

## Diabetic foot ulceration and Wound Healing Dressing materials

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### Abstract

Wound dressings signify a part of the organization of diabetic foot ulceration. Preferably, dressings should assuage symptoms, provide wound protection, and persuade healing. No single dressing fulfills all the requirements of a diabetic patient with an infected foot ulcer. Dressing's research in this area is in general poor. On the other hand, each category of dressings has particular characteristics that aid selection. Non glue dressings are simple, low-cost, and well tolerate. Foam and alginate dressings are highly absorbent and effective for heavily exuding wounds Dressings contain inadine and silver may aid in managing wound infection. Occlusive dressings should be avoided for infected wounds. All dressings require frequent change for wound inspection. Profoundly exudation ulcers require frequent change to reduce maceration of surrounding skin. Dressing alternative should be guided by the characteristics of the ulcer, the requirements of the patient, and costs.

**Keywords:** Diabetic foot ulceration; Wound Healing; Dressing Materials.

### Introduction

In the modern era in human life faced the most complicated biological process that occurs in healing of wound. In the moment of after an injury, the biological pathways to immediately responds to the wound repair process in it's become activated and are synchronized to respond healing process, however, retain the ability to regenerate

healing process throughout human life. Regenerate pathways in humans, which would change medical practice as much as the introduction of wound healing did in the twentieth century. Diabetes affects approximately 170 million people worldwide,

#### 2.1 wound

A wound by factual definition is a crash in the defensive function of the skin; the loss of continuity of the epithelium, with or lacking loss of primary connective tissue (i.e. muscle, bone, nerves. A wound may be described in many ways; by its etiology, anatomical location, by whether it is acute or chronic, by the method of closure, by its presenting symptoms or undeniably by the exterior of the predominant tissue types in the wound bed The wound also undergoes physical contraction throughout the entire wound healing process, which is believed to be mediated by contractile fibroblasts (myofibroblasts) that appear in the wound

#### 2.1.1 Wound Classification

Wounds may be classified by several methods; there an etiology, location, type of injury or presenting symptoms, wound depth and tissue loss or clinical appearance of the wound. General wounds are classified as being:

- Superficial (loss of epidermis only)
- Partial thickness (engage the epidermis and dermis)
- Fullthickness (engage the dermis, subcutaneous fat and on instance bone)

The most widespread method for classification of a wound is identification of the leading tissue types in attendance at the wound bed that is black - necrotic and the relevant amount of each articulated as a proportion. This categorization method is very visual, supports good assessment and planning

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and assists with uninterrupted reassessment.

### 2.1.2. Wound healing

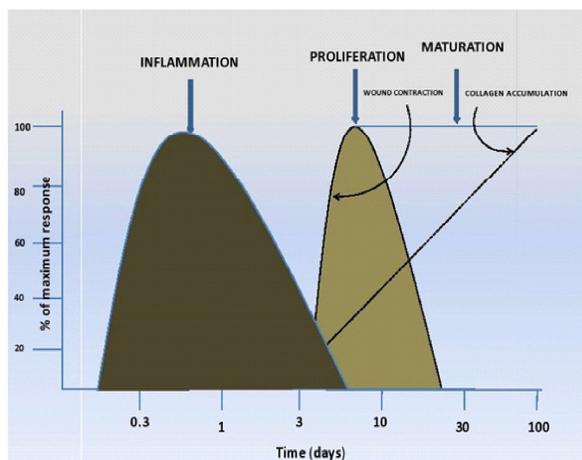
Wound healing is the course of action by which skin or other body tissue repairs itself subsequent to trauma. In undamaged skin, the epidermis (exterior layer) and dermis (deeper layer) form a protecting barrier aligned with the external environment. When the barrier is busted, an orchestrated surge of biochemical events is set into motion to repair the damage. This process is alienated into conventional phases: blood clotting (hemostasis), inflammation, tissue enlargement (proliferation) and tissue modernize (maturation). Blood clotting may be well thoughtout to be part of the inflammation stage as an alternative of a separate stage

### 2.1.3. Phases of Wound Healing

Whether wounds are closed by primary objective, theme to delayed primary closure or left to heal by secondary objective, the wound healing process is a vibrant one which can be divided into three phases. It is decisive to retain information that wound healing is not linear and repeatedly wounds can progress both forwards and back through the phases depending upon innate and extrinsic armed forces at work within the patient.

The phases of wound healing are:

- Inflammatory phase
- Proliferation phase
- Maturation phase



## 3. Diabetic wound healing

Diabetic foot is one of the most considerable and destructive complications of diabetes, and is defined as a foot precious by ulceration that is

connected with neuropathy and/or peripheral arterial disease of the lower limb in a patient with diabetes

A diabetic foot ulcer is a wound that occurs in approximately 15 percent of patients with diabetes and is collectively positioned on the bottom of the foot. Of those who develop a foot ulcer, 6 percent will be hospitalized due to infection or other ulcer-related complication.

Diabetes is the foremost cause of non-traumatic lower extremity amputations in the world, and approximately 14-24 percent of patients with diabetes who develop a foot ulcer will require a confiscation. Foot ulceration precedes 85 percent of diabetes-related amputations. Research has shown, however, that development of a foot ulcer is escapable.

### 3.1 Taxonomy of Diabetic wound healing

The most extensively conventional taxonomy system for diabetic foot ulcers and lesions is the Wagner ulcer taxonomy system. This system [Table 1], which is based on the depth of penetration, the presence of osteomyelitis or gangrene, and the extent of tissue necrosis the drawback of the Wagner taxonomy system and The University of Texas taxonomy represent a progress in the healing of the diabetic foot. This system [Table 2] uses four grades, each of which is customized by the presence of infection (Stage B), ischemia (Stage C), or both (Stage D). This system has been validated and is in general extrapolative of of outcome, since growing grade and stage of wounds are less likely to heal without revascularization or amputation. It is now widely used in several clinical trials and diabetic foot centers.

Since there are a manifold taxonomy schemes, it is unstated that each has its own set of advantages and drawbacks. The advantage of the Meggitt-Wagner and University of Texas taxonomy is that both systems have been shown to be predictive of poor outcomes

However, there are certain drawbacks of all current taxonomy:

- These taxonomy do not include all the diabetic foot complications.
- They are thorny to remember, principally University of Texas taxonomy and PEDIS taxonomy.
- They cannot be used as a teaching tool, as this taxonomy are difficult to be understood

### 3.2 Factors Affecting Wound Healing

Numerous factors can lead to impair wound healing. In general terms, the factors that persuade revamp can be categorized into confined and systemic. Confined factors are individuals that directly manipulate the characteristics of the wound itself, while systemic factors are the on the whole health or disease condition of the entity that affect his or her knack to heal (Table 3). Many of these factors are correlated, and the systemic factors act through the local effects affecting wound healing.

**Table 1.** Wagner-Meggitt Classification of Diabetic Foot.

Grade 0	No open lesions; may have deformity or cellulitis
Grade 1	Superficial diabetic ulcer (partial or full thickness)
Grade 2	Ulcer extension to ligament, tendon, joint capsule, or deep fascia without abscess or osteomyelitis
Grade 3	Deep ulcer with abscess, osteomyelitis, or joint sepsis
Grade 4	Gangrene localized to portion of forefoot or heel
Grade 5	Extensive gangrenous involvement of the entire foot

Table 2. University of Texas Classification of Diabetic Foot.

	Grade 0	Grade 1	Grade 2	Grade 3
Stage A	Preulcerative or postulcerative lesion completely epithelialized	Superficial wound, not involving tendon, capsule or bone	Wound penetrating to tendon or capsule	Wound penetrating to bone or joint
Stage B	Infection	Infection	Infection	Infection
Stage C	Ischemia	Ischemia	Ischemia	Ischemia
Stage D	Infection and Ischemia	Infection and Ischemia	Infection and Ischemia	Infection and Ischemia

When an area of the body does not receive a passable amount of oxygen, a condition known as hypoxia, it can slow and even halt the healing progression.

**Table 3.** Local-Systemic Factors

Local Factors	Systemic Factors
Oxygenation	Age and gender
Infection	Sex hormones
Foreign body	Stress
Venous sufficiency	Ischemia
	Diseases: diabetes, keloids, fibrosis, hereditary healing disorders, jaundice, uremia
	Obesity
	Medications: glucocorticoid steroids, non-steroidal anti-inflammatory drugs, chemotherapy
	Alcoholism and smoking
	Immuno compromised conditions: cancer, radiation therapy, AIDS
	Nutrition

#### How do increase oxygen flow

Supplying wounds with this necessary is about much more than just inhalation, even though proper

### 3.3 Local Factor That Influence Healing

#### 3.3.1 Oxygenation

##### What role does oxygen play

Even as the exact way oxygen works in the wound healing process is not completely unstated, it's extensively renowned oxygen plays a role in virtually every part of the wound healing stages. When the body experiences a wound, it develop an increased need for bacterial resistance, cell propagation, collagen synthesis and angiogenesis, amongst other reparative function.

As reported in the British Journal of Dermatology, oxygen's foremost function lies in its aptitude to produce energy. In order for cells to appropriately reproduce and migrate, they must have a plenty amount of energy. Like all functions involved in the human biology, they have need of oxygen to be able to make energy.

inhalation techniques are significant for wound healing as well as common health. ensure that the arteries and veins are pliant, open and clear is key to creation sure that blood flows to the wound bed and can transport with it oxygen molecules. That means subsequent your diabetes high blood pressure care plans to construct sure your cardiovascular system is in finest condition. moreover, quitting smoking and avoid excessive alcohol consumption can be advantageous to oxygen supply to the wound bed

#### 4. Process of wound dressing materials

The process of dressing choice is determined by a number of factors together with the nature and position of the wound, and the assortment of materials available. In most situations the cost of healing is also a most important factor. This article describe some of these structured in detail and provide advice on the arrangement of a structured approach to the selection process.

If we've eternally vocal with our doctor or constant browsed through our local medical bring in store, we capacity previously be attentive of the

option patients have for wound dressings. With so much range reachable, include poles a part styles, core materials and indispensable usage; it can be thorny to choose the right dressing for your unique wound healing requirements. If you find manually stuck seeking out the best option, follow these handy tips for choosing the best dressing.

In recent years we encompass heard of a number of animal-related products and research studies that have insightful implication for the wound care manufacturing. Whether wound dressings made to simulate spider webs or using tilapia to improve wound healing rates, there are a number of hugely valuable animal species. If there's one creature you would might not take for granted to be helpful, the crocodile might come to mind. Over the last several months, there has been a number of impressive wound care breakthrough courteousness of animal crop. That includes a powerful foam inspired by frogs and wound dressings made from eggshells. Moreover, scientists have used Zebra fish to study the properties of skin growth. Now, fish are once again plateful push the precincts of wound healing expertise.

The wound care production is all about exploring new ideas to lessen costs and recover patient treatment. While options like honey, foam and collagen are more established, there are wound dressings made from a slew of it appears that unlikely sources. That list includes crab shells, algae and special fluorescent dye, among several other exceptional types. Now, there could be a new dressing array made from a source with a little more history in the wound care industry.

There are numerous wound dressing types, like hydrocolloid and collagen that remove slough and foster tissue regrowth. Many existing ointment, like alginate, are perfect for chronic leg ulcers. Hypochlorous acid, in the interim, is perfect for tackling the biofilms that develop on chronic wounds. And research into more efficient treatments happen all the time, as with the development of solutions like the Coban 2 Compression System and Hydrofera Blue Ready.

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##### *5. Future prospective of diabetic wound dressing material.*

Wound dressing material is prove to be a very flexible material. It can be used in a wide diversity of biomedical application, from topical wound dressings to the hard-wearing scaffolds requisite for tissue engineering. Many researchers are previously trying to develop novel biomaterials from synthetic polymers. These new materials could be used in several biomedical and biotechnological applications, such as tissue engineering, wound dressings, drug delivery and medical implants. Conversely, much interdisciplinary research is required in order to bring dressing material crop to successful commercialization. A number of medical studies will be essential to prove its usefulness and functionality. If dressing material proves to be efficient in wound repair and tissue engineering, then it will have to be produced on an industrial scale. Due to its simple fermentation process, large scale microbial cellulose production appears to be quite viable; however, specific engineering details need to elaborate. Also, more biochemical and genetic investigations need to be conducted in order to fully understand and improve the dressing material production process.

##### *Conclusion*

An extensive array of dressings is now commercially on hand for treatment of diabetic foot ulcers. New products are recurrently creature at large, each under attack at different aspects of healing. Without clinical trials involving infected ulcers, no confirmation can be gathered to differentiate these products. A suitable dressing will control exudates and odor, assuage pain, and contain wound infection. Whatever dressing is chosen, there is no substitute for adequate wound debridement, appropriate systemic antibiotic therapy, and frequent (daily) dressing changes and wound inspection.

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