

PAEDIATRIC NURSING PRACTICE MANUAL
SECTION 13

CARE OF THE CHILD WITH AN ORTHOPAEDIC CONDITION

13.1 NEUROVASCULAR OBSERVATIONS

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Aim

The child or young person will maintain normal perfusion, movement and sensation of the affected extremity distal to the constriction and/or injury site.

Background

Compartment Syndrome is a surgical emergency where an increased pressure exists within one or more muscle compartments of the extremity. Pressure sources may be external or internal to the extremity. External pressure sources may include tight, bulky dressings, bandages and plaster casts. Internal pressures may include fractures, bleeding or fluid accumulation e.g. IV infiltration. A combination of both internal and external pressures may increase the chances of developing a compartment syndrome.⁵

Criteria

1. When possible, assess the extremity prior to application of restriction - to establish a base for comparison.
2. Assess the neurovascular status hourly for 24 hours. If all other observations are within acceptable parameters it may not be necessary to wake a child to check sensation. If this is the case, record findings as outlined in key point 6.
3. Within 30 minutes of administration of any analgesia, document the extent of relief obtained on the Children's Early Warning Tool (CEWT).
4. Reduce the frequency of observations according to the patient's condition, to a minimum of four hourly for 72 hours. **Note:** Daily assessment may continue in hospital and after discharge if appropriate.
5. Note relevant information that justifies the findings above under comments, eg. plaster intact, active and passive exercises attended, analgesia administered and motor function / sensation decreased or 'not tested as patient asleep.'
6. Sign each entry in the appropriate column.

7. **Use of the Doppler**

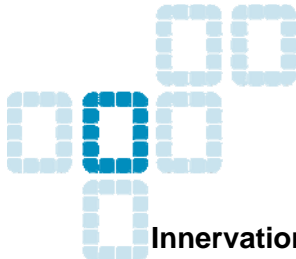
Doppler assessment is not essential for every patient who requires neurovascular assessment.

Doppler monitoring may be requested for patients with specific conditions or post surgery.

The frequency will be determined by the medical officer.

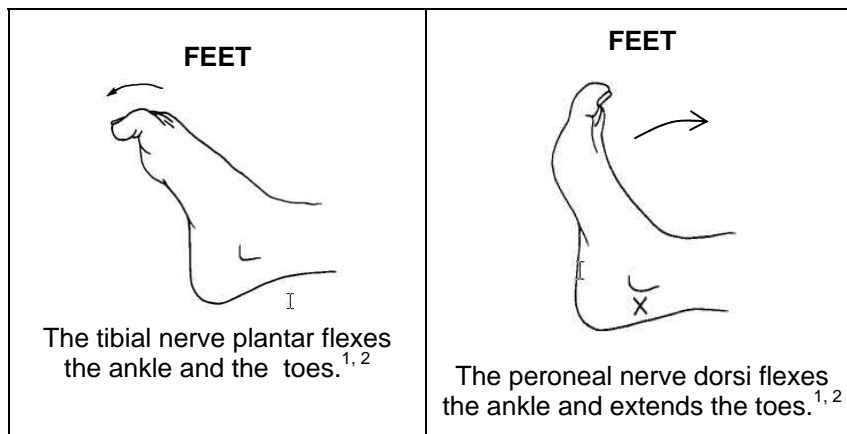
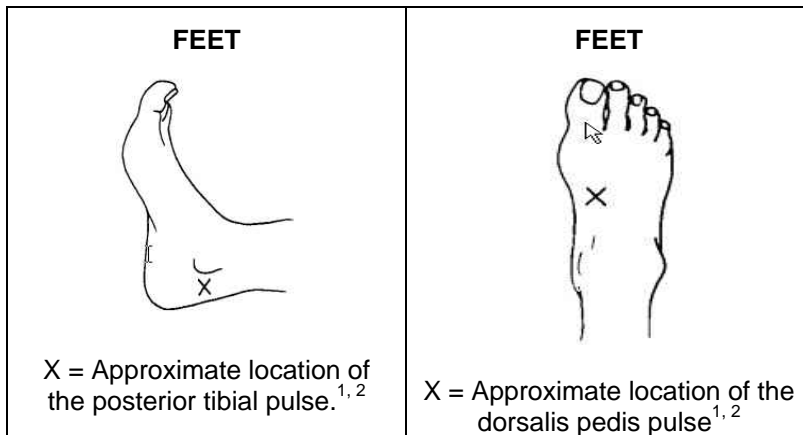
PROCEDURE	ADDITIONAL INFORMATION
<p>Assess the extremity distal to the bandage or plaster for:</p> <p>Colour</p> <p>Indicate the colour by ticking the appropriate box. If the foot is not pink, consider the child's ethnicity.</p> <p>Skin temperature (Warmth)</p> <p>Indicate the skin temperature by ticking the appropriate box.</p> <p>Capillary refill time</p> <p>Depress the nail bed. Determine the length of time it takes for circulation to return. Indicate the refill time in the appropriate box.</p> <p>Pulse/s</p> <p>Identify pulse/s and record the findings in the blank space/s. Indicate findings as S = strong, W = weak or A = absent. If the plaster is intact and pulses are unable to be palpated, write "plaster intact" in appropriate column.</p> <p>Sensation/Motor Function</p> <p>Assess as described in diagram overleaf. Indicate findings in the appropriate column as: P = present, D = decreased or A = absent.</p>	<p>Compare the findings with the non affected part to determine deviations from normal.¹</p> <p>A pale or blanched appearance of the skin may be indicative of arterial insufficiency.^{1,2}</p> <p>A restriction in arterial flow may cause the skin to feel cool to touch.^{1,2}</p> <p>Conversely, skin that feels warm/hot may indicate venous constriction.¹⁻³</p> <p>Refill times of >3 seconds may indicate compromised circulation.³</p> <p>A weak or absent pulse may indicate constriction. Death of tissue due to anoxia will occur if normal blood flow is not restored to the distal extremity.</p> <p>Note: The absence of a pulse is an unreliable sign. Arterial flow may continue in the presence of compartment system.¹</p> <p>Neurovascular impairment is most commonly caused by pressure on a nerve or vascular supply to the extremity.</p> <p>Increased pain and/or decreased and/or absent sensation or motor function may indicate the onset of compartment syndrome.²</p>

PROCEDURE	ADDITIONAL INFORMATION
<p>Pain on passive movement Passively extend distal extremity. Determine intensity of any pain present. Note: The presence of an epidural or PCA device may mask the development of compartment syndrome.⁴ Record presence of pain as Y = yes or N = no</p> <p>Pain unrelieved by analgesia Indicate as Y = yes or N = no.</p> <p>Swelling/Oedema Assess amount of swelling at distal extremity and compare with the unaffected limb. Indicate findings as N = nil, SI = slight, S = small, M = moderate, L= large or Ex = extreme.</p> <p>Perfusion If ordered by the medical officer, assess the extremity for decreased perfusion using the Doppler. Document as P = Present, A = Absent N/A = Not applicable</p>	<p>Presence of pain may be regarded as the first symptom of compartment syndrome. As such the cause should be investigated.</p> <p>Pain related to ischaemia is not relieved by normal narcotic analgesia and is described as unrelenting/unremitting.^{2,6} Any such pain warrants further investigation to determine the cause.</p> <p>Oedema occurs as a result of injury or surgery and has the potential to threaten neurovascular status and increase the risk of compartment syndrome.²</p> <p>Early detection of decreased perfusion is vital in preventing complications such as compartment syndrome.⁷ Note: Pulses may still be present as swelling may not necessarily affect the major vessels but the blood supply to the compartment may still be significantly compromised.⁸</p>


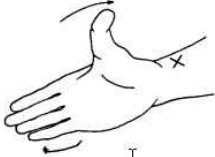
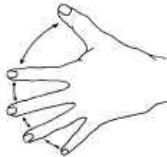


Innervations of the Hands and Feet

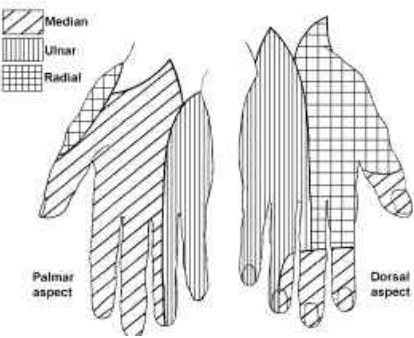


Motor Innervation - Feet



Motor Innervation - Hands

<p style="text-align: center;">HANDS</p>  <p>The Median nerve allows opposition of the little finger with the thumb.^{1,2}</p>	<p style="text-align: center;">HANDS</p>  <p>The radial nerve allows extension of the fingers and the wrist.</p> <p>X = Approximate location of the radial pulse.^{1,2}</p>	<p style="text-align: center;">HANDS</p>  <p>The ulnar nerve allows the wrist to move laterally and the fingers to spread.^{1,2}</p>
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Sensory Innervation

<p style="text-align: center;">HANDS</p>  <p>Median Ulnar Radial</p> <p>Palmar aspect Dorsal aspect</p>	<p style="text-align: center;">FEET</p>  <p>Sensation to the sole of the foot is supplied by the tibial nerve.^{1,2}</p>  <p>λ indicates the sensory area supplied by the peroneal nerve.^{1,2}</p>
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References:

1. Altizer L. Neurovascular assessment. [Expert opinion]. Orthopaedic Nursing.20(4):48-50. ; 2001.
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All protocols should be read in conjunction with the Disclaimer in the Preface of this manual