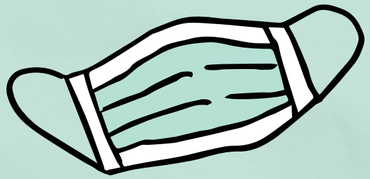

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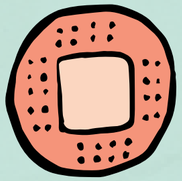
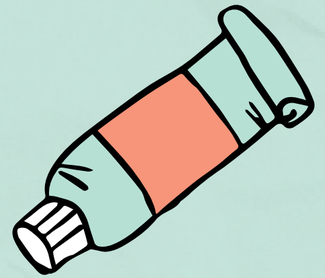
Artful Suturing: How Skin Protects Us

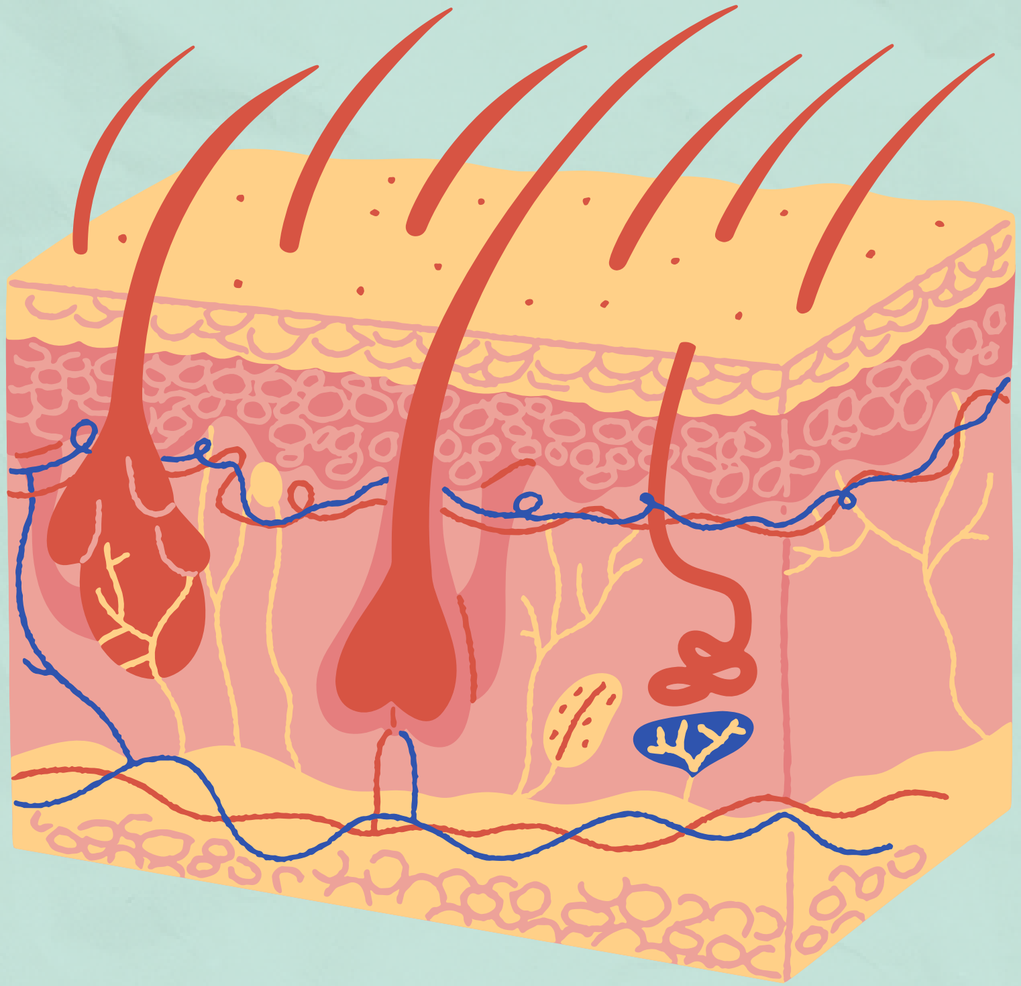




LEARNING GOALS

We are learning to:

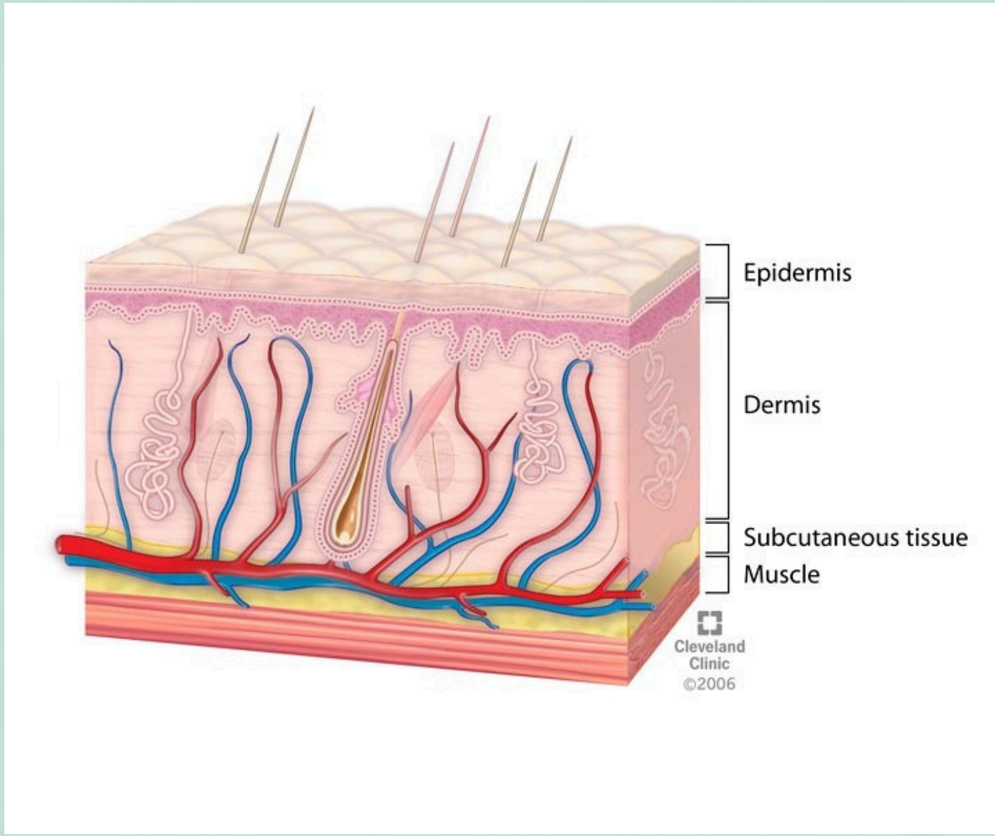
- Explain how skin protects the body.
- Describe how closing the wound can help healing begin.
- Explore the immune response to pathogens.
- Name some careers that help people with wound care and healing.



Skin - Your Body's Protection System

- Skin is the body's largest organ, covering the whole body.
- Skin protects against germs and regulates our body temperature.
- The skins main layers are the epidermis, dermis and hypodermis (subcutaneous tissue).
- Skin is one of your body's first lines of defense in the immune system.

Turn and talk: What are two ways your skin helps you every day?



https://my.clevelandclinic.org/health/body/10978-skin

Skin Layers

Epidermis (top layer):

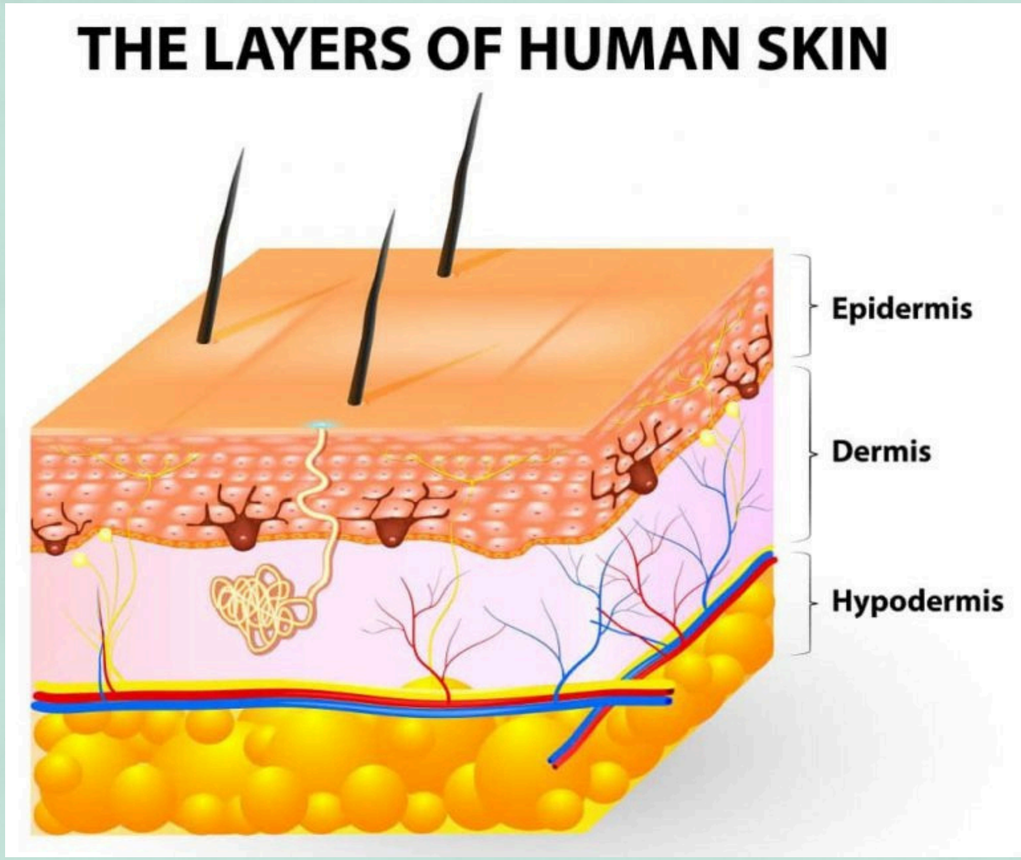
- Acts as a barrier, keeping bacteria from entering the bloodstream and protecting against infections.

Dermis (middle layer):

- Keeps skin flexible and resilient with collagen and elastin, grows hair
- Nerves in the dermis help you feel pain

Hypodermis/subcutaneous tissue (bottom layer):

- The fat in the hypodermis cushions muscles and bones during injuries and reglates body temperature.
- Nerves and blood vessels in hypodermis connect to rest of the body



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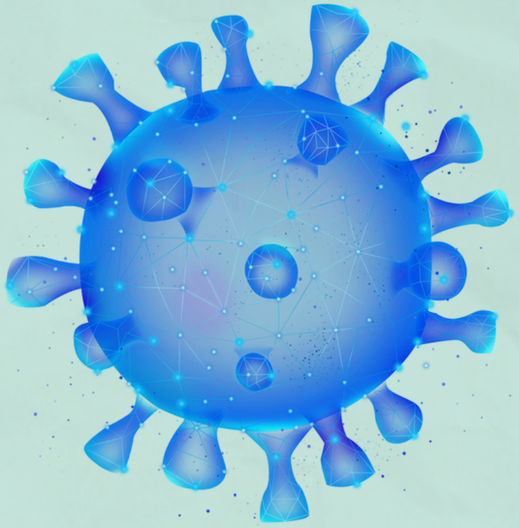
First line of defense: Immune System



The skin is the body's most widespread physical barrier, with multiple layers to protect against pathogens (germs) entering the body.

- The outer layer of the skin (epidermis) is composed of cells called keratinocytes that physically block the pathogens from entering.

- The cells of the epidermis are shed continuously (known as desquamation) which removes any microbes (germs) that may be attached to the skin

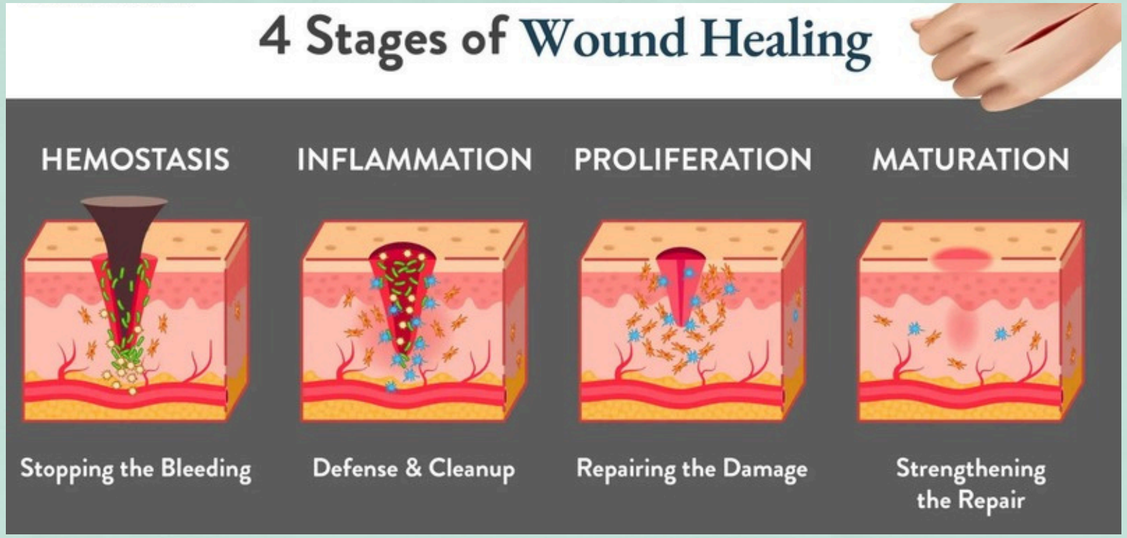
https://biologyinsights.com/the-1st-line-of-defense-in-your-immune-system-explained/

How do wounds heal?

A wound is an opening in the skin where bacteria can invade and cause infection.

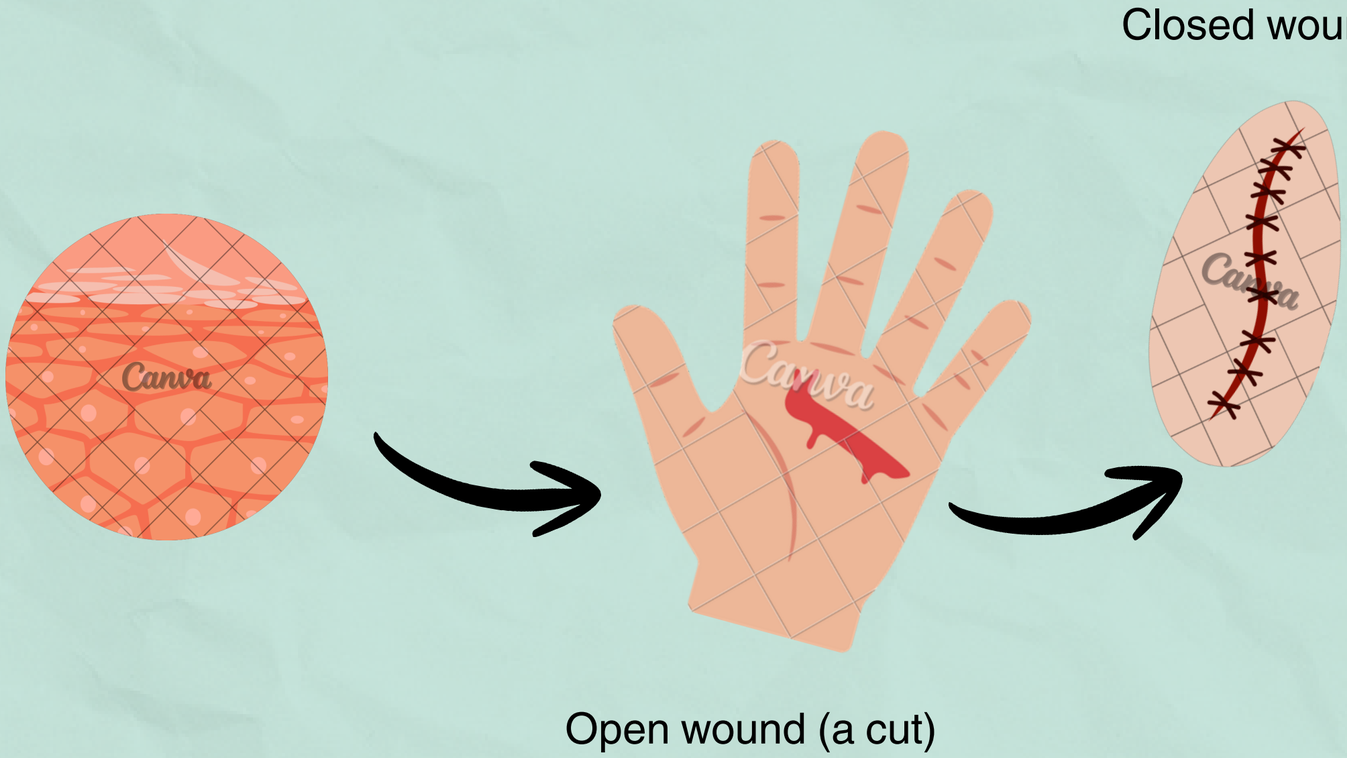
Stages of wound healing:

- The wound will bleed and the blood will clot to stop the bleeding (forms a dry scab to protect tissue underneath from germs)
- The immune system protects the wound by releasing fluid leaks from the wound to helps clean the area. Blood vessels open so oxygen and nutrients can be brought to the wound to help heal.
- The repair stage begins where red blood cells make the skin more resilient and new skin is created over the tissue.



https://medlineplus.gov/ency/patientinstructions/000741.htm

WHY CLOSE SOME WOUNDS?



- Some serious cuts or wounds may need sutures to help with healing by holding the tissue together.
- Dead tissue may be removed to help with healing.
- The edges of the cut are pulled together and sutured to hold the wound closed.

https://www.webmd.com/skin-problems-and-treatments/getting-stitches-and-caring-for-stitches

WHO HELPS WITH WOUNDS

Embed the teacher-facing Health and Social Care careers showcase document.

Careers: Registered Nurse & Nurse Practictioner

RN

Registered Nurse

Helps care for patients, gives treatments, and checks how they are healing.

Talents:
Care • Teamwork • Observation • Communication

Average Income in NB:
$83,850

RN

NP

Nurse Practitioner

Diagnoses and treats illness, helps patients heal, and can provide advanced care.

Talents:
Problem-solving • Leadership • Care • Communication

Average Income in NB:
$105,300

NP

Careers: Dentist & Medical Doctor

DDS

Dentist

Cares for teeth, gums, and the mouth, and helps people heal after dental treatment.

Talents:
Care • Focus • Precision • Communication

Average Income in NB:
$132,000

DDS

MD

Medical Doctor

Treats illnesses and injuries and helps patients recover over time.

Talents:
Problem-solving • Care • Listening • Decision-making

Average Income in NB:
$187,297

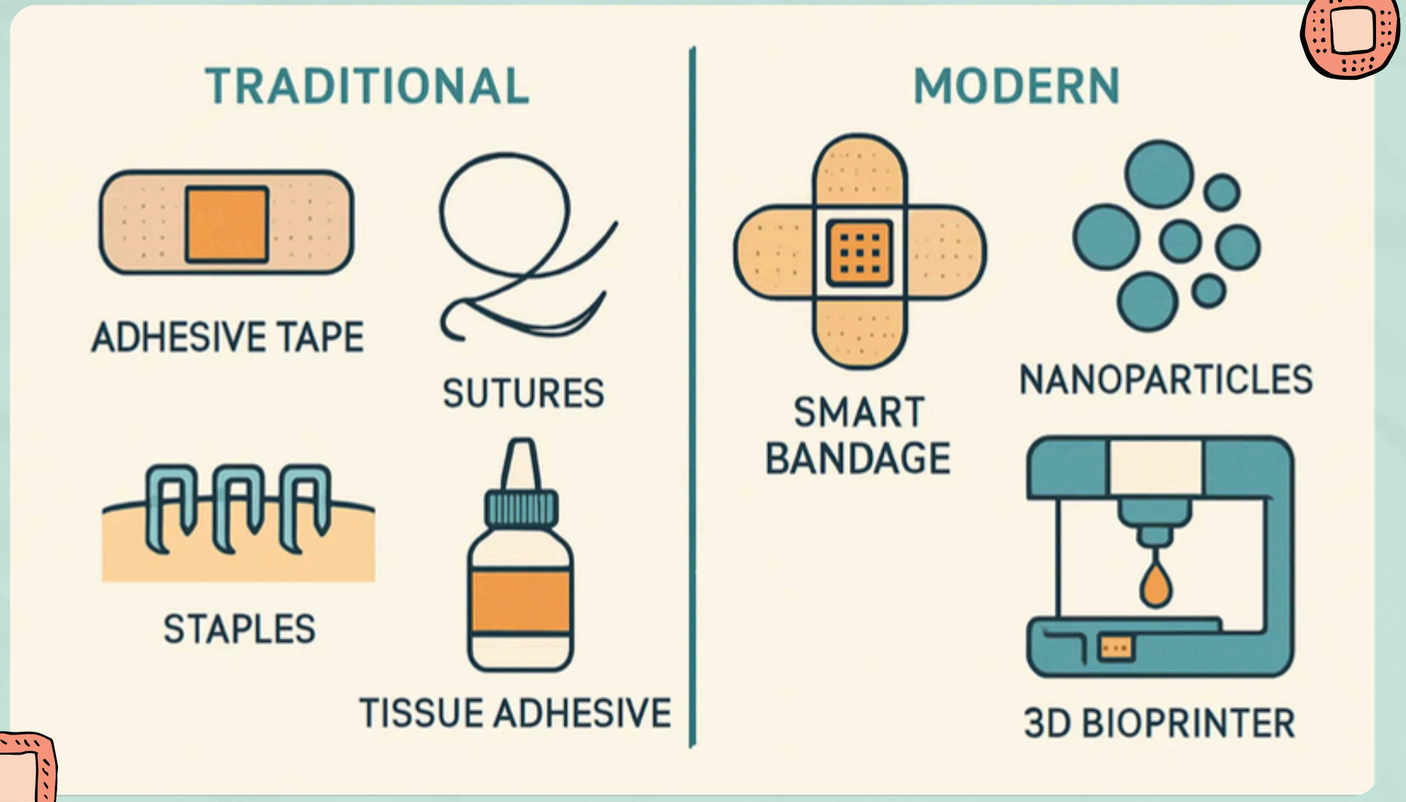
MD

More Ways Wounds Can Be Closed

These ideas are optional extra learning about newer technologies in wound care.

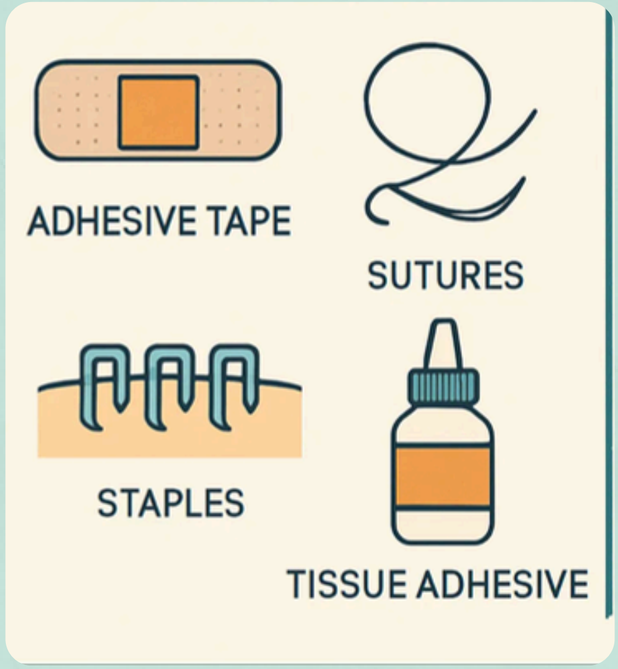
Wound Closure Methods

Health care practitioners still use stitches, staples, and medical tape to close many cuts, especially when the wound is new and the skin can be brought together easily.



Grade 6+ Extension

TRADITIONAL



Traditional methods such as adhesive tape, sutures, staples, and tissue adhesive remain common and are often used to help close cuts and protect the skin as it heals.

Adhesive Tape

Adhesive tape (AKA Band-aid) gently holds the skin together without needles and work best for small cuts where the skin is not being pulled apart.

Tissue Adhesive

Tissue adhesives are special glues that close the skin without needles and are often used on small cuts, especially on the face.

Sutures

Sutures are the most common way to close wounds and use thread to hold the skin together while it heals.

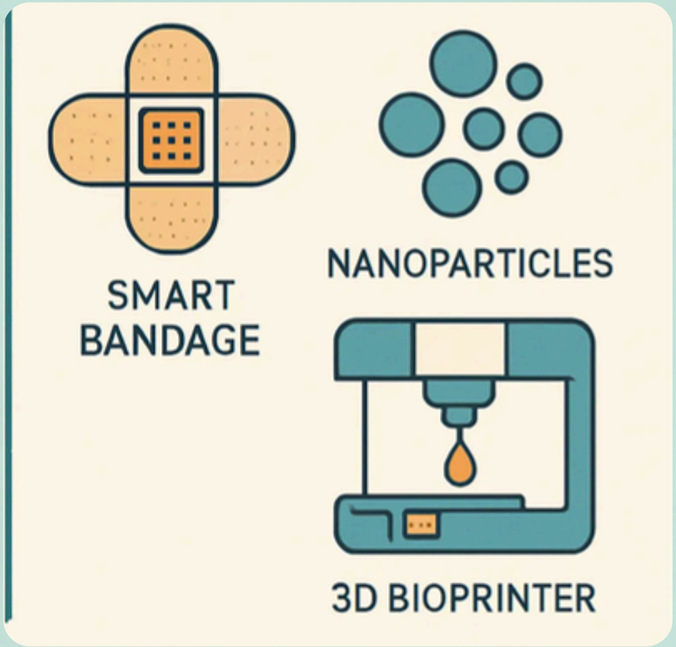
Staples

Staples close the skin very quickly and are often used for long cuts, but they can sometimes be less comfortable during healing.

MODERN

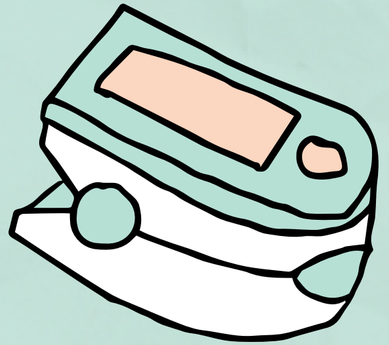
Modern methods such as smart bandages, nanoparticles, and 3D bioprinters use advanced technology to support healing, reduce scarring, and help close wounds in new ways.

Make a turn and talk: Brainstorm around what new modern methods may be coming in the future?



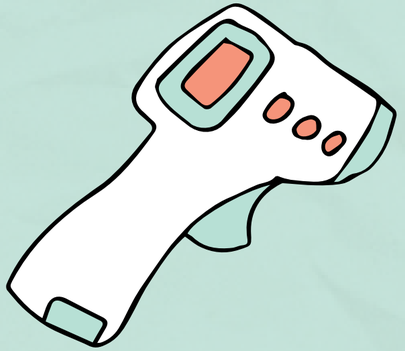
1. Smart Wound Dressing

Smart wound dressings are high-tech bandages that check how a wound is healing and send useful information.



2. Nanotherapeutics

Nanotherapeutics use very tiny particles in bandages or creams to help fight germs and speed up healing.



3. 3D Bio Printing

3D bioprinting creates new skin tissue to help repair large wounds where the body needs extra help to heal.

Teacher Appendix

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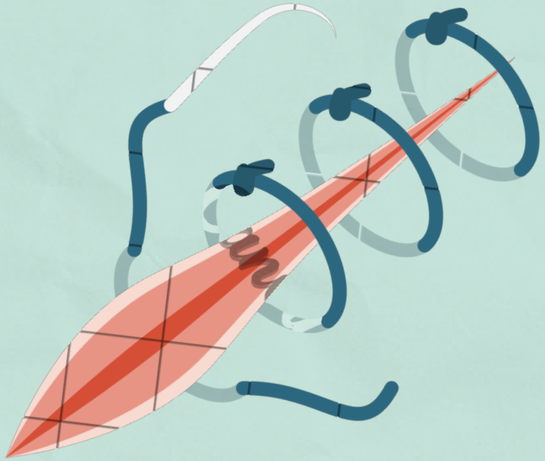
Figure 1 - Interrupted Suture



Interrupted Suture

An interrupted suture is made one stitch at a time. Each stitch is tied separately. This helps hold the two sides of the wound closer together

Everyday example

It is a bit like buttoning up a shirt: each button is its own “stitch” that helps bring the two sides together, one at a time.

Figure 2 - Suture Spacing

Stitches work best when they are spaced in an even way.

Even spacing helps the wound close more neatly and helps the edges line up.

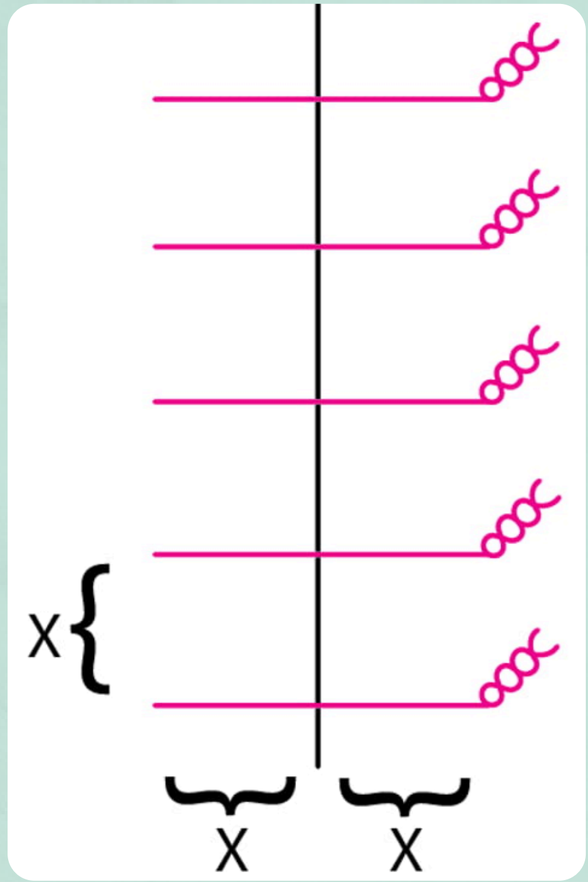


Image source: https://www.merckmanuals.com/professional/multimedia/image/suture-spacing

Figure 3 - Square Knot

A square knot helps keep a stitch in place.

The knot should feel secure, but not so tight that it pulls too hard on the wound model.

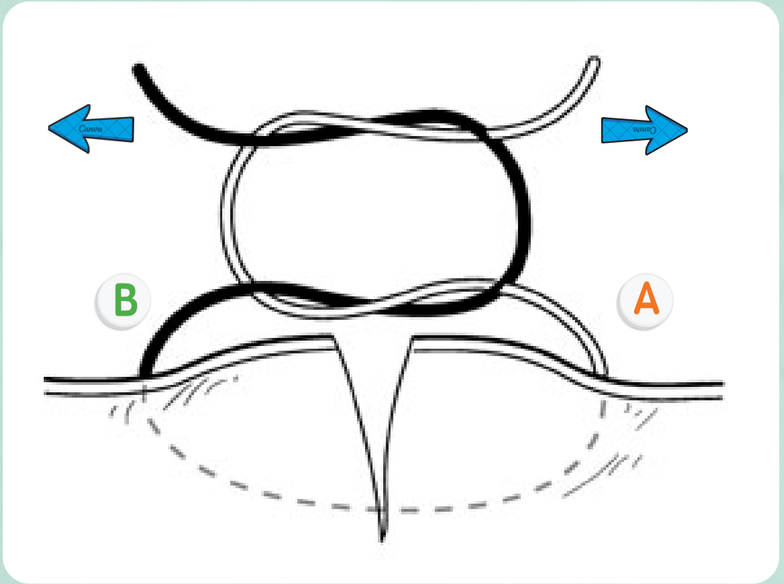
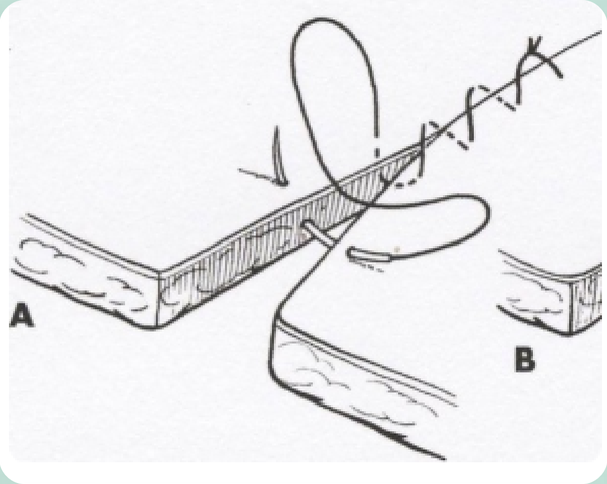


Figure 4 - Continuous Suture

Continuous (aka running) Suture



A continuous suture uses one long piece of cord. Instead of tying a knot after every stitch, the cord keeps moving along the wound and is tied at the beginning and the end.

It is a bit like lacing a shoe or sewing along a line without stopping after every stitch.

Everyday example