Phases of the wound healing process

Learning points...

- Identifying different types of wound
- Recognising the different phases of wound healing
- Best practice for managing wounds

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This is the first in a six-part series on wound management. It describes the stages of the wound healing process and explains how they relate to nursing practice. Nurses need to know how to recognise and understand the different phases so they can identify whether wounds are healing normally and apply the appropriate treatments to remove the barriers to healing. Part 2 (page 14) focuses on wound assessment.

Wound healing is a complex process with overlapping phases and, although knowledge of this intricate process is growing, some of the complexities involved are still not fully understood (Martin, 2013). Wound healing, sometimes called the healing cascade, is generally described in four distinct phases:

- Inflammation;
- Destruction;
- Proliferation;
- Maturation.

Table 1 details the practice points of each but, in reality, the phases overlap considerably and it is not always easy to recognise each one (Diegelmann and Evans, 2004). For example, the signs and symptoms of the inflammatory phase could be confused with wound infection. In addition, while one part of the wound is in the inflammatory phase another could be progressing through the destructive phase (Shipperley and Martin, 2002). The wound in Fig 1 shows a combination of slough, debridement and granulation.

**Primary and secondary intentions**

There are two ways that wounds heal: primary intention and secondary intention, depending on the wound type and cause. The healing process is essentially the same for both, although the timescales may differ. Acute wounds – for example, those caused by surgery where there is minimal tissue loss – heal by primary intention. Provided there are no complications, these wounds tend to heal quickly, with minimal scarring (Martin, 2013).

In wounds where there is considerable tissue loss – for example, pressure ulcers or venous leg ulcers – healing occurs through secondary intention by the process of granulation and epithelisation. The secondary healing process can be explained simply using the analogy of a house on fire, in which the healing process is represented by the four emergency services required to deal with the fire – the fire fighters, refuse collectors, builders and decorators (Shipperley and Martin, 2002).

**Phase 1: Inflammation - the fire fighters**

This phase starts immediately after the injury is caused and lasts 0-3 days (Shipperley and Martin, 2002); it is similar to the fire-fighting phase in that it is the body’s emergency response to the injury. The main purpose of the inflammatory response is to...
prevent further blood loss by vasoconstriction, which results in a blood clot or scab (Ng, 2010). Without this response, no healing can take place (Hart, 2002).

Once bleeding has been stopped, the blood vessels within the wound dilate. This allows fluid carrying the cells necessary for the healing process to enter the wound. Around 10-15 minutes after the injury has occurred, the classic signs of inflammation are evident around the wound (Monaco and Lawrence, 2003). These include the red appearance of the wound, heat, swelling and pain, and are the result of histamine and prostaglandins at the wound site.

**Phase 2: destruction – the refuse collectors**

The destructive phase lasts 1-6 days. Once a house fire has been extinguished, the refuse collectors come in to clear up the debris created by the emergency. Similarly, within a wound, the functions of the destructive phase are to prevent infection, clean the wound and provide the best conditions for healing to occur (Li et al, 2007).

White blood cells enter the wound via the blood vessels and accumulate there. They cleanse the wound by releasing chemicals that digest any bacteria or tissue debris present (Gibson et al, 2009). Once this is complete, the white cells die off and can be seen as moist, sticky tissue, known as slough (Wolcott et al, 2008). The next phase cannot begin until the wound is sufficiently cleaned (Diegelmann and Evans, 2004; Hart, 2002).

**Phase 3: proliferation – the builders**

After the debris from a house fire has been cleared, builders are called in to restore the house to its former structure; in wound healing, this is known as the proliferative phase and usually lasts 3-24 days.

During this phase, new tissue is regenerated and constructed by fibroblasts, the cells responsible for the development of new blood vessels, collagen and other connective tissue (Shipperley and Martin, 2002). Tiny new capillaries join together in a scaffold within the wound; this develops into granulation tissue that fills the wound cavity (Martin, 2013). Granulation tissue is pale pink but becomes bright red as more new blood vessels develop (Sussman and Bates-Jensen, 2007).

**Phase 4: maturation – the decorators**

The maturation phase can be likened to redecorating the house after a fire; it lasts between 21 days and two years. Epithelial cells, located in intact hair follicles, sweat glands and around the edges of the wound, move over the newly formed granulation tissue and reduce the size of the wound by contracting, thereby pulling the edges together (Fig 2).

Macrophages re-organise the collagen within the newly healed wound to form a scar (Flanagan, 1997). This scar tissue will fade from red to white over time; however, this will only regain 80% of the strength of non-injured skin.

**Conclusion**

This article has provided a simple overview of the complex wound healing process. It is essential that nurses can recognise the different phases so they can monitor the progress of wounds as they pass through the various stages. Each phase requires different management strategies, and inappropriate treatment can delay wound healing.

**References**


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**TABLE 1. WOUND HEALING PRACTICE POINTS**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Practice point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation</td>
<td>The wound and surrounding tissue appear red, warm and hot; this is normal and should not be mistaken for infection</td>
</tr>
<tr>
<td>Destruction</td>
<td>Slough within a wound is normal and is not a sign of infection; if wounds are kept too dry, white cell activity will be reduced and healing may be delayed</td>
</tr>
<tr>
<td>Proliferation</td>
<td>Granulation tissue is a sign that the wound is healing but very dark red granulation tissue may indicate the presence of infection or ischaemia. Granulation tissue is very fragile due to the delicate capillaries - rough handling may cause the wound to bleed and delay healing</td>
</tr>
<tr>
<td>Maturation</td>
<td>Ensuring the wound is kept moist during this phase will allow the cells to move across the wound surface easily and speed up healing (Winter, 1962)</td>
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</tbody>
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**FIG 2. EPITHELIAL CELLS MIGRATING OVER A WOUND**


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- Part 3: Assessing and treating wound pain (18 November)
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- Part 5: Selecting the most appropriate wound dressings (2 December)
- Part 6: Wound complications and how to deal with them (16 December)

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