

## Wound Management



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### Course Aims and Objectives

- To define a wound and recognise the four types of wounds.
- To identify the components of the skin
- To identify the wound healing process and the factors affecting it
- To recognise common types of dressings
- Practical session

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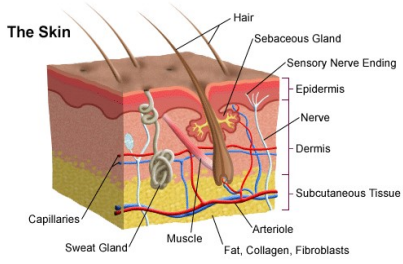
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### The Skin



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**Sirius Business Services**  
**Function of the Skin**



- Protection of internal structures – physical barrier to microorganisms and foreign matter.
- Acid PH helps to prevent infection



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**Sirius Business Services**  
**Function of the Skin**



**Sensory perception :**

Allows you to feel pain, pressure, heat. This helps us to identify potential dangers and avoid injury



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**Sirius Business Services**  
**Function of the Skin**



**Thermoregulation :**  
Blood vessels constrict or dilate to raise or lower body temperature.  
Sweat production promotes cooling.



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**Sirius Business Services**  
**Function of the Skin**



**Excretion :**

Transmits small amounts of water and body waste via sweat. Helps to prevent dehydration.



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**Sirius Business Services**  
**Function of the Skin**



**Metabolism :**

Photochemical reaction in the skin produces Vitamin D essential for metabolism of calcium.



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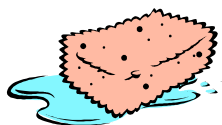
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**Function of the Skin**



**Absorption :**

Some substances can be absorbed directly into blood stream.



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**Sirius Business Services**  
**Wounds**



**What is a Wound?**

A wound may be defined as the interruption of continuity in a tissue, usually following trauma. Skin is predominantly affected although any tissue, whether nerve, bone or organ, may be wounded.

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**Sirius Business Services**  
**Wounds**



**Types of wounds?**

- physical
- mechanical
- thermal
- medical / physiological

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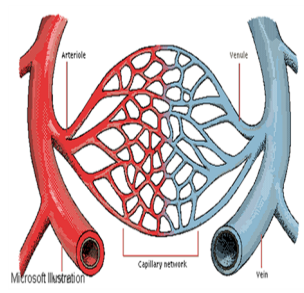
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**Sirius Business Services**  
**Wounds**



- Arteries
- Capillaries
- Veins



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**Chronic Wounds**

**Chronic Wounds or Hard to Heal – are they the same ?**

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**Sirius Business Services**  **SIRIUS**  
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**Chronic Wounds - Definition**

Typically they have a duration of more than 4 weeks and are characterised by the failure to progress through the normal stages of wound healing (Menke, 2007)

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**Hard to Heal - Definition**

One that fails to heal with standard therapy in an orderly and timely manner.....

(Troxler, Vowden & Vowden, 2006)

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**Sirius Business Services**  
**The Human Costs**



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**Sirius Business Services**  
**Wounds – The Patients View**



**'Pain was terrible...God almighty, the pain was terrific...it was unrelenting.'**  
**'I couldn't walk about...I packed up driving...'**  
**'I was on crutches...I couldn't take the kids swimming...I didn't go out.'**

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**Sirius Business Services**  
**Wounds – The Patients View**



**'...and when they used to come twice a week to do my legs, sometimes three, if I did want to go out, I couldn't go out 'cos they held me in. You don't know what time they are going to call so my life was round the district nurse.'**

**'I am very conscious of it, if its there I think to myself if I can smell myself, somebody else can.'**

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**Sirius Business Services**  
**Glass Half Empty.....**



Treat all wounds as potentially hard to heal...




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**Wounds – General Difference**



Acute	Chronic
Short duration	Not healed by 6 weeks
No underlying pathology	Underlying pathology
Normal inflammatory stage	Prolonged inflammatory stage
Usually heals without complication	A variety of complications may arise
Acute wound fluid supports proliferation	CWF does not support proliferation
Wound fluid doesn't damage peri- wound skin	CWF damaging to peri-wound skin
Neutrophil, elastase and MMP levels normal	Neutrophil, elastase and MMPs levels high
Fibrinectin intact	Fibrinectin degraded
Normal remodelling of ECM	Defective remodelling of ECM
Normal growth factor levels	Lower levels of GFs
Normal levels of inflammatory cytokines	Increased levels of pro-inflammatory cytokines

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**Sirius Business Services**  
**Wounds**



**Its All About Timing....**

- Hard to heal definition can be applied to both acute and chronic wounds and is independent of the wound type and aetiology
- Many wounds are challenging to manage
- Delayed healing occurs in a variety of wound types
- Although common, delayed healing is frequently not recognised early enough

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**Sirius Business Services**  
**Wound Healing**



- Wound healing is a collective term for the physiological processes that repair and restore damaged skin tissue.
- Healing involves a complex series of molecular, cellular and chemical changes.
- Individual should be assessed and treated as a whole not just the visible injury.

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**Sirius Business Services**  
**Understanding Normal Healing**



**Four phases of wound healing:**

1. Vascular response (or coagulation)
2. Inflammation
3. Proliferation
4. Maturation

Not all wounds follow this initial stage as this depends upon the nature of the wounding (i.e. pressure ulcers or C6 stage leg ulcers)

The normal process can be interrupted at any stage and is vulnerable to a variety of intrinsic and extrinsic factors

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**Sirius Business Services**  
**Wound Healing Analogy....**



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**Sirius Business Services**  
**Vascular Response**



Trauma  
Bleeding  
Air initiates clotting process supported by platelet aggregation (clumping).  
Coagulation cascade – formation of fibrin mesh which closes wound temporarily – dries to form scab.  
Blood and serous fluid helps to cleanse wound surface.



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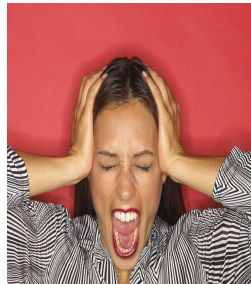
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**Sirius Business Services**  
**Inflammation 1**



Release of inflammatory mediators (prostaglandin & histamine) from mast cells.  
Blood vessels adjacent to injured area become more permeable (vasodilation).  
Presence of heat, erythema, discomfort and functional disturbance.  
Increase in exudate due to increased permeability of capillary walls. This is rich in nutrients, growth factors and enzymes (MMPs)



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**Sirius Business Services**  
**Inflammation 2**



Neutrophils arrive within a few hours of injury.  
Primary role is 1<sup>st</sup> line defence against infection.  
Phagocytotic action, killing bacteria and breaking down foreign materials and devitalised tissue.  
Produce and release inflammatory mediators which recruit and activate fibroblasts and epithelial cells.  
Short life span.



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### Sirius Business Services Inflammation 3



Macrophages and lymphocytes become prominent in the wound bed and help with the clean up by regulating phagocytic activity. They also encourage production of enzymes (growth factors) and **cytokines**. Cytokines are used extensively in intercellular communication (Project manager!). These cells control the transition from inflammation to proliferation – preparing for repair men!



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### Sirius Business Services Proliferation 1 - ECM



Production of new granulation tissue through collagen production (Scaffolding) and angiogenesis (new blood supply). Fibroblasts are key cells in this phase (being responsible for production of collagen) but they also produce the Extra cellular matrix (ECM).



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### Sirius Business Services Proliferation 2



Provisional wound matrix is remodelled and replaced with scar tissue which partially restores structure & function of tissues. Migration and proliferation of epithelial cells and fibroblasts from uninjured tissue and stem cells circulate to wound site. In normal dermis fibroblasts are slow and sparsely distributed, in provisional wound matrix they are numerous and active migrating in response to cytokines (communication cells) and growth factors released.



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### Sirius Business Services Maturation



Wound becomes less vascularised.  
Collagen fibres are reorganised lying at right angles to the wound margins.  
Collagen is constantly degraded and new collagen synthesised.  
Highest activity occurs between 14 – 21 days.  
Scar tissue is gradually remodelled and becomes comparable to normal tissue after a long period of time.  
Can take 12 – 18 months and full tensile strength not regained. (Approx 80%)



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### Sirius Business Services Factors Affecting Healing



#### What Factors May Affect the Healing Process ?

- Wound related
- Patient RELATED

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### Sirius Business Services Patient Related Factors



#### Extrinsic

- Non concordance
- Social isolation
- Financial/ employment issues
- Environmental
- Nurse/ pt relationship
- Is a carer for others
- Cultural/ religious beliefs
- Previous experiences
- Lifestyle choices

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**Sirius Business Services**  
**Wound Related Factors**



- Long wound duration
- Large wound (> 100cm<sup>2</sup>)
- Full thickness wound (Exposed tendon or bone)
- Underlying osteomyelitis
- Failure to progress by 40% at 6 weeks
- Presence of devitalised tissue
- Presence of local infection
- Presence of systemic infection
- High exudate levels
- Wounds over a moveable joint
- Wounds that are in close proximity to an 'orifice' (ie anus, stoma)
- Inflammatory/ excoriated or macerated peri wound skin
- Presence of oedema
- History of previous damage to same site
- Malignancy

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**Sirius Business Services**  
**Wound Bed Assessment**



**Tissue Type**

Assessing the tissue in the wound bed informs the phase of healing a wound may be in and aids diagnosis. Part of your management plan should be based on wound bed status.

Is the wound bed.....

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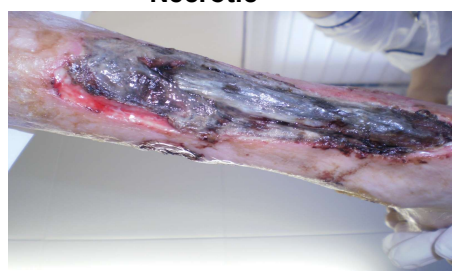
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**Sirius Business Services**  
**Wound Bed Assessment**



**Necrotic**




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**Sirius Business Services  
Wound Bed Assessment**



**Sloughy**



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**Sirius Business Services  
Wound Bed Assessment**



**Granulating**



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**Sirius Business Services  
Wound Bed Assessment**



**Epithelialising**



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**Sirius Business Services**  
**Assess For Infection**



- Wound infection is a problem because it delays healing.
- Defining the term infection is important.
- The presence of bacteria does not necessarily constitute infection.
- Wound swabs will not diagnose infection.
- Identification of clinical signs of infection is essential for diagnosis.
- Not all clinical signs are associated with a wound infection.
- Follow your local guidelines.

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**Sirius Business Services**  
**Local Infection**



**Look for:**

- Erythema
- Increase in exudate
- Wound bed dark/ dull/ bleeding easily (raspberry jam)
- Bridging
- Discolouration of slough and/ or dressings (bright green/ blue)
- Odour
- Be aware that patients with diabetes may not present with all of the above – be cautious

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**Sirius Business Services**  
**Anatomical Location**



- Wounds on certain anatomical sites such as moveable joints or weight bearing loads (heels) can be problematic.
- Fixation of dressings can be difficult and not offloading pressure ulcers can lead to a deterioration in wound condition.

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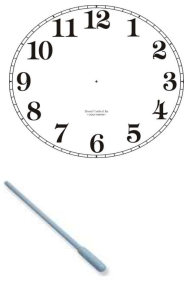
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### Sirius Business Services Assess Size and Depth



- Map/ trace and work out surface area in cm<sup>2</sup>
- If previously mapped work out % reduction over 6 weeks (or % increase if applicable)
- For deeper, cavity wounds assess for tracking/ undermining using a probe and a clock face technique




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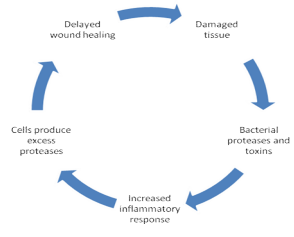
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### Sirius Business Services Wound Management



#### Vicious Circle of Delayed Wound Healing




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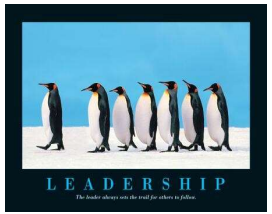
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### Sirius Business Services Wound Management



#### Your Role

- Don't accept the status quo
- Strive for excellence
- Embed best practice
- Inspire others
- Monitor outcomes
- Challenge
- Escalate (safeguarding)
- Prove your worth




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**Sirius Business Services**  
**Wound Management**



**In Summary:**

- Understand normal healing so you can recognise the abnormal
- Assess holistically to enable you to identify the risks for healing
- Recognise why a wound is 'behaving' in a certain way and be able to put a evidence based plan in place to manage the problem.
- Measure the effectiveness of your management plan taking appropriate action if outcomes aren't being met.

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**Sirius Business Services**  
**Sepsis**



**What is Sepsis?**

Sepsis, also referred to as blood poisoning or septicaemia, is a potentially life-threatening condition, triggered by an infection or injury.

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**Sirius Business Services**  
**Sepsis**



- In sepsis, the body's immune system goes into overdrive as it tries to fight an infection.
- This can reduce the blood supply to vital organs such as the brain, heart and kidneys.
- Without quick treatment, sepsis can lead to multiple organ failure and death.

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**Sirius Business Services**  
**Sepsis**



Early symptoms of sepsis may include:

- a high temperature (fever) or low body temperature
- chills and shivering
- a fast heartbeat
- fast breathing

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**Sirius Business Services**  
**Sepsis**



- In some cases, symptoms of more severe sepsis or septic shock (when your blood pressure drops to a dangerously low level) develop soon after. These can include:
- feeling dizzy or faint
- a change in mental state, such as confusion or disorientation
- diarrhoea
- nausea and vomiting
- slurred speech
- severe muscle pain
- severe breathlessness
- less urine production than normal (for example, not urinating for a day)
- cold, clammy and pale or mottled skin
- loss of consciousness

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**Sirius Business Services**  
**Sepsis - Causes**



- lung infection (pneumonia)
- appendicitis
- an infection of the thin layer of tissue that lines the inside of the abdomen (peritonitis)
- an infection of the bladder, urethra or kidneys (urinary tract infection)
- an infection of the gallbladder (cholecystitis) or bile ducts (cholangitis)
- skin infections, such as cellulitis – this can be caused by an intravenous catheter that's been inserted through the skin to give fluids or medication
- post-surgical (after surgery) infections
- infections of the brain and nervous system – such as meningitis or encephalitis
- flu (in some cases)
- bone infection (osteomyelitis)
- heart infection (endocarditis)

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**Sirius Business Services**  
**Sepsis - Assessment**



Systemic Inflammatory Response Syndrome (SIRS)

SIRS is present if there are at least 2 of the following :

- Temperature >38.3 or <36.00C
- New confusion/drowsiness
- Pulse >90/min
- RR >20/min
- Blood glucose >7.7 mmol/L (not if diabetic)

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**Sirius Business Services**  
**Dressing Selection**



- Dressing selection should be simple and promote moist wound healing ( Winter 1962)
- Avoid complex combinations of dressings which may be expensive and ineffective.
- Do not be taken in by expensive dressings. Ensure that they are safe and research based.
- Wounds need to be reassessed and dressing selection changed accordingly.

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**Sirius Business Services**  
**Dressing Selection**



- Dressings will create an environment that may facilitate healing
- If underlying causes are not treated then the wound is unlikely to heal.
- Remember there is no miracle dressing that will heal all wounds!!!



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**Sirius Business Services**  
**Dressing Selection**



- Bacteria proof
- Allows gaseous exchange
- Manages exudate
- Non-adherent
- Fibre and toxin free
- Hypoallergenic
- Maintain haemostasis and optimum temperature.
- Acceptability to patient
- Cost effective

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**Sirius Business Services**  
**Dressing Selection**



**Alginates**

- Discovered in 1880s by sailors.
- Different brands may seem similar but vary in their composition (calcium/sodium salts).

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**Sirius Business Services**  
**Dressing Selection**



**Properties of Alginates**

- Some alginates have haemostatic properties due to release of calcium ions.
- Promotes debridement of slough
- Highly absorbent and biodegradable can absorb 20 times own weight. Made from brown seaweed.
- Suitable for wet or cavity wounds.

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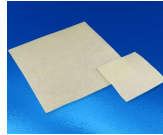
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**Dressing Selection**



**Alginate Examples:**

Sorbsan –faster gelling action that is easily removed on irrigation.



Kaltostat - firmer gel formed at slower rate.



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**Sirius Business Services**  
**Dressing Selection**



**Film Dressings:**

- Impermeable to fluids and bacteria
- Promote moist wound healing.
- Permeable to air and water vapour.
- Non absorbent
- Can be used as primary and secondary dressing
- Remove by lifting corner and stretching horizontally.

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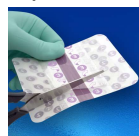
**Sirius Business Services**  
**Dressing Selection**



**Film Dressings:**

Film plus absorbent dressing can prevent blistering postoperatively.

- Tegaderm pad
- Opsite post op



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**Sirius Business Services**  
**Dressing Selection**



**Foams**

- Available as either polyurethane or silicone.
- Adhesive and non adhesive variables – adhesives may cause skin reactions.
- Moderate or low exudate this varies according to MVTR (ability to transmit water vapour to outer surface).
- Can be used as primary or secondary dressing.
- Adhesive versions can cause contact dermatitis.

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**Sirius Business Services**  
**Dressing Selection**



**Foams**

- Allevyn
- Biatan
- Mepilex – Safetac technology. Foam with soft silicone.
- Good for gentle skin although absorption of exudate is lower.



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**Sirius Business Services**  
**Dressing Selection**



**Hydrocolloids**

- One of the first “modern dressings”
- Provides moist wound healing and promotes debridement and formation of healthy granulation tissue.
- Occlusive and waterproof
- Low to medium exudate wounds-limited absorption capacity.
- Caution if used on infected wounds.
- May have slight odour on removal.

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**Sirius Business Services**  **Dressing Selection**

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**Hydrocolloids**

Examples:

- Comfeel
- Duoderm



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**Sirius Business Services**  **Dressing Selection**

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**Hydrofibre**

- This is not an alginate although it performs in a similar way.
- Is made from the same composition as hydrocolloids.
- Absorbs wound fluid and transforms into soft gel.
- Highly absorbent.
- Promotes debridement.
- Absorbs and locks in bacteria and exudate.

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**Sirius Business Services**  **Dressing Selection**

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**Hydrofibre**

Examples:

- Aquacel
- Versiva xc



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**Sirius Business Services**  
**Dressing Selection**



**Hydrogels**

- Contain high water content up to 96%)
- Excellent biocompatibility (also occur in contact lenses and ECG gel)
- Starch compounds (Carboxymethylcellulose) are integrated to provide gel forming properties.
- Promotes debridement of eschar and slough.
- Hydrogel sheets may reduce pain.
- Caution if used on infected wounds.
- Requires secondary dressing

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**Sirius Business Services**  
**Dressing Selection**



**Hydrogels**

Examples:



- Aquaform gel
- Purilon gel(suitable for use with larvae as it does not contain propylene glycerol)
- Actiform cool –ionic hydrogel may assist in pain management
- Intrasite conformable

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**Sirius Business Services**  
**Dressing Selection**



**Wound Contact Layers**

- Non adherent dressings for lightly exuding granulating wounds
- Prevents trauma to wound bed.

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**Sirius Business Services**  
**Dressing Selection**



**Wound Contact Layers**

Examples :

- NA Ultra-knitted viscose fabric.
- Atruaman – impregnated with triglycerides.
- Mepitel – soft silicone contact layer for delicate skin



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**Sirius Business Services**  
**Dressing Selection**



**Absorbent Dressings**

- For highly exuding wounds.
- Some may bind bacteria into dressing to control infection and bacteria load.

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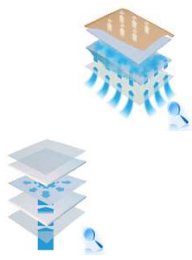
**Sirius Business Services**  
**Dressing Selection**



**Absorbent Dressings**

Examples:

- Eclipse.
- Zetuvit plus



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**Sirius Business Services**  
**Dressing Selection**



**Antimicrobials – When are they appropriate ?**

- In wounds that are infected
- Should be used for 2 weeks then review treatment:
- May be used in conjunction with antibiotics
- If no improvement discontinue
- If infection still present but improvement noted
- continue for further 2 weeks then review
- If your patient has been on antimicrobials for over 2 weeks ensure that they have been reviewed by the qualified staff.

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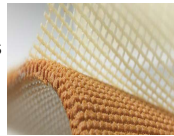
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**Sirius Business Services**  
**Dressing Selection**



**Inadine and Cadexomer Iodine**

- Inadine –10% povidone-iodine
- Cadexamor iodine – released from starch when in contact with wound exudate
- Caution in thyroid patients iodine sensitivity, renal problems



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**Sirius Business Services**  
**Dressing Selection**



**Silver**

- Aqucel AG -1.2%
- Acticoat – nano crystalline silver – rapid bacteria kill due to high concentration of elemental silver
- Actisorb silver – with charcoal for odour



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**Sirius Business Services**  
**Dressing Selection**



**Polyhexamethylene Biguanide (PHMB)**

- Wound cleanser- Surfactant
- Debriding hydro gel
- Contains betadine which penetrates and removes bacteria



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**Sirius Business Services**  
**Dressing Selection**



**Honey**

- Algivon
- Non –adherent alginate impregnated with medical grade Manuka honey
- Facilitates debridement
- Inhibits bacterial growth
- Reduces odour.



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Aseptic technique  
for use in  
wound dressing

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**Sirius Business Services**  
**Dressing Selection**



**Conclusion**

- There is no miracle dressing that will heal a wound if underlying aetiologies are not addressed.
- It is important that you understand the properties of different dressings and their function.
- If you think that a dressing is not meeting the needs of the patient you must ensure that a qualified member of staff reassess the wound ASAP!

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**Any Questions ?**

[www.siriusbusinessservices.co.uk](http://www.siriusbusinessservices.co.uk)

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