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Advances in Wound Care: A Review of Best Practices in Nursing-An Updated Review Article

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Abstract:

Background: Wounds, whether acute or chronic, pose significant challenges in healthcare due to their prevalence and complexity. These injuries can lead to prolonged recovery periods, tissue necrosis, and increased healthcare costs. Wound healing involves a series of predictable stages, but chronic wounds, often arising from conditions like diabetes and pressure ulcers, may fail to progress through these stages, leading to complications. Despite advancements in wound care, including various technologies and products, the treatment of chronic wounds remains a significant challenge.

Aim: The aim of this review is to summarize the best practices in nursing for the management of wounds, emphasizing the role of emerging technologies and advanced treatment modalities in enhancing wound healing outcomes.

Methods: This review synthesizes recent literature on wound care practices, highlighting various wound types, stages of healing, and emerging treatment technologies. The review discusses standard care protocols, such as debridement, infection prevention, and the use of specific dressings, along with the latest advancements in wound care, including biologic products, negative pressure wound therapy (NPWT), and tissue-engineering approaches.

Results: Key findings from this review indicate that while traditional wound care methods, including debridement and infection control, remain crucial, emerging technologies such as negative pressure wound therapy, biologics, and advanced dressings are improving healing times and outcomes. New approaches targeting cellular mechanisms and extracellular matrix (ECM) mimicry offer promising therapeutic

avenues. The integration of growth factors, stem cell therapies, and biophysical signals into wound care products has shown potential in accelerating the healing process.

Conclusion: Wound care has evolved significantly through innovations in technologies and treatments. Nurses play a critical role in managing both acute and chronic wounds, applying advanced therapies and evidence-based practices to improve healing outcomes. Continued research into the molecular and cellular mechanisms of wound healing is essential to develop more effective and targeted treatments, reducing the burden on healthcare systems.

Key Words: Wound care, nursing interventions, chronic wounds, negative pressure wound therapy, growth factors, tissue engineering, biologics, wound healing.

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Introduction:

Wounds, which are prevalent across the body, can be debilitating injuries that necessitate prolonged recovery periods. These injuries are typically categorized as acute or chronic, based on their clinical presentation. Regardless of the origin, untreated wounds ultimately lead to necrosis and cellular death of the skin (1), with the severity determined by their depth and extent. Wounds, irrespective of their cause—whether thermal (2, 3), mechanical, pressure-related (4, 5), or otherwise—share a common set of risk factors that contribute to both the initial breakdown of the skin barrier and hinder the successful healing process. Many of these factors stem from relative ischemia (5), which can manifest as inadequate blood flow (e.g., peripheral arterial disease or venous stasis (6)), microvascular damage (e.g., in diabetes (7)), or vasoconstriction (e.g., the acute effects of nicotine use (8)). Additional systemic factors influencing wound healing include nutritional status, fibroblast and progenitor cell health (e.g., as impacted by corticosteroids or radiation (9)), and the presence of infectious bioburden (1). The natural healing process of acute wounds follows a predictable sequence of events: inflammation, proliferation/repair, and remodeling (1, 10). However, wounds that fail to progress through these stages and remain in a prolonged inflammatory state are reclassified as chronic wounds (11–13). Chronic wounds, particularly those of common types, exhibit distinct characteristics. Pressure ulcers, for instance, progress through stages of increasing tissue necrosis, beginning with discoloration and pain due to microvascular injury (stage 1), advancing to ulceration and skin breakdown (stage 2), and eventually affecting underlying fat (stage 3) or deeper structures (stage 4). Diabetic ulcers, on the other hand, are often accompanied by altered sensory perception, resulting in paresthesias or anesthesia, which eliminate the protective afferent feedback (pain) that normally prevents soft tissue injury and allows unnoticed progression of ulceration. Venous stasis wounds typically present with varying degrees of granulation tissue, pain, periwound skin discoloration, and significant exudate. Arterial ulcers are associated with acute ischemia, often resulting in significant pain and the formation of eschar. Despite these varying forms, all these wounds tend to converge in their phenotype and chronicity, ultimately requiring specialized care. Through extensive research and innovation, a wide range of wound care technologies and products have been developed to aid in the treatment of chronic or stalled wounds (14).

The human and economic burden of wounds has remained a significant challenge throughout history (15) and continues to place a substantial strain on healthcare systems. In 2014, wounds affected over 8 million individuals in the United States, with an estimated cost of $30 billion (16). As the population ages and obesity rates increase, the prevalence of high-risk comorbidities also rises, contributing to the expansion of the wound closure product market, which reached $21.4 billion in 2022 and is projected to grow at a compound annual growth rate of 4.15% from 2023 to 2030 (Grand View Research) (17). Surgical wounds represent the largest category of wounds, driven by an increase in the number of surgeries and an aging population. Proper surgical techniques and optimal suture materials remain crucial, as wound dehiscence can lead to a 9.6% increase in mortality, extend hospitalization by an additional 9.4 days, and add up to $40,000 in hospital charges. For individuals with diabetes, the lifetime risk of developing a foot ulcer is 25%, with 15% of these ulcers progressing to amputation. Pressure injuries, affecting 3.5% to 69%

of patients in hospitals (equating to approximately 2.5 million patients annually) (18–20), can lead to complications, including wound-related infections and mortality, which contribute to over 55% of wound-related deaths, totaling up to 60,000 fatalities in the United States each year (21–24). The cost of pressure injuries in the U.S. is estimated to be between $9.1 billion and $11.6 billion annually. Additionally, while the incidence of burn injuries in the U.S. has declined (~16.8 per 100,000), inpatient stays for burn-related injuries remain approximately twice as long and costly compared to non-burn-related stays ($24,000 versus $10,700). Annually, burn injuries incur medical costs of approximately $1.5 billion and result in $5 billion in lost workdays.

Standard of Care and Emerging Treatments

The standard of care for the management of most wounds involves the preparation of a viable wound bed conducive to healing [15]. This process may involve irrigation or debridement, which includes the removal of foreign materials and necrotic tissue [25, 26]. Depending on the specific characteristics of the wound, healing may proceed through secondary intention, or primary closure may be performed, and in certain cases, grafts or flaps may be necessary [27]. Complex wounds, typically chronic in nature, may require serial debridements, either as part of the healing process or as an interim step toward closure [28, 29]. The following section outlines various wound healing products cleared or approved by the U.S. Food and Drug Administration (FDA), including those classified under different categories such as class II [510(k): "K-"], class III [Premarket Approval (PMA): "P-"], National Drug Code (NDC), Biologic Product (BP-), Biologic License Application (BLA), and others for wound healing.

In recent years, surgical wound care has been augmented by assistive technologies. For wounds that are amenable to primary closure, various options are available, including staples, sutures (with absorbable products such as poliglecaprone 25 [Monocryl (K960653) (Ethicon)] and polydiaxone 910 [Vicryl (K183183) (Ethicon)], among others), cyanoacrylate adhesives [Dermabond (P960052; K152096) (Ethicon) (30) and Liquiband (K211878) (AMS) (31)], and adhesive strips [Steri-Strips (K813265) (3M) (32)]. These methods aim to eliminate dead space and reduce tension on the wound, thereby fostering tissue repair and regeneration. Pressure injuries, a significant concern in institutionalized patients, have an incidence of approximately 12% [33]. To mitigate the increased capillary afterload, a range of interventions have been developed, including foam dressings such as Mepilex (K123892) (Molnlycke) and specialized clinical mattresses made from foam [Ultrafoam (Amico)], water [Akva (ProActive)], and autonomously alternating air mattresses that adjust pressure distribution [Protekt Aire (ProActive), Aura (Amico), Clinitron (Hillrom)]. These devices help reduce the nursing burden required for frequent repositioning of patients to alleviate pressure.

Management of chronic open wounds follows a set of principles aimed at improving healing. These include debridement, moisture balance, infection prevention, and medical optimization of underlying comorbid conditions, such as peripheral vascular disease, smoking, and diabetes. Serial debridement, in particular, reduces the microbial load and necrotic material that impede healing, creating an environment conducive to inflammation reduction and the transition to active proliferation [29, 34]. Traditional debridement techniques involve sharp excision of necrotic or fibrinous tissue, followed by wet-to-dry gauze dressings that assist in continuous microdebridement. In cases of gross contamination, additional anti-infective treatments may be employed, such as sodium hypochlorite solutions [Vashe Wound Solutions (K123072) (SteadMed) (35) and Dakin's Solution (K150208) (Century) (36)], cyclic lipopeptides [37], silver-impregnated dressings [Mepilex Ag (K100029) (Molnlycke) (38), Contreet (K013525) (Coloplast), Allevyn Ag (K063835) (Smith + Nephew)], and enzymatic debridement agents like Santyl (NDC 50484-010) (Smith + Nephew) [40]. Excess moisture in highly exudative wounds can lead to maceration of the wound bed and surrounding tissues, further hindering the healing process. Dressings that help manage this moisture include alginates [Kaltostat (K904488) (ConvaTec) and Tegaderm Alginate (K973036) (3M)], hydrocolloids [DuoDerm (K990368) (ConvaTec), Suprasorb H (K183208) (Lohmann and Rauscher)], hydrofibers [Aquacel (K982116) (ConvaTec)], and hydrogels [Purilon (K971597) (Coloplast) and Hydrosorb (K041105) (Hartmann)]. Additionally, negative pressure wound therapy (NPWT) [VAC

(K062227) (KCI), Avelle (K180205) (ConvaTec), and Avance (K203369) (Monlycke)] not only helps control moisture but also enhances healing through increased capillary perfusion, wound contraction, evacuation of debris, and micromechanical force [41].

For chronic wounds located in sensitive areas, such as those over tendons or surgical donor sites, biologics or dermal regeneration templates [Integra Dermal Regeneration Template (P900033) (Integra Lifesciences) and Novosorb (K172140) (PolyNovo), AlloDerm (LifeCell)] may be utilized, sometimes in combination with growth factors [Primatrix (K153690) (Integra Lifesciences) and Helisorb (Medira)] or cultured epidermal autografts [Epicel (HDE: BH990200.34) (Vericel)]. Emerging technologies in wound care include products designed to detect elevated protease activity, which can serve as an indicator of impaired wound healing [Woundchek (DEN180014) (Systagenix) (42)], as well as epidermal harvest and suspension systems [Cellutome (KCI) and Recell (BP170122) (Avita)]. Other innovations include targeted pulsed electromagnetic therapy [SofPulse (K070541) (Endonovo)], topical wound oxygen therapy [TWO2 (WoundSource)], and ultrasound therapy [UltraMIST (K1407828) (WoundSource)]. Growth factors such as epidermal growth factor, fibroblast growth factor, transforming growth factor–β, and platelet-derived growth factor (PDGF) have been studied for their potential to accelerate wound healing. Notably, the development of PDGF supplementation [Regranex (BLA103691) (Smith + Nephew)] has shown promise as an adjunct in the management of chronic wounds, particularly in diabetic neuropathic ulcers.

The Need for New Treatments:

Chronic wound physiology is known for its complexity, involving intricate cellular processes regulated by multiple signaling pathways and regulatory axes. Emerging technologies have begun to specifically target these coordinated cellular mechanisms. Although foundational interventions for wound care optimization have proven effective, there are still persistent challenges that remain insufficiently understood, requiring continued research and innovation. While commercial products have primarily focused on "macro" factors, such as moisture and pressure, there is considerable opportunity to refine wound care by addressing "micro" factors, including cells, proteins, and peptides. Biomaterials currently available for wound healing primarily target symptom alleviation, such as managing fluid exudation, moisture balance, scarring, pressure relief, and infection. In contrast, more advanced biomaterials are being developed to provide biophysical cues that emulate the extracellular matrix (ECM) and modulate the immune response for effective inflammation resolution. These therapies are often formulated as injectable systems or biomaterial-based delivery systems and may incorporate drug and biological therapies. Fundamental research has demonstrated how biophysical signals (43–50) can be integrated into these biomaterials to control cell behavior (51–57). Biomaterial-based delivery systems, such as hydrogels, can facilitate sustained-release (58) or stimuli-responsive release, which helps to overcome the limits and risks associated with systemic administration and enhances patient adherence to these emerging therapies (59–62). Emerging biomaterials with integrated pharmacological and tissue-regenerative functions are typically biodegradable, with macroporosity to allow for vascularization and cell recruitment. To ensure successful translation into clinical settings, these materials must achieve biocompatibility. Stimuli-responsive release mechanisms can include triggering release based on the skin's pH, which typically ranges from pH 4 to pH 6 (63), a more acidic state during healing (64), or by leveraging temperature differences between the body's core and appendicular skeleton, which can approach a difference of up to 5°C, inducing vasodilation and enhancing nutrient and oxygen supply.

Advanced Wound Therapies in Preclinical Trials

In the context of acute wounds, such as those resulting from surgery or trauma, current bandages play a pivotal role in inhibiting bleeding, absorbing exudate, and promoting wound closure, thereby facilitating the healing process. Recent advancements in wound dressings for acute wounds have concentrated on achieving tight wound closure to ensure hemostasis, managing wound exudate, and preventing infection. For instance, a highly adhesive dressing composed of alginate and poly(N-isopropylacrylamide) was demonstrated to actively contract wounds due to its thermoresponsive properties, exhibiting high toughness and accelerating wound contraction in splinted mouse models (65).

A notable innovation involved combining adhesive hydrogels with surgical mesh, demonstrating strong adhesion, flexibility, permeability, and strength through the use of poly(N-isopropylacrylamide)/chitosan hydrogels and polyethylene terephthalate surgical mesh, respectively, under mechanical stress (66).

In chronic wound management, advanced bandages are designed to target the dysregulated inflammatory phase, replace damaged skin tissue, and offer protection against infection. Particularly in diabetic wounds, recent efforts have focused on stimulating the healing process by inducing acute inflammation. For instance, the preventive delivery of mast cell stabilizers and the release of the neuropeptide substance P induced robust inflammation post-wounding, enhancing wound reepithelialization and accelerating healing in diabetic mice (67, 68). Furthermore, the removal of proinflammatory factors that damage tissue also contributed to improved tissue regeneration and healing in these models. Specifically, reducing the activity of reactive oxygen species and matrix metalloproteinase 9 (MMP9)—both continuously released by immune cells in diabetic wounds—promoted progression into the proliferation phase and expedited wound healing in various diabetic mouse models. Hydrogels engineered for sustained release of the iron(II) scavenger deferoxamine, which prevents the conversion of hydrogen peroxide to the toxic hydroxyl radical, as well as hydrogels releasing low molecular weight MMP9 inhibitors and MMP9-silencing RNA, demonstrated enhanced reepithelialization and accelerated wound healing in diabetic mice (69–71). A sustained-release formulation of PPCN hydrogel loaded with stromal cell-derived factor-1 further accelerated wound healing in diabetic mice (72). Additionally, bandages designed to remove proinflammatory cytokines, such as Monocyte Chemoattractant Protein-1 (MCP-1) and interleukin-8 via electrostatic interactions, also facilitated wound closure in db/db mice, suggesting that reducing chronic inflammation enhances healing in diabetic wounds (73). To address the impaired extracellular matrix (ECM) in diabetic wounds, ECM-mimicking hydrogels, which display laminin-derived peptides or serve as growth factor reservoirs to guide stromal cell behavior, have been investigated. For example, a hydrogel adorned with heparin-binding domains from laminin accelerated wound healing in db/db mouse wounds, with or without the encapsulation of vascular endothelial growth factor and platelet-derived growth factor (PDGF) (74). Moreover, a thermoresponsive hydrogel decorated with the laminin-derived peptide A5G81 facilitated keratinocyte and dermal fibroblast migration, accelerating wound healing in db/db mice with splinted wounds (75). In the context of burn wounds, a peptidic derivative of heat-shock protein 90α applied via a carboxymethyl cellulose hydrogel to burn wounds in pigs improved reepithelialization and promoted healing in this large animal model (76).

Infections are a common and potentially fatal complication in both acute and chronic wounds. A range of anti-infective bandages has demonstrated promising results in preclinical trials. For instance, a polymeric hydrogel composed of poly(acrylic acid) and poly(acrylamide), loaded with antimicrobial silver/graphene particles, exhibited exceptionally high swelling ratios due to the hydrophilic nature of polyacrylamide, thereby promoting wound healing in excised rat wounds (77). Additionally, novel hemostatic, absorbent, and antimicrobial wound dressings, including those based on new mechanobiological strategies, have shown significant promise in animal models of surgical wound healing. Two recently reported hydrogel systems—agarose and alginate—demonstrated high antibiotic loading and sustained release, alongside good wound enclosure and beneficial effects on burn wounds in pig models (78, 79). Furthermore, multilayered poly-l-lactic acid nanosheet suspensions exhibited high barrier functionality, firmly adhering to burn wounds without adhesives and effectively preventing infection by *Pseudomonas aeruginosa* in mouse burn wound models for at least three days (80). For wound infections, several theranostic electroconductive dressings have been developed, designed to monitor infection-related parameters such as pH and temperature, and release antibacterial agents as needed (81–83). One such hydrogel, based on a carbon/polyaniline working electrode, was able to sense wound pH and release cefazolin, which enhanced wound healing in excisional mouse wound models. Another system utilized electrical stimulation to provide pro-healing cues, improving wound healing in diabetic mice (84). Furthermore, various electronics-integrated wound dressings have been recently developed for electrostimulation, wound monitoring (e.g., wound pH and temperature), and on-demand drug delivery (85–87). Moreover, several antimicrobial peptides have shown potential in preclinical wound models (88–

90). For example, a DNA hydrogel releasing antimicrobial peptides, where retention is facilitated by ionic interactions between negative DNA and cationic peptides, reduced *Staphylococcus aureus* burden in ex vivo porcine skin explants and accelerated wound healing in mice (88).

A primary area of research in wound healing involves developing skin substitutes to replace the invasive procedure of autografting, which holds promise for offering new therapeutic options for severe burn injuries, where both auto- and allografting are the current standard treatments. One of the most promising approaches in this domain is three-dimensional (3D) bioprinting, which has garnered significant attention. This technique, which integrates scanning and printing technologies, enables the creation of personalized skin substitutes that provide complete, three-dimensional coverage of wounds. A portable system for 3D scanning and bioprinting, capable of fabricating autologous fibroblast (dermis) and keratinocyte (epidermis) layers composed of collagen and thrombin-crosslinked fibrinogen, demonstrated effective vascularization, reepithelialization, and improved wound healing in excisional mouse models (91). In addition, bioprinted gelatin-alginate hydrogels containing mesenchymal stem cells and a nitric oxide donor, which promotes angiogenesis, significantly accelerated reepithelialization and wound closure in burn wounds in mice (92). However, the large mesh sizes of gels used as bioinks can result in a rapid release of therapeutic agents, leading to burst drug release. To mitigate this issue, hydrogels have been crosslinked during the printing process to enable sustained drug release. For instance, 3D-printed photocrosslinked hydrogels made from chitosan methacrylate, the antibiotic levofloxacin, and the analgesic lidocaine demonstrated controlled drug release over three days and enhanced wound closure in rat burn models (93). In conclusion, experimental bandages for both acute and chronic wounds that possess immunomodulatory, anti-infective, skin-substitutive, and sealing properties have shown considerable promise in animal models of wound healing. These proof-of-concept studies underscore the dynamic progress within the preclinical pipeline, illustrating the potential for addressing critical elements of pathophysiology and clinical challenges associated with acute and chronic wounds.

Role of Nurses in Wound Care and Treatment Interventions:

Nurses play a critical role in wound care and treatment interventions, as they are often the first healthcare professionals to assess, manage, and monitor patients with wounds. Their responsibilities encompass a broad range of tasks, from initial wound assessment to the application of appropriate treatments and ongoing care, all of which are essential to optimizing patient outcomes. Wound care is a dynamic and multifaceted process, and nurses must possess comprehensive knowledge of various wound types, healing processes, and treatment modalities to deliver effective care. One of the primary roles of nurses in wound care is conducting thorough assessments. A detailed wound assessment is essential for determining the type of wound, its severity, and the underlying factors contributing to delayed healing, such as infection, poor circulation, or comorbid conditions like diabetes. Nurses utilize standardized tools and protocols to evaluate the wound's size, depth, exudate levels, and signs of infection, which inform their treatment decisions. They also assess the patient’s overall health status, including nutritional needs and mobility, which can significantly impact wound healing. Effective wound assessment by nurses ensures that appropriate interventions are initiated promptly, and that wound progression is closely monitored.

Following assessment, nurses are responsible for selecting and applying the most suitable dressing or wound care product. The choice of dressings is based on the wound’s characteristics, such as moisture levels, exudate volume, and infection risk. Nurses must be familiar with various types of wound dressings, including hydrocolloids, hydrogels, alginates, and foam dressings, as well as their specific indications. In addition to selecting the correct dressing, nurses must ensure that the dressing is applied correctly to maintain a moist wound environment, promote healing, and prevent complications such as infection or maceration. The proper application and maintenance of dressings are essential for reducing wound healing time and minimizing patient discomfort. Infection control is another vital aspect of wound care, and nurses play a central role in preventing and managing wound infections. They are responsible for maintaining a sterile environment during wound dressing changes and ensuring that proper hand hygiene and infection control protocols are followed. Nurses are also trained to recognize early signs of infection, such as

increased redness, warmth, swelling, or purulent drainage. If infection is suspected, nurses collaborate with other healthcare providers to implement appropriate interventions, which may include wound cultures, antibiotic therapy, and further wound debridement to remove necrotic tissue.

Patient education is a crucial component of wound care and treatment. Nurses educate patients and their families on proper wound care techniques, the importance of good nutrition for wound healing, and lifestyle changes to prevent further injury or infection. They provide guidance on activities such as proper dressing changes, maintaining hygiene, and recognizing early signs of infection. Education is particularly important for patients with chronic wounds, such as those related to diabetes or vascular insufficiency, as they often require long-term management strategies to promote healing and prevent recurrence. Moreover, nurses are involved in the emotional and psychological aspects of wound care. Chronic wounds, especially those resulting from conditions like pressure ulcers, burns, or diabetic ulcers, can have significant emotional and psychological impacts on patients. Nurses provide support and encouragement, addressing any concerns or anxieties patients may have regarding their wounds and the healing process. They also assist patients in setting realistic goals and expectations for wound healing, which helps to reduce stress and enhance the patient's overall well-being. In summary, nurses play an indispensable role in wound care, from initial assessment and treatment to infection prevention, education, and emotional support. Their expertise and ongoing involvement in the wound care process are essential to promoting optimal healing and improving patient outcomes. As the field of wound care continues to evolve, nurses must stay updated on the latest advancements in treatment and technology to provide the highest standard of care.

Conclusion:

Advances in wound care have drastically improved over recent years, yet significant challenges persist, particularly in the management of chronic wounds. These wounds, including pressure ulcers, diabetic foot ulcers, and venous and arterial ulcers, often remain unhealed despite conventional treatments. This review underscores the importance of understanding the underlying mechanisms of wound healing, from the stages of inflammation to tissue repair and remodeling. The natural progression of acute wounds can be hindered by factors such as infection, ischemia, and comorbid conditions, which can prevent the transition to the healing phase. The nursing role in wound care is central to patient outcomes, requiring a comprehensive approach to assessment, treatment, and ongoing management. Nurses are pivotal in selecting appropriate dressings, applying therapies such as negative pressure wound therapy (NPWT), and ensuring infection control. Emerging technologies, including biologics, growth factors, and tissue-engineering approaches, are transforming wound care, offering new solutions for difficult-to-heal wounds. For instance, biologic products such as cultured epidermal autografts and dermal regeneration templates are gaining traction, particularly in chronic wounds over sensitive areas. Moreover, novel approaches targeting cellular behavior, such as stimuli-responsive biomaterials, are being developed to improve healing rates. Despite these advancements, challenges remain, particularly in integrating these new technologies into everyday clinical practice. Nurses must be equipped with both theoretical knowledge and practical skills to implement these innovations effectively. Additionally, ongoing research is needed to refine these therapies, with a focus on improving biocompatibility, enhancing patient adherence, and minimizing risks associated with their use. Future directions in wound care will likely involve a more personalized approach, where treatment is tailored based on the individual's wound physiology and underlying health conditions. The role of nurses will continue to expand, incorporating advanced technologies into their practice while providing essential patient education and support. Additionally, advancements in wound care products that mimic the extracellular matrix (ECM) or offer sustained drug release hold promise for accelerating healing and improving patient outcomes. In conclusion, the evolving landscape of wound care presents both opportunities and challenges for healthcare providers, particularly nurses. With the integration of cutting-edge technologies and continued innovation, there is hope for more effective treatments that can significantly enhance wound healing and improve patient quality of life.

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الملخص:

الخلفية: تمثل الجروح، سواء كانت حادة أو مزمنة، تحديات كبيرة في الرعاية الصحية بسبب انتشارها وتعقيدها. يمكن أن تؤدي هذه الإصابات إلى فترات تعافي طويلة، واحتشاء الأنسجة، وزيادة تكاليف الرعاية الصحية. يشمل شفاء الجروح سلسلة من المراحل القابلة للتنبؤ، ولكن الجروح المزمنة، التي تنشأ غالبًا من حالات مثل مرض السكري وقروح الضغط، قد تفشل في التقدم عبر هذه المراحل، مما يؤدي إلى مضاعفات. على الرغم من التقدم في رعاية الجروح، بما في ذلك التقنيات والمنتجات المختلفة، فإن معالجة الجروح المزمنة لا تزال تمثل تحديًا كبيرًا.

الهدف: الهدف من هذه المراجعة هو تلخيص أفضل الممارسات في التمريض لإدارة الجروح، مع التركيز على دور التقنيات الناشئة والأساليب العلاجية المتقدمة في تحسين نتائج شفاء الجروح.

الطرق: تدمج هذه المراجعة الأدبيات الحديثة حول ممارسات رعاية الجروح، مع تسليط الضوء على أنواع الجروح المختلفة، ومراحل الشفاء، والتقنيات العلاجية الناشئة. تناقش المراجعة بروتوكولات الرعاية القياسية، مثل التنظيف الجراحي، والوقاية من العدوى، واستخدام الضمادات الخاصة، إلى جانب أحدث التقدمات في رعاية الجروح، بما في ذلك المنتجات البيولوجية، والعلاج بالضغط السلبي للجروح(NPWT) ، ونهج الهندسة النسيجية.

النتائج: تشير النتائج الرئيسية لهذه المراجعة إلى أنه على الرغم من أن الأساليب التقليدية في رعاية الجروح، بما في ذلك التنظيف الجراحي والسيطرة على العدوى، تظل مهمة، فإن التقنيات الناشئة مثل العلاج بالضغط السلبي للجروح، والمنتجات البيولوجية، والضمادات المتقدمة تحسن من أوقات الشفاء والنتائج. توفر الأساليب الجديدة التي تستهدف الآليات الخلوية والمحاكاة في مصفوفة الخلايا خارجية (ECM) آفاقًا علاجية واعدة. لقد أظهرت دمج عوامل النمو، وعلاج الخلايا الجذعية، والإشارات الفيزيائية الحيوية في منتجات رعاية الجروح إمكانات في تسريع عملية الشفاء.

الخاتمة: تطورت رعاية الجروح بشكل كبير من خلال الابتكارات في التقنيات والعلاجات. يلعب الممرضون دورًا حيويًا في إدارة الجروح الحادة والمزمنة، حيث يطبقون العلاجات المتقدمة والممارسات المعتمدة على الأدلة لتحسين نتائج الشفاء. لا بد من استمرار البحث في الآليات الجزيئية والخلوية لشفاء الجروح لتطوير علاجات أكثر فعالية ودقة، مما يقلل من العبء على أنظمة الرعاية الصحية.

الكلمات الرئيسية: رعاية الجروح، التدخلات التمريضية، الجروح المزمنة، العلاج بالضغط السلبي للجروح، عوامل النمو، الهندسة النسيجية، المنتجات البيولوجية، شفاء الجروح.