Scope
This guideline is aimed at all Health care professionals involved in the care of infants within the Perinatal Directorate.

Key Points
- There should be a low threshold for an x-ray (clavicle and upper arm) in all infants with an apparent brachial plexus injury
- Associations of a brachial nerve palsy include fracture of the clavicle\(^1\), phrenic nerve palsy\(^2\) and Horner’s syndrome
- Respiratory distress associated with an Erb’s palsy will require a chest x-ray.
- The physiotherapists will document the results of the Toronto movement assessment scale at 8 weeks and 12 weeks\(^3\)
- An infant with a result of <3.5 on the Toronto scale should be considered for referral for surgery at a specialist centre\(^4\)
  (local referrals to Mr Bainbridge, Derby Children’s Hospital)

Aims
The aim of this policy is that infants with a significant brachial nerve injury are identified, complications are excluded and referral to a paediatric physiotherapist is instituted. In addition those infants at risk of permanent nerve damage are highlighted and referred on by 12 weeks for specialist opinion and possible surgical intervention\(^5\)\(^6\)\(^7\)\(^8\)\(^9\).

Background
Brachial nerve injury has an incidence of between 0.4 - 2 per 1000 deliveries.\(^10\)\(^1\) The brachial plexus consists of the nerves C5/C6/C7/C8/T1 and the clinical features will depend on the nerve roots that have been injured and the severity of the injury. Factors that increase the risk of a brachial nerve injury include macrosomia\(^11\), prolonged labour, shoulder dystocia, breech delivery and assisted delivery\(^1\)\(^12\). The injuries occur secondary to forceful traction of the infant’s neck.\(^13\)\(^14\)\(^15\)\(^16\) The type of injury can be classified as:

- Avulsion or rupture
- Neurotmesis
  - Severe contusion and loss of encapsulating sheath
- Axonotmesis
  - Loss of continuity of axon but with preservation of encapsulating sheath
- Neuropraxia
  - Mild shock or bruising
Risk Factors and Neonatal Management

Perinatal

**Risk Factors:**
- Previous baby >3.5kg or with previous Erb's palsy/Obstetric Brachial Plexus Palsy
- Maternal diabetes
- Cephalopelvic disproportion
- Multiparity
- Breech presentation

Birth

**Risk factors:**
- Shoulder dystocia
- Prolonged 2nd stage of labour
- Assisted delivery
- Breech birth

Post-natal

- **No**

  “Floppy” arm?

  - Yes

    - Examine for Horner’s sign
      - if present, refer to specialist centre for surgery.

    - Examine for tachypnoea
      - If present admit to NNU for CXR

    - If fractured clavicle inform consultant to discuss with physio

  - No bony injury

    - Refer to physiotherapy

**Physiotherapist to assess:**
- Handling and sensory advice.
- If not possible, information leaflet to be provided (includes information shown in Appendix)
Outpatient Management

24hrs – 1 week
Passive movements to elbow, wrist and hand

7-10 days
Physiotherapy outpatient appointment

6 weeks
Full range of passive movements of shoulder

8 weeks of age
Physiotherapist to conduct Toronto assessment scale
Consultant to review with results of Toronto score at 9 weeks
Primary nerve surgery if indicated

12 weeks of age
Physiotherapist to re-assess Toronto scoring
Consultant to review with results of Toronto score
See Appendix 1 & 2: Toronto scoring scale
Appendix 1: Toronto Scale for assessment of Erb’s Palsy

<table>
<thead>
<tr>
<th>Gravity Eliminated</th>
<th>Grade</th>
<th>Score</th>
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<tbody>
<tr>
<td>No contraction</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Contraction, no motion</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Motion &lt; ½ range</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Motion &gt; ½ range</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>Full motion</td>
<td>4</td>
<td>0.6</td>
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</table>

<table>
<thead>
<tr>
<th>Against gravity</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Motion &lt; ½ range</td>
<td>5</td>
<td>0.6</td>
</tr>
<tr>
<td>Motion &gt; ½ range</td>
<td>6</td>
<td>1.3</td>
</tr>
<tr>
<td>Full motion</td>
<td>7</td>
<td>2</td>
</tr>
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Upper limb movements to be measured

1) Elbow flexion
2) Elbow extension
3) Wrist extension
4) Finger extension
5) Thumb extension
Appendix 2

Physiotherapist to conduct Toronto score

- **<3.5**
  - Refer to specialist centre for surgery.

- **3.5 – 5.5**
  - Refer to specialist centre for assessment.

- **>5.5**
  - 8 weeks of age.

  - **>5.5 and improving well**
    - 12 weeks of age.
    - Ongoing
  
  - **Slow progress**
    - Regular review periods
  
  - **Progressing well with increasing scores**
    - Extend times between reviews until discharge
References

Monitoring:
This is based on a review of incident forms by the Risk Manager in conjunction with the clinical lead, and will include trend analysis if considered necessary, and referred to the Perinatal Risk Group where appropriate. Any action points / plans will then be referred to the Maternity Services or Neonatal Governance Group.

Audit Standards (neonatal)

All infants with an Erbs palsy / brachial plexus palsy should be referred by the neonatal team to a paediatric physiotherapist for assessment and follow up. (100%)

Guideline development:

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>Oct 2007</td>
<td>Original guideline</td>
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<tr>
<td>Aug 2008</td>
<td>Neonatal Guidelines Meeting</td>
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<tr>
<td>Oct 2015</td>
<td>Review and update by Kay Calvert, Paediatric Physiotherapist</td>
</tr>
<tr>
<td>Oct 2015</td>
<td>Minor editorial changes (Guidelines lead - REM)</td>
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<tr>
<td>3/11/2015</td>
<td>Neonatal Guidelines Meeting</td>
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<tr>
<td>Nov 2015</td>
<td>Amendments (Guidelines lead – REM)</td>
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<tr>
<td>Nov 2015</td>
<td>Neonatal Governance Meeting</td>
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<tr>
<td>Nov 2018</td>
<td>Review and update by Nicky Horsley, Paediatric Physiotherapist</td>
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<tr>
<td>Dec 2018</td>
<td>Neonatal Guidelines and Governance Meetings</td>
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Appendix: Passive Movement Exercises
taken from reference 17 APCP

Range of Motion Exercises for Infants with Obstetric Brachial Plexus Palsy

Range of motion exercises are movements done with your baby’s arm to ensure that the joints maintain full movement. They should be performed slowly and held at the end of range for at least 10 seconds. The exercises should be done at least 3 times a day with each exercise being repeated three times unless otherwise directed by your therapist. There will be many more opportunities to do these stretching exercises such as during baths and times when your baby is being nursed, held or changed.

Shoulder Exercises

A Gently grasp your baby’s forearm and hold their shoulder blade down firmly with the palm of your hand. Then raise their arm slowly up over their head keeping the arm close to the ear and hold.

B This exercise resembles a ‘high five’. Raise your baby’s shoulder out half way and bend the elbow to 90°. Maintaining this position, rotate the baby’s arm back so that the arm touches the bed and hold.
C  Bend both your baby’s elbows to 90° and keep elbows tucked into the side of your baby’s body. Turn the forearms out to the side and down towards the surface and hold. **This is probably the most important exercise.**

### Elbow Exercises

A  Keep your baby’s palm turned up, hold above and below the elbow, gently but firmly straighten your baby’s elbow and hold. Then bend your baby’s elbow and hold.

B  Keep your baby’s elbow bent at 90° with their upper arm against the body. Start with your baby’s palm turned down, then turn your baby’s forearm up until the palm is facing upwards and hold. Then, turn your baby’s forearm until the palm is facing down and hold.
Wrist and Finger Exercises

A Hold your baby’s wrist in one hand and their hand in your other hand. Gently bend their wrist backwards and hold, then straighten their fingers and hold.

B Use the same wrist position as above and straighten their thumb and hold.

Positioning and Handling

- If your baby’s arm is very floppy it should be well supported with the hand, elbow and shoulder in the neutral position. Often a towel under the affected arm during sleep helps to keep the arm in the neutral position.

- Move your baby’s arm gently for washing, dressing and skin care. It is helpful to dress the affected arm first and undress it last. When washing and drying, particular care should be taken with skin folds.

- When handling, feeding and cuddling your baby, the affected arm should be well supported.