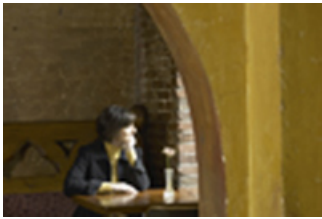


Fact sheet: Chronic wounds



It is easy to get hurt in your day-to-day life, but most small wounds will heal on their own. Yet for larger wounds from surgery or bigger cuts, you might need more than just a small adhesive bandage. These wounds have to be closed with stitches or staples, and it may take a few weeks for them to fully heal. But some wounds, like foot or leg ulcers, pressure sores, or cancer treatment wounds, heal even more slowly, or do not heal at all. Wounds that do not heal normally are called chronic wounds. Treating chronic wounds usually takes a very long time and is often painful. These wounds can also be a heavy psychological burden for those who have them. In this fact sheet we describe the different options for helping chronic wounds to heal and relieving the pain they cause.

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How do wounds normally heal?

Wound healing involves several steps. After an injury the body increases the blood flow to the area that has been wounded. This makes the wound become red and warm and allows white blood cells (leucocytes) and platelets (thrombocytes) to reach the wound. White blood cells help fight off infection of the wound. Platelets activate blood clotting (coagulation), preventing further bleeding. Scavenger cells (phagocytes), which remove damaged or dead cells and germs also travel in the bloodstream to the wound. The blood also brings many other substances needed for wound healing, such as oxygen and certain nutrients. After that, cells are produced that form new skin and underlying skin tissue, as well as new blood vessels. Connective tissue fibers (collagen) and small muscle cells are also produced. This stabilizes the wound, and it helps the edges join together so the wound can close. Depending on how deep the wound is, it heals with or without a scar.

Why do some wounds take so long to heal?

There are many reasons why a wound may heal poorly. Infection can slow down healing as germs enter the wound. Infected wounds often even get worse. Pressure sores (bed sores) may also heal poorly because of constant pressure on them in people who have to lie in bed. These areas of the body have to be relieved from pressure to help the wound heal. You can read about preventing pressure sores in our feature on pressure sores (URL: <http://www.informedhealthonline.org/index.633.56.en.html>) .

Poor blood flow to the wound can also prevent it from healing quickly. In people with a circulation problem, not enough blood flows to their legs and feet in particular.

Therefore, wounds on these parts of the body heal especially poorly. Narrowing of the blood vessels that transport oxygen (arteries) or problems with the leg veins like venous valve insufficiency can cause leg or foot ulcers. These ulcers are extremely painful and heal very slowly. People with diabetes might not experience the pain from these ulcers if their diabetes has damaged their nerves (diabetic neuropathy). This is especially dangerous, as they might not realize that an open wound has developed or become worse.

Diabetes can slow healing, but so can other chronic diseases like cancer. Immune suppression can also cause wounds to heal poorly or become inflamed.

It is also harder for the skin to heal as people get older, or when they are not well-nourished. We do not know if a special type of diet or food supplements lead to faster wound healing, but a healthy diet and proper treatment of the underlying diseases are essential to wound healing.

What other things influence the development and healing of chronic wounds?

Underlying diseases, personal circumstances and other factors can all contribute to a wound developing or healing poorly. Some examples: It is important for wound healing in people with diabetes that blood sugar levels not be too high for too long. Wearing very tight shoes also affects the healing of wounds in people who have diabetes because they often do not feel the pressure on the wounds from the shoes, so it is important for them to wear shoes that fit a bit looser.

People with venous insufficiency are often treated for high blood pressure. An important part of the treatment of a leg ulcer is also wrapping the leg in elastic bandages or wearing compression stockings. These put external pressure on the tissue and relieve the pressure on the veins, allowing leg ulcers to heal better. Bandages with several layers are more effective than ones with only a single layer. There are also devices with inflatable chambers that are placed around the full length of the legs and then inflated and deflated in cycles from ankle to groin. This puts pressure on the legs to force the blood out of the deep veins – this is called “intermittent pneumatic compression”. It is not known whether this intervention has a greater benefit than just bandages or stockings or whether a combination of these measures is a good idea.

People who develop a pressure sore (decubitus ulcer) are

usually physically weak or have diseases that limit their ability to move around. They often need help to move. When someone is able to move only hardly or not at all, regular repositioning is important. This is done to reduce pressure as much as possible on the parts of the body that have bed sores, and to make sure that no new bed sores develop.

Wounds can also become infected, making the healing process even slower. Depending on how severe the inflammation is, your doctor may also prescribe antibiotics.

How are chronic wounds treated?

Wound cleaning

More severe chronic wounds are often first cleaned thoroughly. A doctor or nurse first performs what is called debridement: they remove dead cells or inflamed tissue from the wound. This can be done by using a gel containing enzymes, forceps, a sharp curette or a scalpel, for example. Cleaning of the wound with a high-pressure water jet is called mechanical debridement. Yet another kind of debridement involves placing specially bred maggots (fly larvae) on the wound with or without a pouch. The maggots remove dead tissue and fluid from the wound. Debridement is often painful. A local anesthetic, in an ointment for example, can help ease the pain. Debridement of large wounds is often done under general anesthetic. Debridement can be repeated regularly.

A simple wound cleaning is frequently done when the bandage is changed. This means that the wound is rinsed with a saline or electrolyte solution. Tap water may also be used in some cases. Even though there are sometimes concerns that tap water might not be clean enough, there is no evidence that in Germany cleaning a wound with tap water increases the risk of infection. Overall, too little is known about the advantages and disadvantages of different cleaning solutions and the effect of cleaning on wound healing in general.

Wound dressings

After the wound is cleaned, a dressing is applied. There are many different types of dressings, such as moist compresses, foils, hydrogels, hydrocolloids, silver-containing wound dressings and foam bandages. These dressings aim to keep the wound moist, remove excess wound fluid, and protect the wound from infection. They usually remain on the wound for a few days and are

then changed when they are soaked through with fluid from the wound or have become loose. There have not been enough trials investigating which type of dressing is best for which type of wound.

There are also wound dressings that have substances to help the healing process by promoting the growth of the body's cells (growth factors). It is unclear whether they have a benefit, though. Applying specially prepared honey to a chronic wound before the dressing is put on probably does not have a benefit for venous leg ulcers. Supplementary treatment with honey has not been studied enough for other types of chronic wounds.

Technical aids

Some hospitals use technical devices to improve wound healing. These include hyperbaric oxygen therapy, vacuum-assisted closure therapy and therapeutic ultrasound. In hyperbaric oxygen therapy, the person with the wound enters a special chamber to breathe in oxygen under high pressure.

In vacuum-assisted closure therapy, the wound is covered with a sponge that is connected to a pump by a tube. The pump sucks fluid out of the wound and improves the flow of blood in the area around the wound. Large chronic wounds might heal better by using vacuum-assisted closure techniques. You can read more about research on vacuum-assisted closure therapy in the research summary "Chronic wounds: Do they heal better with vacuum therapy?" (URL: <http://www.informedhealthonline.org/index.298.en.html>) .

In therapeutic ultrasound chronic wounds are treated with sound waves. This warms up the parts of the body around the wound and the tissue moves, as if it were being massaged. The goal of therapeutic ultrasound is to promote self-healing, but it has not been shown that this causes chronic wounds to heal better. The same is true of the electromagnetic therapy, which applies electromagnetic waves to the wound through different devices (for example pillows or mats).

Skin grafts

Some wounds are so large that they do not close on their own. In these cases a skin graft could be an option. Skin grafts involve a surgeon transplanting skin from another part of the body, usually the thigh, onto the wound so that it is closed. Grafts made from human cell products and

synthetic materials can increase the chances of a poorly healing wound closing faster.

Some complex, poorly healing wounds require close cooperation on the part of the treatment team, and psychological as well as medical aspects have to be considered. It is important that pain is also treated properly in every wound treatment.

What are the pain relief options for chronic wounds?

The pain that chronic wounds cause is often underestimated by people who have not experienced it themselves. It can make daily life and sleeping difficult, and it can be depressing. Drugs like paracetamol can help ease the pain. If these are not enough, a doctor can prescribe stronger medication that will help more. Some wound dressings have the pain reliever ibuprofen in them – yet in research done so far they have not been shown to reduce the pain from the wound.

It is especially important for people with chronic wounds who are often in pain to let others know if they are suffering pain, and to quickly find ways of relieving it. Friends and relatives can help a lot by providing care and support. Relatives can also make a major contribution by helping to organize quality care that will ensure regular and good treatment of the wound. Important contacts include the family doctor, specialists for wound treatment and outpatient nurses.

People with chronic wounds can feel very uncomfortable, are often embarrassed and are shy of social contact. Particularly because of this, it can be a big help if someone is there to support them. Maybe they also need someone to help keep them from losing their patience – also and especially if it takes a long time until the wound heals. Good personal and medical support is important to help someone along this path, and even makes it easier to reach the desired goal – it is also easier to cope with setbacks if you know that you are not alone. Support can be especially important if treatment is not successful and ways of dealing with the problem over the long term have to be found.

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Glossary

antibiotics

Antibiotics are medicines that can be used for bacterial and some fungal infections. Antibiotics do not work against viruses. Well-known antibiotics include penicillin, tetracycline and chloramphenicol.

evidence

Evidence is what we call scientific proof from well-conducted, good-quality scientific trials that have been carefully designed to answer specific questions. Depending on the types of questions, different scientific research methods (types of study) are most appropriate to find reliable answers to these questions. Randomized controlled trials (RCTs), for example, are the best way to get reliable evidence on the effectiveness of medical treatments (interventions). This type of study, however, is not the best form of evidence for all possible questions, and does not provide the best answers to all kinds of questions, either. Epidemiological studies, for example, are very suitable for establishing well-founded proof for the spreading of a disease in the population.

infection

In medicine, we speak of an infection when a person has caught a germ (an infectious agent). This germ can be a bacterium, a virus, a fungus or a worm. The germ multiplies and then either spreads throughout the body or only attacks one particular organ. As long as there are no signs of a disease, this is called an asymptomatic infection. When the body shows a reaction to the germ in the form of symptoms, this is called a symptomatic infection (an infectious disease). The period between the moment the germs enter the body and the moment the first symptoms of the disease appear, is called the incubation period. It may last a few hours or days, or even many years. An infection does not necessarily have to lead to the onset of a disease.

coagulation

Coagulation or clotting stops bleeding. Coagulation is a complex process involving several steps. If a blood vessel is damaged, thrombocytes (platelets) line the wall of the blood vessel. The platelets clump together. This process is called aggregation. Clotting factors, which are particular proteins formed in the liver, also travel to the wounded blood vessel. A complex chain reaction including these

factors gathers more platelets and repairs the wound. The walls of the wound close together and connective tissue cells help build new tissue.

debridement

The word debridement comes from the French word "débrider", which means to remove extra fluid. In medicine, debridement is the cleaning or scraping away of dead cells and contaminated tissue out of a wound. This can be done with a scalpel, spoon or other instrument, and is called surgical debridement. It can also be done with a chemical made of particular proteins (enzymes), or it can be done "mechanically". "Mechanical" or physical debridement can be done with a special dressing. Excess wound fluid, cells, and germs stick to the dressing and are removed whenever the dressing is changed. Mechanical cleaning of a wound can also be done under the shower: the flow of water can remove germs and dead cells. Using wound-cleaning substances like hydrogen peroxide or moist dressings is another form of mechanical debridement. An old type of debridement that is coming more into use again is "biological" debridement, done with sterile maggots. The term debridement is also used for the surgical removal of stitches after a wound has healed.

collagen

"Colla" comes from a Greek word meaning glue. Collagen is a protein that is part of a variety of tissues. For example, there is collagen in connective tissue, tendons, ligaments, cartilage, bones, and in dentine in the teeth.

leg ulcer

A leg ulcer is an open sore on the lower leg. This sore is often caused by a condition called chronic venous insufficiency, and sometimes by circulation problems in the arteries. Some other chronic conditions like diabetes increase the risk of developing a leg ulcer.

ulcer

The term "ulcer" comes from a Latin word meaning an open sore. An ulcer involves damage to the skin or mucous membrane that reaches into the lower layers of the skin. An ulcer can occur in or on different parts of the body, including the stomach, lower bowel, the leg or as a bed sore (for example, on the heel or base of the spine) in people who are in bed long term. Particular factors can

lead to ulcers, including circulation problems, infections, tumours, diabetes or blood vessel diseases like peripheral vascular disease. An ulcer is often painful and it often takes a long time to heal.

hyperbaric oxygen therapy

In hyperbaric oxygen therapy (HBOT), the patient breathes pure oxygen (100%) at a pressure greater than 100 kPa (> 1 bar). The oxygen is taken up by blood vessels in the lungs and transported to other organs and tissues.

decubitus

The word decubitus comes from the Latin word "decumbere", which means to lie down. It is usually called a bed sore, pressure sore or pressure ulcer. Bed sores develop from unrelieved pressure on the skin, causing damage to the skin and the underlying skin tissue. The continuous pressure compresses small blood vessels, which cannot supply the surrounding tissue with enough oxygen and nutrients. The skin changes and becomes necrotic (dies). Bed sores mainly affect people who have to lie in bed for long periods. The most vulnerable areas are those where the skin lies directly over the bone, and include the heels, ankles, knees, hips, base of the spine, spine, and elbows. Elderly people or people with chronic diseases such as diabetes or circulation problems have a high risk of developing bed sores.

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growth factors

Growth factors are proteins that affect wound healing in a

variety of ways. Growth factors attract inflammatory cells (leucocytes) and tissue cells (fibroblasts) to the wound. The inflammatory cells fight germs. Tissue cells stimulate the growth of new tissue. Growth factors also stimulate the formation of new cells and blood vessels.

inflammation

An inflammation is a (defense) reaction of the body to an injury, irritation or infection. More blood is brought to the respective body part to protect the body. This is why this body part feels warmer, becomes swollen and red and is usually more sensitive. If the inflammation affects the mucous membranes, they secrete more fluid than usual. This helps to wash out the germs that have entered.

ultrasound

An ultrasound examination (sonography) is used to visualize the interior parts of the body. In this procedure, the "echoes" of acoustic waves with a frequency above the audible range of human hearing can be turned into images. A special machine sends these waves into the body part to be examined. Depending on the type of tissue, the waves are reflected strongly (e.g. body cavities filled with fluid), weakly, or not at all (e.g. bone tissue). The ultrasound machine turns the echo into an image of the body region examined on a fluorescent screen. Ultrasound examinations are typically done in pregnancy diagnostics, diagnosis of abdominal diseases like gall and kidney problems, or examinations of the thyroid gland and the vessels.

Sources

Akbari Sari A, Flemming K, Cullum NA, Wollina U. Therapeutic ultrasound for pressure ulcers. *Cochrane Database of Systematic Reviews*: Version 2009, Issue 4. CD001275. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/16855964>)]

Barber C, Watt A, Pham C, Humpreys K et al. Influence of bioengineered skin substitutes on diabetic foot ulcer and venous leg ulcer outcomes. *J Wound Care* 2008; 17: 517-527. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/19052516>)]

Briggs M, Flemming K. Living with leg ulceration: a synthesis of qualitative research. *J Adv Nurs* 2007; 59: 319-328. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/17608682>)]

Briggs M, Nelson EA. Topical agents or dressings for pain in venous leg ulcers. *Cochrane Database of Systematic Reviews*: Version 2010, Issue 4. CD001177. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/20393931>)]

Carter MJ, Tingley-Kelley K, Warriner RA. Silver treatments and silver-impregnated dressings for the healing of leg wounds and ulcers: A systematic review and meta-analysis. *J Am Acad Dermatol* 2010. (currently only available online) [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/20471135>)]

Cullum NA, Al-Kurdi D, Bell-Syer SEM. Therapeutic ultrasound for venous leg ulcers. *Cochrane Database of Systematic Reviews*: Version 2010, Issue 6. CD001180. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/20556749>)]

Ebbeskog B. *Elderly patients with slow-healing leg ulcers - an embodied suffering*. Stockholm: Centre of Excellence in Elderly Care, Karolinksa Institute. [Full text (URL: <http://diss.kib.ki.se/2003/91-7349-492-5/thesis.html>)]

Edwards J, Stapley S. Debridement of diabetic foot ulcers. *Cochrane Database of Systematic Reviews*: Version 2010, Issue 3. CD003556. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/20091547>)]

Fernandez R, Griffiths R. Water for wound cleansing. *Cochrane Database of Systematic Reviews*: Version 2010, Issue 5. CD003861. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/18254034>)]

Jones JE, Nelson EA. Skin grafting for venous leg ulcers. *Cochrane Database of Systematic Reviews*: Version 2010, Issue 1. CD001737. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/17443510>)]

Jull AB, Rodgers A, Walker N. Honey as a topical treatment for wounds. *Cochrane Database of Systematic Reviews*: Version 2009, Issue 4. CD005083. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/18843679>)]

Lo SF, Chang CJ, Hu WY, Hayter M, Chang YT. The effectiveness of silver-releasing dressings in the management of non-healing chronic wounds: a meta-analysis. *J Clin Nurs* 2009; 18: 716-28. [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/19239539>)]

Kantor J, Margolis DJ. Venous ulcers. In: Williams H, Bigby M, Diepgen T, Herxheimer A, Naldi L, Rzany B. *Evidence-Based Dermatology*. London: BMJ Publishing Group. 2008: 539-545.

Moore ZEH, Cowman S. Wound cleansing for pressure ulcers. *Cochrane Database of Systematic Reviews* Version 2010, Issue 5. CD004983 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/16235386>)]

Moore ZEH, Cowman S. Repositioning for treating pressure ulcers. *Cochrane Database of Systematic Reviews* Version 2010, Issue 5. CD006898 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/19370658>)]

Nelson EA, Mani R, Vowden K. Intermittent pneumatic compression for treating venous leg ulcers. *Cochrane Database of Systematic Reviews* Version 2010, Issue 1. CD001899 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/18425876>)]

Olyae Manesh A, Flemming K, Cullum NA, Ravaghi H. Electromagnetic therapy for treating pressure ulcers. *Cochrane Database of Systematic Reviews* Version 2009, Issue 4. CD002930 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/16625564>)]

O'Meara S, Al-Kurdi D, Ologun Y, Ovington LG. Antibiotics and antiseptics for venous leg ulcers. *Cochrane Database of Systematic Reviews* Version 2010, Issue 1. CD003557 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/20091548>)]

O'Meara S, Cullum NA, Nelson EA. Compression for venous leg ulcers. *Cochrane Database of Systematic Reviews* Version 2009, Issue 1. CD000265 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/19160178>)]

Palfreyman SSJ, Nelson EA, Lochiel R, Michaels JA. Dressings for healing venous leg ulcers. *Cochrane Database of Systematic Reviews* Version 2010, Issue 1. CD001103 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/16855958>)]

Reddy M, Sudeep SG, Kalkar SR, Wu W et al. Treatment of pressure ulcers: a systematic review. *JAMA* 2008; 300: 2647-2662. [Full text (URL: <http://jama.ama-assn.org/cgi/content/full/300/22/2647>)]

Storm-Versloot MN, Vos CG, Ubbink DT, Vermeulen H. Topical silver for preventing wound infection. *Cochrane Database of Systematic Reviews* Version 2010, Issue 3. CD006478 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/20238345>)]

Ubbink DT, Westerbos SJ, Evans D, Land L, Vermeulen H. Topical negative pressure for treating chronic wounds. *Cochrane Database of Systematic Reviews* Version 2009, Issue 4. CD001898 [Summary (URL: <http://www.ncbi.nlm.nih.gov/pubmed/18646080>)]

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