

Burn Physiotherapy and Occupational Therapy Guidelines

1st edition



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Glossary

ACI	Agency for Clinical Innovation
ADLs	activities of daily living
CHW	the Children's Hospital at Westmead
CRGH	Concord Repatriation General Hospital
Erythema	abnormal redness of the skin due to capillary congestions as in inflammation
Heterotopic ossification	the presence of bone in soft tissue where bone normally does not exist
Hypertrophic	excessive development of an organ or part
ICU	intensive care unit
MDT	multidisciplinary team
Plyometric	also known as 'jump training' or 'plyos', are exercises in which muscles exert maximum force in short intervals of time, with the goal of increasing power (speed-strength)
Pruritus	itch
ROM	range of movement
RNSH	Royal North Shore Hospital
SBIS	Statewide Burn Injury Service
TBSA	total body surface area

Contents

Acknowledgements	iii
Glossary	iv
Introduction	1
Purpose	1
Therapy for burn injuries	2
Oedema	4
Background	4
General principles	4
Exercise	5
Background	5
General principles	5
Intervention	6
Precautions and considerations	8
Splinting and positioning	9
Background	9
General principles	9
Precautions and considerations	13
Compression	14
Background	14
Procedures	16
Precautions and considerations	17
Silicone products	18
Background	18
Procedures (for sheet silicone)	18
Precautions and considerations	18
Paediatrics	18
Skin care	19
Background	19
Procedure	19
Massage	20
Background	20
Procedure	20
Precautions and considerations	20
Education	21
Background	21
Procedure	21
Other scar treatments	22
Camouflage make-up	22
Scar modulators	22
Reconstructive surgery	22
Website links and references	23
References	23
Further reading	23

Introduction

Purpose

A burn injury has a unique and significant effect on the individual's skin and whole body. The specialist knowledge and skills of the multidisciplinary team (MDT) are essential to successfully treat a patient with burn injuries and assist the patient to reach their full potential recovery.

The following guidelines were developed by the physiotherapy and occupational therapy specialist staff working within the Agency for Clinical Innovation (ACI) Statewide Burn Injury Service (SBIS) from the tertiary Severe Burn Units at The Children's Hospital at Westmead (CHW), Royal North Shore Hospital (RNSH) and Concord Repatriation General Hospital (CRGH). The three Severe Burn Units that make up the NSW ACI Statewide Burn Injury Service (SBIS) treat approximately 2500 burn cases per year, 900 of those being admitted to these units for treatment.

Physiotherapists and occupational therapists, as part of the specialist burn MDT, have many overlapping skills and roles in the care of patients with burn injuries. The information in these guidelines is for 'burn therapy' which may involve either or both physiotherapists and occupational therapists. However, the emphasis during different phases of care and for individual patients during their rehabilitation may change between the two disciplines.

The guidelines specifically concern burn therapy and can be read in conjunction with other information found on the [ACI Burn Injury web pages](#) relating to pathophysiology, surgical and non-surgical wound management, psychosocial care, nutritional care and speech pathology. There are [NSW Health](#)

[Burn Transfer Guidelines](#)¹ that are used to ensure the right patient is treated in the right facility.

This is a consensus document and describes the principles of burn therapy used in NSW burn units. These guidelines are intended to be useful to support therapists new to the area of burn care. They are not intended to be prescriptive, but aim to give sound principles of burns therapy and should always to be used with sound clinical reasoning.

If further explanation or clarity is required in regard to these guidelines, it is important to contact therapists in the burn units.

Ambulatory Care / Burn Unit	Phone	Fax
Royal North Shore Hospital	02 9463 2110 (7:30-16:00hrs) / 02 9463 2112	02 9463 2006
The Children's Hospital at Westmead	02 9845 1044 (7:30-16:00hrs) / 02 9845 1114	02 9845 0546
Concord Repatriation General Hospital	02 9767 7775 (7:30-16:00hrs) / 02 9767 7776	02 9767 5835

Therapy for burn injuries

Scarring from burn injuries leads to many adverse consequences, including limitation of normal function and mobility, restriction of growth, altered appearance and adverse psychological effects. Burn therapy starts immediately, or as soon after presentation for treatment as possible, and **continues until scar maturation which is commonly 12-18 months. The time to reach scar maturity varies between individuals.** Maturation is when the scar is no longer active and optimally pale soft and flat (Fig.1.).

Burned skin and active scars contract over hours rather than over days or weeks



Fig.1. Mature burn scar (pale, soft, flat)

Scar management and burn therapy are broad terms that cover the principles and aspects of therapy described below and include:

- oedema management
- exercise
- splinting and positioning
- compression garments
- silicone and scar softening products
- skin care
- massage.

It is essential for any burn therapist to view the burn injury without dressings or coverings to properly assess the depth and location of the injury, particularly with respect to joints and effect of any movement.

The underlying pathophysiology of scarring is not fully understood, but can be explained in simple terms as the laying down of disorganised connective tissue in the newly forming scar. As the scar forms it can become raised, fibrous (firm, tight) erythematous (red), dry, painful and pruritic (itchy). This type of scar is known as a hypertrophic scar (Fig.2.). Hypertrophic scars typically do not extend beyond the boundaries of the initial injury and may undergo partial spontaneous resolution.

These properties of hypertrophic scar tissue underpin the principles of scar management and burn therapy. Hypertrophic active scars more adversely affect flexor surfaces of joints, high movement areas such as the face and concave areas such as axillae and web-spaces between digits as they have strong contractile forces (Figs.3, 4, 5, 6, and 7).

Burn injuries, as a consequence of the damage and the body's repair processes, commonly cause significant pain and pruritus. The pain can be varied in its manifestation, from the acute phase to longer term chronic pain, can be neuropathic in nature and related to hypersensitivity and vascular issues. Therapy for burn scars addresses the management of this pain and itch through all areas including exercise, skin care, massage, compression and scar softening.

The consideration of psychological factors potentially affecting participation in Burn Therapy is also important. This includes pre-morbid life experiences of trauma, personal resilience, availability of external supports and lack of motivation due to falling into the 'sick role' (see [Social work guidelines on ACI Burn Injury webpage](#)²⁻³).

Paediatric patients often have some differences or exceptions that are highlighted at the end of each section.



Fig.2. Hypertrophic scarring



Fig.5. Dorsal foot toe contracture



Fig.3. Axillae contracture



Fig.6. Elbow contracture



Fig.4. Hand contracture



Fig.7. Knee contractures

Background

The physiological insult of a burn injury induces oedema. Acutely this occurs due to inflammation; fluid leak from the vascular system into the interstitial tissue. This can occur both locally to the injured area and in a larger percentage of body surface area (>20% total body surface area (TBSA) in adults and >10% TBSA in paediatrics) as a systemic inflammatory response. Larger area burn injuries require fluid resuscitation which can further exacerbate the oedema. The lymphatic system may also be compromised and contribute to ongoing oedema. Throughout the rehabilitation period oedema may continue to occur, influenced by limb dependency, lack of movement and or mobility, inappropriate compression and bandaging and comorbidities such as diabetes. The effects of oedema include poor wound healing, restriction of movement and pain.

General principles

All the burn therapy modalities covered in these guidelines consider and address oedema management:

- positioning; elevation, splinting
- compression; bandaging, pressure garments
- exercise; active and passive
- activities of daily living (ADLs) participation
- massage.

Background

Exercise aims to maintain and regain range of movement, strength, exercise tolerance and function.

- Deconditioning and impaired physical condition is a common complication following burn injury, due to the hyper-metabolic response seen in severe burns, coupled with the effects of pain and prolonged bed rest.
- High metabolism and poor oral intake associated with severe burn injury exacerbate muscle wasting if there is no physical stimulus.
- It is common for burn patients to experience a reduction in exercise performance, tolerance and strength due to prolonged intubation, prolonged bed rest, immobilisation (to protect new grafts) and sedation, as well as poor awareness and ability to comply with treatment.
- Other factors that impact active participation in exercise include pain, slow wound healing and wound breakdown.
- Exercise can assist with oedema management.
- A splinting regime may be in place when the patient is not exercising e.g. during sleep and rest.

General principles

Exercise includes ambulation, functional retraining, joint range of movement, strengthening and aerobic training. Any form of physical activity can be a form of exercise.

- Exercise should commence as early as possible upon presentation/admission.
- Early range of motion of the affected area, ambulation, and participation in ADLs is the key to an optimal recovery.
- Continue exercise across acute, intermediate and long term phases of care, with exercise prescription differing according to patient's needs and abilities. **NB range of motion maintenance will be necessary until scar maturation, commonly 12-18 months post-burn, however this varies according to the individual.**

- Burns over or closely adjacent to a joint require extra vigilance to maintain range of motion (ROM) in combination with splinting.
- Stretches should address lines of tension and may not necessarily be in the anatomical plane (Fig. 8.).
- Where possible, combine stretches to include stretching over multiple joints. Remember skin is a continuous and large multi-joint tissue.
- It is essential that stretches are observed without dressings or garments in place, to identify and optimise lengthening or stretching on contracture banding.
- Exercise prescription is dynamic and dependent on wound healing, grafting, patient's medical condition, comorbidities and age.
- Exercise frequency, intensity, time and type are all individualised.
- Performance is dependent on patient's pain tolerance, scarring and motivation. Aim to perform exercises several times a day.
- Pain is commonly associated with exercise, therefore consideration of pain tolerance, medication regime and source of pain is important.
- Encourage independence and self-management as early as possible.
- Patient, family and carer understanding and education are essential.
- Integrate exercise into ADLs.
- More frequent exercise is better than just one long session.
- Patient goal setting is important to encourage participation and monitor progress.
- Liaise with MDT regarding choice of dressings to best facilitate ROM and exercise.

Burned skin and active scars contract over hours rather than over days or weeks

Intervention

Range of movement

Range of movement to end of range is essential. Active ROM is encouraged as soon as possible. Active-assisted ROM and passive ROM are useful adjuncts to obtain end of range particularly if the patient is unable to actively participate. Stretches need to be low repetitions but long in duration to provide a sustained stretch.

The location of the burn is important to consider in terms of predicting potential scarring and contracture of joints. Areas of the body to be particularly aware of are:

- face (Figs.16-17.)
- neck (Figs.9-10.)
- axillae (Figs.7-8.)
- elbows (Fig.6.)
- hands and wrists (Figs.11-12.)
- knees – flexor surfaces (Fig.7.)
- ankles and feet (Fig.5.).



Fig.8. Stretch over multiple joints showing tight blanching scar tissue



Fig.9. Axilla stretch with banding

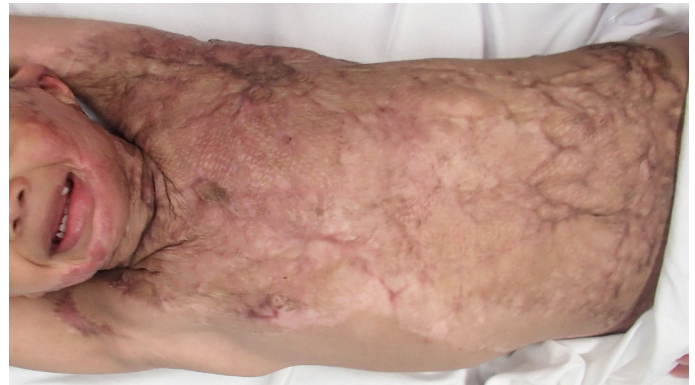


Fig.10. Axilla stretch minimal banding or pull



Fig.11. Neck stretch (mouth and teeth closed)



Fig.12. Neck stretch with assistance



Fig.13. Hand exercises – full flexion



Fig.14. Hand exercise – extension



Fig.15. Hip extension stretch over exercise ball for burns to anterior hip region

Ambulation

Frequency of ambulation is dependent on wound location, wound size (%TBSA) and amount of oedema.

- Commence as soon as possible dependent on post-operative protocols. This can occur in intensive care unit (ICU) if appropriate.
- Educate on donor site discomfort. Donor sites are commonly on the lower limbs and are not a contraindication to ambulation.
- Educate on blood rush and consequent discomfort and or pain when standing and walking.
- Use ambulation to optimise respiratory function.
- Only consider wheelchairs and walking aids when normal walking is not yet possible.
- Aim for independent pre morbid ambulation as soon as possible.

Functional re-training

- Encourage independence with ADLs and function as soon as possible.
- Only use adaptive devices for early success for the patient and wean as soon as possible.
- Incorporate exercises into the patient's daily routine.
- Incorporate specific exercises as indicated e.g. proprioception, balance and plyometrics (dynamic strengthening).
- Aim to return to work, sport, school, pre-morbid activities as early as possible.
- Individuals with severe burns may require a fit to drive assessment from the Road and Maritime Services and patients with smaller burn injuries will require medical clearance for driving from their general practitioner or treating doctor. More information can be found at [Information for health professionals](#), Roads and Maritime Services⁴.

Strength

- The principles of strength training after burn injury are no different to strength training following other injuries e.g. musculoskeletal injuries.
- Antigravity functional exercises should be used as soon as possible.
- Use the patient's own body weight as resistance. Resistance can also be created by such adjuncts as resistance bands (e.g. Theraband®, Superband®), pegs and free weights.
- Bed exercises can be used when the patient is unable to perform other more effective strengthening exercises.

Aerobic exercise

Participation in aerobic exercise is dependent on the patient and wound status.

- Common types of aerobic exercise include walking, cycling and jogging.
- Swimming can be commenced once all wounds are healed and should be guided by the burn specialist.
- Long-term restrictive lung injury is common in patients with inhalation injury. This should be considered when prescribing aerobic exercise.

Precautions and considerations

- Post-operative instructions, consultant and MDT advice should be followed. A period of immobilisation immediately following skin grafting must be observed. Seek advice as appropriate.
- Precaution is necessary with wounds – but continue exercise program with awareness and monitoring of wound location and status.
- Careful hand placement and position with passive and assistive exercise is important to avoid shearing the wound.
- Donor sites are painful but not a contra-indication to exercise.
- Some potential precautions to consider are exposed tendons, flaps, reconstruction, regrafting, k-wires, medical condition e.g. low blood pressure, infections, graft fragility, related trauma, heterotopic ossification, peripheral neuropathy and wound breakdown.
- The impact of overheating and sweat on skin integrity must also be considered. Modify the environment or activity as necessary, for example air-conditioned room, removal of garments, adequate hydration.

Splinting and positioning

Background

As burned skin and active scars contract over hours rather than over days or weeks, splinting and positioning are important aspects of burn therapy. Splinting and positioning may be required depending on the location and severity of the injury and the patient's ability to cooperate in active therapy. Indications for splinting are influenced by the potential to scar and contract and the ability for the patient to maintain the range of movement with exercise alone. Splinting can be used post grafting to allow the graft to take, this is normally 5–7 days.

Aims

- To immobilise a skin graft after surgery.
- To protect vulnerable structures e.g. exposed tendon.
- To prevent skin and tendon contracture.
- To maintain the joint range when the patient is unable to do so e.g. post-operative, intubated in ICU with ventilation and sedation, sleeping, young children.
- To prevent long term deformity.

General principles

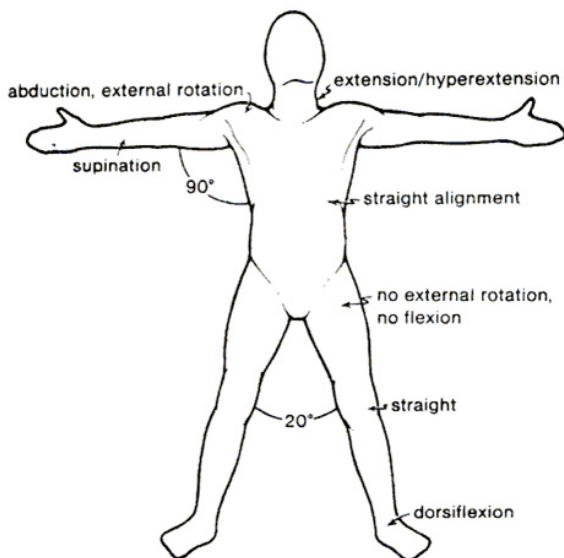


Fig.16. Positioning principle diagram



Fig.17. Incorrect positioning

(From Helm PA, Kevorkian CG, Lushbaugh M, et al. Burn injury: rehabilitation management in 1982. *Arch Phys Med Rehabil.* 1982;63:8.)

When determining the use and application of splinting and positioning, consider the location of the injury. Splinting and positioning must be applied to maximise the lengthening of the skin of the affected area.

A clear schedule and routine which is individual to each patient is important. The plan must be communicated to the other MDT members and education given to the patient, family and carers to ensure compliance with the regime.

The splinting regime is determined by the patient's ability to maintain the maximum range with active exercise. For example, following a skin graft procedure, the splint may remain on until the graft is stable and then may be reduced to night time wear.

- Splints used for burn injured patients may not be in a 'functional' position as they may be for other types of patient groups.
- Where possible, splint a joint or joints at the end of range to maximise the stretch of burn scars or pull on burn area to prevent contractures.
- Some high risk areas such as axilla, hips, neck (collar, pillow), palms, hands, knees, wrists, hips, toes and face require special consideration and can be splinted.

Advice should be sought from experienced burn unit therapists if unsure.

- Refer to [Speech Pathology guidelines](#)⁶ for mouth splinting.
- Other relevant injuries or conditions are to be considered and consultation with other teams caring for the patient should occur as appropriate.
- Splinting and exercise are used in conjunction, so incorporate exercise therapy into the splinting regime according to the recommendation from therapists.
- Types of splinting materials that can be utilised are varied e.g. plaster of Paris, thermoplastics. Topical negative pressure wound management dressing can act as a splint by immobilising the area.
- If the joint is losing range, consider serial casting.

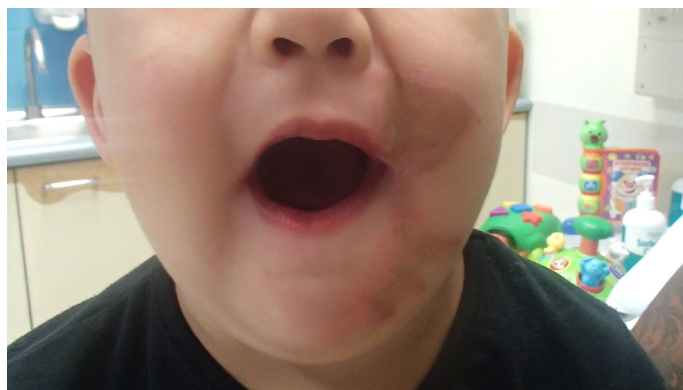


Fig.18. Lateral mouth graft with pull



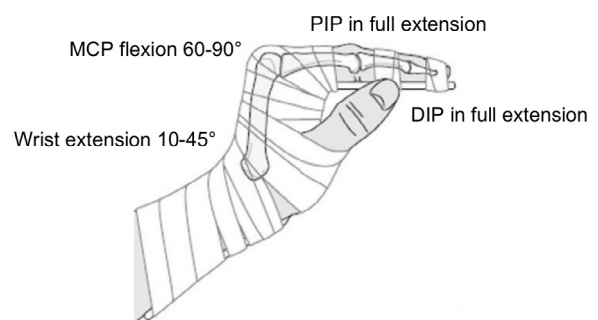
Fig.19. Mouth exerciser and splint



Fig.20. Acutely burned oedematous hand:



Fig.21. Contracted hand – inadequate treatment metacarpal phalangeal joint hyperextension inter-phalangeal joint flexion



Figs.22. and 23. Hand splint position of safe immobilisation (POSI)



Fig.24. Thumb web space 'C' splint



Fig.25. Palmar extension splint (for palmar burn)



Fig.26. Alternate palmar extension splint



Fig.27. 'Toe down' thermoplastic splint



Fig.28. Neck extension support



Fig.29. Custom made soft collar with chin straps



Fig.30. Watusi collar



Fig.31. Knee extension splint and bed block



Fig.32. Three point knee extension orthotic

- Maintaining full range of movement and prevention of any contractures are of primary importance.
- Splints will be worn at night until the scar is mature and during the day when the scar is active.
- Gradually the day regime includes more periods with splints off e.g. two hours on, two hours off.
- Splinting regimes are balanced with activities during the day e.g. meal times, bath times, swimming. Splints are always on for a day sleep.
- Any loss of range requires serial casting to prevent further progression.
- Frequent checking of splint fitting due to child's growth.



Fig.33. Paediatric axilla splint supine

Paediatrics

- The principles of splinting in the paediatric population differ to those in adults with splinting generally done more frequently, for longer periods in any given 24 hours and for longer over the course of active scar management period.
- Splint if the wound takes longer than two weeks to heal as it may scar and scarring can result in contracture.
- Splinting position at end of range or close to can be tolerated well in children e.g. children can be positioned in axilla splints that hold the shoulder in a position greater than 90° abduction, splinting can be closer to 160° in most children and involves some degree of forward flexion and external rotation.
- Initially splints are worn 24 hours and removed only for exercise and dressing changes; this guarantees both child and parents becoming accustomed to the splints early in the admission.

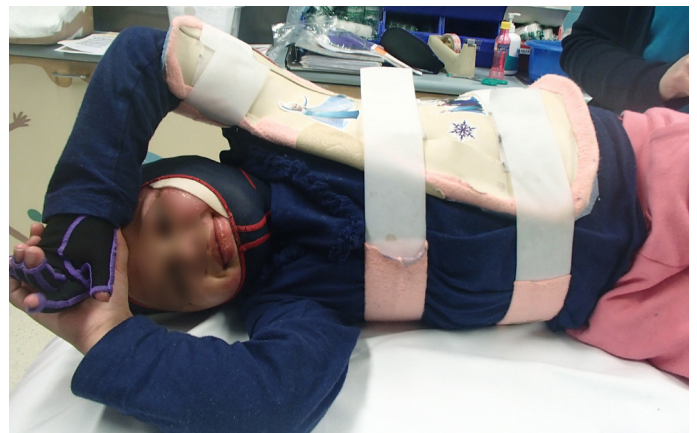


Fig.34. Paediatric axilla splint side lying

Precautions and considerations

- Splint care
 - Continual checking and remoulding needs to be done to ensure that the goals of the splinting regime are being achieved.
 - Check for issues that will require possible adjustment of the splint such as changes in oedema, breakdown, fragile skin, changes in ROM, maceration.
 - Ensure appropriate hygiene and cleaning of splints and skin.
- Special consideration to prevent brachial plexus injury from axilla by ensuring sufficient forward flexion at the shoulder.
- Check circulation and general observations as per any other splinting regime.
- Although there is a degree of discomfort in wearing splints, the targeted body parts should not need to be 'forced' onto the splint; advise ROM exercises prior to splint application or if significant may need further intervention e.g. serial casting.
- If the splint is not fitting the patient then investigate the cause; loss of ROM, early contracture, weight change. The splint may require remoulding.
- There are special considerations by therapists in fabricating the splint. Do not modify the splint unless consulting with the treating burn therapists.
- Environmental issues e.g. excessive sweating in hot weather may require more frequent cleaning or additional linings.

Compression

Background

The aim of compression therapy is to keep developing scars flat and prevent raised scarring. It is hypothesised that compression reduces the excessive blood flow that delivers scarring mediators. Compression can be achieved in a variety of ways e.g. cohesive flexible bandage (see Fig. 35.), tubular elasticised stocking (see Fig. 35.), bandaging, and pressure garments (customised or off the shelf). Any type of compression method can also be used to assist with holding scar softening products. It is recommended that pressure remain between 24 and 40mmHg and be replaced or adjusted regularly to maintain this pressure.

The type of compression used depends on wound healing, area of body affected, time since healing and individual patient needs.

Measurement and prescription of custom made pressure garments (Figs.40-44) is a specialised skill and is to be undertaken by the primary treating burn therapist.



Fig.35. Cohesive bandage; hand glove



Fig.36. Tubular elasticised stocking



Fig.37. Ready-to-wear stocking



Fig.38. Ready-to-wear glove



Fig.39. Off the shelf shop bought stretchy vest



Fig.41. Custom made vest



Fig.40. Custom made body suit

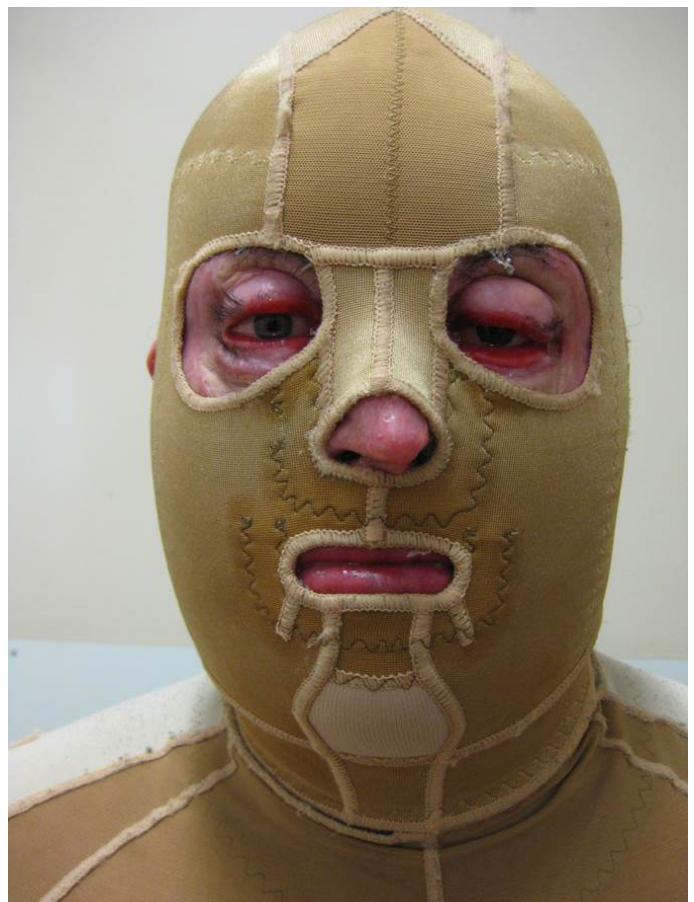


Fig.42. Custom made face mask



Fig.43. Custom made glove - palmar insert



Fig.44. Custom made pants

Procedures

- Pressure garments should be worn at all times except showering or bathing, massage and moisturising. This equates to approximately 23 hours per day.
- It is recommended that compression garments be worn whilst the scar remains active, approximately 12-18 months in adults. Children may require a pressure garment for a longer period.
- Two sets of garments are required for hygiene purposes i.e. one on, one in the wash.
- Education of the patients and carers is essential to ensure correct use of garments, including donning, doffing and daily laundering.
- Garments can be worn over minor wounds with thin dressings. Check with therapists if in doubt.
- Pressure garments will need to be re-tensioned or remeasured and replaced every 3-6 months based on wear and tear. Replacement is required due to material losing tension and no longer providing adequate compression.

Paediatrics

- Young children grow rapidly and require regular assessment of fit e.g. Three monthly when compression garments would be remeasured due to growth and fabric fatigue; re-tensioning garments is not advisable.
- To aid dressing and undressing of young children, specific design components of garments should be included.
 - Zippers in arms and leg garments.
 - Typically vests are given back closure for easy donning and prevention of a small child being able to remove the vest themselves.
 - Velcro closures allow for weight fluctuations.
 - Additions such as 'nappy straps' to hold down the lower edge of a vest to prevent the garment riding up over a typical toddler 'round belly', this is only possible if the child is still wearing nappies.
 - Suspenders on pants are essential for children at least in the under 10 year olds.
 - When using gloves, mid dorsal zippers placement assists with easy donning.
- In the very small hand use of cohesive flexible bandage (e.g. Coban®, Co-Flex®) gloves are recommended as custom made gloves are difficult to create and fit the hand adequately.
- Separate vests and pants are more suitable than an all in one garment, due to growth and toileting etc.

Precautions and considerations

- Ensure the garment is fitting correctly; compression should be even, snug but not constrictive or wrinkled.
- It is expected that seam lines and zippers will leave a temporary indentation in the skin. This is normal and does not necessitate stopping of garment use.
- Persistent swelling of areas distal to pressure garments may indicate uneven compression; the method of compression should be reviewed; it may be necessary to involve the distal area in the garment (e.g. add a glove to an arm-sleeve) to manage the swelling (see Figs.45-46).
- Care should be taken when donning and doffing compression garments to prevent shearing of the skin; aids are available to assist with donning and doffing of garments.
- Skin must be checked daily as scars can have different sensation and the wearer may not be aware their skin has broken down.
- Young children and people with a cognitive impairment must have parents or carers monitoring use of the compression garments and skin integrity. If unable to monitor daily do not use.
- Compression garments may need to be temporarily stopped based on skin deterioration, infection, deep venous thrombosis, excessive swelling and surgery or as advised; contact burns therapists if concerned.
- Particular consideration and close monitoring should be given for patients with decreased sensation or impaired circulation e.g. peripheral neuropathy, cardiac history.
- The psychological impact of compression garments cannot be underestimated; thorough patient education, understanding and possible psychosocial support is important.
- Small areas may not require a full garment e.g. small 50 cent area on chest; in this case more localised products can be used e.g. hydrogel dressing (e.g. Duoderm®, Coloplast®), silicone.
- If garments are not correctly washed it may cause skin irritations or breakdown.
- Changes in weight and body shape may influence need and timing for measuring and remeasuring; burn patients often lose a lot of weight acutely and ideally the patient's weight should be stable before measuring for expensive custom made garments.
- Garments are to be worn irrespective of the weather.
- Garments can be worn during exercise, sport and swimming and therefore require more frequent change and laundering.
- Most custom made garments do not provide full sun protection so additional precautions for sun protection should be used.



Fig.45. and 46. Distal swelling to compression on right hand, left hand had extended distal pressure

Links to websites for pressure garment companies

[Second Skin™ Custom Made Garments](#)

[Jobst™ Ready to Wear Garments \(BSN\)](#)

[Jobst™ Custom Designed Garments](#)

[Therapy Support Laboratory TSL Garments custom made and ready to wear](#)

Silicone products

Background

Medical grade silicone products are generally used to soften red, raised or thickened (hypertrophic) scars. Silicone is available in sheet, liquid and putty forms. Most commonly the sheet form is used (e.g. Cica-Care®, Epi-Derm™). Liquid silicone (e.g. Kelo-cote®, Strataderm®, Dermatix®) is generally used on areas where it is difficult to secure the sheet form (e.g. the face or digits). Silicone putties (e.g. Otoform K2®, Soft Putty Elastomer™) can be used to fill concave areas to give extra pressure and softening in the palm of a hand or web spaces (Figs. 47-48). Silicone should ideally be used in conjunction with pressure garments and splints.

Procedures (for sheet silicone)

- Skin must be fully healed before commencing use of the product.
- To be applied on clean, dry skin (wipe off excess moisturiser with a damp cloth)
- Gradually increase hours of wearing depending on skin tolerance.
- Silicone is not to be worn for 24 hours per day as the skin requires time to breathe.
- Silicone is to be cleaned under warm or cold water with hand soap, thoroughly rinsed, air dried or patted with a lint free cloth each time it is removed. It should then be stored in an airtight container in a cool dry area out of the sun.
- Silicone should be removed for all water based activities, or heavy exercise that causes excessive perspiration.
- The use of silicone should be continued until scar is mature.

Precautions and considerations

- To be ceased temporarily if a wound develops or signs of breakdown.
- To be ceased if a reaction occurs; red rash, irritated, itchy in the area where the silicone is applied only.
- Young children and people with cognitive impairment must have parents or carers monitoring use of the products and skin integrity, if unable to monitor daily do not use products.
- It is unnecessary to use two products on the same area at the same time e.g. liquid with sheet on top.



Fig.47. and 48. Silicone gel sheets on active scars

Paediatrics

The routine for wearing silicone products needs to be individually tailored for children. Products are usually worn at night for school age children as they get hot playing sport, etc. at school, whereas younger children may be able to wear during the day.

Background

A burn can impair the thermoregulation of the skin temporarily or permanently as the skin loses its ability to sweat or heat up. Therefore it is important to control the environmental temperature. Sebaceous glands which produce oils to naturally moisturise the skin may be damaged and so skin hydration needs to be replaced by applying regular moisturiser. There is also a greater risk of developing skin cancer, as the ultra violet barrier function can also be damaged during a burn. There is a risk of skin discolouration with sun exposure.

Procedure

- Daily washing or showering for cleansing of skin and removal of excess creams.
- Moisturising at least daily with a simple water based moisturiser as tolerated.
- Attend to wound care as advised by treating team.
- Daily sun protection: clothing, wide brim hats, minimum SPF 30+ sunscreen until scars are mature.
- Moisturiser and sunscreen products should be applied at separate times.

Massage

Background

Massage is used to break up the collagen bundles that form to make a scar. The aim is to soften and desensitise the skin, prevent adhesions and decrease pruritus, as well as stretch the skin and scarred tissue.

Procedure

- Encourage patient's participation and their carers. Carers particularly need to participate if the burn is in difficult to reach areas and parents in the case of young children.
- It is recommended to massage the scar with moisturiser several times per day; if the skin is dry more frequent massage with moisturiser will be required.
- If the patient has a large scar area, or difficulty donning or doffing garments, it may be impractical to massage several times during the day; for these patients, massage can be incorporated into skincare when moisturisers are applied.
- Massage with firm pressure so the skin blanches.
- Massage in slow circular motions using a flat hand and fingers taking care not shear or damage the skin. If very thick use a pinch and roll technique.
- Massage should be continued until the scar is mature.
- It is important that patients and carers be taught to do the massage.

Precautions and considerations

- It is important to continue with firm massage to assist with desensitisation. With time the discomfort and pain will reduce. Pain and discomfort will occur if the scar is hypersensitive and/or very tight, or patient is anxious; educate the patient so they understand this.
- Care with skin irritation from moisturising products should be observed.
- Fragile skin can break down if massage commences too early, gentle massage may be indicated initially. Cease temporarily if skin breakdown occurs.
- Massage does not have an immediate effect on scar appearance or softening, but may assist to alleviate itch immediately.



Fig.49. Scar massage

Background

For burn patients and their carers, the stress associated with burn injury may hinder transfer and retention of information. Patients are also often deprived of sleep, in pain and taking medications which can impair the storage and understanding of new information. Patients and their carers need to have full understanding of the benefits and risks of complying with their burn therapy. When the patient develops a more complete understanding and appreciation of their injury and recovery process, then stress and anxiety levels may improve.

Procedure

Those to be educated include:

- patient
- carer and family
- multidisciplinary team and staff.

The education needs to be:

- consistent and repetitious
- goal oriented
- realistic
- related to the patient's premorbid activity
- age, developmental, cognitive and psychologically appropriate
- considerate of language and cultural barriers and use interpreters when appropriate
- consistent across the MDT
- inclusive of written material and simply expressed.

Other scar treatments

Camouflage make-up

Some patients may choose to use camouflage make-up for special occasions particularly when scarred areas are on faces and other exposed areas. There are companies that specialise in camouflage make-up e.g. Veil®, Dermablend™ and Microskin™.

Scar modulators

The burn specialist medical team may in certain circumstances be able to offer other scar modulating therapies such as corticosteroid injections into the active scar tissue, needling or laser therapy including fractional ablative laser and CO² laser.

Reconstructive surgery

Preventing the need for reconstructive surgery is always the first aim. This is done through careful primary surgery and rehabilitation including early debridement and grafting, avoiding wide meshed skin grafts wherever possible, early healing, early mobilisation, therapy, compression, etc.

However the need for reconstructive surgery despite best efforts cannot always be avoided. The indications for reconstructive surgery include:

- functional restrictions – contraction
- role of growth in children
- tissue loss
- cosmetic enhancement.

Types of surgery which are done in reconstruction include excision of scar tissue and grafting, z-plasty, full thickness grafting, skin and muscle flaps.

To gain the optimal result from any reconstructive surgery scar management, as described in these guidelines, needs to recommence and be followed through until scars are mature and optimal range of movement gained. Reconstructive surgery injures the skin again and the potential physiological scarring process recurs.

Website links and references

ACI Burn Network web pages

www.aci.health.nsw.gov.au/networks/burn-injury/resources

NSW Road & Maritime Services

<http://www.rms.nsw.gov.au/roads/licence/health/health-professionals.html>

NSW Speech Pathology Burn Guidelines

www.aci.health.nsw.gov.au/resources/burn-injury

Further reading

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