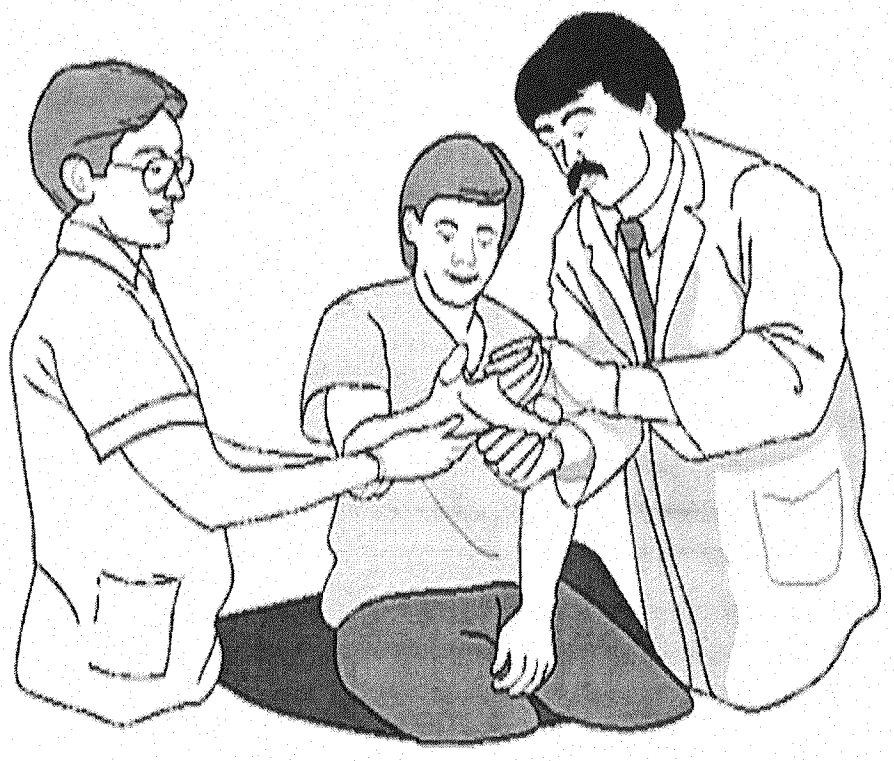
Splinting In The ED



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Forward

The purpose of this Splinting Workshop is not to provide a total education and expertise in the care of injuries requiring immobilization. The purpose is to provide the student with a basic understanding of the various types of conditions that require immobilization and to provide hands-on practice in the application of plaster of Paris splints. The proper method of making the plaster ready for use in splinting and the proper application of the plaster is the main goal of this presentation.

The information contained in this booklet comes from personal experience and many written sources. This information should be used as general guidelines in the treatment of injuries requiring immobilization with plaster splints, but should be supplemented by continued reading, education, practice, and consultation with members of the medical profession.

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Splinting Techniques

Splints are used to immobilize fractures, dislocations, and for definitive therapy for certain soft tissue injuries. Splints have been made of plaster, fiberglass, wood, cloth, cardboard and an amazing variety of other materials. For the purpose of this workshop, the focus will be on plaster splints.

The general principles of Splinting include:

- Patient comfort
- Prevent motion at fracture site
- Maintain bony alignment
- Control hemorrhage
- Prevent further injury (neurologic, vascular)
- Facilitate patient movement
- Augment healing
- Decrease tension on wounds across joints
- Decrease edema

Indications for immobilization other than fractures:

- Acute arthritis
- Severe contusions and abrasions
- Skin lacerations across joint areas
- Tendon lacerations
- Tenosynovitis
- Puncture wounds to hands, feet, and joints
- Animal bites to hands or feet
- Deep space infections of the hands and feet
- Joint infections
- Sprains and strains

Materials Used

The materials used for making plaster splints start with the plaster material itself. Plaster of Paris is named for the fact that it was first made from gypsum of Paris, France. When this gypsum is heated to approximately 128 degrees C, most of the water of crystallization is driven off, leaving behind a fine white powder: Plaster of Paris. When water is re-introduced to this powder, the reaction is reversed. The

plaster recrystallizes or "sets" by incorporating water molecules into the crystalline lattice of the calcium sulfate dihydrate molecules. Plaster used today consists of plaster of Paris impregnated into loose weave cloth and is commonly used in planks or rolls.

The use of prefabricated splint materials often speeds the application of the device. These splint rolls have 10 to 20 sheets of plaster enclosed between a thick layer of foam padding and a thin layer of cloth. Using this material, no time is required to apply padding before Splinting the area being addressed.

A single layer of cloth stockinette is commonly used under the plaster. This stockinette protects the skin and is folded back over the plaster at each end of the splint to create a smooth, professional looking, padded end.

Cast padding under the plaster protects the skin and pads bony prominence and allows for minor swelling. Bony prominence of the upper and lower extremity that require padding include:

Upper Extremity:
- Olecranon
- Radial styloid
- Ulnar styloid

Lower Extremity:
- Upper portion of the inner thigh
- Patella
- Fibular head
- Achilles tendon
- Medial malleolus
- Lateral malleolus

Padding is made of soft cotton with a very coarse weave and is stronger and pads better than previously used thick paper products. This padding should be applied around the area to be padded in at least 2-3 layers. It should extend approximately 3 inches beyond the end of the splint so that it can be folded back to form smooth, well padded edges. Care should be taken to avoid wrinkling which may cause pressure areas on the skin. Avoid making the padding too tight, which

might result in a constricting band effect on the underlying skin and tissue.

Types of Plaster

There are two types of plaster materials: Fast Drying and Extra Fast Drying. The fast drying has a setting time of approximately 5-8 minutes. This allows more time to apply and mold the splint before it starts to set or get hard. Fast drying produces less heat than the extra fast drying.

Extra fast drying plaster sets in approximately 2-4 minutes. This produces much more heat. This material is useful when acutely reduced fractures are being splinted.

Setting time of plaster can be changed by several methods. Water temperature is very important. Hot water hardens plaster faster than cold water (room temperature water is preferred for most applications). Other factors include:

Accelerates Setting Time:
- Reusing dip water
- Salicylic acid
- Zinc
- Magnesium
- Copper
- Iron
- Aluminum

Splint Application:

Splint application includes several steps:
- Submerge plaster material in water until bubbles stop
- Gently squeeze out excess water
- Smooth the splint on hard surface to uniformly
- Laminate the material to increase strength of splint
- Place over the stockinette and padding
- Smooth with palms of hands
- Secure with single layer of padding
- Secure with elastic bandage
- Avoid patient movement until plaster sets

Examine and document splint and patient's neurovascular status

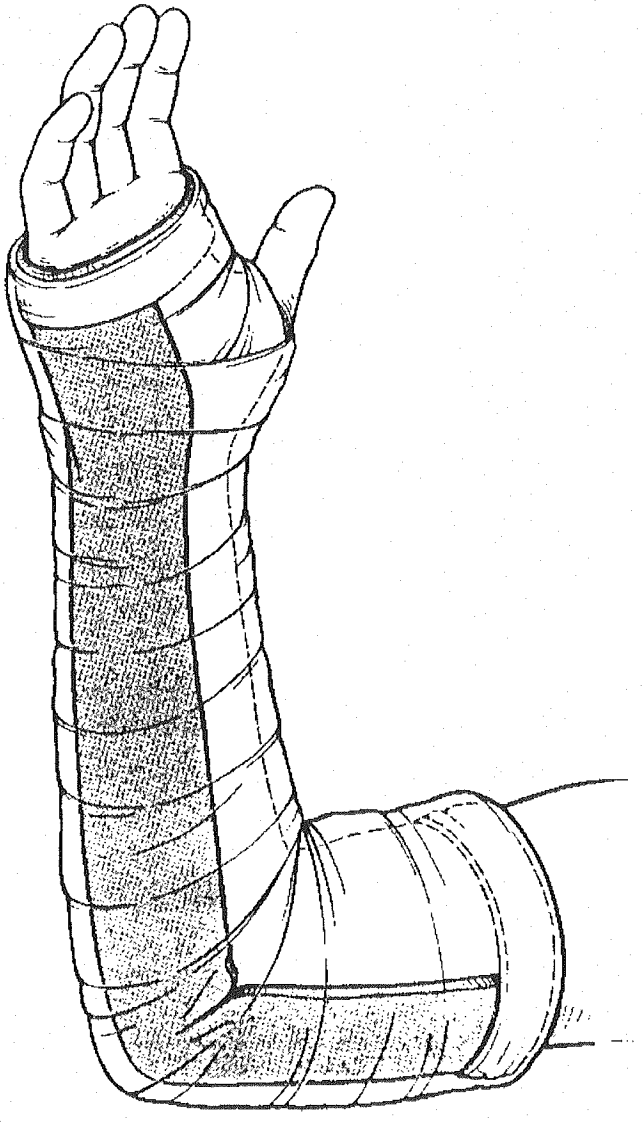
Give the patient the following discharge instructions:

Keep splint clean, dry, and elevated
Rest
Keep elevated above the area of the heart
Ice packs for comfort
24 hour non-stress period for splint

Note the diagrams at the end of this booklet "How To Apply Plaster Splint" for visual instructions.

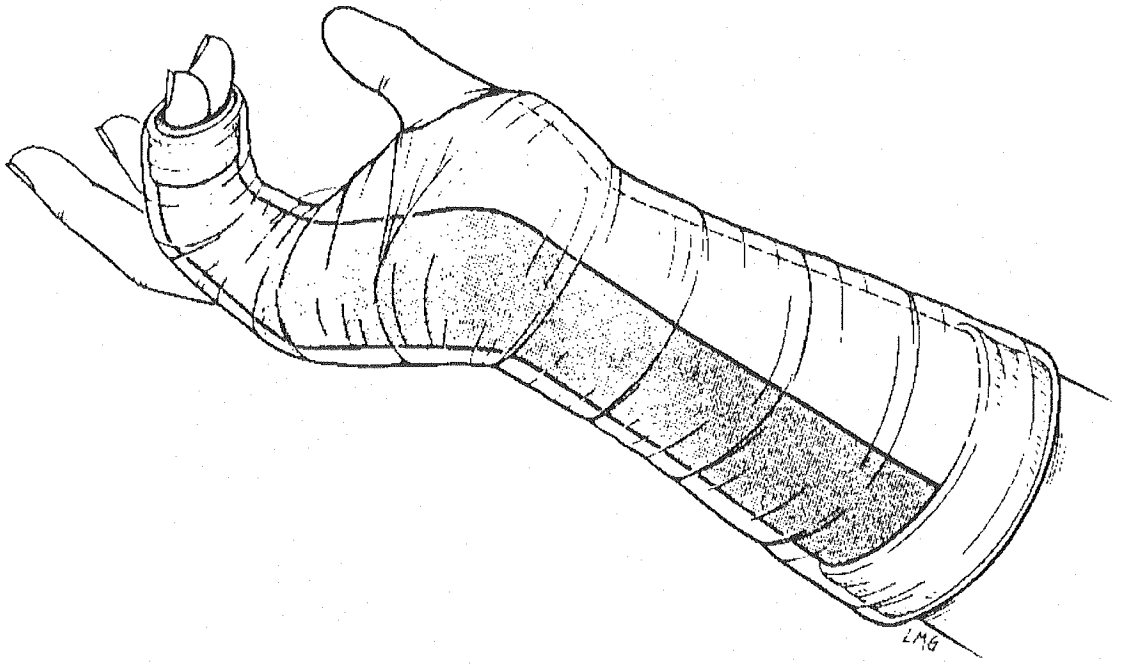
Long Arm Posterior Splint

The long arm posterior splint is used to immobilize areas of the elbow, forearm and wrist. The material used should be 4-6 inches wide with a notch cut out at the elbow for smooth fit. The elbow should be flexed at 90-degree angle, forearm in neutral (thumb up) position, wrist is neutral position or slightly dorsiflexed (10-20 degrees).



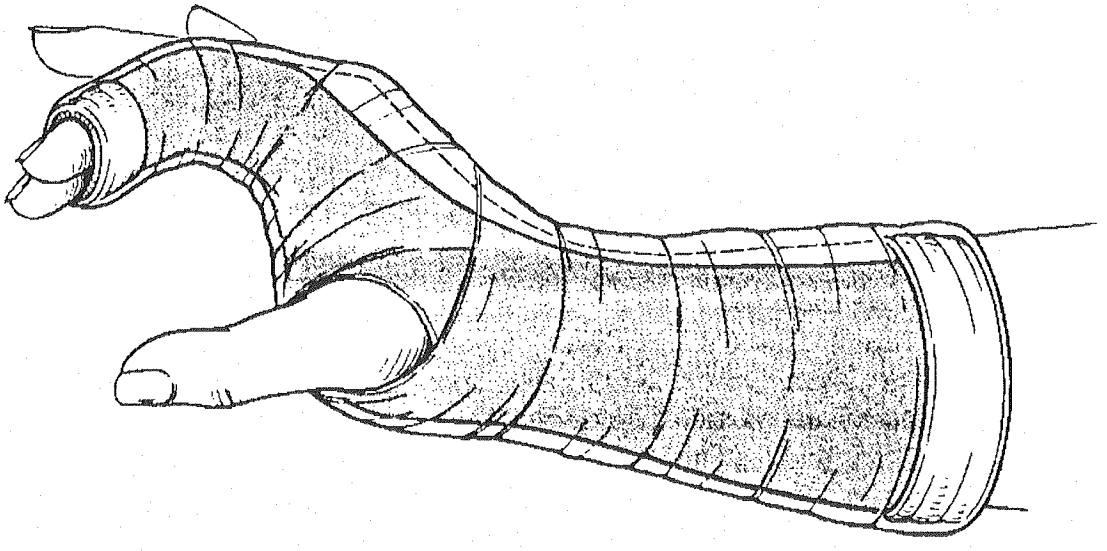
Ulnar Gutter Splint

The ulnar gutter splint is used to immobilize carpals, metacarpals, and digits. The material used should be 4 inches wide. Immobilize the 4th and 5th metacarpals and phalanges. Cotton padding should separate the fingers. The MCP joints should be flexed at 90 degrees, the PIP joints at 10 degrees and the DIP joints at 5 degrees of flexion.



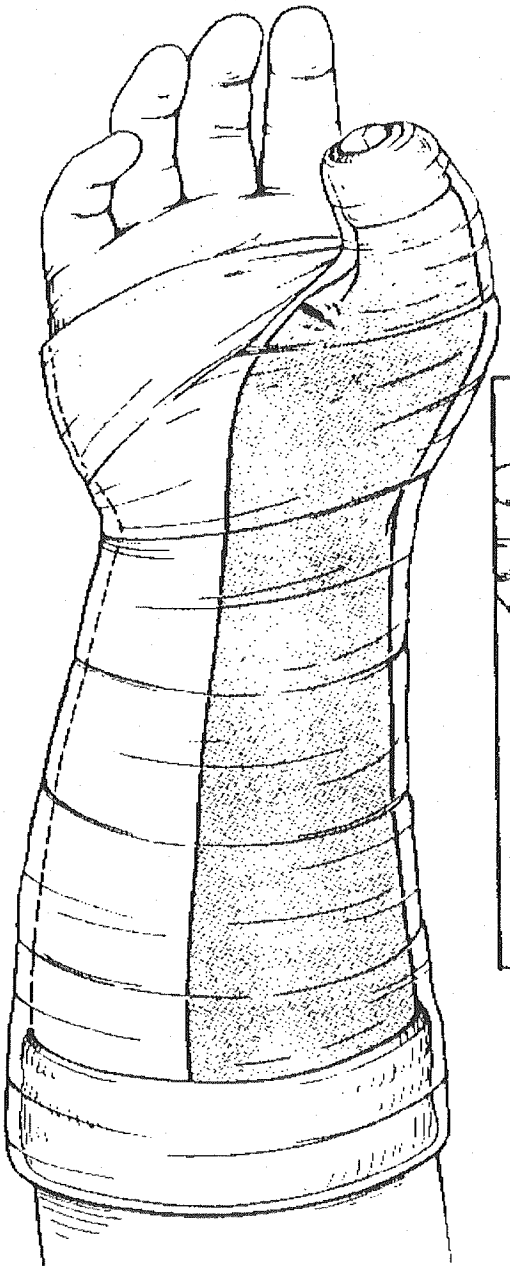
Radial gutter Splint

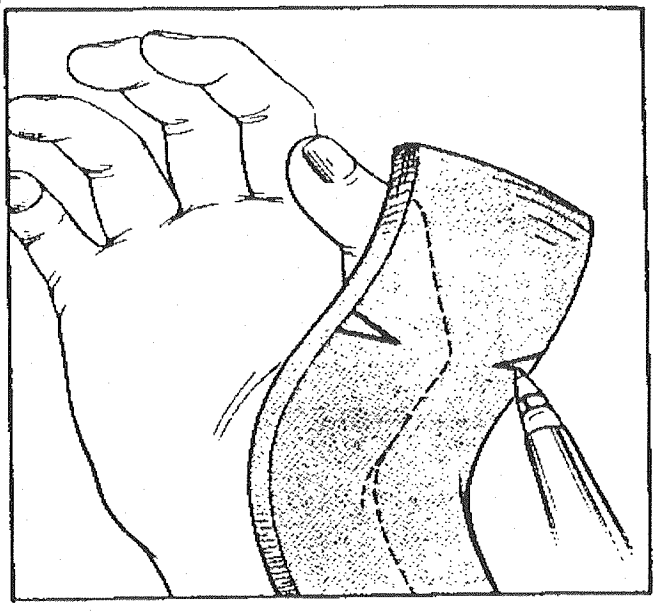
The radial gutter splint is used to immobilize the 2nd and 3rd metacarpals and phalanges. Separate fingers by cotton padding. The material used should be 4 inch wide. A hole should be cut out for the thumb with plaster along the radial and volar border of the forearm. The MCP joint should be at 90 degrees, the PIP at 10 degrees and the DIP joint at 5 degrees of flexion.



Thumb Spica (Gutter) Splint

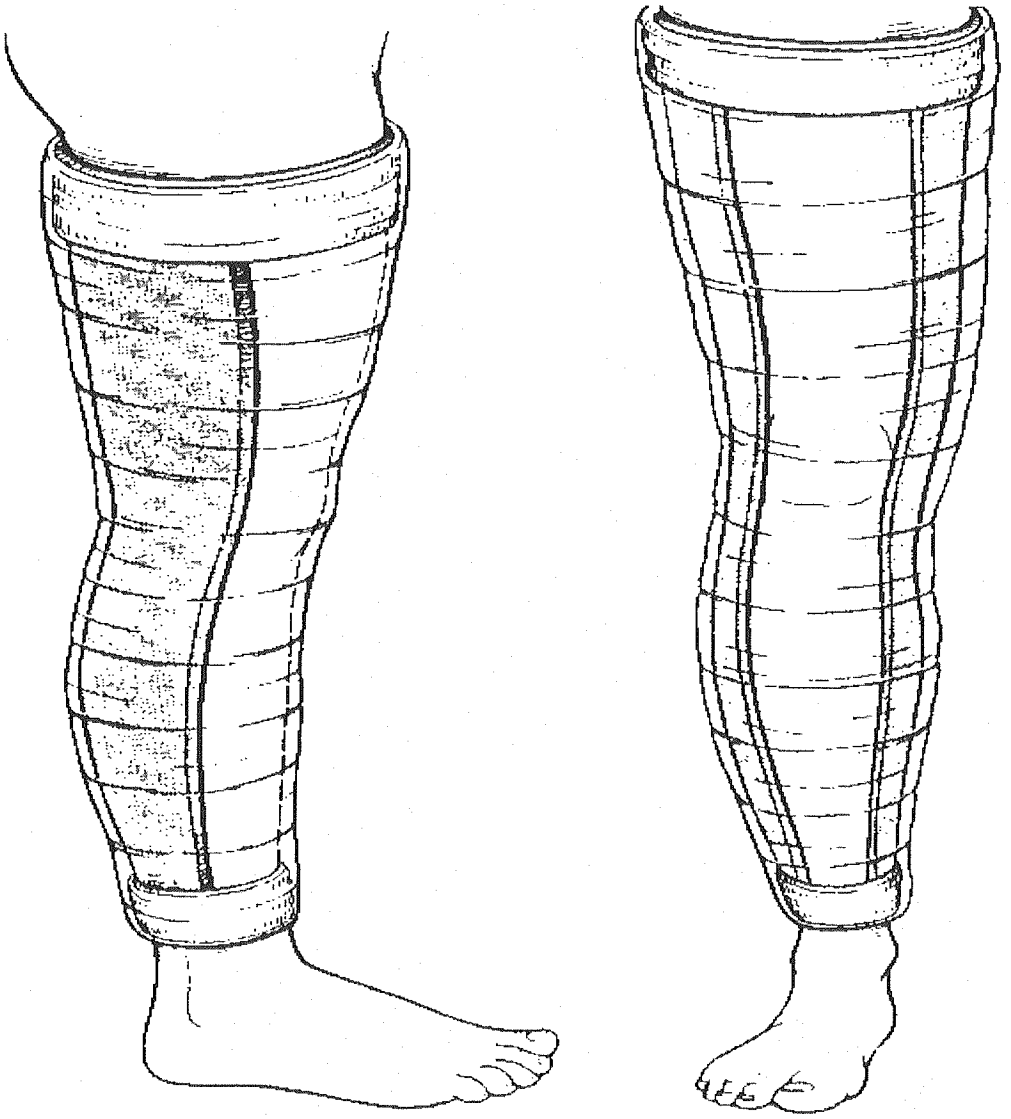
The thumb spica or gutter splint is used to immobilize the thumb in abducation with plaster along the radial border of the forearm. The material used should be 4 inches wide and extend from the thumbnail to mid forearm.





Knee Immobilizer

The knee immobilizer is used for mild to moderate ligamentous and soft tissue injuries. They are made out of foam, hard plastic, fabric and velcro straps. The knee immobilizer should extend distally to within a few inches of the malleoli and proximally to just below the buttock crease. A plaster splint that can be used instead of the more expensive removable immobilizer is the Jones Splint. This splint is also useful when the leg is too large for the knee immobilizer, for treatment of angulated fractures, or for temporary immobilization of other knee injuries. The material is 6 inch wide and runs from just below the buttock crease to 2-3 inches above the malleoli.

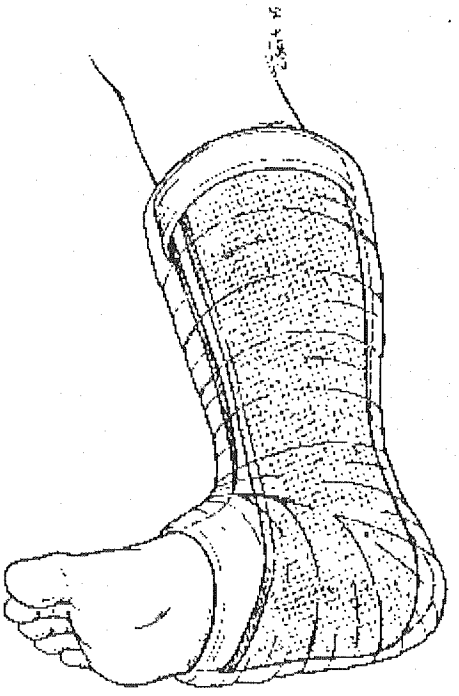


Posterior Leg Splint

The posterior leg splint is used to immobilize 2nd and 3rd degree ankle sprains, fractures of the distal fibula and tibia, reduced ankle dislocations, tarsal and metatarsal fractures or other foot problems. The material used is 4 inches wide, 15-20 layers with the knee and ankle at 90 degrees. The splint extends from the plantar surface of the great toe along the posterior surface of the lower leg to the level of the fibular head. If toe movement is painful, incorporate the toes into the splint after padding between each digit.

Sugar Tong (Stirrup) Splint

The sugar tong splint is used for ankle injuries or fractures. This splint allows less plantar flexion and is damaged less than the posterior split. It covers the malleoli and offers medial and lateral ligamentous protection. The material used is 4-6 inches wide. The splint extends from the fibular head along the lateral calf, under the plantar surface of the calcaneus, up the medial side of the calf.



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How To Apply Plaster Splint

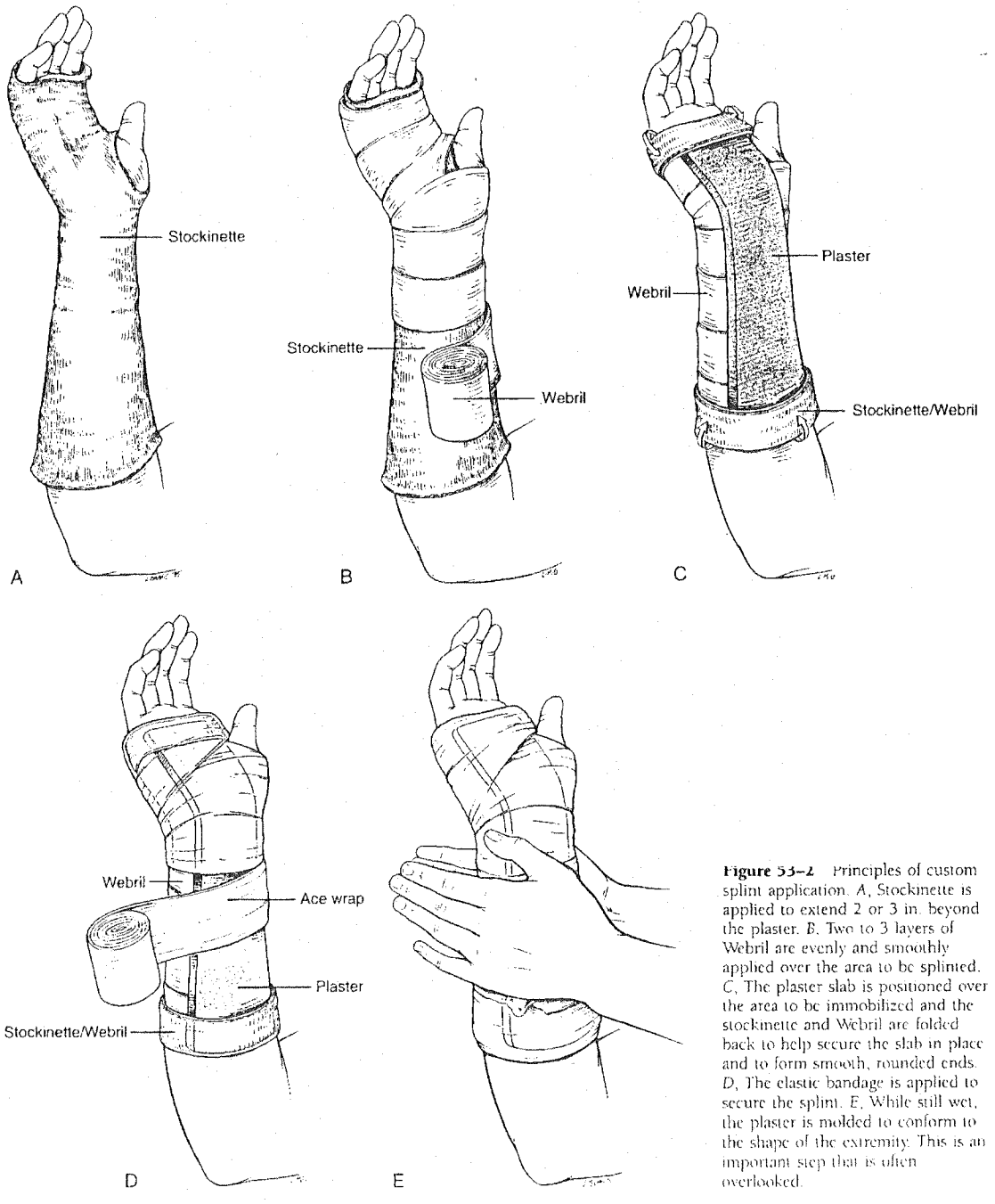

Figure 53–2 Principles of custom splint application. *A*, Stockinette is applied to extend 2 or 3 in. beyond the plaster. *B*, Two to 3 layers of Webril are evenly and smoothly applied over the area to be splinted. *C*, The plaster slab is positioned over the area to be immobilized and the stockinette and Webril are folded back to help secure the slab in place and to form smooth, rounded ends. *D*, The elastic bandage is applied to secure the splint. *E*, While still wet, the plaster is molded to conform to the shape of the extremity. This is an important step that is often overlooked.