ISOLATED LIMB INJURIES: MANAGEMENT OF PLASTER BACKSLABS, TEMPORARY SPLINTS AND DEFINITIVE CASTS IN THE ED-SCH

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- The purpose of this guideline is to guide clinicians when applying and splitting or removing casts to ensure that cast application, removal and splitting will be carried out in a safe, effective manner by Emergency Department clinicians trained in relevant risk assessment, equipment use and approved techniques.
- The clinician undertaking the procedure should confirm the required actions with the primary clinician prior to commencement.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st September 2023	**Review Period**: 3 years
Team Leader:	Nurse Educator	**Area/Dept**: Emergency Department SCH

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CHANGE SUMMARY

- Cast Removal or Splitting using a cast saw in ED SCH (2013-1024 v3) and Minor Limb Management- application of Plaster backslabs in ED- SCH (2013-1020 v3) combined into one practice guideline titled - *Isolated Limb Injuries: Management of Plaster Backslabs, Temporary Splints and Definitive Casts in the ED-SCH*
- Due for mandatory review.
- **28/11/23:** Minor review – addition of Application of Plaster of Paris (POP) Clinical Skills Assessment (CSA). See page 4.

READ ACKNOWLEDGEMENT

- This guideline applies to Emergency Department Medical Officers and Registered Nurses.
- SCH Physiotherapists and Orthopaedic Medical Officers should read this document.

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Purpose and Scope

To facilitate treatment of patients presenting to the Emergency Department (ED) with isolated limb injuries or fractures requiring immobilisation or removal/splitting of plasters.

Application

Plaster backslabs, temporary splints and definitive casts are a common, effective and economical method of supporting a fracture. Correct application reduces pain and swelling, promotes sound bony union without deformity, protects against further injury and assists in the restoration of function.

Removal/Splinting

To ensure that cast removal and splitting will be carried out in a safe, effective manner by ED clinicians trained in relevant risk assessment, equipment use and approved techniques.

Responsibilities

Management is responsible for ensuring that Clinicians who undertake this practice are provided with appropriate knowledge and training.

Clinicians must be professionally accountable, work within their scope of practice and document all interventions in the patients' medical record. The clinician is responsible for ensuring they select and apply the appropriate temporary splint or plaster backslab that supports and/or immobilise the affected limb/body part. Clinicians should refer to the SCHN Fracture Management Practice Guideline for detailed management advice.

RN Training and Accreditation

- RN's will attend education in the application and removal of plaster backslabs and temporary splints.
- A Recognition of Prior Learning (RPL) plan will be considered for RN's with previous experience.
- Nurses must practice under the supervision of accredited nurse during the initial accreditation process.
- It is recommended prior to completing the Application of Plaster of Paris (POP) Clinical Skills Assessment (CSA) that nurses should apply a minimum of three of each type of plaster or until feels competent.
- The Application of POP CSA will be recorded in MyHealthLearning
- The Clinical Nurse Educators, Nurse Educators or delegate of an area where application of plasters occur on a regular basis, are responsible for supporting the nurse during the accreditation program (supporting both theoretical learning and skills acquisition).
- It is the professional responsibility of each nurse to approach the NE/CNE and/or Manager if additional/ongoing training and assessment in this skill is identified.

Related Documents

This document is to be read in conjunction with the following:

SCHN Fracture Management Practice Guideline

Nurse Initiated Analgesia: Clinical Initiatives Nurse

Plaster Backslab Application and cast saw videos

Inclusion Criteria

If the presentation is a major trauma or complicated by damage to other body systems, treatment of the fracture should be delayed until lifesaving resuscitation has been addressed. If the child has an isolated injury, fracture management may proceed.

In collaboration with the managing clinician, identify and assess patients with isolated fractures or injuries involving upper limbs and distal lower limbs in need of immobilisation with plaster backslabs or temporary splint.

Principles of Application

- Early, appropriate immobilisation can provide significant relief from pain.
- Suspected fractures cab be immobilised in a temporary splint prior to going to radiology, unless it interferes with getting adequate views of the injured limb.
- Plasters should be thin and padded and immobilise the joints above and below the fracture.
- Elevate the affected part in a position of comfort e.g., arm in a sling or pillow support for legs.

Types of Splints and Plasters

There are 3 types applied in the ED setting:

- Temporary splint
- Plaster backslab
- Definitive Casts- Full Plaster Of Paris (POP), semi-rigid cast (soft cast) and rigid polyester cast

Temporary Splint

A temporary splint should be applied for fractures that require reduction under general anaesthetic or sedation.

Reasons for application include:

- Obvious deformity to limb
- Difficulty to control/Uncontrolled pain
- Open fractures
- Possible dislocation
- Neurovascular deficit

- Fractures requiring operative management.
- Fractures requiring reduction in the ED
- Co-morbidity likely to affect management e.g. osteogenesis imperfecta, paraplegia

A temporary splint is for pre-procedural management intervention only and patients **should not** be discharged with a one insitu.

Plaster Backslab

A plaster backslab is a partial cast that is held in place with bandages, this allows for localised swelling that often occurs in the in the first 24-48 hours of an injury. It is the treatment choice for a wide variety fractures in children of all ages. It enables a fracture of a bone to be supported and protected while the fracture heals.

The type of cast, duration it is in situ depends on the fracture and age of the child. Please refer to the SCHN Fracture Management Practice Guideline for detailed management and type of plaster backslab that should be applied.

Definitive Casts

A definitive cast is one that can usually stay insitu for the duration of the injury. They can only be applied by clinicians who have undertaken the appropriate training. The application and management of these casts are not discussed in detail in this guideline.

Pre-Application

STOP and confirm the 6 key Safety Checks prior to application:

1. ***Correct patient***
2. ***Appropriate analgesia***
3. ***Correct limb***
4. ***Correct anatomical side***
5. ***Correct plaster application type***
6. ***Correct plaster for fracture***

1. Review X-ray Images and confirm plaster requirements with managing clinician.
2. Review plaster backslab videos if needed and ensure appropriate clinicians are available to assist.
3. Ensure patient and family/carer are aware of diagnosis and the management required. If not, escalate to managing clinician to ensure this occurs.
4. Gain informed consent by explaining procedure to the patient and their family/carer.
5. Ensure you engage the Child Life Therapist or distraction to assist the child in coping with the procedure if required.
6. Consider the need for and provide adequate pain relief by administering analgesia, elevating the limb or applying ice.
7. Ensure all jewellery or constrictive clothing is removed.
8. Prepare all equipment including lined basin of cold water, non-compression stockinette, undercast padding, Plaster of Paris, bandages, tapes, scissors and as needed dynacast for reinforcement.

9. Clean any abrasions or compromised skin and apply an appropriate dressing.
10. Undertake and document a neurovascular assessment.

Application

Temporary Splint

1. Select an appropriate width of plaster that covers ½-⅔ the diameter of the fractured limb.
2. Measure length for plaster on non-injured limb, ensuring joint above and below fracture are included.
3. Fold 10-12 layers of measured plaster.
4. Select appropriate width of undercast padding to fully encase plaster layer *(allow for a small gap of padding on either side of the plaster).*
5. Measure the undercast padding by doubling the length of the plaster measurement. Then, fold 2-3 layers of measured undercast padding.
6. Wet plaster and place on one side of the measured undercast padding, then, fold over other side of undercast padding to fully encase plaster.
7. Apply combined plaster and undercoat padding to underside of affected limb in resting position/position of comfort.
8. Bandage to secure, ensure access to distal pulses and digit tips for ongoing limb assessment.
9. Elevate limb.

Plaster Backslab

1. Select an appropriate width of plaster that covers ½-⅔ the diameter of the fractured limb *(plaster backslabs **should not** be circumferential).*
2. Measure length for plaster *(NB: consider measuring on non-injured limb if pain limits the ability to measure on injured limb).*
    i. Primary Piece: Ensure joints above and below fracture are included *(approximately 2-3 fingers length below uninvolved joint).*
    ii. Ensure that supporting structures *(e.g. hand or palmar piece, or foot stirrup) have* adequate coverage over area needing support.
    (Please refer to plaster backslab videos for more information).
3. Fold appropriate number of plaster layers required and shape as needed (see *plaster backslab videos for more information)*
    i. Primary Piece: 10-12 layers *(NB: for long legs and arms, if needed fan at proximal end to ensure adequate width.)*
    ii. Supporting Structures: 6-8 layers.

4. Select and apply stockinette, leaving extra length at either end to enable it to be folded back over plaster. *(Do not make too tight or too loose as this can cause pressure areas).*
5. Beginning at the distal end of the fractured limb apply 2-3 layers of undercast padding, overlapping by 25-50% ensuring there are minimal creases and adequate padding over bony prominences.
6. Place plaster in cold water, remove and squeeze out excess water.
7. Apply plaster pieces in desired position, allowing for full movement of uninvolved joints and ensure smooth edges.
8. Apply a bandage/s, ensuring adequate pressure to keep the plaster in place, apply tape to secure.
9. Apply dynacast as required (e.g. long leg, long arm) considering patients age and mobility.
10. Gently mould plaster and hold in position for a minimum of three minutes or until plaster is firm.
11. Advise patient that as the plaster dries the thermal reaction that is created produces a temporary warmth, this fades away with time.

Post Application

- Check required positioning of plaster are achieved and edges are smooth to avoid risk of pressure areas developing.
- Attend a neurovascular limb assessment
- Measure and fit aids as indicated:
  - Upper limbs – Apply appropriate sling (e.g. Collar and Cuff, broad arm).
  - Lower limb – Assess for competency on crutches. If unable to use crutches safely refer to SCHN Fracture Management Practice Guideline for management advice. Including, occupational therapy referral information for hiring of wheelchair or other device such as pram if age appropriate.

Patient and Family Education

- Discuss the signs and symptoms of neurovascular compromise with the patient and family/carer.
- Advise on positioning of the injured limb, safe activity and use of oral analgesia where appropriate.
- Provide Patient and family/carer with "Plaster cast or Backslab care instructions for patients and their carers fact sheet".
- Limb aids:
  - If fitted for crutches, ensure safe crutch fitting and demonstration of correct use.
    - Provide verbal instructions and Crutches – instructions for safe crutch walking fact sheet.
  - If fitted for a sling, instruct and advise on sling application and use.

Follow Up

Most children with plasters should be referred for follow-up in the OPD fracture/plastics clinic, private consultant review or by their local doctor when appropriate. Please refer to the to SCHN Fracture Management Practice Guideline for follow up information.

Other discharge instructions and follow up appointment discussed with child & family and written information/appointment details provided to family.

In general nurses should refrain from giving specific commitments regarding follow up procedures, types of splints or duration of immobilisation. Short term immobilisation applied in the Emergency Department may be replaced with a variety of standard or waterproof casts, removable synthetic splints, weight bearing, or non-weight bearing casts/boots or may be removed altogether. Options can be highly variable and are decided following specialist review and physiotherapy assessment. An individual age/activity appropriate risk assessment and carer consultation is performed as part of the definitive treatment.

Outcomes

Children with limb injuries and fractures requiring immobilisation will have appropriate and safe application of plasters and splints to manage pain, optimise healing and protect from further injury.

Documentation

All interventions must be documented in the patient's medical record and should include:

- Neurovascular observations and pain score.
- Analgesia/distraction techniques used.
- Review of images/investigations – type of fracture present.
- Type of splint or plaster (temporary splint, plaster backslab or definitive cast), plaster required (short arm or long arm), location of fracture/ limb and side left/right.
- Fitting and application of any aids (slings/crutches).
- Follow up arrangements e.g., outpatient department, LMO, private.
- Education and advice given.
- Discharge/Disposition.

Principles of Removal

Precautions

The clinician undertaking the procedure should confirm the required actions with the primary clinician prior to commencement. Clinicians should practice use of the cast saw on previously removed casts prior to removing/splitting a cast on a patient.

Electric cast saws are commonly used for ease of cut, patient comfort and speed of procedure; however, saws are noisy and may be frightening to children. The blade oscillates or vibrates rather than rotates or spins like a conventional saw. The blade may touch soft mobile tissues momentarily without harm under light pressure, however it is preferable to avoid all skin contact as the serrated blade edge can abrade or burn the skin even when care is taken. A flexible plastic guard should be inserted under the cast cutting line, if possible, especially whenever waterproof padding has been used.

Caution: Patients who required operative intervention should be discussed with the relevant specialty registrar prior to proceeding with any plaster splitting or removal as there may be underlying hardware in place/unstable fracture

Indications

Cast modification, removal or splitting may be required in the ED setting.

Indications may include, but are not limited to:

- Pain, swelling and/or neurovascular compromise.
- Suspicion of pressure injury or infection under the cast or at cast margins.
- Broken or collapsed cast requiring reinforcement or replacement.
- Wet under-cast padding or water damaged non-waterproof cast, which must be removed. Deferment risks severe maceration and subsequent skin breakdown.
- Splitting cast for air travel.

Patient Assessment

Clinicians who undertake cast removal/splitting must be able to identify risks related to age and assess:

- Anatomical landmarks
- Skin integrity
- Musculo-skeletal function
- Cognitive age, co-operation level and psycho-social factors

As there are associated risks, it is important that a risk minimisation approach is applied. Young children have thin, sensitive skin and are at particular risk of cutaneous injury. Potential hazards include discomfort, pinching or skin damage.

Carers and patients (relevant to age) should be fully informed about the procedure, risks outlined, and consent acquired (implied).

Cast Assessment

The cast should be examined and assessed prior to any procedure as regards to:

- Cast Issue/concern.
- Type of cast: Plaster of Paris (Gypsona®), rigid polyester cast (Dynacast Elite®).

> - ***Semi-rigid cast (Delta-Cast®Soft) is pliable and may be unwound to remove. Removal does not require use of a cast saw.***

- Nature and extent of padding
- Thickness of the cast
- Location
- Size and length of the cast:

> - ***Caution: Plaster saw blades get hot with constant use, especially when splitting synthetic casts.***

- Plan and/or mark cutting line/s for splitting of the cast, thereby avoiding bony prominences, and minimising the number of passes required with the saw. (*univalve = single split or bivalve = 2 splits).*

Equipment assessment

Tools/Equipment

There are several tools that may be used in cast removal/splitting including plaster or bandage scissors, shears, spreaders and cast saw. The clinician should understand how and when to use each item of equipment. Adherence to safe work practice (Workplace Health and Safety, WHS) is expected.

Plaster or Bandage Scissors with protected blade tip

Plaster shears

Small single hand spreader

Large two hand spreader

Oscillating Saw

The blade must not be contaminated or have excessive build-up of plaster dust or debris around the blade. Blade serrations should not be dull or worn which may result in overheating of the blade. Ideally, the cast saw should not be used on wet plaster due to clogging and the subsequent risk of ineffective split and overheating. If used on wet plaster the saw blade should be wiped clean upon completion. The clinician must ensure safe positioning of the electrical cord. The saw must not be left unattended whilst connected to the mains power supply. The plaster saw should have regular service checks as per the Clinical Engineering testing schedule.

Oscillating Cast Saw

Guard

Small and medium sized flexible plastic guards are available. Whenever possible, a guard should be inserted under the cast along the proposed cutting line, especially when waterproof padding is insitu. Tight plasters associated with swelling may preclude use of guards.

Caution: Forcible insertion of guards may abrade / injure the skin or cause pain

Use of a guard is **NOT** a substitute for correct technique.

Environment assessment

To ensure safe work practice the work surface, the patient and carer and the clinician/assistant should be positioned to enhance access. This will assist in stabilisation of the child/limb and enable correct clinician posture. Positioning may need adjustment during the splitting procedure. The work area should be well lit.

PPE

Limit exposure to contaminated casts and dust particles. When cutting contaminated casts, gloves are recommended to reduce exposure especially from body substances/blood. Use of face masks and draping with sheets is acceptable protection. Optional gowns, safety goggles and hearing protection may also be used as an adjunct.

Preparation

1. Ensure appropriate clinicians are available to assist in maintaining stability of the limb and prevent unexpected movement.
2. Review cast saw video if needed.
3. Explain procedure to the patient and their family/carer and gain informed consent.
4. Ensure you engage the Child Life Therapist or distraction to assist the child in coping with the procedure if required.

5. Consider the need for and provide adequate pain relief by administering analgesia, elevating the limb.
6. Demonstrate equipment, explain the vibration method, and explain risk of heat. Instruct patient to inform clinician if the blade becomes hot or uncomfortable (in relevant ages).

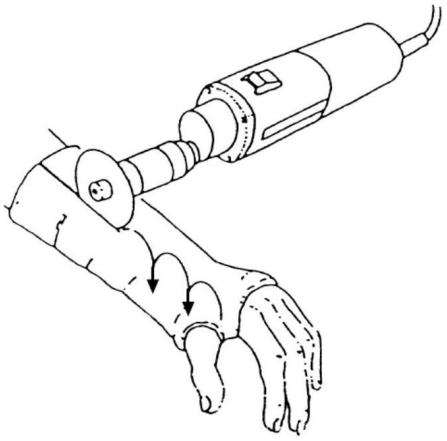
Cast Saw Splitting/Removal Technique

1. Insert plastic guard underneath expected cutting line.
2. Securely hold cast saw (ideally with two hands) and position the blade over the cutting line. Keep the blade perpendicular to the cast surface.
3. Use a 'down and up' vertical motion and allow the blade to cut at its own rate. Withdraw the blade from the cast when the blade breaks through the cast wall and there is a loss of resistance.
4. Re-position blade progressively along the cutting line and repeat the 'down and up' vertical motion to the end of the cast.
5. If required, split the cast with plaster spreaders by placing the jaws of the spreader into the cut made by the saw and squeezing the handles.
6. Cut the liner or padding using plaster scissors.
7. Keep split cast insitu or remove cast as per managing clinician's instructions.

I. ***Option 1: Keep split plaster insitu:*** Secure the cast with tape and a bandage and monitor for signs of neurovascular compromise. A secondary/bivalve cut in the cast may be required if there continues to be neurovascular compromise.

II. ***Option 2: Remove plaster*****:** Make a secondary/bivalve cut/s in the cast and split plaster further with plaster spreaders, remove cast. A replacement cast may then need to be applied, if so, apply as per managing clinician's instructions.

1. ***Guard may not fit under length of plaster initially, ensure guard is moved along cutting line as space allows.***
2. ***Be mindful on bony prominences (avoid where possible) on cutting line.***
3. ***One hand should grasp the barrel of the saw whilst the other hand should have a finger placed between the barrel and the blade to steady and guide. The fingers from the hand closest to the blade may also rest along the cast to provide stability.***
4. ***To avoid overheating of blade: avoid Excessive pressure when using 'down and up' motion slightly rotate saw between cuts, AND do not drag saw along cast.***
5. ***Keep blades of shears/scissors parallel to skin to prevent pressure points and/or injury.***
6. ***A swollen or compromised limb with a split cast insitu should be reviewed and have a period of limb elevation and documented neurovascular assessment prior to discharge.***
7. ***Secondary/bivalve cuts should be avoided in areas where there is flexion, e.g. crease of elbow in a long arm plaster***



Post Removal and Splitting Care

- Inspect the limb post removal for any abnormalities, breaches in skin integrity or wounds. Assess, clean and dress as required.
- Report any adverse incident such as a cut, abrasion or burn using the IMS+ system. Ensure open disclosure occurs with patient and family/ carer and arrange follow up as required.
- Consider need for post removal x-ray.
- Ensure all interventions are documented in the patient's medical record.
- Clean and return all equipment to original storage location.

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