

Local Guideline and Procedure



Health
Hunter New England
Local Health District

CLINICAL APPLICATION OF STRAIGHT LEG TRACTION

Sites where Local Guideline and Procedure applies	John Hunter Children's Hospital
This Local Guideline and Procedure applies to:	
1. Adults	No
2. Children up to 16 years	Yes
3. Neonates – less than 29 days	Yes
Target audience	Clinical staff applying and providing care to paediatric patients
Description	Provides information to clinicians for care of a child/infant requiring straight leg traction

[Go to Procedure](#)

National Standards	NS 1, 2, 3, 6.
Keywords	Traction, Bucks, straight leg, lower limb, paediatric orthopaedics, fractured femur
Document registration number	JHCH 10.5
Replaces existing document?	JHCH 10.5 - 2017
Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:	
Relevant Accreditation Criterion e.g. NSQHS Standards Criterion and/or other:	
<ul style="list-style-type: none"> • NSW Health Directive PD2017_032_PCP_2 Clinical Procedure Safety • NSW Health Policy Directive IB2020_010 Consent for Medical and Healthcare treatment manual .pdf • NSW Health Directive/PD2017_013. Infection Prevention Control Policy pdf • HNELHD 2019_020_PCP_1 Clinical Handover-ISBAR 	
Local Procedure note	This document reflects what is currently regarded as safe and appropriate practice. The procedure section does not replace the need for the application of clinical judgment in respect to each individual patient but the procedure requires mandatory compliance . If staff believe that the procedure should not apply in a particular clinical situation they must seek advice from their unit manager/delegate and document the variance in the patient's health record.
Position responsible for the Local Procedure and authorised by	JHCH Clinical Quality & Patient Care Committee
Contact person	Clinical Nurse Consultant, Paediatric Orthopaedics
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PURPOSE AND RISKS

This local clinical procedure has been developed to provide instruction to the health clinician and to ensure that the risks of harm to the child associated with application of traction are prevented, identified and managed.

The risks are:

- Ineffective traction
- Neurovascular damage
- Skin damage

The risks are minimized by:

- Clinicians having knowledge of traction management
- Clinicians seeking assistance if the therapy is outside their scope of practice
- Following the instructions set out in the clinical protocol
- Recognition of the common clinical signs of the risks with neurovascular assessment

Rectification of the causes of the risks to the patient

Please refer to the problem solving table PAGE xx for further instruction

Risk Category: Clinical Care & Patient Safety

GLOSSARY

Acronym or Term	Definition
Counter-traction	A force that is opposing the traction force, which creates a pull on the limb
Footplate	A square plastic spreader that sits below the bottom of the patient's foot when in skin traction
Fracture	A complete or incomplete break in a bone resulting from force
Hydrocolloid	A malleable adhesive skin dressing applied with the intention of protecting the skin under the skin traction
Ischaemia	Insufficient blood supply to a part of a body due to a mechanical obstruction
Pulley	A device that is designed to allow rope to move freely through it in a desired direction
Skin shearing	A separation between layers of skin resulting from opposing forces
Skin traction	Traction that is applied via adhesive tape applied on the skin
Traction	A pulling force on an extremity designed to achieve a desired therapeutic outcome
Traction frame	A frame that supports pulleys and rope for traction
Weight bag	A weighted bag that provides a specified amount of pull on the skin traction device

PROCEDURE

This Procedure does not replace the need for the application of clinical judgment in respect to each individual patient. More comprehensive information is available in the learning resource available on the ward share drive.

INDICATIONS AND BENEFITS OF STRAIGHT LEG TRACTION

- Short term relief of an irritated/septic joint
- Short term therapy for patients with femoral fractures and /or hip dislocations waiting for definitive treatment
- Post-reduction treatment for hip dislocation
- Decrease and prevent muscle spasm
- Analgesia

PREPARATION

It is mandatory to ensure that the parents / carers have received appropriate information to provide informed consent. Patient identification, correct procedure and correct site process must be completed prior to any procedure.

PRIOR TO APPLICATION

- Prepare the child for the procedure in a developmentally appropriate manner. Plans should be individualised to suit the child in consultation with parents/carers
- It is strongly advised that a child life therapist is called if the procedure occurs during regular business hours
- Assess the child's skin integrity and skin history, i.e., eczema
- Perform and document a neurovascular assessment
- Ensure all the equipment is available BEFORE administration of analgesia

ANALGESIA MANAGEMENT

- The child should be calm, relaxed and free of pain prior to the procedure
- A definitive analgesia plan must be in place before any physical contact affecting a fracture site or inflamed joint is initiated
- If the child has severe pain, it is recommended the Acute Pain Service.

Where a nerve block and / or opioid analgesia are contra-indicated in the acute phase of injury, the reason must be clearly documented in the child / young person's notes with an alternate analgesia plan.

PARENT PREPARATION

Parents and child / young person, where appropriate, should have an initial treatment plan explained to them. It is recommended the parents/carer be included in the procedure and be given a role, such as distraction and comfort. This should be clearly defined prior to the procedure.

STAFF PREPARATION

It is mandatory for staff to follow relevant: "Five moments of hand hygiene", infection control, moving safely/safe manual handling, and documentation practices.

PRESCRIBING TRACTION

- Traction must be prescribed in the notes by a medical officer.
- The traction and management plan must be written in a clear and unambiguous manner.
- Use metric, not imperial weight measurements, ie, kg not lb.

APPLYING TRACTION

- Traction is a medical therapy. It must be applied by knowledgeable and competent clinical staff. Two clinicians are required for traction application.
- Ensure the procedure is followed. The accuracy with which the traction is applied will determine its effectiveness.
- Determine clinician competence. Locate an experienced staff member if necessary. It is recommended traction is applied by clinicians who are experienced with traction application or at least under instruction from an experienced clinician.
- The procedure will take approximately 20 minutes.

EQUIPMENT

- Alcohol based hand rub for staff
- Personal Protective Equipment for staff
- 1 x skin traction kit (adult kits should be used for children over 3 years)
- Non-sterile scissors
- Tape
- 1 x water weight bag – do not use sand bags or IV bags
- Hydrocolloid – recommend thin version and enough to place under the skin traction
- Electronic scales (baby scales)
- A jug full of tap water
- A bed with a traction frame



Figure 1. Equipment required for application of straight leg traction.

CLINICAL PROCEDURE

BE AWARE OF POTENTIAL RISK FACTORS

The arrows highlight areas at risk of damage from traction therapy. Constant force and pressure can damage nerves, expose tendons, cause pressure areas over bone and restrict blood flow to the limb.

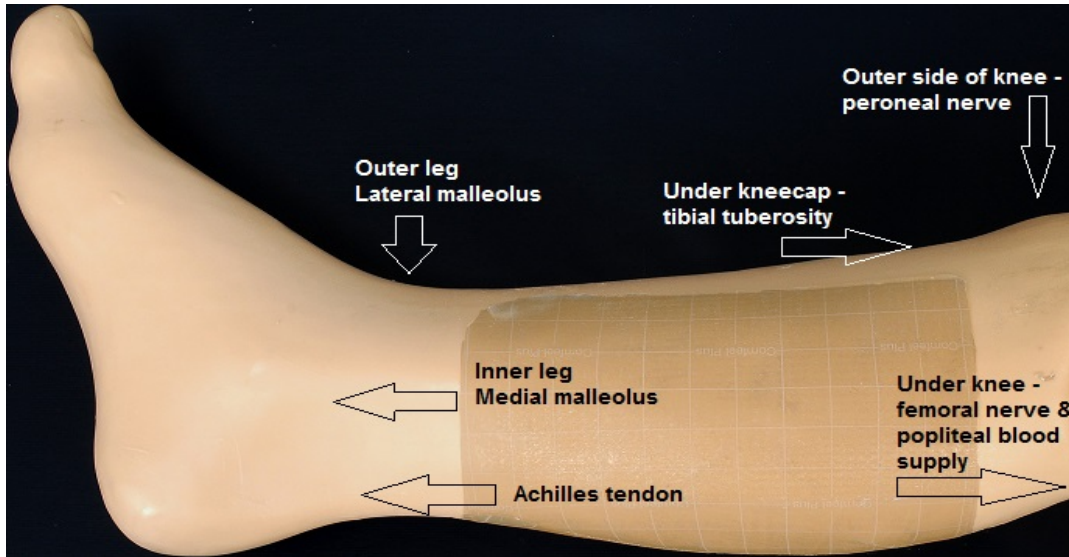


Figure 2. Arrows identify the areas that are at risk of damage from pressure and force.

PROTECTIVE DRESSINGS

Cut and place a hydrocolloid dressing on either side of the child's lower legs. This will protect the skin from the adhesive tape in the traction kit. It also distributes the force over the skin surface.

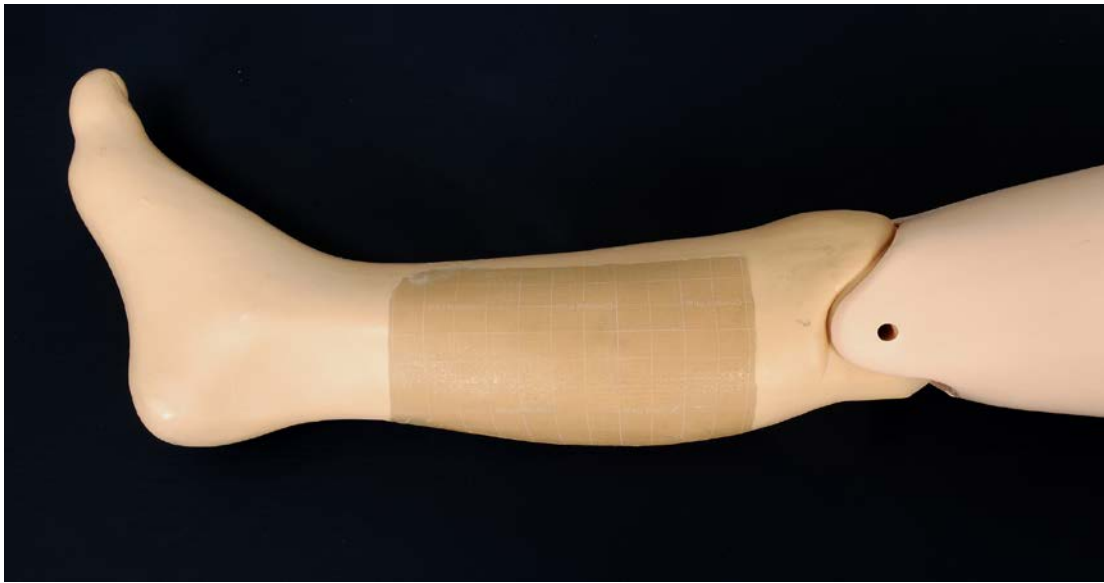


Figure 3. Hydrocolloid can be placed under the traction tape to protect the skin.

PROCEDURAL STEPS

TRACTION TAPE

- The foot plate should be half a hand space from the end of the foot.
- The tape should be 1cm above the ankles and 1cm below the knee.
- Measure and cut before removing the backing paper from the tape.
- The skin traction should not be stuck to skin above the knee or below the ankles.
- Ensure the tape has no wrinkles.



Figure 4. Measuring and applying skin traction.

- Ensure there is a gap between the foot plate of the traction kit and the end of the child's foot. The child should not be able to touch the kit with their toes when their foot is extended.
- Wrap the bandage around the leg – avoiding the potential areas of risk. There is no evidence that one wrapping style is more effective than another.
- The bandage should be secured with tape. Do not use the metal fasteners in the skin traction kit. Do not place adhesive tape circumferentially around the child's leg.



Figure 5. Pull rope through the footplate holes with a long and short piece.

- Pull one end of the rope through the footplate so that there is a shorter piece of rope approximately 10-15 cm in length. Tie the two parts of the rope in a firm knot at the end of the footplate. This should leave you with a single, long piece of rope.



Figure 6. After tying the knot, thread the single strand of rope through a pulley at the end of the bed.



Figure 7. The rope is threaded through a pulley and the weight bag hangs at a 90° angle.



Figure 8. Ensure the bag is hanging free of the bed and the floor.

APPLYING THE WEIGHT

Understanding the purpose of the traction is very important. It will dictate how much weight the child should have on their limb. The amount of weight applied to a limb is important.

FOR CHILDREN WITH FRACTURES:

The weight should be between 5-10% of the child's weight. For example, if the child weighs 12kg, the weight should be between 600g-1.2kg depending on the build and muscle tone of the child.

- too little weight is ineffective
- too much weight will cause skin and tissue damage

FOR CHILDREN WITH SEPTIC JOINTS:

The weight should be approximately 2.5% of the child's weight, up to a maximum of 1kg, and added gradually over 2 hours. The purpose of the traction is comfort and to prevent a flexion contracture of the hip.

**Weight in excess of 10% will cause skin shearing within weeks.
Weight in excess of 20% will cause neurovascular compromise to the limb within days and eventually, ischaemia.**

PUTTING ON THE WEIGHT:

- Use baby scales to weigh the water bag
- Write the weight and date on a sticker and attach to the bag
- Change the weight over gently, steady and gradually
- Attach the prescribed weight
- The weight needs to be adjusted, ensure the knot can be undone easily
-



Figure 9. Labelling the weight bag.

SKIN SHEARING

In the picture below, you can see how the tape has pulled the skin towards the weight and has separated the top layers of skin from the lower layers. This is called skin shearing.



Figure 10. Skin shearing caused by excessive, continuous weight.

AFTER APPLICATION**COUNTER-TRACTION**

The patient's body is the counterweight to the weight placed on the limb. Without counter-traction the patient may experience muscle spasm, mal-alignment of bones and they will slide out the end of the bed.

The most important task at the end of the procedure is often forgotten. Without counter-traction, there will no effective traction on the limb.

The amount of counter-traction required is whatever is needed to stop the patient sliding down the bed. Once the weight is applied, the child may feel some initial discomfort. This should be temporary. The heel should be slightly elevated off the bed. This can be achieved with a towel or bunny rug.

SPASMS

Sometimes the quadriceps muscle can go into strong spasm, which is very painful. If this occurs, prn medication and some steady, extra manual traction is recommended (this is not to be performed by novice staff) until the spasm decreases.

If the child is still unsettled after medication and manual traction, assess the child and traction. If no problem can be identified - initiate a clinical review.

MAINTENANCE**SITTING UP IN BED - EXCEPTION**

Most children in traction are able to sit up. The exception is for children or young people who have had traumatically dislocated hips. The sitting angle should be prescribed in the notes. Never sit up a patient post hip dislocation without checking with the orthopaedic team first.

At the beginning of every shift:

- Check the traction thoroughly
- Make necessary adjustments and changes
- Perform a complete neurovascular assessment

NOTE: No counter-traction = ineffective traction

Traction must be continuously maintained for the duration of treatment and may not be removed without instructions from the treating team.

- If the child's skin integrity deteriorates, clinical review is required.
- Do not place talc, cream, oil or moisturiser on the affected leg unless it is prescribed on the patient's medication chart.

REMOVAL

- Care must be taken when removing adhesive products from skin.
- Take care if using commercial adhesive removal products. Check for broken skin.

- Warm soapy water can be used.
- A warm bath/shower is suggested to remove tape once treatment has been completed.

SUMMARY

- The child's neurovascular status has been checked and is satisfactory
- There are no signs and symptoms of neurovascular compromise, or a clinical review has been initiated and the cause has been rectified
- The skin under the tapes is intact
- The weight has been checked with electronic scales
- The weight bag is labelled and dated
- The weight is equal to or less than 10% of the child's weight up to a maximum of 2.2kg
- Counter-traction has been applied
- The weight is off the floor
- The child is not sliding down the bed
- The child is lying in bed in correct alignment with the traction
- The traction is set-up correctly
- The child and parents are aware the child may sit up as tolerated – unless this is contra-indicated, ie, post hip dislocation
- The child has a pain score less than or equal to 3/10 using an appropriate paediatric pain scoring tool
- The child is interactive and is moving without distress
- The child is interactive and does not become easily distressed when staff approach
- The child is having simple regular analgesia and PRN opioid analgesia prior to personal care, pressure area care or painful procedures
- The child is eating and drinking
- The child has had their bowels open within 2 days
- The child has laxatives charted

The child and family have had appropriate referrals to allied health staff, which may include:

- Occupational therapy
- Physiotherapy
- Social work
- Psychology
- Child life therapy
- Dietician to visit

PROBLEM SOLUTION CHECKLIST

PROBLEM	WHAT IS THE GOAL FOR THE CHILD?	WHAT ARE YOU GOING TO DO ABOUT THE PROBLEM?	HOW ARE YOU GOING TO ASSESS IF YOUR INTERVENTION HAS BEEN SUCCESSFUL?
The extremity is swollen	<ul style="list-style-type: none"> Maintain neurovascular circulation Reduce or prevent swelling <p><i>*IV therapy should not be running through an affected limb unless there is no alternative option – where this occurs, staff need to be aware of the extra risks of neurovascular compromise and not assume the IV therapy is the cause of neurovascular changes</i></p>	<ul style="list-style-type: none"> Encourage movement of the distal joint (where appropriate) Check for and release restrictive materials down to the level of the skin Check the traction weight is less than or equal to 10% of the child's body weight (if a young person, the traction should not exceed 2.2kg) Instigate a clinical review within 30 minutes Increase the frequency of neurovascular assessment according to the recommendation in the protocol 	<ul style="list-style-type: none"> Corrective intervention has been initiated The swelling has been reduced
Skin integrity is impaired	<ul style="list-style-type: none"> Reduce the risk of further damage to the skin Give the skin an environment that promotes healing Remove the cause of the damage to the skin (see next column) Maintain effective traction 	<ul style="list-style-type: none"> Request a clinical review within 2 hours Increase the surface area of the skin traction Reduce the weight of the traction (after consultation with CNC or MO) Apply an appropriate dressing (a thin hydrocolloid is usually appropriate) Take care not to cause further damage when removing adhesive from broken skin 	<ul style="list-style-type: none"> Further damage to skin is prevented Skin is healing or has healed Traction has been maintained Damaged skin has been documented with clinical photography
Constipation	<ul style="list-style-type: none"> Constipation is prevented and/or treated <p><i>*please note the effects of slowed bowel motility if patient is having opioid analgesia</i></p>	<ul style="list-style-type: none"> Document bowel activity daily Ensure laxatives are charted Encourage fluid intake 	<ul style="list-style-type: none"> Bowel activity is usual for the child
Ineffective and/or	<ul style="list-style-type: none"> The child is assessed for pain 	<ul style="list-style-type: none"> Use a paediatric pain scoring tool to assess the child's 	<ul style="list-style-type: none"> The child's has an appropriate and

inadequate analgesia	using a paediatric pain assessment tool and is treated according to the paediatric pain protocol	<p>pain and document the assessment</p> <ul style="list-style-type: none"> • Administer appropriate and effective analgesia • Check counter-traction • Check for occult sources of pain • Re-assess regularly • Request clinical review within 30 minutes • Complete IMS+ report (if appropriate) 	<p>definitive pain management plan and the pain is effectively controlled</p> <ul style="list-style-type: none"> • The child or young person reports their pain as well controlled • Staff and family are able to perform care
Increased pain after traction application / re-application	<ul style="list-style-type: none"> • The source of the pain is discovered and clinical intervention initiated <p><i>*Ineffective traction can cause pain</i></p>	<ul style="list-style-type: none"> • Check the amount of weight is appropriate (less than or equal to 10% of the child's body weight) • The traction weight does not exceed 2.2kg • Check that the traction is correctly applied – there is counter-traction • Check the rope is not caught in a pulley • Pain assessment • Request a clinical review within 30 minutes 	<ul style="list-style-type: none"> • The source of the pain is discovered and clinical intervention has been successful
Traction is applied incorrectly	<ul style="list-style-type: none"> • The traction is re-applied correctly 	<ul style="list-style-type: none"> • Refer to the procedure. • Request a clinical review if not able to re-apply the traction correctly • Complete IMS+ documentation 	<ul style="list-style-type: none"> • The traction has been correctly applied and is effective
The traction is falling off or not adhering to the leg	<ul style="list-style-type: none"> • The skin is free of substances, i.e., oils, talc, creams, that prevent the traction from adhering to the skin 	<ul style="list-style-type: none"> • Ensure the skin is dry, free of oils, talc and creams and free of shedding or flaky skin. • Do not put cream or talc on the leg • Is the traction kit an adult kit? • Check /reduce the weight • Increase the traction surface area 	<ul style="list-style-type: none"> • The traction is adhering to the skin and is effective
The child is moving and spinning around in the traction (this can be a sign of healing)	<ul style="list-style-type: none"> • Maintain the traction and keep the child safe 	<ul style="list-style-type: none"> • Do not prevent the child from moving unless it is unsafe • If supervision is not effective, the child can be placed into straight leg traction in a cot for the last week of therapy at the surgeon's discretion 	<ul style="list-style-type: none"> • The traction is effective and the child is safe

<p>Child is sliding down the bed and the traction bag is constantly on the floor</p>	<ul style="list-style-type: none"> • Maintain effective traction 	<ul style="list-style-type: none"> • Ensure the bed end is elevated to provide counter-traction • Check the linen for slide sheets • Check the child is not on a pressure relieving mattress (they are covered in slippery fabric) • Ensure the weight is not in excess of 10% of the child's body weight • If a young person, check the traction does not exceed 2.2kg • Reduce the traction weight 	<ul style="list-style-type: none"> • Effective traction is achieved and the child is not sliding down the bed
<p>Pressure area under the heel</p>	<ul style="list-style-type: none"> • Elevate the heel off the bed 	<ul style="list-style-type: none"> • Fill out IMS+ documentation • Request clinical photograph of injury • Grade the pressure injury 	<ul style="list-style-type: none"> • The pressure under the heel has been reduce and further soft tissue damage is prevented • The pressure area has been staged, documented in the notes and recorded with clinical photography
<p>The child is moving and spinning around in the traction (this can be a sign of healing)</p>	<ul style="list-style-type: none"> • Maintain the traction and keep the child safe 	<ul style="list-style-type: none"> • Do not prevent the child from moving unless it is unsafe 	<ul style="list-style-type: none"> • The traction is effective and the child is safe

COMPLIANCE, IMPLEMENTATION AND MONITORING

The owners/developers of the document (Orthopaedic CNC) will:

1. Distribute the approved guideline to all relevant managers and clinical staff using email.
2. Distribution of a fact sheet
3. Provide JHCH clinical in-service highlighting any changes to clinical practice
4. Report on any IMS+ received for this guideline and respond appropriately

APPENDICES

Appendix 1 – Clinical Audit form

REFERENCES

- Altizer L (2004) Neurovascular Assessment *Orthopaedic Nursing* 21(4):48-50.
- Byrne Thomas (1999) The Setup and Care of a Patient in Buck's Traction *Orthopaedic Nursing* 18(2):79-83.
- Chang, T., Sargant, C. & Sponseller, P. (2009) Postoperative Orthopaedic Neurovascular Monitoring in the Pediatric Population *Journal of Pediatric Orthopaedics* (29)1:80-84.
- Draper J and Scott F (1996) An investigation into the application and maintenance of Hamilton Russell traction on three orthopaedic wards. *Journal of Advanced Nursing* 23(3):536-541.
- Dwek, J R (2010) The periosteum: what is it, where is it, and what mimics it in its absence? *Skeletal Radiology* 39:319-323.
- Fort C (2003) How to combat 3 deadly trauma complications *Nursing* 33(5):58-63.
- Great Ormond Street Hospital Neurovascular Observations Guideline from website May 2012.
- Judge, N. (2007). Neurovascular Assessment *Nursing Standard* (21)45:39-44.
- Kruse J Traction and Buck's Traction. Learning Contract online document at 3rd September 2012.
- Kunkler C (1999) Neurovascular Assessment *Orthopaedic Nursing* 18(3):63-71.
- Love C (1998) A Discussion and Analysis of Nurse Led Assessment for the Early Detection of Compartment Syndrome *Journal of Orthopaedic Nursing* 2(3):160-167.
- Maher A, Salmond, S & Pellino T (2002) *Orthopaedic Nursing* (3rd ed.). WB Saunders, Philadelphia.
- Osmond Tracey (1999) Principles of Traction *Australian Nursing Journal* 6(7):1-4.
- Parker M (2004). Pre-operative traction for fractures of the proximal femur *The Cochrane Database of Systematic Reviews* The Cochrane Library (3).
- Ritter, S.H. (1995). Assessment of Preschool Children. New York: ERIC DIGEST.
- Satryb, S, Wilson, T & Patterson, M (2011) Casting All Wrapped Up *Orthopaedic Nursing* 30(1):37-41.
- Styracula L (1994). Traction Basics: Part IV: Traction for Lower Extremities *Orthopaedic Nursing* 13(5):59-68.
- Taylor I, (1987) Ward Manual of Traction, Ch 2 – 6, Churchill Livingstone.
- Wright, E. (2007) Evaluating a paediatric neurovascular assessment tool *Journal of Orthopaedic Nursing* 11:20-29.
- Wright, E. (2009) Neurovascular impairment and compartment syndrome *Paediatric Nursing* (21)3:26-29.
- Zimmer Orthopaedic Surgical Products Inc (2005). The Traction Handbook, California.

FEEDBACK

Any feedback on this document should be sent to the Contact Officer listed on the front page.

CONSULTATION

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APPROVAL

CPGAG - April 2020
JHCH CQ&PCC - 27th May 2020

APPENDIX ONE - CLINICAL AUDIT TOOL**(National Standard 1: 1.7.2 The use of agreed clinical guidelines by the clinical workforce is monitored)**

Criterion no.	Criterion	Exceptions	Definition of terms and/or general guidance	Data source	Frequency	Position Responsible
1	Percentage of children in Hamilton-Russell traction who have not had the therapy applied as recommended by the protocol. All children in Hamilton-Russell traction will be audited, inclusive of consumer feedback	None	The aim is that all children undergoing Hamilton-Russell traction therapy receive the recommended standard treatment. (Standard = 100%)	Patient health record and consumer feedback	Constant	CNC Paediatric Orthopaedics
2	Quantity of IMS+ reporting		The aim is that the percentage of IMS+ will be reduced	IMS+	Constant	
3	Competency of clinicians who are able to apply, care for and provide information to others regarding care of the child in Hamilton-Russell traction	None	The aim is that all staff who apply, care for and provide information to others, have the minimum described standard of skill and knowledge	Audit staff	12 monthly	CNC Paediatric Orthopaedics

Reference: *Electronic audit tool - National Institute for Health and Clinical Excellence (NICE): www.nice.org.uk/nicemedia/live/10996/56372/56372.xls*