

# ORTHOPAEDIC TRACTION: CARE AND MANAGEMENT

## PRACTICE GUIDELINE<sup>®</sup>

### DOCUMENT SUMMARY/KEY POINTS

- This document outlines different types of traction and its various uses for children with orthopaedic conditions.
- Daily Traction Care
- Potential Complications
- Skeletal Traction
- Gallows/Bryant Traction
- Thomas Splint
- Cervical Traction
- Hamilton Russell Traction

### CHANGE SUMMARY

- New SCHN document based on the CHW guideline of the same title. The CHW guideline has been rescinded.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

<b>Approved by:</b>	SCHN Policy, Procedure and Guideline Committee	
<b>Date Effective:</b>	1 <sup>st</sup> February 2018	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Clinical Nurse Educator	<b>Area/Dept:</b> Orthopaedic Ward CHW

## READ ACKNOWLEDGEMENT

- Clinical staff caring for paediatric patients requiring orthopaedic traction are to read and acknowledge they understand the contents of this document.
- SCH Nurses are not to establish traction until they have completed and been assessed competent in the *Orthopaedic Traction Learning and Assessment* package

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

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## General Principles

### **Definition of traction**

“Application of a pulling force to part of the body”<sup>1,2,3,4</sup>

### **Aim**

- To restore and maintain straight alignment and length of bone following fractures and dislocations
- Relieve pain due to muscle spasms
- To immobilise limb to treat injured or inflamed joints
- To correct contracture deformities

### **Principles**

- Provide Counter traction, using the patient's body or pull of weights in the opposite direction.
- Maintain continuous traction in a correct line of pull.
- Prevent friction
- Provide daily traction care

## Application of Traction

1. Traction is applied by a Registered Nurse who has demonstrated the appropriate skill and knowledge required to perform the procedure. An Enrolled or an Endorsed Enrolled Nurse may assist the Registered Nurse.
2. **Pain Management:** Children with femoral fractures, who require traction, need to be assessed by the Anaesthetic Registrar prior to application of traction. A femoral nerve block is the preferred pain management strategy ([Fracture Management Practice Guideline](#) and *if at CHW*, relevant sections in the [Pain Management Practice Guideline](#)). Analgesia may be given to the patient in the interim.
3. Hourly neurovascular observations are required for 24 hours following application of all types of traction and are recorded on a neurovascular chart. Refer to the [Neurovascular Assessment Practice Guideline](#).
4. Adhesive skin traction can cause skin reactions. Apply a test patch to the child's skin before applying traction. If the adhesive skin traction causes a reaction, apply non-adhesive skin extensions<sup>2</sup>.
5. **Do not** apply substances that increase adhesion to the skin such as Tincture benzoin, as they may increase the risk of skin tear on removal<sup>5</sup>
6. Before applying traction for a fracture of the femur, check the child's x-ray to determine the exact position of the fracture. Apply skin extensions just below fracture site.  
**At CHW:** For quick reference of application of traction, use the “Traction Manual” located in plaster/traction room in the Orthopaedic Unit.

## Analgesia

- The type of analgesia used will depend on the injury suspected, the degree of pain experienced and the medical condition of the child<sup>8,9</sup>.
- Be aware that analgesia can mask the signs of compartment syndrome. Analgesic requirements should be in proportion to the injury that the child has sustained<sup>8,9</sup>.

### ***A Guide for the Use of Analgesia: First 24 hours Post Injury***

#### **Fractures involving Femur**

Morphine/ fentanyl, given in ED on admission	Femoral Nerve Block, given in ED prior to transfer to ward	Oxycodone	Paracetamol *	Ibuprofen	Diazepam
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7. Note: \* Link to Ministry of Health paracetamol guidelines:  
[http://www0.health.nsw.gov.au/policies/pd/2009/pdf/PD2009\\_009.pdf](http://www0.health.nsw.gov.au/policies/pd/2009/pdf/PD2009_009.pdf)
8. Note: Oral analgesia needs to be prescribed in the child's medication chart in the Emergency Department before transfer to the ward.

## **Traction care<sup>4</sup>**

1. Ropes are running freely through pulleys, and are intact and secure.
2. Traction is not hindered by friction, for example bedclothes.
3. Weight bags are the correct weight for the child, and are hanging freely. The correct weight is determined by the Registered Nurse applying the traction or by the Orthopaedic Registrar.
4. The child's body weight, and/or appropriate elevation of the foot or head of the bed, maintains counter traction.
5. Bandages are free from wrinkles. Change the outer bandage daily.
6. Type of traction applied, care of traction and any changes relating to care are documented in the child's notes/care plan.

## **Maintain Skin Integrity<sup>6</sup>**

- Pressure area care.
- Foam protection should cover medial and lateral malleoli (bony prominences on ankle) on all traction involving lower limbs.
- Skin in contact with Thomas Splint Ring should be checked when oiling the ring.

- Document the condition of the skin on admission and throughout care, in the child's progress notes and care plan, for example lacerations, rash, pressure areas.

## Adjustment of Traction

- Traction is adjusted as ordered by the Orthopaedic Medical Officer, Clinical Nurse Consultant or Nurse Practitioner, to correct rotational or bone length discrepancies.
- If skin extensions are replaced, hourly neurovascular observations should be commenced for 24 hours.

## Care of a Child in Traction

### Nutrition

- A well balanced diet and fluids should be encouraged; no extra calcium supplements are required.
- If required, consult with a Dietitian.

### Physiotherapy

- Ensure that the child in traction maintains normal range of motion of unaffected limbs.
- For children in a Thomas Splint/Hamilton Russell traction, who require long term traction, quadriceps should be strengthened by providing an exercise program 2 weeks post fracture.
- If strengthening exercises are required, refer the patient to an Orthopaedic Physiotherapist.

### Parent Participation

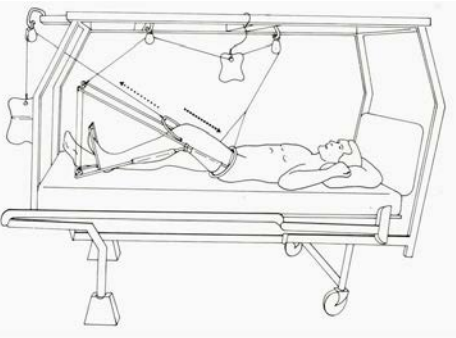
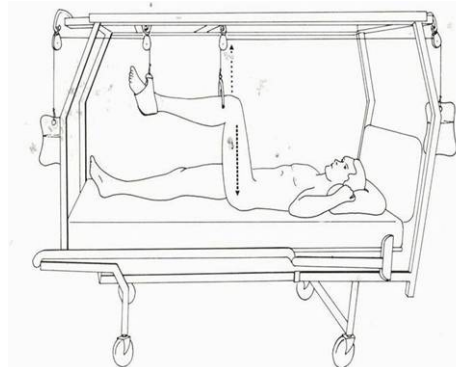
- Promote and negotiate with parent/carer the level of care that they would like to provide for their child. For example oiling of the Thomas splint ring and personal hygiene.
- Explain all procedures to the parents/carers before commencing.

- Enable parents/carers to participate in planning their child's care.

## **Potential Complications** <sup>1,2,3,4</sup>

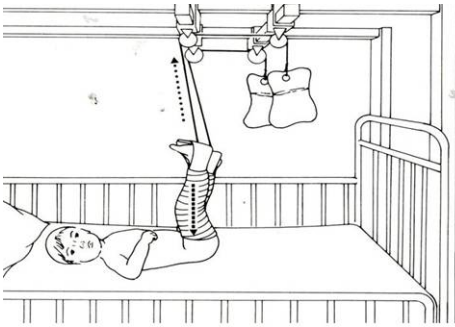
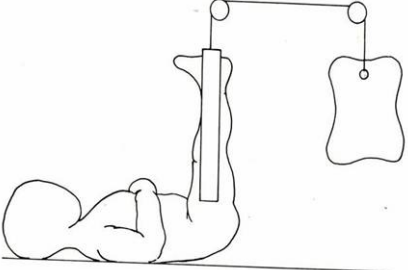
7. Skin breakdown/pressure points/allergic reactions to skin extensions.
8. Neurovascular impairment.
9. Joint contractures.
10. Pin site infections associated with skeletal traction.
11. Respiratory problems associated with semi-recumbent positions.
12. Constipation from immobility and analgesics.

## Skeletal Traction

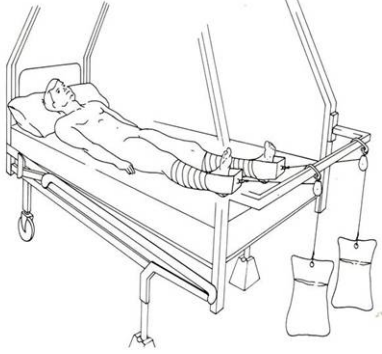
Illustration	Description & Use	Special Care & Maintenance
<p><b>SKELETAL TRACTION with a Steinmann's Pin and a Pearson's Knee Attachment</b> <sup>3</sup></p>  <p>The Thomas Splint with Pearson's knee piece, counter-traction is achieved by elevating the foot of the bed. In this case ensure the child sits up only for meal times/schooling.</p>	<ul style="list-style-type: none"> <li>• Skeletal Traction attaches directly to the bone, with the use of pins, wires, halo frame or tongs. This provides a strong steady continuous pull. <sup>2,1,2,3,4</sup></li> <li>• Skeletal traction is used for unstable fractures, soft tissue injuries or cervical injuries. <sup>1,2,3,4</sup></li> <li>• Skeletal Traction is applied under a General Anaesthetic, a traction bed and equipment will need to be sent to theatres.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure the weight bag corresponds with medical orders.</li> <li>• Attend daily pin site dressings with normal saline swabs, unless otherwise directed by medical officer (<a href="#">Care of External Fixation procedure</a>).</li> <li>• Inform Orthopaedic Medical Officer if there is any sign of swelling, redness or purulent ooze around pin sites.</li> <li>• Ensure the stirrup is centrally located over pin and remains secure (unable to slide off pin).</li> <li>• Ensure the ends of Steinmann pins are covered (usually with cork) to prevent further injury by scratching.</li> <li>• At no time should the weight applied to the pin be released unless ordered by the Orthopaedic Medical Officer</li> <li>• Removal of pins is done under a general anaesthetic or nitrous oxide</li> </ul>
<p><b>90/90 Traction</b> <sup>3</sup></p> 		<p><b>COUNTER-TRACTION</b></p> <ul style="list-style-type: none"> <li>• 90°/90° traction: counter – traction is provided by the patient's own body.</li> </ul>



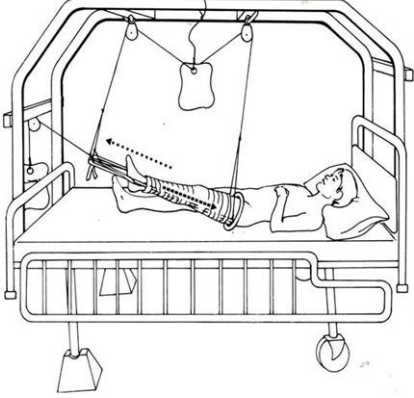
## Gallows/Bryant's Traction

Illustration	Description & Use	Special Care/Maintenance
<p><b>GALLOW'S/BRYANT TRACTION<sup>3</sup></b></p>  <p><b>Correct Position of Skin Extensions and Hips in relation to pulley's<sup>3</sup></b></p> 	<ul style="list-style-type: none"> <li>Gallows traction is applied to ensure the child achieves the correct position for a fractured femur.</li> <li>Traction reduces muscle spasm and maintains proper alignment of the affected limb.<sup>1</sup></li> <li>It is also used to lengthen ligaments prior to operative correction of developmental hip dysplasia, or post operatively for some forms of anal surgery.<sup>1,2,3,4</sup></li> <li>Is used for children under 15kgs, due to risk of vascular complications<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>Both legs to remain flexed at 90 degrees at the hips.</li> <li>The baby's buttocks is to remain slightly off the mattress. i.e. you should be able to fit the palm of your hand between the mattress and baby's buttocks. Adjust the weights to achieve extended legs and slightly flexed knees.<sup>3</sup></li> <li>Traction abducted 5-cm daily (children with Development Dysplasia of the Hips as ordered by Orthopaedic Consultant).</li> <li>If the child is over 12kg or walking unaided, a Thomas splint or Buck's traction is to be applied depending on the child's condition.</li> <li>A Child should <b>not</b> be picked up at any time, as traction should remain continuous.</li> <li>Bandages protecting skin extensions are applied from the distal end to the proximal end of the limb as well as from the lateral to medial points.</li> <li>Bandages must be non-restrictive, wrinkle free and changed daily by the nurse caring for the child.<sup>3</sup></li> </ul>

## Bucks Traction

Illustration	Description & Use	Special Care & Maintenance
<p><b>BUCKS TRACTION<sup>3</sup></b></p> 	<ul style="list-style-type: none"> <li>• Used in conditions involving the hip, femur and knee eg, Irritable Hip &amp; Perthes disease</li> <li>• Provides light traction forces.</li> <li>• Is a balanced skin traction exerted via skin extensions.<sup>1,2,3</sup></li> </ul>	<ol style="list-style-type: none"> <li>1. Maintaining Skin Integrity                         <ul style="list-style-type: none"> <li>• Protect medial and lateral malleoli with cotton wool.<sup>2,3,4</sup></li> <li>• Check heels of child regularly for pressure areas.</li> <li>• Remove the bandages every day for inspection of skin and attend to pressure area care.<sup>2,3,4</sup></li> </ul> </li> <li>2. Range of Motion                         <ul style="list-style-type: none"> <li>• Allow sufficient space between the foot and the spreader to enable the child to plantar flex.<sup>3</sup></li> <li>• Allowing sufficient rope to enable examination of the child's hip for irritability, adduction and abduction.</li> </ul> </li> <li>3. Use of Foam Bucks Boots                         <ul style="list-style-type: none"> <li>• Used when child requires hydrotherapy and land physiotherapy or if child is allergic to skin extensions</li> <li>• Ensure boot size corresponds with child's size and physique.</li> <li>• 1/24 neurovascular observations for 4 hours</li> </ul> </li> </ol>

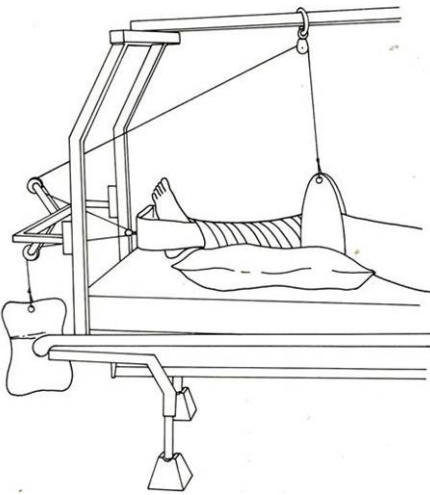
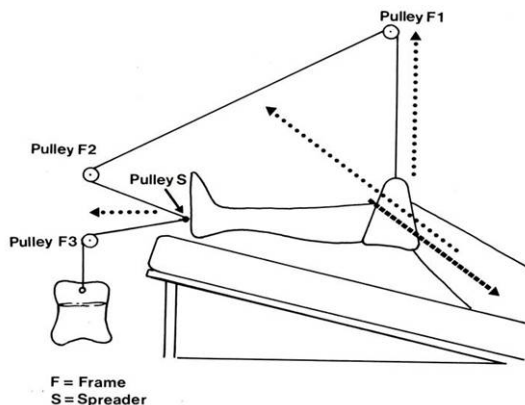
## Thomas Splints Traction

ILLUSTRATIONS:	DESCRIPTION & USE	SPECIAL CARE & MAINTENANCE
<p><b>THOMAS SPLINT TRACTION<sup>3</sup></b></p>  <p><b>Counter-traction</b></p> <ol style="list-style-type: none"> <li>Maintained by child's body weight when foot of the bed is elevated.</li> <li>Child must lie flat with only one pillow, meals/toileting/school are the only exceptions in order to prevent hip contractions.</li> </ol>	<ul style="list-style-type: none"> <li>Thomas Splint traction is maintained to ensure that the child achieves correct alignment of a fractured femur.</li> <li>The aim is to reduce muscle spasms and maintain alignment of the fracture site.<sup>1,2,3,4</sup></li> </ul>	<ul style="list-style-type: none"> <li><b>Thomas Splint Ring</b> <ol style="list-style-type: none"> <li>Correct size, correct position maintained. Fitting comfortably in the groin and against the anterior superior iliac spine.</li> <li>Ensure child's leg is not internally or externally rotated.</li> <li>Ensure child is able to plantar flex and dorsi flex the foot.</li> <li>Thomas Splint ring to be oiled with olive oil 4 hourly until clinical indicators suggest otherwise, i.e. swelling largely subsided.<sup>6</sup></li> </ol> </li> <li><b>Traction Care</b> <ol style="list-style-type: none"> <li>Extensions are free of wrinkles, inner bandage to be changed by a registered nurse only when required.</li> <li>Slings supporting the leg are to be attached to the Thomas Splint. These are to be wrinkle free firm and supportive, especially under the fracture site</li> <li>Areas around Thomas Splint ring, medial and lateral malleoli, Achilles tendon to be checked daily for blistering, bruises or pressure sores.<sup>1</sup></li> <li>Maintain muscle tone to aid healing and rehabilitation. Education programme implemented by physiotherapist and reinforced by nursing staff.</li> </ol> </li> </ul>

## Cervical Traction

DESCRIPTION & USE	SPECIAL CARE & MAINTENANCE
<ul style="list-style-type: none"> <li>• Halter straps used for sprains, torticollis or cervical trauma</li>   <li>• Halo/brace/vest used for fractures/dislocation of cervical or high thoracic vertebrae</li>   <li>• Skeletal tongs (Gardner Wells Tongs) used for fractures/dislocations of cervical vertebrae</li>   <li>• <b>Important to detect any alteration in central nervous system function, regular neurovascular checks<sup>2</sup></b></li> </ul>	<p><b>Chin Halter Straps</b></p> <ul style="list-style-type: none"> <li>• Check the patient 3-4<sup>th</sup> hourly for pressure areas on occiput.</li> <li>• Ensure the weight in the bag corresponds to the medical instructions</li> <li>• Ensure halter is wrinkle free, clean and not causing any pressure over ears or chin.</li> </ul> <p><b>Halo /Brace/Vest:</b></p> <ul style="list-style-type: none"> <li>• Daily pin site care (<a href="#">Orthopaedic External Fixation Device – Management and Care Practice Guideline</a>).</li> <li>• Ensure pins remain secure, they may need to be tightened, contact orthotic department or orthopaedic registrar</li> <li>• Never use bars attached to halo and vest for moving the child<sup>1</sup></li> </ul> <p><b>Gardner-Wells Tongs:</b></p> <ul style="list-style-type: none"> <li>• Daily pin site dressings with normal saline (<a href="#">Orthopaedic External Fixation Device – Management and Care Practice Guideline</a>).</li> <li>• Inform Orthopaedic Medical Officer of any signs of swelling, redness or purulent ooze.</li> <li>• Check that cranial screws are not loose - inform Orthopaedic Medical Officer of any concern regarding changes in traction.</li> </ul> <p><b>Maintain Skin Integrity:</b></p> <ul style="list-style-type: none"> <li>• Attend regular pressure area care</li> </ul>

## Hamilton Russell Traction

ILLUSTRATIONS	DESCRIPTION & USE	SPECIAL CARE & MAINTENANCE
<p><b>HAMILTON RUSSELL TRACTION</b></p>  <p><b>FORCES</b></p>  <p>F = Frame              S = Spreader</p>	<ul style="list-style-type: none"> <li>• Two directional lower limb traction</li> <li>• Used to treat proximal fractures /dislocations of the femur, hip, and acetabulum</li> <li>• Used for post-operative management following hip surgery</li> </ul>	<ul style="list-style-type: none"> <li>• Skin extensions applied below the knee<sup>2</sup></li> <li>• Pillow to be placed under the leg to support the thigh and lower leg</li> <li>• The knee is flexed to provide an angle between the thigh and the mattress of approximately 20 degrees</li> <li>• Ensure a spreader bar is used with the sling. The rope should be tied to the spreader. The sling should be wider than the knee, to prevent pressure on the peroneal nerve<sup>2</sup></li> <li>• Check skin under bandages</li> <li>• Check that the heel is free from pressure</li> </ul> <p><b>Countertraction</b></p> <ul style="list-style-type: none"> <li>• Obtained by elevating the foot of the bed</li> </ul>

## References

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7. Houghton K, Peregrina M, Gillies D, Herden J. A small trial of the nursing care of patients immobilised with a Thomas splint. Journal of Orthopaedic Nursing. 2003;7(4): 201-204.
8. Byrne, T. Zimmer Traction Handbook 9<sup>th</sup> Edition. 2006 San Diego, California

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