

# 2B: General Guidelines for Extremity Casting

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01 Principles of Orthopedic Casting - RECAP

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02 Patient Preparation

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03 Fiberglass Application

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04 Skin Preparation

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05 Cast Removal

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# Upon successful completion of this module, students will be able to:

- ✓ Recall the foundational principles of orthopedic casting, including immobilization, alignment, and fracture protection.
- ✓ Identify the key steps involved in preparing a patient for casting, including medical history review and injury assessment.
- ✓ Review checklist or protocol for patient preparation to standardize best practices.
- ✓ Recall the steps for applying a fiberglass cast, including material handling and layering techniques.
- ✓ Understand the correct application of fiberglass, ensuring proper alignment, tension, and smoothness.
- ✓ Discuss the impact of incorrect fiberglass application on patient outcomes, such as pressure sores.
- ✓ Identify the tools and techniques required for effective skin preparation before casting.
- ✓ Recall the tools and techniques used for cast removal, including the proper use of cast saws.
- ✓ Explain the importance of safety measures to prevent skin injury during cast removal.
- ✓ Recall the step-by-step process for removing a cast while minimizing patient discomfort.
- ✓ Identify risks associated with improper cast removal, such as skin abrasions or patient anxiety.

# General Guidelines for Extremity Casting

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Orthopedic casting is an essential skill for healthcare professionals who manage fractures and other musculoskeletal injuries. Employing effective casting techniques for the extremities is crucial in ensuring optimal healing and functional recovery. This section will discuss the fundamental principles of orthopedic casting and highlight effective techniques for managing fractures and other injuries of the extremities.

## 1. Review of Principles of Orthopedic Casting

Orthopedic casting techniques play a critical role in the management of fractures and other musculoskeletal injuries. Adhering to key principles ensures optimal patient outcomes by promoting proper healing, reducing complications, and improving overall patient satisfaction. The following principles are essential for effective orthopedic casting techniques:

- **Accurate diagnosis and assessment:** Begin with a thorough evaluation of the injury using physical examination, patient history, and imaging studies (e.g., X-rays, CT scans, or MRIs) to accurately diagnose the fracture or injury. This information will guide the selection of the most appropriate casting technique.
- **Fracture reduction and alignment:** Properly align the fractured bones before casting to ensure optimal healing and minimize the risk of malunion or nonunion. In some cases, closed reduction may be sufficient, while others may require open reduction and internal fixation before casting.
- **Adequate immobilization:** The cast should immobilize the injured area and provide support to promote healing. Ensure that the cast extends from the joint above the injury to the joint below the injury, effectively stabilizing the fracture site.
- **Anatomic and functional positioning:** Position the affected limb in a functional and anatomically neutral position during casting. This reduces muscle atrophy, joint stiffness, and the risk of developing contractures, ultimately improving the patient's recovery and rehabilitation process.
- **Appropriate padding and pressure distribution:** Apply sufficient padding to protect the skin, nerves, and blood vessels from pressure and irritation caused by the cast material. Ensure even pressure distribution throughout the cast to avoid creating pressure points or compromising circulation.
- **Proper cast material and application:** Choose the appropriate cast material (plaster of Paris or fiberglass) based on the specific needs of the patient and the type of fracture. Apply the cast material evenly and smoothly, using just enough tension to conform to the contours of the extremity without causing excessive pressure.
- **Patient education and follow-up care:** Instruct the patient on proper cast care, including keeping the cast clean and dry, monitoring for signs of infection or complications, and avoiding activities that could damage the cast. Schedule regular follow-up appointments to monitor the patient's progress, address any complications, and adjust the treatment plan as needed.
- **Timely cast removal and rehabilitation:** Remove the cast when the fracture has healed adequately, as determined by clinical assessment and imaging studies. Implement a rehabilitation program tailored to the patient's specific needs to restore strength, range of motion, and function in the affected limb.

**By adhering to these principles, healthcare professionals can ensure that orthopedic casting techniques are effective in promoting proper healing, reducing complications, and achieving optimal patient outcomes.**

# Patient Preparation - General Guidelines

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*Preparing a patient's skin prior to the application of an orthopedic fracture cast is crucial to ensure proper hygiene, reduce the risk of infection, and provide a comfortable fit. Here are the general steps to prepare the skin before applying a cast:*

- **Clean the skin:** Gently clean the area around the fracture site using mild soap and water or an antiseptic solution. This step helps to remove dirt, debris, and bacteria from the skin, reducing the risk of infection.
- **Dry the skin:** Pat the skin dry with a clean towel or gauze. Make sure the skin is completely dry before proceeding, as moisture can interfere with the adhesion of the cast materials and promote the growth of bacteria.
- **Assess the skin:** Examine the skin for any signs of infection, open wounds, or skin irritation. If there are any concerns, consult with the healthcare professional responsible for the patient's care.
- **Apply a skin barrier** (if necessary): In some cases, a skin barrier may be used to protect the skin from irritation or maceration. This could be a moisture barrier cream or spray, which can help prevent skin breakdown caused by prolonged exposure to moisture.
- **Trim or shave hair** (if necessary): Excessive hair in the cast area can cause discomfort, itching, and difficulty removing the cast later. If the patient has a lot of hair in the area, it may be necessary to trim or shave it before applying the cast. Be sure to get the patient's consent before doing so.
- **Position the limb:** Properly position the patient's limb in the desired position for casting. This may involve supporting the limb with pillows, bolsters, or other positioning aids to ensure that it remains stable and comfortable during the casting process.
- Once the patient's skin is clean, dry, and properly assessed, you can proceed with applying the stockinette, padding, and casting material according to the healthcare professional's instructions.

**Remember, it's essential to consult with a healthcare professional to ensure proper technique and care for the patient's specific needs.**

# Points to Ponder

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*In addition to the previous guidelines, it is essential to remove any jewelry from the affected limb before applying a fiberglass cast to the upper extremity for several reasons:*

**Swelling:** After an injury, it is common for the affected limb to swell. If jewelry is left in place, it may become too tight, constricting blood flow and causing additional pain, discomfort, or even tissue damage.

**Pressure points and skin irritation:** Jewelry can create pressure points or cause skin irritation when trapped under the cast. This can lead to discomfort, pain, and even pressure sores or skin breakdown, complicating the healing process.

**Cast fitting:** Jewelry can interfere with the proper fitting and molding of the cast. A well-fitted cast is essential for immobilizing the affected limb and promoting healing. Jewelry may prevent the cast from fitting snugly and providing the necessary support.

**Imaging studies:** During the course of treatment, the patient may require additional imaging studies, such as X-rays, to monitor the healing process. Metal jewelry can interfere with the quality of these images, making it difficult for healthcare providers to assess the patient's progress accurately.

**Cast removal:** When it is time to remove the cast, jewelry may complicate the process. If jewelry is trapped beneath the cast, it can be challenging to safely remove the cast without damaging the jewelry or causing injury to the patient.

**Removing jewelry from the affected limb prior to the application of a fiberglass cast for the upper extremity helps to ensure patient comfort, proper cast fitting, and effective healing while reducing the risk of complications during the treatment and recovery process.**

# Materials for Fiberglass Application

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*Fiberglass orthopedic casts are widely used for immobilizing fractures and providing support to injured limbs. The materials used in the application of a fiberglass cast include the following:*

- ✓ **Fiberglass cast tape:** The primary component of a fiberglass cast is the fiberglass cast tape, which is made of woven fiberglass fabric impregnated with a polyurethane resin. The fiberglass fabric provides strength and durability, while the resin hardens when exposed to moisture, allowing the cast to set and maintain its shape. Fiberglass cast tape is available in various widths and colors, allowing for customization according to the patient's needs and preferences.
- ✓ **Padding:** Padding is applied under the fiberglass cast to protect the patient's skin and provide cushioning. Cast padding, such as synthetic or cotton cast padding, is commonly used for this purpose. Another option is a tubular stockinette, which is a stretchy, soft material that can be placed over the limb before the cast padding and fiberglass tape are applied. Padding should be applied smoothly and evenly to prevent pressure points or wrinkles that could irritate the skin.
- ✓ **Gloves:** When applying a fiberglass cast, healthcare providers should wear gloves to protect their hands from the resin and prevent skin irritation. The gloves also ensure a clean application and prevent contamination of the cast materials.
- ✓ **Water:** Water is used to activate the polyurethane resin in the fiberglass cast tape. The healthcare provider will typically dip the fiberglass tape roll in water or use a spray bottle to dampen it. The temperature of the water can affect the working and setting time of the cast; using warmer water will speed up the setting time, while cooler water will slow it down. The water should be clean to prevent contamination and reduce the risk of infection.
- ✓ **Scissors or cast saw:** Scissors or a cast saw may be needed to trim the edges of the cast or remove it once the fracture has healed. Scissors can be used to trim the cast padding and stockinette, while a cast saw is specially designed to remove fiberglass casts without injuring the patient's skin.
- ✓ **Cast spreader:** In some cases, a cast spreader may be used to remove a fiberglass cast. This tool is designed to spread the cast apart after making an initial cut with a cast saw, allowing for safe and efficient removal of the cast without damaging the patient's skin.

**These materials, when used in conjunction with proper casting techniques and principles, contribute to the successful application and management of fiberglass orthopedic casts. Fiberglass casts are preferred by many healthcare providers and patients due to their lightweight, durable, and water-resistant properties.**



# Steps for Cast Removal

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Fiberglass orthopedic casts are widely used for immobilizing fractures and providing support to injured limbs. The materials used in the application of a fiberglass cast include the following:

## 1. Preparation

### ***1.1 Gather Supplies***

- Cast saw (oscillating saw specifically designed for cast removal).
- Cast spreader.
- Bandage scissors or cast scissors.
- Protective eyewear (for the provider) and ear protection (for the patient if sensitive).
- Gauze and cleaning materials for the skin.

### ***1.2 Educate the Patient***

- Explain the process to the patient to alleviate anxiety.
- Reassure that the cast saw will not cut the skin when used correctly.

### ***1.3 Ensure a Safe Environment***

- Position the patient comfortably, ensuring the limb is supported.
- Maintain good lighting and proper ergonomics for the provider.

## 2. Cutting the Cast

### ***2.1 Identify Cutting Locations***

- Mark the cutting sites along the longitudinal axis, usually on the sides of the cast to avoid pressure points.

### ***2.2 Operate the Cast Saw***

- Turn on the cast saw and test it to ensure functionality.
- Use the oscillating blade at a 90-degree angle to the cast surface.
- Apply firm but controlled pressure to penetrate the fiberglass without pressing too hard.

### ***2.3 Create Longitudinal Cuts***

- Make two parallel cuts along the length of the cast, one on each side.



# Steps for Cast Removal continued...

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## 3. Spreading and Removal

### 3.1 Use the Cast Spreader

- Insert the cast spreader into the cut sections and gently pry open the cast.
- Work slowly to avoid excessive pressure on the underlying tissue.

### 3.2 Remove the Padding

- Use bandage scissors to carefully cut through the soft inner padding and stockinette.

### 3.3 Lift the Cast Away

- Remove the cast halves gently, ensuring no sharp edges contact the skin.

## 4. Post-Removal Care

### 4.1 Assess the Skin

- Inspect the skin for abrasions, dryness, or irritation.
- Address any areas of concern, such as cleaning the skin or applying moisturizer.

### 4.2 Advise the Patient

- Discuss the next steps in care, such as rehabilitation exercises or further protection for the limb.
- Reinforce follow-up instructions and answer any patient questions.

### 4.3 Dispose of the Cast

- Safely discard the cast materials per facility protocols.

## 5. Documentation

- Record the procedure in the patient's medical record, including any observations of the skin, patient feedback, and post-care instructions. Always bring any questions/concerns to your physician, medical supervisor etc.

