
ApodanNordic

**Wound Care
Training Program**

For Instructional Purposes Only

Attention

This manual is provided for your educational purposes only.

It is designed to help you gain a better understanding of the treatment of wounds. It is not intended to be used for selling purposes.

This manual is set up as a training manual, together with a Power Point presentations on each subject that can support the training and education. For each subject written there will be a copy of the slide that supports the subject in the left margin.

Enjoy your reading

Bent Jensen
ApodanNordic A/S

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Introduction

Our skin is one of the largest organs of the body. It measures two square yards (1.8 m²) and has many functions. It is also highly visible. Records show that, throughout history, persons with skin diseases have suffered severe discrimination. If the skin breaks down and heals again, the resulting scar can be uncomfortable, unattractive, or both. After reading this section I hope, that you will understand the good wound care practices.

The following criteria have been established for an ideal wound dressing

- Is safe for the patient
- Does not introduce dangerous compounds into the wound bed.
- Maintains a clean wound bed
- Avoids dehydration of the wound bed
- Maintains body temperature at the wound site
- Prevents exogenous bacteria from entering the wound
- Protects the surrounding skin and prevents maceration
- Removes necrotic tissue
- Minimizes bacterial growth
- Promotes formation of granulation tissue
- Facilitates re-epithelialization
- Manages exudates
- Minimizes disruption of the wound bed
- Controls odor
- Relieves pain
- Stays in place
- Applies and removes easily
- Saves clinician and caregivers time
- Is cost effective

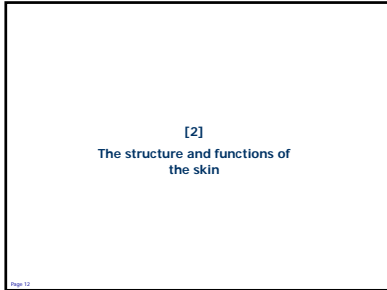
Strange words can be found in the “Glossary” section in the back of your manual.

Use the manual and the Power Point presentations; after all, only practice makes perfect.

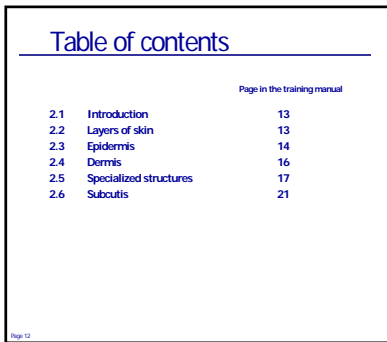
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Section 1.



The structure and functions of the skin



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1.1 Introduction

Our skin is one of the largest organs of the body. It measures two square yards (1.8 m²) and has many functions. It is also highly visible. Records show that, throughout history, persons with skin diseases have suffered severe discrimination. If the skin breaks down and heals again, the resulting scar can be uncomfortable, unattractive, or both. After reading this section you will understand the good wound care practices.

In addition to simply giving us a permanent "bodysuit" to make sure we stay intact, the skin has many specific and important functions.

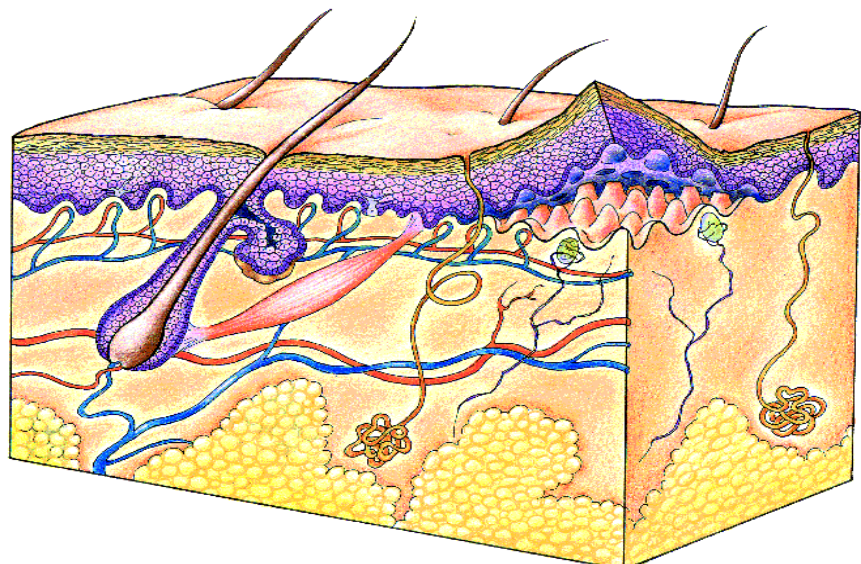
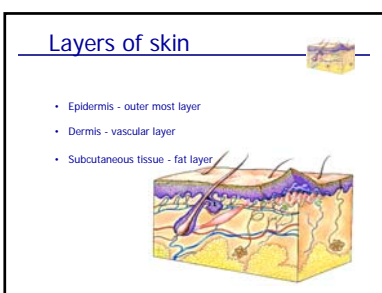
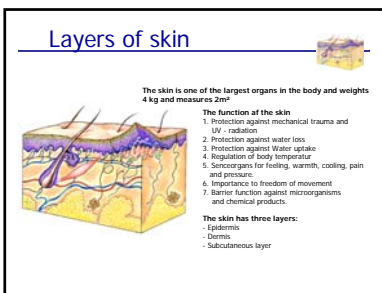
1.2 Layers of skin

The function of the skin

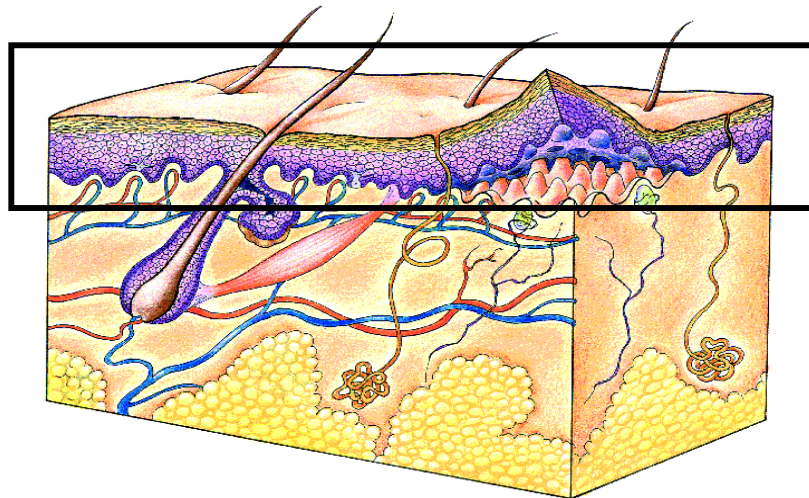
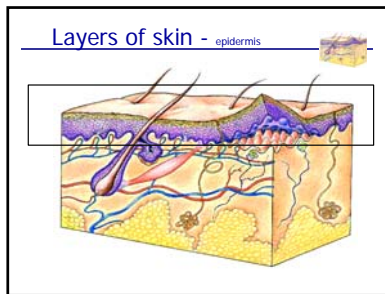
1. Protection against mechanical trauma and UV - radiation
2. Protection against water loss
3. Protection against Water uptake
4. Regulation of body temperature
5. Sense organs for feeling, warmth, cooling, pain and pressure.
6. Importance to freedom of movement
7. Barrier function against microorganisms and chemical products.

The skin is made up of three layers:

- Epidermis
- Dermis
- Subcutaneous layer



1.3 Epidermis



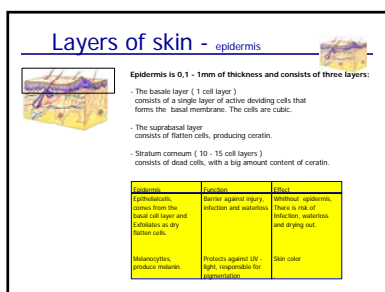
Epidermis vary in thickness in different parts of the body 0,1 - 1mm of thickness and consists of three layers:

The basal layer (1 cell layer) consists of a single layer of active deviding cells that forms the basal membrane. The cells are cubic.

The supra basal layer consists of flatten cells, producing keratin.

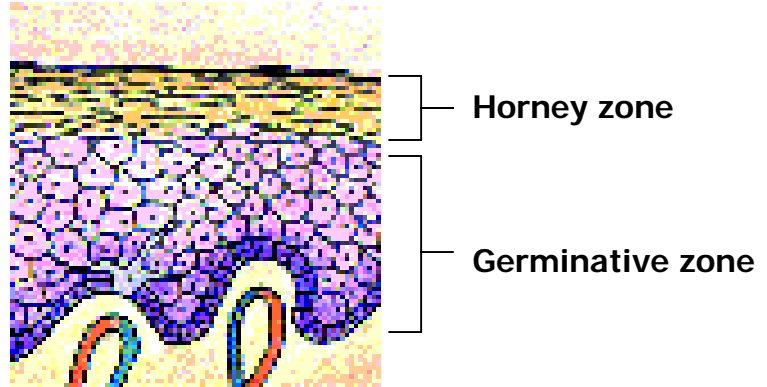
Stratum corneum (10 - 15 cell layers) consists of dead cells, with a high amount content of keratin.

The epidermis is thick and hard in areas subject to wear and tear (soles of feet, palm of the hands). In regions like the inner tights and eye lasses it is thinner and softer.



| Epidermis | Function | Effect |
|--|---|---|
| Epithelial cells, comes from the basal cell layer and Exfoliates as dry flatten cells. | Barrier against injury, infection and water loss | Without epidermis, There is risk of Infection, water loss and drying out. |
| Melanocytes, produce melanin. | Protects against UV - light, responsible for pigmentation | Skin color |

If you look at a cross section of the *epidermis*, you can see two zones. These are known as the *horney zone* and the *germinative zone*



The stratum corneum is located in the horney zone. The stratum spinosum, stratum granulosum and basal cell layer (or stratum basale) can be found in the germinative zone.

Normally only the cells in the germinative zone are alive. They are: keratinocytes, melanocytes, Langerhans cells and Merkel´s cells.

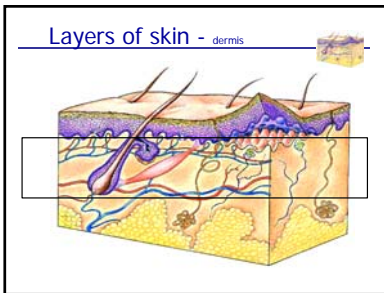
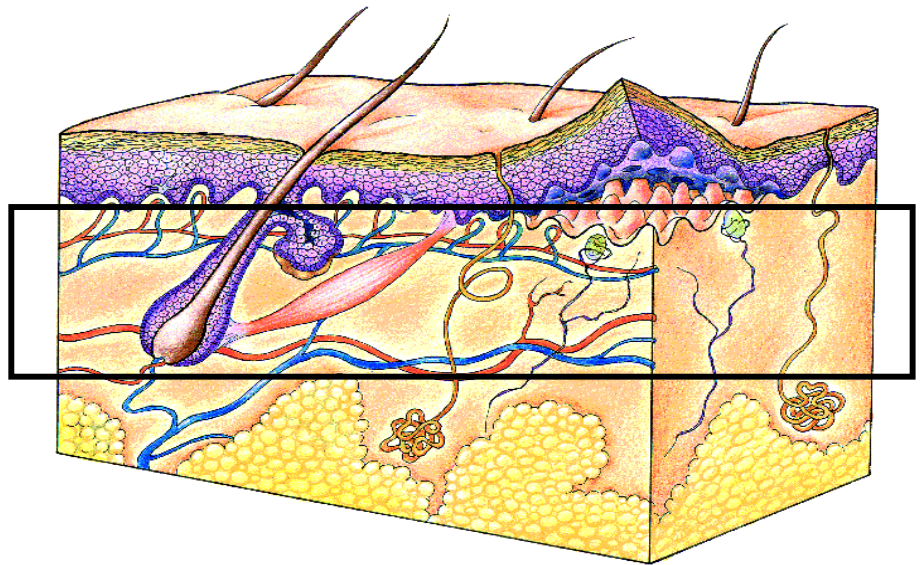
The most common cell in the epidermis is the keratinocyte.

The keratinocyte begins life in the basal cell layer. It is tall and has the form of a column. As the cell gets older, it moves up to the surface (that is, the stratum corneum) and becomes flatter.

The cell loses its nuclei and starts producing a protective protein, *keratin*. When the keratinocytes reach the surface of the skin, they are dead and shed off as dry flakes of *keratin*.

The main functions of the epidermis are to protect us against our environment and prevent dehydration.

1.4 Dermis



Dermis is a compact 1 - 4 mm of thickness and consists of:

- Connective tissue and different specialized structures (sweat glands, sebaceous glands, hair follicles, blood vessels and nerve endings)

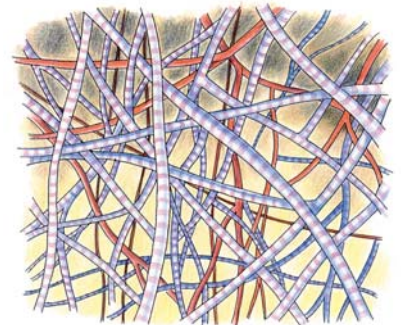
Layers of skin - dermis

Dermis is a compact 1 - 4 mm of thickness and consists of:

- Connective tissue and different specialised structures (sweat glands, sebaceous glands, hair follicles, blood vessels and nerve endings)
- The Connective tissue components:
 - Collagen 90%
 - Elastin 5%
 - Amorph substances 5%

| Dermis | Function | Effect |
|---------------------|----------------------|---|
| Collagen - proteins | Strenght and support | The strenght is dependent on amount and quality of the collagen |
| Elastin - proteins | Elasticity | Reduce scarring |

- The Connective tissue components:
 - Collagen 90%
 - Elastin 5%
 - Amorph substans 5%

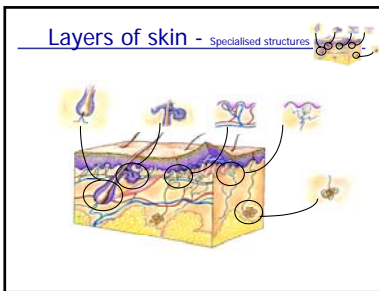


| Dermis | Function | Effect |
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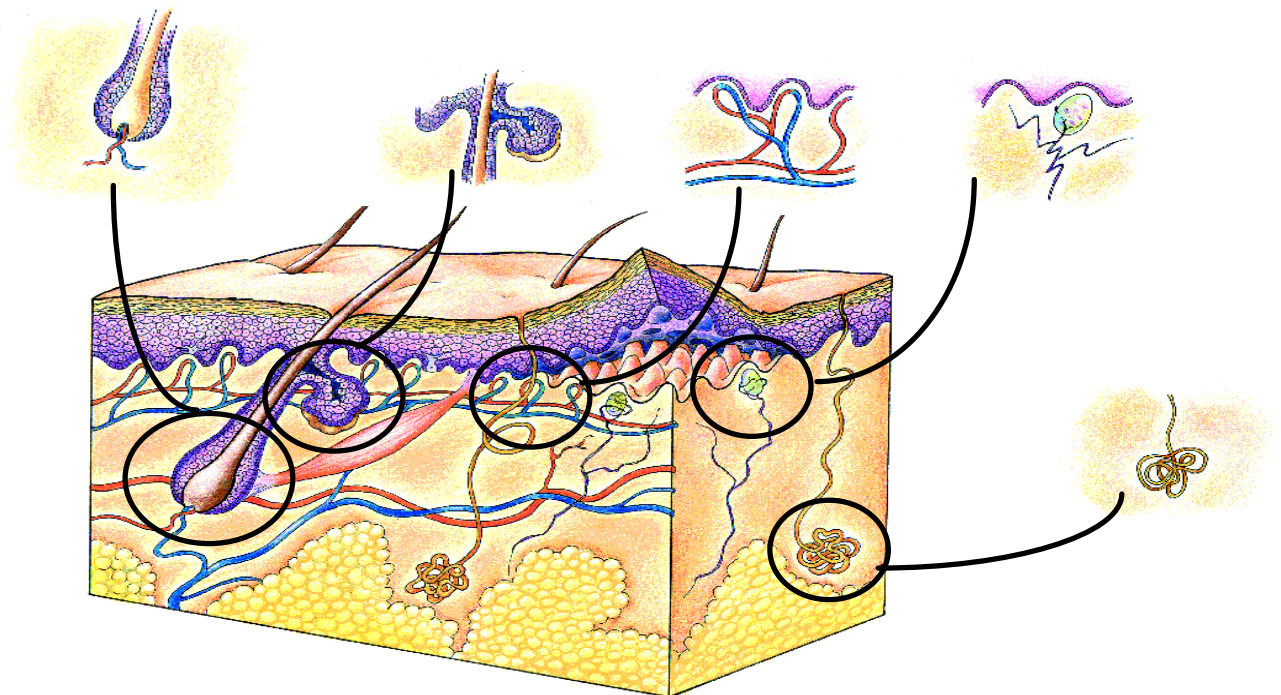
The Dermis mainly consists of proteins. Collagen gives the skin its physical properties and provides support, and elastin and reticulin provide elasticity. The collagen fibers are secreted by cells called fibroblasts by a process called fibroplasia. Collagen fibers are grouped together, like rope, and are very strong.

The dermis can also be divided in two parts: the papillary dermis (just below the epidermis) and the reticular dermis (the lower, or deeper, dermis).


1.5 Specialized structures



The dermis also contains many special structures including:



Layers of skin - Specialised structures

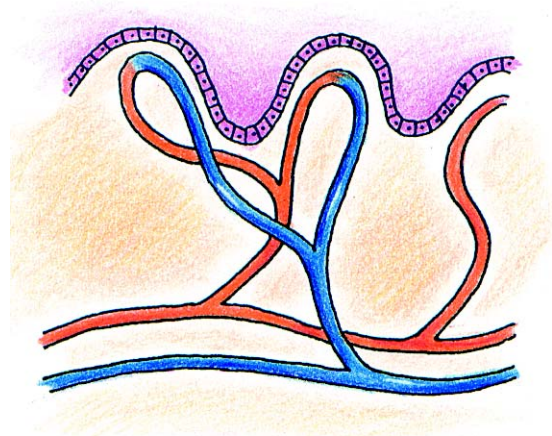


Blood vessels :

- Big arteries in the subcutaneous fat layer sends a net of small vessels in to the dermis. The small vessels reach the papillary area and supply the basal membrane.
- All nutrition to the epidermis is provided by diffusion over the basal membrane.
- The superficial vessel system also have impact on the regulation of body temperature.

| Arteries | Venules | Capillaries |
|------------------------|------------------------|------------------------|
| Carry oxygenated blood | Carry oxygenated blood | Carry oxygenated blood |
| Carry oxygenated blood | Carry oxygenated blood | Carry oxygenated blood |
| Carry oxygenated blood | Carry oxygenated blood | Carry oxygenated blood |

Blood vessels :




Blood vessels to provide the skin with oxygen and nutrients, to remove waste products, and to help regulate our body temperature.

Big arteries in the subcutaneous fat layer sends a net of small vessels in to the dermis. The small vessels reach the papillary area and supply the basal membrane.

All nutrition to the epidermis is provided by diffusion over the basal membrane.

The superficial vessel system also have impact on the regulation of our body temperature.

Layers of skin - Specialised structures

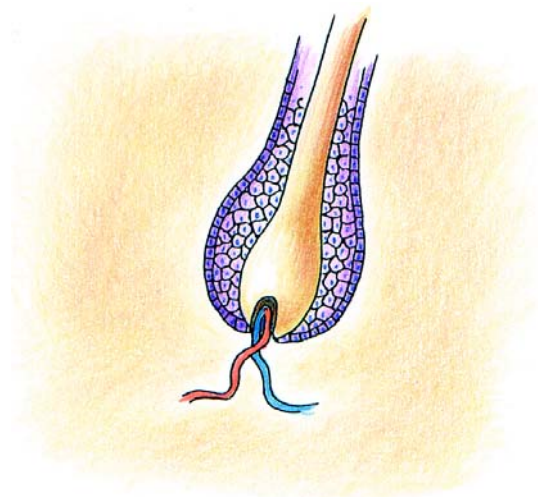


Hair follicles :

- Consists of the outlayer of collagen from dermis. The inner layer is epidermal cells.
- The hair grows from the base of the follicle.
- Every single follicle has its own muscle (erector pili), that can raise the hair.
- That is a part of the termoregulationen.
- The hair also is a part of the sensefeeling

| Arms | Arms | Arms |
|------|------|------|
| Arms | Arms | Arms |
| Arms | Arms | Arms |
| Arms | Arms | Arms |

Hair follicles:



Consists of the outer layer of collagen from dermis. The inner layer is epidermal cells.


The hair grows from the base of the follicle.

Every single follicle has its own muscle (erector pili), that can raise the hair.

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It is important to note that hair follicles are lined with epidermal cells even though they are in the dermis. As such, hair follicles play a significant role in the wound healing process, to be discussed later.

Layers of skin - Specialised structures

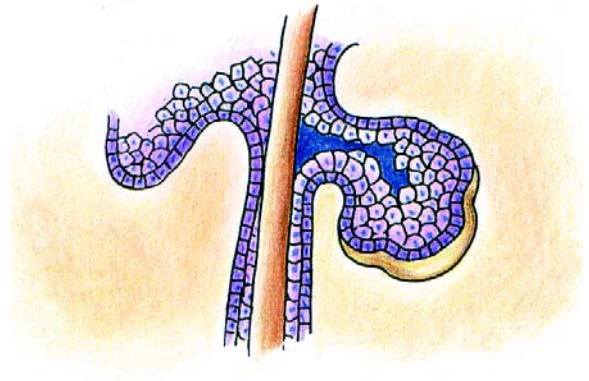


Sebaceous glands:

- Sebaceous glands secrete an oiled substance (Sebum)
- Sebum is part of the ointment to the hairfollicle and the skin.
- Is part of keeping the pH of the skin on approx. 5

| Name | Function | Effect |
|------------------|--|---|
| Sebaceous glands | Produce sebum and keeps the hair and skin as a smooth condition. | "Undamaged" by superficial injury "Damaged" by deep injury |


Sebaceous glands:



Sebaceous glands secrete an oiled substance (Sebum). Sebum is part of the ointment to the hairfollicle and the skin.

Is part of keeping the pH of the skin on approximately 5.

Layers of skin - Specialised structures

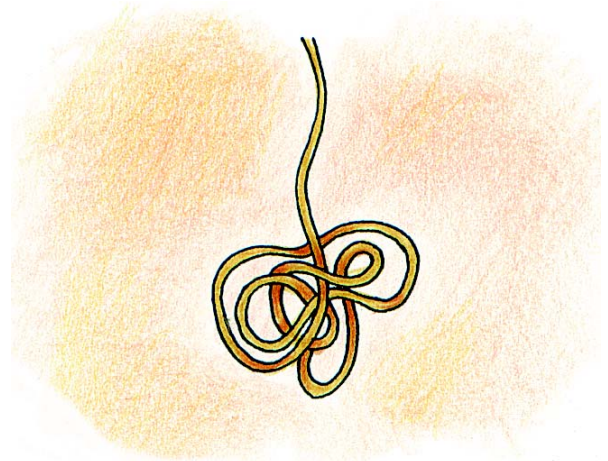


Sweat glands :

- The apocrine sweat glands are localised under the arms, near the breast and around the genitals.
- The sweat glands' takes part in the thermoregulation.
 - There is a normal water loss of 500 ml, but under extreme circumstances it can be up to 6 L. / 24 Hours

| Name | Function | Effect |
|--------------|--------------------------------|---|
| Sweat glands | Produce sweat Thermoregulation | "Undamaged" by superficial injury "Damaged" by deep injury |

Sweat glands :




The apocrine sweat glands are localised under the arms, near the breast and around the genitals.

The sweat glands take part in the thermoregulation. There is a normal water loss of 500 ml, but under extreme circumstances it can be up to 6 L. / 24 Hours.

During puberty, as part of the development of secondary sex characteristics, the apocrine glands are formed in the dermis under the arms, near the breast and around the genitals. These glands have features of both sweat and sebaceous glands.

Layers of skin - Specialised structures



Nerve endings:
 - Specialised somatic receptors for feeling pain, warmth, cold, feeling and pressure.
 - Many receptors are localised by the hair follicles.

| Name | Function | Effect on skin |
|-----------------|---|---|
| Nerve - endings | Feeling of pain, temperature, touch, pressure and vibration and reflexes. | Injury on nerve endings increases the ability to react on trauma. |

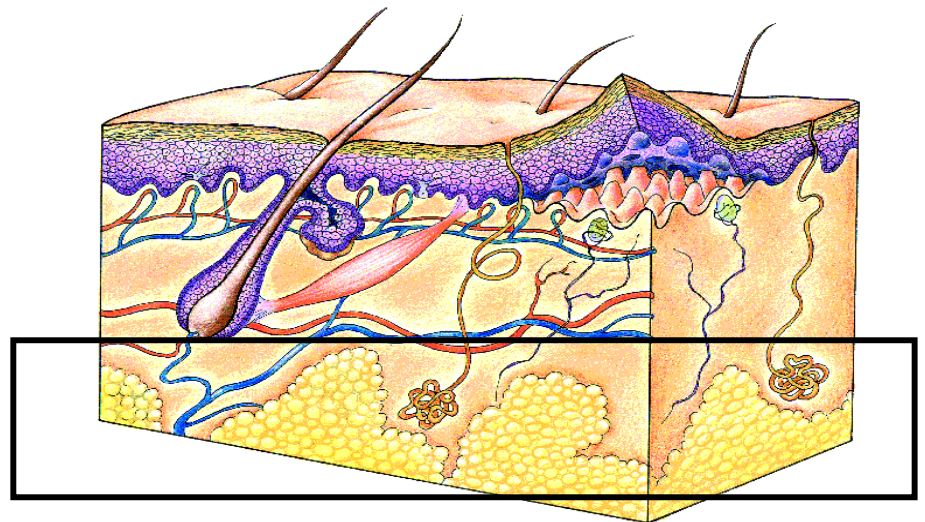
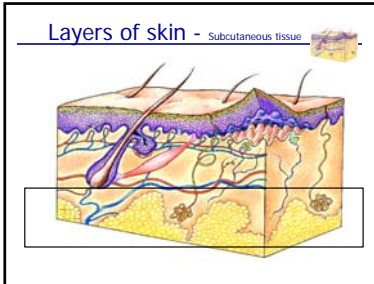
Nerve endings :



Specialised somatic receptors for feeling pain, warmth, cold, feeling and pressure.

Many receptors are localised by the hair follicles.

1.6 Subcutaneous layer



Layers of skin - Subcutaneous tissue

The subcutaneous layer is loosely un-organized layer:
 - Consists normally big deposits of fatty tissue.
 Injury on subcutaneous tissue can be very difficult to heal.

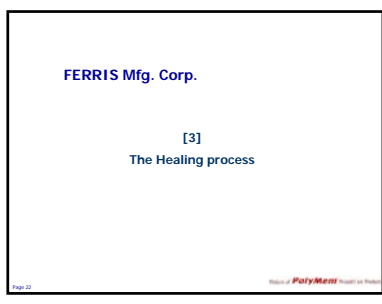
| Subcutis | Function | Effect |
|-------------------------|---|--|
| Fat - soft mobile layer | Insulate, energy store, Act as a cushion against trauma | Missing subcutaneous tissue changes skin contours |
| Loose connective tissue | Protects against cold | Damaged tissue has effect on other tissue areas in terms of blood supply |

The subcutaneous fatty tissue, or superficial fascia, contains fat and looser connective (also called fibrous) and elastic tissue. The amount of fat tissue varies greatly. On the abdomen, for instance, there is an abundance of fat and very little fibrous tissue whereas the scalp contains almost no fat tissue at all.

The subcutaneous fat is not only the body's energy store but also supports blood vessels and nerves passing to the dermis. In addition, it acts as a cushion to protect the body from damage and helps protect against the cold.

| Subcutis | Function | Effect |
|---|--|--|
| Fat - soft mobile layer. | Insulate, energy store. Act as a cushion against trauma | Missing subcutaneous tissue changes skin contours |
| Loose connective tissue Contains nerve-endings and blood vessels | Protects against cold | Damaged tissue has effect on other tissue areas in terms of blood supply |

Section 2.



The healing process

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2.1 Introduction

We often take the healing process for granted. By the time we are adults, most of us have hundreds of wounds and most, if not all, closed rapidly and did not cause problems after they were healed. However, the healing process is very complex and can be influenced by many factors. As a matter of fact, taking wound healing for granted can cause serious complications for a large number of people..

To better understand how, and why, these complications can occur we have to understand what is normal. In this section, I will describe the process of the wound healing and what you can expect if no complications occur.

Immediately after the skin has been damaged the process of wound healing starts

2.2 Inflammation (day 0 – 8)

At the very first hemostasis will occur to stop the bleeding. Blood, leaking from inflamed, dilated, or broken vessels, coagulates. A clot forms and platelets interact to generate the cascade that forms thrombin.

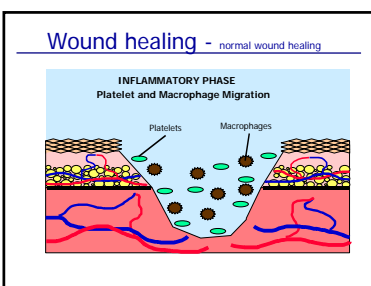
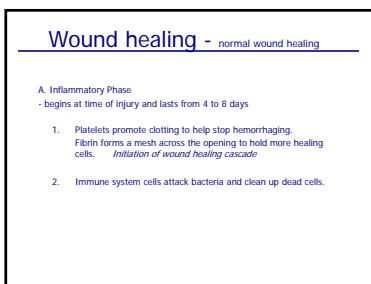
Thrombin converts fibrinogen to polymer fibrin which closes the blood vessels

Inflammatory Phase begins at time of injury and lasts from 4 to 8 days

Platelets promote clotting to help stop hemorrhaging. Fibrin forms a mesh across the opening to hold more healing cells. *Initiation of wound healing cascade*

Immune system cells attack bacteria and clean up dead cells.

Inflammation is both a defense mechanism (by means of neutrophils and mast cells during the early stages, and macrophages during the later stages of inflammation) and a response to start the healing process. Inflammation is characterized by redness, swelling, heat, pain and loss of function. Macrophages also secrete chemicals and growth factors to trigger wound healing.



2.3 Proliferation, or granulation tissue formation (day 2 – 13)

Wound healing - normal wound healing

B. Proliferative Phase
 - lasts from 4 to 13 days. Granulation occurs during this time

1. Fibroblasts migrate to the wound and start forming new connective tissue. Collagen adds strength to the repair area
2. Blood vessels begin reforming and soon proliferate. Skin cells migrate and divide to repair the wound surface.

Lasts from 4 to 13 days. Granulation occurs during this time.

Fibroblasts migrate to the wound and start forming new connective tissue. Collagen adds strength to the repair area.

Blood vessels begin reforming and soon proliferate. Skin cells migrate and divide to repair the wound surface.

Wound healing - normal wound healing

PROLIFERATIVE PHASE
Collagen Synthesis

Fibroblast

Dermal tissue lost in partial-thickness or full-thickness wounds needs to be replaced before the wound can resurface.

Wound healing - normal wound healing

PROLIFERATIVE PHASE
Neovascularization: New Capillary Formation

New Capillaries

Angiogenesis, the formation of new blood vessels, provides nutrients and oxygen to the tissue.

Wound healing - normal wound healing

PROLIFERATIVE PHASE
Granulation Tissue Formation

Collagen Fibers Capillaries

Fibroblasts make collagen, a protein matrix upon which new blood vessels can grow.

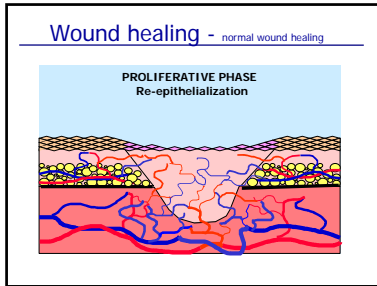
Wound healing - normal wound healing

PROLIFERATIVE PHASE
Contraction

Previous Size of Wound

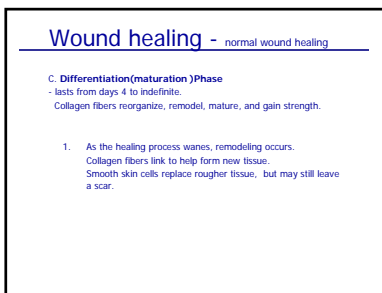
Specialized fibroblasts (myofibroblasts) pull the wound margins inward, i.e. contraction

2.4 Epithelialization (day 3 – 15)

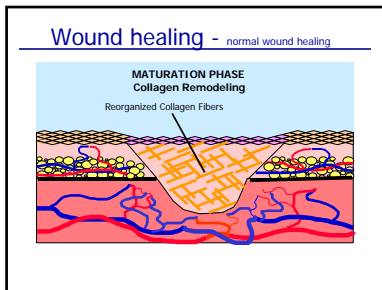
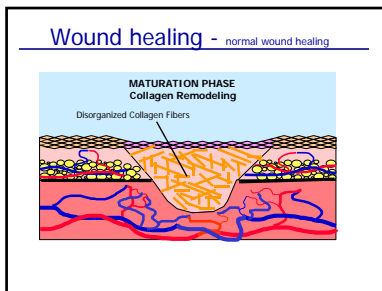


Epidermal cells or keratinocytes migrate across the wound to close the defect. Subsequent proliferation of the cells will cause the epidermis to become thicker.

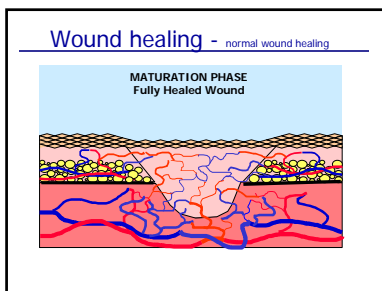
2.5 Maturation (day 4 – indefinite)



Collagen fibers reorganize, remodel, mature, and gain strength.

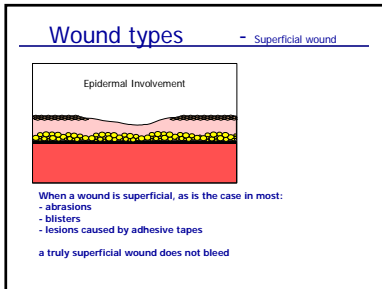


As the healing process wanes, remodeling occurs. Collagen fibers link to help form new tissue. Smooth skin cells replace rougher tissue, but may still leave a scar.



2.6 Wound Depth

A superficial or partial-thickness wound usually heals faster than a deep wound. The deeper the wound, the more tissue has to be replaced or repaired and the longer it will take.

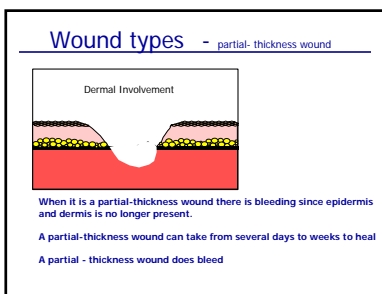


Superficial wound

When the wound is superficial only the epidermis is affected
When a wound is superficial, as is the case in most:

- abrasions
- blisters
- lesions caused by adhesive tapes

A truly superficial wound does not bleed



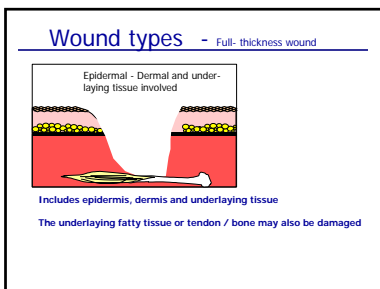
Partial-thickness wound

When it is a partial-thickness wound there is bleeding since epidermis and dermis is no longer present.

A partial-thickness wound can take from several days to weeks to heal.

One of the most important differences between partial-thickness and deep full-thickness wounds is that in partial-thickness wounds not all hair follicles have been destroyed. Since hair follicles are surrounded by epidermal cells, small islands of epithelium remain in the wound bed, even though the epidermis may have been destroyed.

A partial - thickness wound does bleed



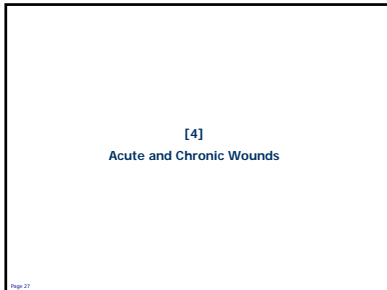
Full-thickness wound

Includes epidermis, dermis and under laying tissue

The under laying fatty tissue or tendon / bone may also be damaged.

These wounds can be very difficult to heal.

Section 3.



Acute and chronic wounds

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3.1 Introduction

As discussed in previous sections, the body is made to react immediately to skin injury, and most wounds will heal. There are however, many factors that may not only delay the healing process, but also result in wounds that do not heal at all.

3.2 Acute wounds

Wound types - Acute wounds

- Sudden Onset

Examples:

- Cutting your finger on a knife
- Surgical wound
- Burn

Sudden Onset

Examples:

- Cutting your finger on a knife
- Surgical wound
- Burn

Normally acute wounds heal by them selves. Healing depends on how much tissue that has to be replaced.

When closed with sutures in surgical wounds, the tissue has to repair itself.

3.3 Chronic wounds

Chronic wounds

- Majority of wounds
- Underlying pathologic conditions
 - Systemic factors
 - external factors
 - local factors
- Slowed healing process
- Hardest to treat

Leg ulcers are another common condition which is very often caused by circulation problems. Most studies about the prevalence of leg ulcers have been conducted in the Western Europe and approximately 0.18 % to 1% of the population has been found to have leg ulcers. A study conducted in Western Australia suggest a leg ulcer prevalence of 0.62% of the total population.

Leg ulcers are most often due to venous, arterial or lymphatic insufficiency. Venous insufficiency is the most commonly occurring underlying condition, though arterial insufficiency constitutes an increasingly important cause. Immunological, metabolic and infectious conditions are less common causes.

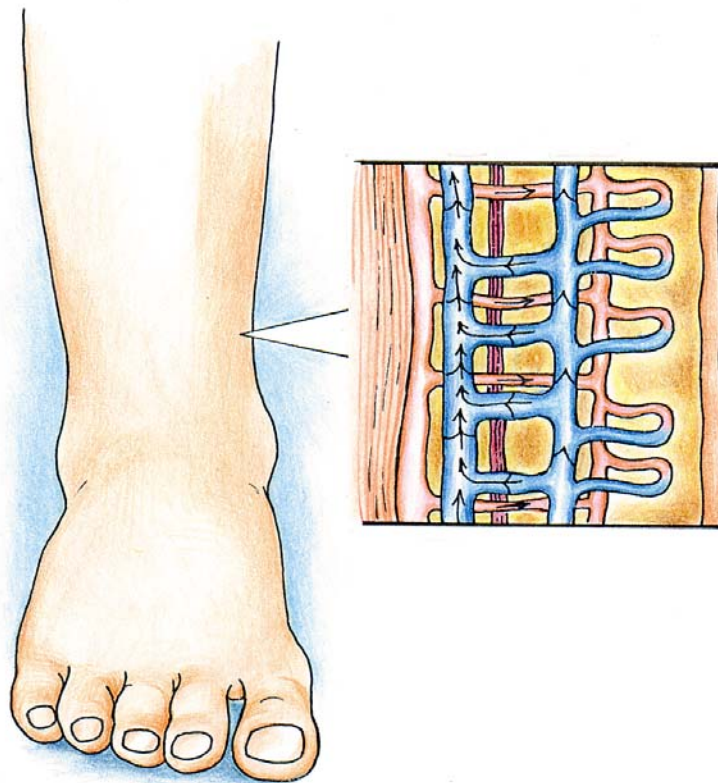
3.4 Venous leg ulcers



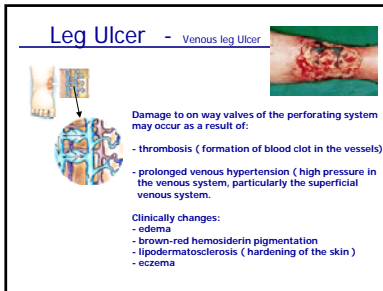
Venous hypertension is the most common cause of leg ulcers. Blood that is rich in oxygen is carried from the heart and lungs to the organs through the arteries. After the oxygen has been released to the tissue, the blood is carried back to the heart via the venous system.

The circulation of blood in the veins of the leg depends upon the muscle pump of the calf muscles. The movement of blood in the veins is caused by contractions and relaxations of the muscles, guided by the valves inside the veins. Blood flows from the skin to the heart via superficial, perforating and deep veins. The venous pressure is normally low.

The process of venous drainage takes place in the deep and superficial venous system. The superficial veins (close to the skin) drain into the deep veins via perforating veins. The perforating veins are the “connectors” of the deep and the superficial systems and have a one-way valve. Under normal circumstances blood can only flow from the superficial to the deep system.

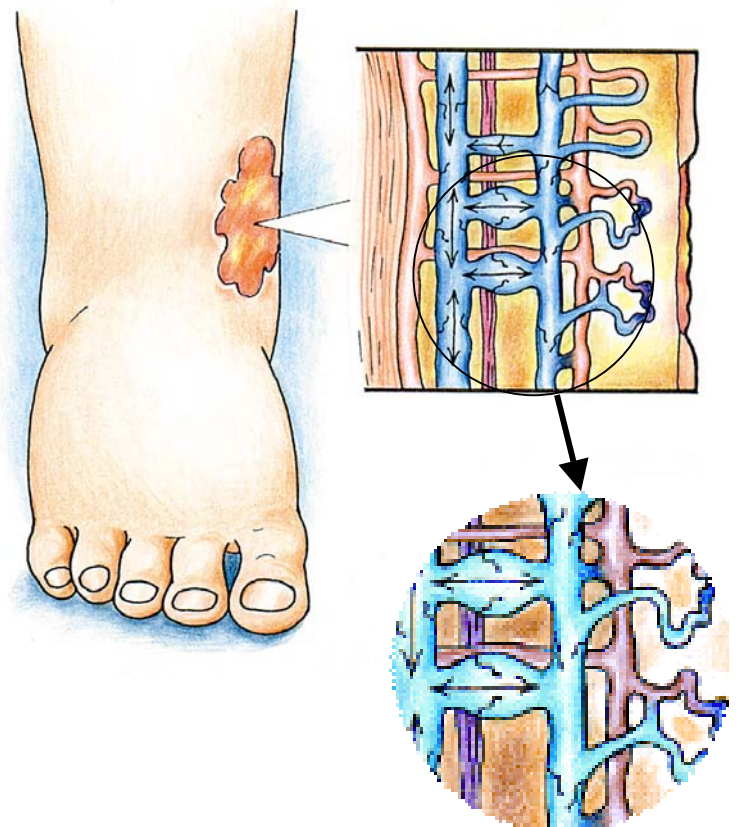


Venous insufficiency of the lower leg is caused by obstruction of the deep veins and / or lack of competence of the valves. Valve incompetence of the deep an / or perforating veins is regarded as the most common cause of venous insufficiency.



Insufficiency of the valve function is caused by deep venous thromboses, congenital abnormalities or degenerative- ageing changes.

Venous insufficiency may also be caused by impairment of the muscle pump. Insufficiency of the deep and / or perforating veins causes reflux to the superficial veins in the upright position and during exercise, which results in venous hypertension.



Often patients do not know that they had thrombosis and only a careful history will reveal that thrombosis may have occurred following surgery or pregnancy many months or years ago. Because the superficial venous system is not designed to handle high pressure, fluid and blood cells will leak out of the veins and into the surrounding skin.

This results in changes in which can frequently be seen clinically as:

- Edema (swelling)
- Brown or brown – red hemosiderin pigmentation (caused by blood cells that remain in the skin)
- Lipodermatosclerosis (loss of flexibility and hardening “fibrosis” of the skin)
- Eczema (reddening, itching, scalling)

In addition to these pathological changes, other theories on actual development of leg ulcers exist. The fluid that leaks from the venous system contains fibrin and leukocytes. In patients with venous leg ulcers, fibrin deposits can be found around the small blood vessels as “fibrin – cuffs”. These fibrin – cuffs hinder the oxygen and nutrient diffusion, and leukocytes may be trapped and occlude the small vessels.



Commonly seen venous leg ulcer, with brown – reddening hemosiderin deposits in the surrounding skin. Fibrin deposits in the ulcer, necrotic tissue, and granulation tissue.

3.5 Arterial leg ulcers



Artherosclerosis of the arteries supplying the legs impairs the blood flow, and decreases the oxygenation of the tissue causing ischaemia. When ischaemia increases to such a degree that it is no longer sufficient to satisfy the minimum oxygen requirements, then more severe changes in the microcirculation are produced.

The lack of oxygen results in necrosis of the terminal vessels, with the subsequent appearance of an arterial ulcer. This type of ulcer is therefore, due to an infarct produced by occlusion of a terminal artery resulting in necrosis of part of an extremity.

Arterial insufficiency of the legs may persist for years without an ulcer occurring. Trauma to the tissue triggers the ulceration. As oxygen is required for healing, the ulcer increases in size.

Smoking is a major risk factor.

Patients with arterial leg ulcers have clinical symptoms, that often present with:

- Very painful and deep ulcers with punched out appearance
- Leg pain when walking
- Absence of hair



Commonly seen arterial leg ulcers.

3.6 Diabetic foot ulcers



The most often encountering metabolic disease that can cause problems with wound healing is diabetes mellitus. Specifically patients with Type I diabetes who need to use insulin and patients whose diabetes is not well regulated.

Diabetes is a disorder of the glucose metabolism. By producing the hormone insulin, the body assures that glucose levels in the cells do not get too high or too low.

Insulin is manufactured in the pancreas, and in 20% of patients with diabetes mellitus, insulin is not produced at all, so called Type I diabetes.

Patients with Type II diabetes do produce insulin, but the system is not working optimally. Diet, exercise, and in some cases oral medication, will usually control this form of diabetes mellitus.

The number of diabetes patients has increased dramatically over the last 10 years, and 8 – 15% of these patients will develop foot ulcers.



Most diabetic foot ulcers are caused by a combination of:

- Neuropathy (loss of sensation as a result of damage to the nerve endings)
- Pressure
- Minor trauma
- Peripheral vascular and / or arterial disease
- Infection

Loss of sensation in the foot (neuropathy) causes foot deformities and makes the patient unaware of minor injuries and pressure.

For instance, they can walk around with shoes that do not fit well without noticing. A minor pressure induced wound occur which, as a result of the vascular and arterial abnormalities, does not heal.

Because patients with diabetes are more likely to get infections, and because the wound contains dead tissue, a wound infection develops.


The stage is set for massive infection of the tissues and destruction of blood vessels as well as the underlying bone



Commonly seen diabetic foot ulcer.

3.7 Pressure ulcers

Pressure Ulcer -



Pressure ulcers are also known as bed sores or decubitus, a Latin word for "lying down". All three names imply the major cause of these wounds is prolonged pressure.

Prolonged pressure on the tissue reduces the blood circulation and thus that blood supply to the skin.

Pressure ulcers are more likely to develop in areas where bone is close to the skin surface:

- sacral area
- heels
- trochanter
- buttocks
- shoulder blades
- elbows and back of head

Definition - "Any lesion caused by unrelieved pressure resulting in damage to underlying tissue" (NANDA, 1994: 221-222)

Pressure ulcers also known as bed sores or decubitus, a latin term for "lying down".

All three names imply the major cause of these wounds is prolonged pressure.

Pressure ulcers can occur when prolonged pressure and shear forces lead to inhibition of the local blood supply, resulting in necrosis and ulceration.

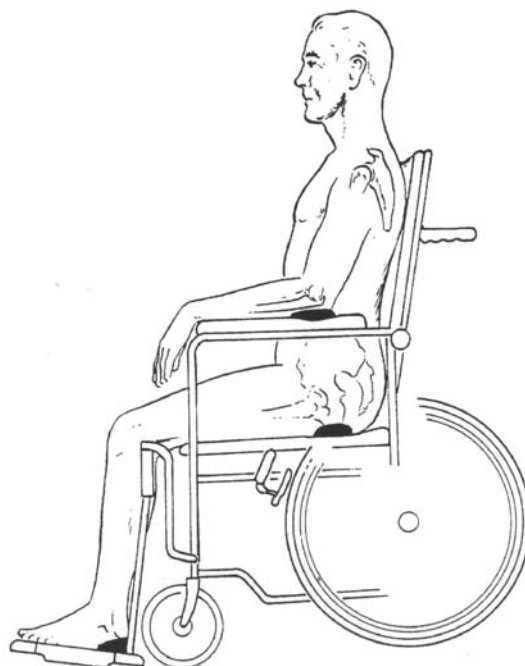
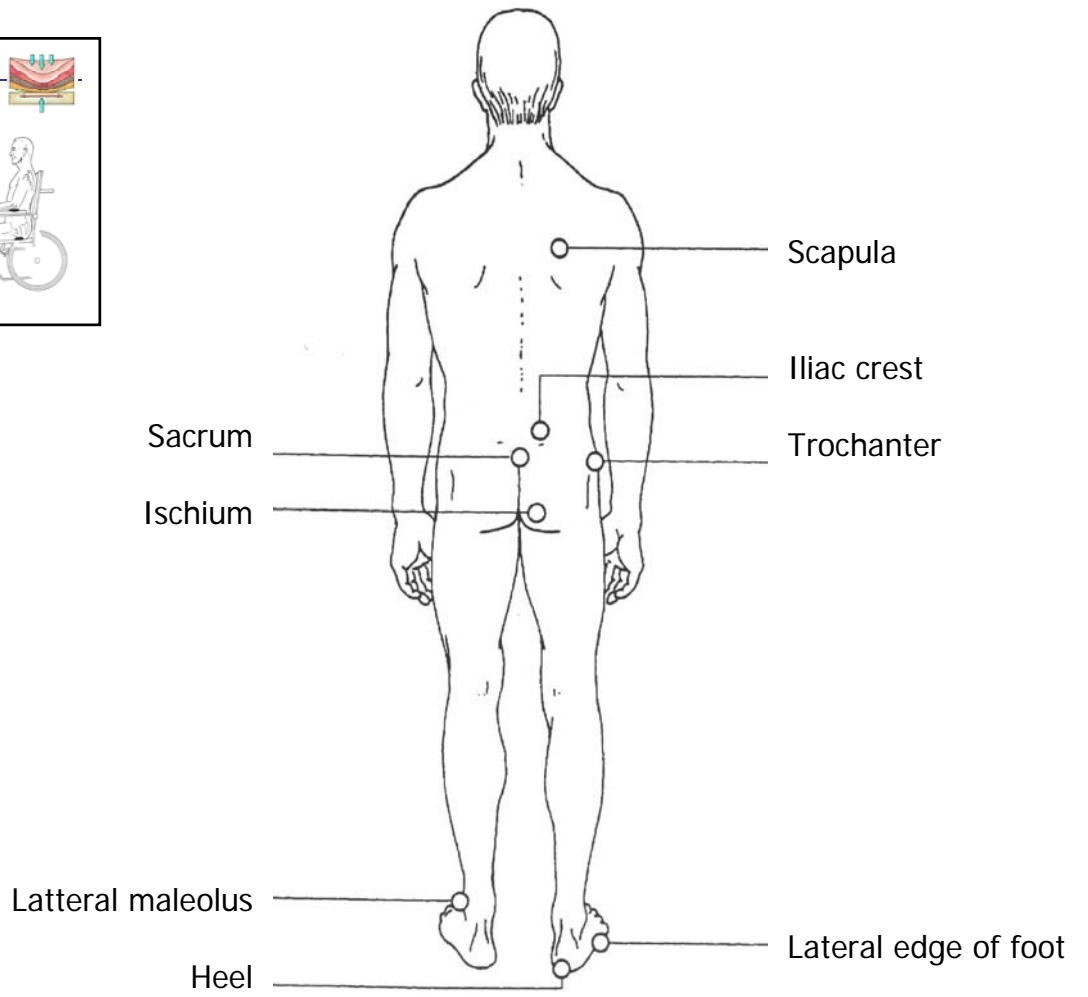
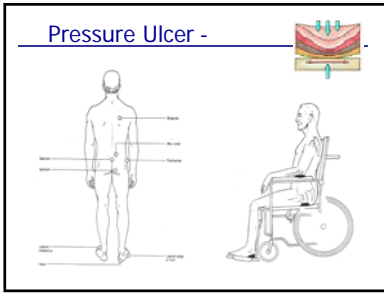
Pressure ulcers usually develop over bony prominences, and their development is influenced by individual susceptibility. Prolonged low pressure can be as harmful as a short period of high pressure. Where, in addition to being under pressure, the tissue is also susceptible to mechanical damage, the risk of decubitus is high.

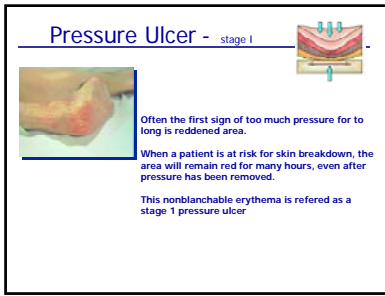
Pressure ulcers only occur as a complication in patients with an underlying illness ; in a healthy person, even during profound sleep, there are preventive reactions against painful pressure.

There is a large number of risk factors in the development of pressure ulcers but, with proper attention to these factors, decubitus ulcers can often be prevented; so it is most important assess individual patients´ risk factors whether they already have an ulcer or not.

Estimates of the prevalence of decubitus vary a lot, but the costs of managing pressure ulcers is very expensive.

Pressure ulcers are more likely to develop in areas where the bone is close to the skin surface, e.g. the sacrum, heels, trochanter, buttocks, shoulder blades, elbows and back of head.





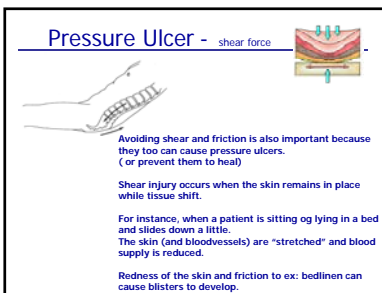
Stage I pressure ulcer:

Often the first sign of too much pressure for too long is a reddened area. When you put pressure on the skin, for instance, by pressing your thumb on the table for a minute or so, the area will turn white (no blood). After removing the pressure your thumb will quickly turn red (the blood vessels open quickly to provide blood to the tissue). Then after a minute or so, the color of your skin will return to normal.

When a patient is at risk for skin breakdown, the area will remain red for many hours even after the pressure has been removed. This reddened area is called nonblanchable erythema and is often referred to as **stage I pressure ulcer**



Healthcare professionals agree that it is important to call this reddened area (even though the skin is intact) a pressure ulcer, because if appropriate measures are taken, there is a change that the skin remain intact



Shear force:

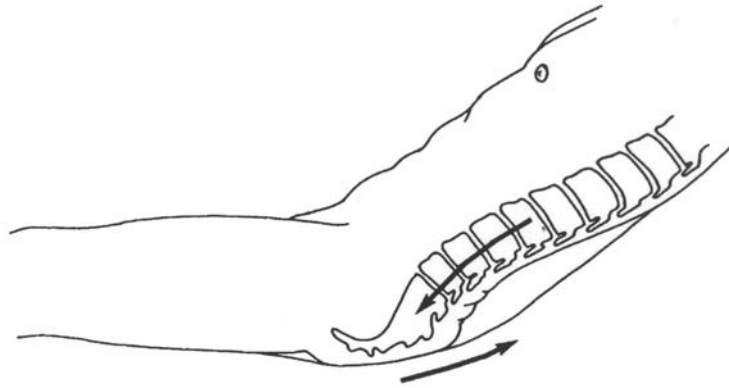
Avoiding shear and friction is also important because they too can cause pressure ulcers (or prevent them to heal)

Shear injury occurs when the skin remains in place while tissue shift.

For instance, when a patient is sitting og lying in a bed and slides down a little.

The skin (and bloodvessels) are "stretched" and blood supply is reduced.

Redness of the skin and friction to ex: bed linen can cause blisters to develop.



Pressure Ulcer - stage II



Partial-thickness skin loss involving epidermis and / or dermis.
The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.



Stage II pressure ulcer:

Partial-thickness skin loss involving epidermis and / or dermis.

The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.



Pressure Ulcer - stage III

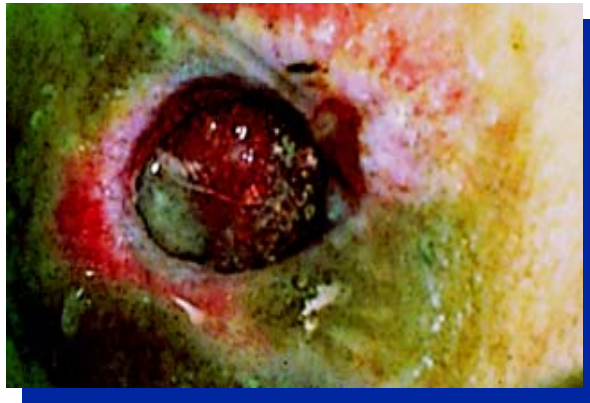
Full-thickness skin loss involving damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia.

The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue



Stage III pressure ulcer:

Full-thickness skin loss involving damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia.

The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue



Pressure Ulcer - stage IV

Full-thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structures (i.e. tendon or joint capsule).

Undermining and sinus tracts may also be associated with stage IV pressure ulcers.

Stage IV pressure ulcer:

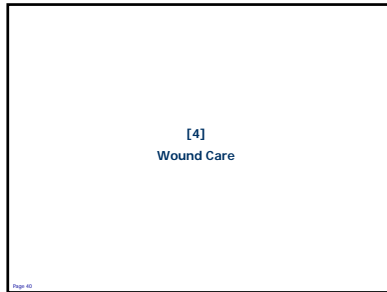
Full-thickness skin loss with extensive destruction tissue necrosis or damage to muscle, bone, or supporting structures (i.e. tendon or joint capsule).

Undermining and sinus tracts may also be associated with stage IV pressure ulcers.

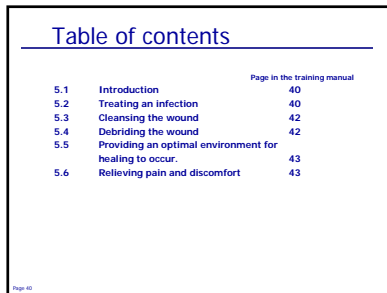




Section 4.



Wound Care



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| 4.4 Debriding the wound | 37 |
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4.1 Introduction

As discussed in the introduction of this manual, good wound care practices can make substantial contribution to the overall well-being and rehabilitation of the patient.

During the past 20 years, researchers have spent a considerable amount of time and effort uncovering the mysteries of Mother Nature and we know more about treating wounds than ever before.

It is although important to remember that every wound is attached to a patient, and that the systemic and external factors that can delay wound healing, should be addressed to obtain the maximum treatment benefits, that is:

- Diagnose and treat the cause
- Treat the patient
- Treat the wound

Diagnosis and patient treatment are very important before treating the wound. These chapters have been discussed earlier (chapter 4).

4.2 Treating an infection

If a clinical infection is made as evidence by one or more of classical clinical symptoms:

Treating an infection

Chronic wounds:

- rarely sterile
- bacterial colonisation
- necrotic tissue, if present, provides an excellent culture medium
- necrotic is predisposed to infection

Acute wounds:

- not colonized to the same extent as chronic wounds
- infection can be complicated

- Local erythema
- Edema
- Pain
- Impaired movement
- Unexplained fever
- Purulent and odorous exudates

The clinician may treat the infection or proceed to determine the cause and its antibiotic sensitive profile.

Treating an infection

The classical clinical symptoms of infection:

- Local erythema
- Edema
- Pain
- Impaired movement
- Unexplained fever
- Purulent and odorous exudates

Systemic antibiotics are commenced on the clinical diagnosis of infection.

Some of the important tissue breaking down enzymes and toxins produced by wound pathogen bacteria.

| Treating an infection | | |
|----------------------------|---|---|
| Enzyme | Biological activity | Bacteria |
| Collagenases | Breaking down the collagen in the connective tissue, and spreading infection. | Clostridium perfringens |
| Coagulase | Plasma coagulation; capsulate the infection and protect the bacteria against immune defense system. | Staphylococcus aureus |
| Streptokinase | Convert plasminogen to plasmin, that breaks down fibrin and other proteins; spreading infection | Hemolytic streptococcus |
| Hyaluronidase | Breaking down connective tissue; spreading infection | Hemolytic streptococcus, staphylococcus, anaerobe bacteria |
| Pyocyanin | Cell toxic connection; delay wound healing | Pseudomonas aeruginosa |
| Hemolysine and leucocidine | Breaking down blood cells and other cells; impact on immune system | Hemolytic streptococcus, Staphylococcus aureus, Escherichia coli, clostridium perfringens |

| Enzyme | Biological activity | Bacteria |
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| Pyocyanin | Cell toxic connection; delay wound healing. | Pseudomonas aeruginosa |
| Hemolysine and leucocidine | Breaking down blood cells and other cells; impact on immune system | Hemolytic streptococcus, Staphylococcus aureus, Escherichia coli, clostridium perfringens |

Topical agents will destroy the bacteria on the surface of the wound but most can not penetrate into the tissue and reach all the bacteria. Also many antimicrobial agents have been shown to be toxic to healthy tissue.

When appropriate antimicrobial therapy has been initiated, the use of PolyMem products can be continued.

4.3 Cleansing the wound

A lot of different manufactures of wound care dressings indicate that the wound needs to be cleaned before application.

Cleansing the wound

A lot of different manufactures of wound care dressings indicate that wound needs to be cleaned before application.

- Initially that is correct if the dressing not by it self clean up the wound.
- If the wound needs cleansing it is usually irrigated with saline with some pressure.
- 8 psi is often considered the maximum recommended pressure

With PolyMem wound care dressings it is only recommended to cleanse the wound before the first application, and **NOT** during future dressing changes.

Initially that is correct if the dressing not by it self clean up the wound.

If the wound needs cleansing it is usually irrigated with saline with some pressure.

8 psi is often considered the maximum recommended pressure for safely cleansing the wound.

4.4 Debriding the wound

The necrotic tissue in the wound needs to be removed before wound healing can occur. Initially the easiest and the cheapest way of removing necrotic tissue is to use scissor and forceps. In some cases it can be difficult, and you also have to know the structures of the skin before doing so.

Autolytic debridement is the nature´s way of cleansing wounds by using the body´s own enzymes.

4.5 Providing an optimal environment for healing Wounds

It was not until late 1940´s through early 1960´s thaty researchers started to realize that dressings can more than just lie there.

Superficial wounds re-epithelialize faster when covered with a dressing that provides warm moist wound environment.

Optimal wound environment

Superficial wounds re-epithelialize faster when covered with a dressing that provides warm moist wound environment

First of all, moist wound environment speed re-epithelialization because cells need moisture to live and migrate.

Second, fibroblast should have the optimal environment to facillitate the wound bed.

Third, Dressings should concentrate and retain growth factors on the wound bed to ensure maximum usage.

Fourth, Dressings should inhibit the growth of bacteria and by that infection to occur.

In the clinic, this reduction in time can make a real difference for the patient.

First of all, moist wound environment speed re-epithelialization because cells need moisture to live and migrate. If the wound surface is dry, scab formation will force the epithelial cells to migrate below the eschar instead of straight across.

Second, fibroblast should have the optimal environment to facilitate the wound bed.

Third, Dressings should concentrate and retain growth factors on the wound bed to ensure maximum usage.

Fourth, Dressings should inhibit the growth of bacteria and by that infection to occur.

4.6 Relieving pain and discomfort

It has long been taken granted that wounds hurt, however today wound care professionals and patients should expect more from wound treatment, especially a reduction in pain and discomfort.

Relieving pain and discomfort

Pain can delay healing through loss of:

- Appetite
- Mobility
- Overall condition
- Enthusiasm

Pain can delay healing through loss of:

- Appetite
- Mobility
- Overall condition
- Enthusiasm

If moist wound healing environment is used, patient report pains relieve.

By choosing a dressing that provides moist environment, that also does not allow the wound to dry out by evaporating moisture trough the dressing, the patient is given the optimal local pain relief during the entire wound healing process.

What also to consider is that evaporation through the dressing could lead the dressing to stick to the wound bed during dressing changes, and that in it self could cause pain.

Section 5.

Glossary

5. Glossary

A

Advanced Pressure Reducing See [Pressure Relieving](#) and [Support Surfaces](#).

Agency for Health Care Policy and Research (AHCPR) is now Agency for Health Care Research and Quality (AHCRO). See below.

Agency for Health Care Research and Quality (AHCRO) formerly Agency for Health Care Policy and Research (AHCPR) sponsors research in the area of health care by interdisciplinary, non-Federal panels of health care professional and consumers. AHCPR is sponsored by and affiliated with the U.S. Department of Health and Human Services, Public Health Services. AHCPR was established in December 1989 under Public Law 101-239 (Omnibus Budget Reconciliation Act of 1989) to enhance the quality, appropriateness, and effectiveness of health care services and access to the services. AHCPR carries out its mission by conducting and supporting general health services research, including medical effectiveness research, facilitating development of "**Clinical Practice Guidelines**," and disseminating research findings and guideline research findings to health care providers, policymakers, and the public.

Aggregate A mass or assemblage.

AHCPR See [Agency for Health Care Research and Quality](#) (AHCRO).

AHCRO See [Agency for Health Care Research and Quality](#) (AHCRO), formerly Agency for Health Care Policy and Research (AHCPR).

Alginate A salt of alginic acid, which is extracted from marine kelp. Calcium, sodium, and ammonium alginates have been used as foam, clot, or gauze for absorbable surgical dressings.

Amino Acid Any organic compound containing an amino and a carboxyl group.

Angiogenesis The process by which new blood vessels are formed.
2) The ability to grow blood vessels.

Autolysis The breakdown of tissue by the action of enzymes contained in the tissue affected; self-digestion.

B

Bedsore (pressure ulcer or sore, decubitus ulcer). An ulceration of tissue deprived of adequate blood supply by prolonged pressure. See [Pressure Ulcer](#), [Staging Pressure Ulcers](#), [Decubitus Ulcer](#) and [Decubitus Care](#).

C

Chemotactic Factor Orientation of a cell along a chemical concentration gradient or movement in the direction of the gradient.

Chronic or Chronic Illness 1) referring to a disease or disorder that develops slowly and persists for a long period of time. It can sometimes remain for the person's lifetime. 2) marked by long duration, by frequent recurrence over a long time, and often by slowly progressing seriousness ... having a slow progressive of indefinite duration - used especially in degenerative invasive diseases, some infections. 3) In chronic wounds (includes bedsore, decubitus ulcers and pressure ulcers and sores) it is usually understood to define a wound that has not healed in thirty (30) days. Diabetic patients normally sixty (60) days before the wound is declared chronic or non-healing. 4) An illness of long-term or permanent nature that may be accompanied by some residual disability resulting in the need for rehabilitation or continuous care.

Chronic Obstructive Pulmonary Disease (COPD) See [Pulmonary Disease](#).

Chronic wounds Wounds that take longer than normal to heal or do not heal at all because of underlying conditions.

Class I/II/III Support Surfaces / Specialty Beds Replaces the older hybrid term Group/Level and Level when referring to Support Surfaces / Specialty Beds. See [Support Surfaces](#) and [Pressure Relieving](#).

Clinical Fact Sheet Developed by Medical Resources Group Inc. between 1995 and 1997. Based on original research, field clinical trials, longitudinal studies, patient case review and literature review of peer level medical and legal publications dealing with chronic non-healing wounds and pressure ulcers (bedsores, pressure sores and decubitus ulcers). All the Clinical Fact Sheets have been subjected to extensive outside peer review - medical and legal.

Clinical Practice Guideline(s) developed to "enhance the quality, appropriateness, and effectiveness of health care services and access to the services. AHCPR (Now the Agency for Health Care Research and Quality, AHCRO) carries out its mission by conducting and supporting general health services research, including medical effectiveness research, facilitating development of "Clinical Practice Guidelines" (AHCPR Guideline publications are available on this site) (emphasis ours), and disseminating research findings and guideline

research findings to health care providers, policymakers, and the public. See [Agency for Health Care Research and Quality](#) (AHCRO).

Collagen 1) The most prevalent protein in the animal kingdom responsible for the structure and integrity of most tissues. A protein containing domains of triple-helical conformation. Characterized by repetitive Gly-X-Y sequences where glycine is in every third residue, and stabilized by proline and hydroxyproline residues. A protein that participates in formation of extracellular aggregates which are primarily supporting elements.

2) The protein substance of the white fibers of skin, tendon, bone, cartilage, and all other connective tissue; composed of molecules of tropocollagen.

3) a protein consisting of bundles of tiny fibers... is the most abundant protein found in the body. It is safe enough to be used as a food product and versatile enough to handle problems ranging from fluid absorption to regeneration of tissue. Collagen fibers give strength and structure to tissue in the body. Fibroblast cells produce collagen, which forms tissue structures. Tissues contain collagen fibers arranged in three dimensions. Collagen fibers contain smaller units called fibrils. Fibrils are organized collagen molecules. Each molecule is a rope-like structure with three strands. Each strand has a specific sequence determining collagen type and function. *For collagen to effectively work in chronic wound healing it must be fully functional, self-assembling, and specific to skin tissue.*⁷ See [Kollagen™](#).

Collagenase 1) any of a group of proteolytic enzymes that decompose collagen and gelatin.

2) An enzyme that catalyzes the hydrolysis of peptide bonds in triple helical regions of collagen.

Collagenase ointment a drug used to treat bedsores, burns, and other skin disorders.

Note: Collagenase ointment in any form destroys collagen.

Collagen Fibrils Delicate fibrils of collagen in connective tissue, usually cemented together in wavy bundles.

Common Procedure Coding System (HCPCS) The HCPCS Code is used to identify items of durable medical equipment, prosthetics, orthotics, and supplies (DMEPOS) for purposes of Medicare billing. The SADMERC, acting for HCFA and the four DMERCs is the sole authority on HCPCS Codes. The information on medical equipment and supplies developed for HCFA by its SADMERC, administered by the four DMERCs is the benchmark for Medicare and has become the **de facto benchmark** for the large majority of third party -insurance companies- payors.

COPD See [Pulmonary Disease](#).

Cost Benefits Measured by assessing a treatment's ability to heal and prevent recurrence, the time it takes to heal and the frequency of dressing change it requires.

Cost Effectiveness The cost of achieving a desired outcome of treatment.

D

Decubitus Ulcer A swollen sore or ulcer of the skin over a bony part of the body, results from prolonged pressure on the part. Decubitus Ulcers are most often seen in patients not able to move around easily, as the elderly, infirm, or severely ill. The sores are graded by stages of severity: Stage I: The skin is red and does not return to normal with relief of pressure. Stage II: The skin is blistered, peeling, or cracked, though damage is still minor. Stage III: The skin is broken and tissue under the skin may also be damaged, and drainage may be seen. Stage IV: A deep, craterlike ulcer has formed. The full thickness of skin and the underlying tissues are destroyed. Prevention of Decubitus Ulcers is an essential aspect of care. See [Pressure Ulcer](#), [Staging Pressure Ulcers](#) and [Bedsore](#).

Decubitus Care preventing and treating sores that form over bony parts of the body (decubitus ulcers, pressure ulcer or sore, bedsore). They occur in patients not able to move around, especially the elderly, the obese, and the seriously ill. These ulcers occur on pressure areas, most often on the bottom of the spine, elbows, heels, outer ankles, inner knees, hips, shoulder blades, and ear rims.

METHOD: Decubiti may be prevented by turning the patient every 2 hours (or alternatively placing the patient on a Class II Support Surface / Specialty Bed to relieve the pressure 24 hours per day, comment by WoundHEAL), keeping the skin dry, and watching pressure areas for signs of redness. Care for decubitus ulcers, which can take a long time to heal, involves cleaning the area and applying special drugs to the ulcers. Large areas of ulcers can be life-threatening. Prompt and continued care of early ulcers can prevent infection and promote healing. See [Pressure Ulcers](#), [Staging Pressure Ulcers](#), [Support Surfaces](#), [Pressure Relieving](#).

Deep Cavity Wound A hollow place or space within the body or in one of its organs situated far beneath the surface, not superficial.

Diabetes Mellitus A disorder of carbohydrate metabolism, characterized by hyperglycemia and glycosuria and resulting from inadequate production or utilization of insulin.

DMERC See [Durable Medical Equipment Regional Carriers](#).

Drainage/Draining The free flow or withdrawal of fluids from a wound, sore, or cavity.

Dressing A covering, protective or supportive for all diseased or injured parts.

DRY FLOATATION®* describes a unique mattress system designed and invented by the founder of ROHO® Inc. It is a dry fluid air system that combines that best properties of both an air and liquid medium without the use of any liquid to equalize and relieve pressure over the body's bony prominences. It delivers compression therapy to the whole body when used in the mattress system configuration. The ROHO® DRY FLOATATION®

Mattress System is certified as a Class (Group/Level) II Support Surface / Specialty Bed. See [Support Surfaces / Specialty Beds](#) and [Pressure Relieving](#).

Durable Medical Equipment Regional Carriers (DMERCs) HCFA has established four Durable Medical Equipment Regional Carriers (DMERCs) to act on its behalf in the administration of Medicare claims. The respective DMERCs are known as fiscal intermediaries ... acting under contract for HCFA. The information on medical equipment and supplies developed for HCFA by the SADMERC, administered by the four DMERCs has become the **de facto benchmark** for the large majority of third party -insurance companies- payers.

E

Edema The presence of an abnormally large amount of fluid in the intercellular tissue spaces.

Epithelialization Healing by the growth of epithelium over a denuded surface.

Epithelium The covering of internal and external surfaces of the body, including the lining of vessels and other small cavities.

Existing Medical Necessity or Medical Necessity^{4,8,9,11} are terms used by medical services providers to assert that the services, supplies and equipment provided for the treatment of a patient's existing medical condition(s) meet the minimum standard (patient's medical condition) set forth by the third party insurer (inclusive of Medicare*) for their respective use. In the case of pressure ulcers (bedsores), there are two distinctly separate applications of the minimum standards: One, for acute care (hospital) treatment environments. And the second, substantially more restrictive standard for patients in their own residence.

Exudate Accumulation of a fluid in a cavity, or matter that penetrates through vessel walls to adjoining tissue, or the production of pus or serum

F

Fibroblasts A connective tissue cell. They differentiate into chondroblasts, collagenoblasts, and osteoblasts, form the fibrous tissues in the body, tendons, and aponeuroses, supporting and binding tissues of all sorts.

Fibronectin An adhesive glycoprotein. Fibronectins are important in connective tissue, where they cross-link to collagen, and they are also involved in aggregation of platelets.

G

Granulation The process of forming granulation tissue.

Granulation Tissue Small, beadlike masses of tissue formed on the surface of wounds.

Group/Level is a classification term used to identify Support Surfaces/ Specialty Beds by their respective therapeutic performance value with Group/Level I being the lowest classification. It is a hybrid term that is gradually being replaced with the term Classification I / II / III. See [Support Surfaces](#) and [Pressure Relieving](#).

H

HCPCS Code See [Common Procedure Coding System](#).

Hemostasis The arrest of bleeding, either by the physiological properties of vasoconstriction and coagulation or by surgical means.

Hydrogel A gel that has water as its dispersion medium.

I

Infection The state or condition in which the body or a part of it is invaded by a pathogenic agent that, under favourable conditions, multiplies and produces injurious effects.

Inflammation A localized pro-TECTIVE response elicited by injury or destruction of tissues which serves to destroy, dilute, or well off both the injurious agent and the injured tissue.

J

K

Keratinocytes The epidermal cells which synthesizes keratin; constitutes 95 percent of the epidermal cells and with melanocyte, forms the binary cell system of the epidermis.

L

Leukocytes White blood corpuscles which act as scavengers, helping to combat infection.

Level I/II/III Support Surfaces / Specialty Beds See [Support Surfaces](#) and [Group/Level](#).

Liability The quality or state of being legally obligated.

M

Maceration the softening and breaking down of the skin from prolonged exposure to moisture.

Macrophages Any of the many mononuclear phagocytes found in tissues.

Medical Necessity or Existing Medical Necessity are terms used by medical services providers to assert that the services, supplies and equipment provided for the treatment of a patient's existing medical condition(s) meet the minimum standard (patient's medical condition) set forth by the third party insurer (inclusive of Medicare*) for their respective use. In the case of pressure ulcers (bedsores), there are two distinctly separate applications of the minimum standards: One, for acute care (hospital) treatment environments. And the second, substantially more restrictive standard for patients in their own residence.

Minimum Standards of Care (Professional Standards of Quality, Quality of Care, etc.) See [Standards of Care](#).

Moist Wound Healing To maintain a moist environment at the wound bed so as to enhance epidermal cell migration and encourage epithelialization.

Monocytes A mononuclear phagocytic leukocyte. Formed in the bone marrow from promonocytes, monocytes are transported to tissues, as of the lungs and liver, where they develop into macrophages.

N

National Pressure Ulcer Advisory Panel (NPUAP) The nationally recognized authority on pressure ulcer (aka bed sore, decubitus ulcer) was formed in 1987 to provide a credible panel of experts to raise awareness and provide information on pressure ulcers, the group began working in the areas of public policy, education and research. NPUAP, now assisted by multiple corporations and organizations, has become a nationally recognized entity. The collaboration of professionals, corporations, and governmental agencies offers a unique model for addressing major health care issues. The European Pressure Ulcer Advisory Panel and the Japanese Society of Pressure Ulcers have adapted the NPUAP model in establishing their organizations.

Legislatively, the NPUAP was instrumental in amending the Omnibus Budget Reconciliation Act of 1987 (Nursing Home Reform Act) in order to strengthen the bill's language that related to quality of care for patients in long term care facilities. In 1989 the NPUAP was recognized by the National Academy of Science.

The legislative credibility of the NPUAP is further documented by the invitation in 1990 to four of its members to serve on the Agency for Health Care Policy Research (AHCPR)

(emphasis ours) panel for the development of guidelines for the Prediction, Prevention and Early Treatment of Pressure Ulcers in Adults, released in May, 1992. This panel of 13 was responsible for the creation of guidelines which also greatly influence the health care profession and the quality of care for patients in the acute, home and long term care settings. Seven members of the NPUAP were also invited to serve on the second AHCPR Pressure Ulcer Panel formed to create guidelines on the treatment of pressure ulcers. This guideline was released in December, 1994.

Necrosis The sum of the morphological changes indicative of cell death and caused by the progressive degradative action of enzymes.

Necrotic Tissue Cell death causes by the progressive degradative action of enzymes.

Negligence The doing of some act which a person of ordinary prudence would not have done under similar circumstances or the failure to do what a person of ordinary prudence would have done under similar circumstances.

Neovascularization New blood vessel formation in abnormal tissue or in abnormal positions.

Neutrophils Granular leukocytes that have a nucleus with three so five lobes. They have the properties of chemotaxis, adherence to immune complexes, and phagocytosis.

NPUAP See [National Pressure Ulcer Advisory Panel](#).

O

Occlusive Dressing A dressing that seals a wound completely to prevent infection from without and to prevent moisture from within from escaping through the dressing.

Osteomyelitis an infection of bone and bone marrow. It is most often caused by a bacterial infection, germs that enter the bone during an injury or surgery. The germs may also reach the bone directly from a nearby infection or through the bloodstream. Staphylococci germs are often part of the cause of this problem. The long bones in children and the spinal bones in adults are often places of infection caused by germs spreading through the bloodstream. Continuing and increasing bone pain, tenderness, local muscle spasm, and fever are symptoms of the disease. Treatment includes bed rest and anti infection drugs by injection for several weeks. Surgery may be necessary to take out dead bone and tissue, to fill holes, and to use artificial devices to keep the diseased bones and joints from moving. Long-term osteomyelitis may go on for years with periods of many or fewer symptoms in spite of treatment

Outcome-Based Wound Healing Therapy that heals the wound faster, cheaper, and better than other therapies.

Outcome Measurement Defining what works, at what cost, and in what length of time.

Outcomes The results of an action.

P

Peri-wound margin is the area of skin radiating out from the edge of the wound opening for 1" to 1-1/2" away from the wound margin-opening.

Phagocytosis Endocytosis of particulate material, such as microorganisms or cell fragments.

Platelets A disk-shaped structure, found in the blood of all mammals and chiefly known for its role in blood coagulation.

Pressure Pad or Mat See [Support Surfaces](#).

Pressure Reducing, Pressure Relieving and Advanced Pressure Reducing - Class II and III - Support Surfaces & Specialty Beds have all passed the HCFA /SADMERC/ Medicare product review process demonstrating their ability to relieve pressure over the body's bony prominences to below 32 mm Hg for sustained periods of time. And the equipment has demonstrated its durability, the ability to withstand prolonged usage and cleaning.

Pressure Relieving (Advanced Pressure Reducing) refer to Support Surface / Specialty Bed systems that lower the pressure on the bodies capillaries at the body's interface below 32 mm Hg (which is the agreed average working pressure of the capillary). Many of the better systems in this classification reduce the pressure well into the mid twenty to low twenty mm Hg range. See [Pressure Reducing](#).

Footnote: Pressure Reducing, Pressure Relieving and Advanced Pressure Reducing - Class II and III - Support Surfaces & Specialty Beds have all passed the HCFA / SADMERC / Medicare product review process demonstrating their ability to relieve pressure over the body's bony prominences to below 32 mm Hg for sustained periods of time. And the equipment has demonstrated its durability, the ability to withstand prolonged usage and cleaning.

Pressure Sore (ulcer, bedsore, decubitus ulcer) Defined as a pressure ulcer, bedsore or decubitus ulcer. See [Pressure Ulcer](#), [Staging Pressure Ulcers](#) [Decubitus Ulcer](#) and [Bedsore](#).

Pressure Ulcer (bedsore, decubitus ulcer, pressure sore) A swollen sore (Stage I) or open wound/ulcer (Stage II, III, IV) of the skin over a bony part of the body, results from prolonged pressure, unequal pressure or outside mechanical force and shear on the part. Pressure ulcers are most often seen in patients not able to move around easily, as the frail, elderly, infirm, or severely ill. The sores are graded by stages of severity: Stage I: The skin is red and does not return to normal with relief of pressure. Stage II: The skin is blistered, peeling, or cracked, though damage is still minor. Stage III: The skin is broken

and tissue under the skin may also be damaged, and drainage may be seen. Stage IV: A deep, craterlike ulcer has formed. The full thickness of skin and the underlying tissues are destroyed. Prevention of decubitus ulcers is an essential aspect of care.

Professional Standards of Care See [Standards of Care](#).

Protein Any of a group of complex organic compounds which contain carbon, hydrogen, oxygen, nitrogen, and which are widely distributed in plants and animals. Twenty different amino acids are commonly found in proteins, and each protein has a unique, genetically defined amino acid sequence which determines its specific shape and function.

Pulmonary Disease, Chronic Obstructive Pulmonary Disease (COPD) a disorder with cough, chest pain, shortness of breath, bloody sputum, abnormal breathing noises, and wheezing. Less common symptoms may be arm and shoulder pain, slight pain in the calf of the leg, swelling of the face, headache, hoarseness, pain in the joints, and drowsiness. Pulmonary diseases are of either a blocking (obstructive) or tightening (restrictive) nature. Obstructive breathing diseases are caused by an obstacle in the airway. It blocks the flow of air. Such blockages may be swelling of the mucus that lines the breathing tube (bronchial mucosa), or thick substances released by the breathing tubes. Severe obstructive breathing diseases include asthma and irritation of the breathing tube (bronchitis). Long-term cases may be combinations of emphysema and bronchitis. Such diseases lower lung expansion and make the work of breathing harder.

Q

Quality of Care See [Standards of Care](#).

R

Remodeling Reorganization or renovation of an old structure. Tissue has regained most of the original tissue strength.

Reverse Staging Pressure Ulcer refers to a discredit practice by some medical service providers of reversing the pressure ulcer size as it closes. That practice has been discredited by NPUAP and AHCRQ, formerly AHCP. Pressure Ulcers that have been evaluated to be Stage III or Stage IV are always classified as Stage III or IV pressure ulcers.

ROHO® See [DRY FLOATATION®](#).

S

SADMERC See [Statistical Analysis Durable Medical Equipment Regional Carrier](#).

Slough Dead mass or necrotic tissue

Specialty Bed (Support Surface / Specialty Bed) See [Support Surfaces](#).

Stage I/II/III/IV Stage I, Stage II, Stage III, Stage IV. Term used to define the severity, depth, etc. of a Pressure Ulcer (bedsore, decubitus ulcer) developed by the National Pressure Ulcer Panel. See [National Pressure Ulcer Advisory Panel \(NPUAP\)](#).

Staging Pressure Ulcers Clinical Fact Sheet, Stage I, Stage II, Stage III, Stage IV. Term used to define the severity, depth, etc. of a Pressure Ulcer (bedsore, decubitus ulcer) developed by the National Pressure Ulcer Panel. See [National Pressure Ulcer Advisory Panel \(NPUAP\)](#).

Standards of Care (Professional Standards of Quality, Quality of Care, etc.) considered by an authority or by general consent as a basis of comparison, an average or normal quality, quantity, or level. The term as used in the treatment of pressure ulcers (bedsore, decubitus ulcer and pressure sore) defines the minimum level of care acceptable to meet the patient's medical and quality of life needs in healing his or her pressure ulcer(s).

Superficial Confined to the surface.

Support Surfaces (Support Surface / Specialty Bed) Term used to describe a Pressure Pad or Mat, Pressure Reducing, Pressure Relief, Pressure Relieving and Advanced Pressure Reducing device or complete system. These medical products have been separated by HCFA/SADMERC in to three distinct Classifications with Class I being the lowest level of therapeutic performance and Class II and III being the highest. Each Class is based on their demonstrated-proven therapeutic level of performance, durability, and wither designed for long or short tern usage. The terms look interchangeable and they are not. Each has a historic definition as it relates to Support Surfaces and Specialty Beds. See [Staging Pressure Ulcers](#), [Decubitus Ulcer](#), [Decubitus Care](#) and [Bedsore](#).

Pressure Pad or Mat, Pressure Relief and Pressure Reducing define simple, generally static devices that reduce the body's interface pressure below that of a standard hospital mattress. These devices are classified as Group/Level or Classification I Support Surfaces.

Pressure Relieving and Advanced Pressure Reducing or Relieving define systems that reduce or relieve the body's interface pressure below 32 mm Hg (See note at end of section). A Class (Group/Level) II Advanced Pressure Relieving device is one that lowers the pressure at the body's interface below 32 mm Hg (the agreed average working pressure of the capillary) and many of the best products in this area reduce the pressure well into the mid to low twenty mm Hg range. These devices are classified as Group/Level II and III devices. Level III devices are specialty beds normally restricted to medical facilities.

Note: The patient with an existing bedsore(s) must have the pressure over the body's bony prominences relieved or reduced below 32 mm Hg to take away the principal cause

of bedsores. If you don't take away the cause, the bedsore cannot heal and in most cases will continue to deteriorate and the patient will develop multiple bedsores. In most cases, patient's who are bed bound must continue to use a Group/Level II Support Surface so long as they are relatively immobile. If they do not, the bedsore(s) will return.

Footnote: Pressure Reducing, Pressure Relieving and Advanced Pressure Reducing - Class II and III - Support Surfaces & Specialty Beds have all passed the HCFA / Medicare product review process demonstrating their ability to relieve pressure over the body's bony prominences to below 32 mm Hg for sustained periods of time. And the equipment has demonstrated its durability, the ability to withstand prolonged usage and cleaning.

T

Tunneled / Undermined A passageway of varying length, through a solid body, completely enclosed except for the open ends, permitting entrance and exit.

U

Undermined See [Tunneled / Undermined](#)

V

Venous stasis a disorder in which the normal flow of blood through a vein is slowed or halted.

Venous Stasis Lesion caused by a disorder in which the normal flow of blood through a vein is slowed or halted.

Venous Stasis Wound caused by a disorder in which the normal flow of blood through a vein is slowed or halted.

Venous Stasis Ulcer Local losses of epidermis and variable levels of dermis and subcutaneous tissue occurring over or near the malleoli of the distal lower extremities.

W

X

Y

Z

Section 6.

What is new?