative practice. Inconsistent information sharing and lack of integrated care pathways may lead to fragmented care, reducing the effectiveness of interventions and increasing the risk of errors. Addressing these issues requires the establishment of clear communication channels and the promotion of team-based approaches to care.

Resistance to change is also a notable barrier in the implementation of evidence-based practices. Healthcare professionals may be reluctant to adopt new guidelines or interventions due to familiarity with existing practices, perceived complexity, or scepticism regarding the applicability of research findings. This resistance can be further compounded by a lack of organisational support or incentives to encourage the adoption of evidence-based approaches. As a result, even well-established evidence may not be fully integrated into clinical practice.

Patient-related factors can also influence the implementation of evidence-based wound care. Variations in patient compliance, health literacy, and socio-economic conditions may affect the effectiveness of interventions and the ability to adhere to treatment plans. For example, patients with limited understanding of wound care practices or those facing financial constraints may struggle to follow recommended treatment regimens, thereby impacting outcomes. These challenges highlight the importance of patient education and engagement as integral components of evidence-based care.

Finally, the complexity of wound care itself presents an inherent barrier to implementation. Wound healing is influenced by a wide range of factors, including patient comorbidities, environmental conditions, and treatment variables. This complexity can make it difficult to standardise care and apply evidence uniformly across different clinical scenarios. Evidence-based management of chronic wounds, in particular, requires adaptable and context-specific approaches, which may not always align with rigid clinical guidelines (Jones *et al*., 2007) [21].

9. Strategies to Improve Evidence-Based Practice

Improving the implementation of evidence-based practice (EBP) in wound care within acute hospital settings requires a multifaceted and systematic approach that integrates clinical expertise, organisational support, and technological innovation. While substantial evidence exists to guide effective wound management, the translation of this evidence into routine clinical practice remains inconsistent. Consequently, targeted strategies are essential to bridge the gap between research and practice, ensuring that patients receive high-quality, standardised care (Ubbink *et al*., 2015; Brölmann *et al*., 2012 [5]).

A primary strategy for enhancing EBP is the development and implementation of structured clinical guidelines and protocols. Evidence-based guidelines provide a framework for consistent decision-making, enabling clinicians to apply validated interventions in wound assessment, dressing selection, and infection prevention. Systematic reviews have demonstrated that adherence to such guidelines improves clinical outcomes, including reduced surgical site infections and enhanced healing rates (Walter *et al*., 2012; Chaby *et al*., 2007) [53, 7]. Embedding these guidelines into routine practice ensures that care delivery is aligned with the best available evidence and reduces variability in clinical approaches.

Education and continuous professional development are also critical in promoting evidence-based wound care. Healthcare professionals must be equipped with up-to-date knowledge and skills to interpret and apply research findings effectively. Training programmes, workshops, and competency-based learning initiatives can enhance clinicians' understanding of evidence-based principles and improve their ability to implement them in practice. Ubbink *et al*. (2015) emphasise that fostering a culture of learning and inquiry within healthcare organisations is essential for sustaining EBP.

In addition to education, the integration of digital health technologies and data-driven systems plays a pivotal role in improving EBP implementation. Business intelligence platforms and predictive analytics tools have been shown to enhance transparency, monitoring, and decision-making within healthcare systems (Moyo *et al*., 2021; Ajayi *et al*., 2022) [33, 2]. These technologies enable real-time analysis of patient data, allowing clinicians to identify trends, assess treatment effectiveness, and make informed decisions. Furthermore, machine learning-based dashboards can support risk assessment and resource allocation, thereby improving both clinical and operational outcomes (Filani *et al*., 2022; Bukhari *et al*., 2022; Taiwo *et al*., 2022) [11, 6, 45].

The use of smart health monitoring frameworks also contributes to the advancement of EBP by enabling proactive and data-informed care. For instance, AI-driven systems designed to predict health risks and support resource planning can enhance the early identification of complications and facilitate timely interventions (Ajao *et al*., 2024 [1]; Taiwo *et al*., 2024). Such innovations align with the principles of evidence-based care by integrating empirical data into clinical workflows, thereby improving accuracy and efficiency in wound management.

Another key strategy involves strengthening organisational support and leadership commitment to EBP. Healthcare institutions play a crucial role in creating environments that facilitate the adoption of evidence-based practices. This includes providing adequate resources, ensuring access to up-to-date research, and establishing policies that prioritise quality improvement. Leadership engagement is particularly important in driving cultural change, encouraging adherence to guidelines, and promoting accountability among healthcare professionals (Brölmann *et al*., 2012) [5].

Audit and feedback mechanisms are also effective in improving EBP implementation. Regular evaluation of clinical practices, combined with constructive feedback, enables healthcare providers to identify gaps in care and implement corrective measures. By monitoring adherence to evidence-based guidelines and tracking patient outcomes, organisations can continuously refine their practices and enhance the quality of wound care services.

Multidisciplinary collaboration further supports the implementation of EBP by facilitating the exchange of knowledge and expertise among healthcare professionals. Collaborative approaches ensure that clinical decisions are informed by diverse perspectives, leading to more comprehensive and effective care. Integrating EBP into multidisciplinary team meetings and care planning processes can enhance consistency and improve patient outcomes.

Finally, patient engagement is an essential component of evidence-based practice. Educating patients about wound care, involving them in decision-making, and encouraging adherence to treatment plans can significantly improve outcomes. Patient-centred approaches align with EBP principles by ensuring that care is tailored to individual needs and preferences.

10. Patient Outcomes and Quality Indicators

Patient outcomes and quality indicators are central to evaluating the effectiveness of wound care interventions in acute hospital settings. As healthcare systems increasingly prioritise value-based care, the measurement of clinical outcomes has become essential in determining the success of evidence-based wound management strategies. Key indicators such as wound healing rates, incidence of surgical site infections, patient satisfaction, and duration of hospital stay provide critical insights into the quality and efficiency of care delivery.

One of the primary indicators of successful wound management is the rate and trajectory of wound healing. Evidence from systematic reviews demonstrates that the application of appropriate interventions, including advanced dressings and perioperative care strategies, significantly enhances healing outcomes. For example, the use of foam dressings has been shown to improve healing in pressure injuries by maintaining optimal moisture balance and protecting the wound environment (Walker *et al*., 2018) [51].

Similarly, comprehensive pre-operative and post-operative wound care interventions contribute to improved healing rates and reduced complications, highlighting the importance of evidence-based practice in achieving favourable outcomes (Gillespie *et al*., 2021) [16].

The prevention of complications, particularly surgical site infections (SSIs), is another critical quality indicator. SSIs are associated with increased morbidity, prolonged hospitalisation, and higher healthcare costs. Evidence-based interventions, such as prophylactic negative pressure wound therapy, have demonstrated effectiveness in reducing infection rates among high-risk patients (Formosa & Ebejer, 2024) [12]. The ability to minimise such complications is a key measure of quality care and reflects the successful implementation of infection prevention strategies within wound management protocols.

In addition to clinical outcomes, patient-centred indicators such as satisfaction, comfort, and quality of life are increasingly recognised as essential components of care evaluation. Effective wound management not only promotes physical healing but also reduces pain, enhances mobility, and improves overall patient well-being. These outcomes are influenced by factors such as the appropriateness of interventions, frequency of dressing changes, and the level of patient engagement in care processes. A focus on patient-centred care ensures that treatment approaches align with individual needs and preferences, thereby improving adherence and outcomes.

The integration of data-driven technologies has further enhanced the measurement and monitoring of patient outcomes in wound care. Predictive analytics and machine learning models enable healthcare providers to assess treatment effectiveness, identify risk factors, and anticipate potential complications. For instance, comparative analyses of machine learning approaches have demonstrated their potential in improving predictive accuracy and supporting clinical decision-making in healthcare settings (Soneye *et al*., 2023; Akokodaripon *et al*., 2023) [41, 3]. These technologies facilitate continuous monitoring and enable timely interventions, thereby improving overall care quality.

Artificial intelligence (AI) also plays a significant role in optimising patient outcomes by enabling personalised treatment planning. AI-driven systems can analyse patient data to predict healing trajectories and recommend tailored interventions, ensuring that care is both efficient and effective (Sagay *et al*., 2024). This level of precision supports the delivery of high-quality care and enhances the ability of healthcare professionals to achieve optimal outcomes for diverse patient populations.

Furthermore, the implementation of smart health monitoring frameworks contributes to improved quality indicators by enabling real-time tracking of patient conditions and resource utilisation. Such systems support proactive care by identifying early signs of complications and facilitating timely interventions, thereby reducing the likelihood of adverse outcomes (Ajao *et al*., 2024) [1]. The integration of these technologies into clinical practice aligns with the principles of evidence-based care and enhances the overall quality of wound management.

Quality indicators also extend to organisational performance, including efficiency, cost-effectiveness, and adherence to clinical guidelines. The consistent application of evidence-based interventions has been shown to reduce hospital readmissions, optimise resource utilisation, and

improve overall healthcare system performance. Monitoring these indicators enables healthcare organisations to identify areas for improvement and implement targeted strategies to enhance care delivery.

11. Future Directions in Wound Care Research

The future of wound care research is increasingly shaped by technological innovation, data-driven methodologies, and the pursuit of personalised and precision-based healthcare. As the complexity of wound management continues to evolve, there is a growing need for research that integrates advanced technologies with clinical practice to enhance diagnostic accuracy, optimise treatment strategies, and improve patient outcomes. Emerging trends suggest that the next generation of wound care will be characterised by the convergence of artificial intelligence (AI), digital health systems, and predictive analytics, all of which hold significant promise for advancing evidence-based practice (Tafirenyika, 2023 [42]; Kuponiyi, Akomolafe & Omotayo, 2023).

One of the most prominent directions in wound care research is the application of AI in clinical decision-making and outcome prediction. AI-driven models are increasingly being developed to analyse complex patient data, identify patterns, and predict wound healing trajectories. These systems enable clinicians to make more informed decisions by providing real-time insights into patient risk factors and potential complications. Evidence indicates that AI-based predictive tools can significantly enhance treatment planning and improve the precision of wound care interventions (Sagay *et al*., 2024; Taiwo *et al*., 2024). Furthermore, advancements in AI detection technologies offer the potential for early identification of infection and delayed healing, thereby facilitating timely and targeted interventions (Sagay *et al*., 2024).

In addition to AI, the integration of advanced data systems and digital health platforms represents a critical area for future research. Interoperable healthcare systems that enable seamless data sharing across clinical settings are essential for improving continuity of care and supporting multidisciplinary collaboration. Research into digital health assistants and integrated care platforms highlights their potential to enhance chronic disease management and streamline clinical workflows, which can be extended to wound care management (Ezeh *et al*., 2024 [9]; Oparah *et al*., 2024 [38]; Taiwo *et al*., 2024). These innovations are expected to play a key role in addressing current challenges related to fragmented care and inefficient data utilisation.

Virtual reality (VR) technologies also present a novel avenue for research and application in wound care. VR has the potential to transform clinical training, patient education, and even therapeutic interventions. For example, VR-based simulations can provide immersive training environments for healthcare professionals, improving their competence in wound assessment and management. Additionally, VR applications may be utilised to reduce patient anxiety and pain during wound care procedures, thereby enhancing the overall patient experience (Kuponiyi, Akomolafe & Omotayo, 2023). Continued research is needed to explore the full scope of VR applications and their effectiveness in clinical practice.

Another important area of future research involves the use of advanced analytics and computational models to support healthcare planning and resource allocation. Predictive frameworks designed for epidemic surveillance and health policy simulation demonstrate the potential of advanced algorithms to inform decision-making at both clinical and organisational levels (Omolayo *et al*., 2024; Kuponiyi, 2024 [31]). Such approaches can be adapted to wound care by enabling the prediction of patient outcomes, identification of high-risk populations, and optimisation of resource distribution within healthcare systems.

The role of AI in enhancing clinical decision-making is further reinforced by studies examining its application in healthcare systems. AI-driven tools can support clinicians in diagnosing conditions, selecting appropriate interventions, and monitoring treatment progress, thereby reducing variability in care and improving overall quality (Kuponiyi, Akomolafe & Omotayo, 2023). As these technologies continue to evolve, future research will need to address challenges related to accuracy, reliability, and integration into existing clinical workflows.

Despite the promising potential of these innovations, several challenges must be addressed to ensure their effective implementation. Issues related to data privacy, ethical considerations, and the need for robust regulatory frameworks are critical in the adoption of digital health technologies. Additionally, disparities in access to advanced technologies may create inequities in care, highlighting the need for inclusive and scalable solutions. Future research must therefore focus not only on technological development but also on addressing these systemic and ethical challenges.

Moreover, there is a need for high-quality clinical trials and longitudinal studies to evaluate the effectiveness of emerging interventions in real-world settings. While technological innovations offer significant potential, their impact on patient outcomes must be rigorously assessed to ensure that they provide tangible benefits in clinical practice. This includes evaluating cost-effectiveness, patient acceptability, and long-term sustainability.

12. Conclusion

In summary, this review has comprehensively examined the principles, practices, and emerging dimensions of evidence-based wound care management within acute hospital settings, demonstrating the critical importance of integrating clinical expertise with robust research evidence and technological innovation. The study set out to explore key domains, including wound assessment, infection prevention, dressing selection, advanced interventions, multidisciplinary collaboration, and the role of digital technologies, all of which have been systematically addressed. Collectively, the findings underscore that effective wound care is inherently multifactorial, requiring structured assessment frameworks, adherence to evidence-based protocols, and continuous evaluation of patient outcomes.

A central insight derived from this review is that consistency in evidence-based practice significantly improves healing outcomes, reduces complications such as surgical site infections, and enhances overall patient safety. The analysis further highlights that multidisciplinary collaboration and patient-centred approaches are indispensable in managing the complexities associated with acute and chronic wounds. Additionally, the increasing integration of technologies such as artificial intelligence, predictive analytics, and digital health systems has demonstrated substantial potential in transforming wound care delivery, enabling more precise, efficient, and proactive interventions.

However, the review also identifies persistent barriers, including variability in clinical practice, resource constraints, and limitations in technological infrastructure, which continue to impede the full realisation of evidence-based care. Addressing these challenges requires targeted strategies such as strengthening clinical education, implementing standardised guidelines, fostering interdisciplinary collaboration, and investing in healthcare technologies that support data-driven decision-making.

In conclusion, advancing wound care in acute settings necessitates a sustained commitment to evidence-based practice, supported by organisational leadership and continuous professional development. It is recommended that future efforts focus on enhancing the integration of innovative technologies, promoting equitable access to advanced care, and conducting further research to strengthen the evidence base. Such measures will be pivotal in improving patient outcomes and ensuring the delivery of high-quality, efficient, and patient-centred wound care.

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