CHEST PHYSIOTHERAPY (PERCUSSION) ● 1/3

INTRODUCTION

- Neonatal critical care review (NCCR) implementation plan recommends babies requiring intensive and high dependency care should have access to a specialist neonatal/paediatric physiotherapist with neonatal competence
- Follow Association of Paediatric Chartered Physiotherapists Good Practice guideline when undertaking physiotherapy interventions (see https://apcp.csp.org.uk/publications/working-children-guidance-good-practice − contact unit or network physiotherapist for access)
- All staff undertaking percussion must complete and annually renew a competency document. Further information available at (competency document available https://www.networks.nhs.uk/nhs-networks/west-midlands-neonatal-operational-delivery/neonatal-guidelines-2022-2024)
- Before considering percussion ensure all other airway clearance options optimised, including:
  - variety and frequency of position changes
  - adequate hydration to prevent tenacious secretions
  - best practice suction technique
- Contact respiratory physiotherapist to review babies with difficulties clearing secretions

PERCUSSION

Definition

- Rhythmic patting over chest wall using a palm cup percussor to generate pressure changes stimulating mucus clearance by ciliary stimulation

Indications

- Volume loss identified by:
  - chest X-ray (collapse/atelectasis)
  - auscultation/palpation
- Secretion retention identified by:
  - chest X-ray (collapse, consolidation)
  - ventilator parameters e.g. PIP
  - decreased SaO_2/PaO_2; increased $PaCO_2$
  - auscultation/palpation
  - suction yield (consistency/colour/volume)
- Signs of respiratory compromise secondary to secretion retention where secretions not cleared effectively with best practice suction technique
- Neuromuscular or respiratory conditions which may require prophylactic physiotherapy and parental training before discharge – refer to physiotherapist

Contraindications

- Cardiovascular instability
- Undrained pneumothorax/bullae
- Pulmonary interstitial emphysema (PIE)
- Acute pulmonary haemorrhage
- Metabolic bone disease/fractured ribs
- Intraventricular haemorrhage (IVH) within 48 hr
- Extreme prematurity (<1500 g/<26 weeks' gestation) in first week of life
- Platelet count $<50 \times 10^9$/L and/or prolonged clotting and/or active bleeding

Precautions

- Poor skin integrity
- Platelet count $<100 \times 10^9$/L
- Avoid chest drain sites and Broviac lines/proximity of wounds/stomas
- Effectiveness reduced in chest wall oedema
- Distended abdomen
- Recent cranial or eye surgery (including ROP laser surgery)
- Acute necrotising enterocolitis
- Recent surfactant therapy
- HFOV (percussion unlikely to be effective)

PROCEDURE

- Always assess cardiorespiratory status before intervention
- Perform with continuous monitoring

CHEST PHYSIOTHERAPY (PERCUSSION) ● 2/3

- Pre-oxygenation with increased pressure/rate where necessary
- Ensure nesting and developmental care support throughout procedure (see **Developmental care** and **Positioning** guidelines)
- Recognise and respond to signs of stress
- Plan treatment episodes pre-feed or >30 min post-feed
- Preterm babies should not receive routine physiotherapy treatment

Positioning

- See **Positioning** guideline
- **Do not** disconnect baby from the ventilator for a turn
- A variety of positions is the most important intervention for optimising ventilation distribution and mobilising secretions. Unless contraindicated use:
  - kangaroo care
  - supine
  - prone
  - semi-prone
  - full side-lying
  - side tilts/cot tilts
- If secretion retention problematic increase frequency of turns
- Do not leave baby in same position for prolonged periods – risk of collapse of dependant (lower) lung
- Different positions can be used to target specific areas of collapse and/or consolidation
- Ventilation/perfusion mismatch may necessitate increasing oxygen delivery
- **Never** use head-down tilt due to risk of IVH/reflux/respiratory compromise

Percussion

- Use percussor where available
  - if unavailable face mask may be used (risk assessment to be completed – contact physiotherapist if unsure)
- **Stabilise head** with 1 hand at all times
- Ensure whole circumference of the percussor makes contact with baby's chest, ideally directly on baby's skin. If not practical, a layer of vest is acceptable. The pressure should not cause any movement of baby/skin reaction
- Ideal rate approximately 3/sec
- Use short percussion episodes according to baby's stability/tolerance/gestational age
  - generally maximum of 2 min (up to 5 min for more robust, term age babies)
- Address signs of stress by pacing baby or giving time-out/comfort holding
- Treat only when clinically indicated and maximum of 4-hrly, except when acute deterioration necessitates additional treatments
- Use maximum of 2 positions
  - avoid using excessive force by moving just the wrist and fingers, not the whole forearm
- Suction following percussion
- Keep percussor in incubator. Wash with soap and warm water and alcohol wipe

Risks of percussion

Vigorous percussion without stabilisation of the head in vulnerable extremely preterm babies and poor use of supportive developmental care techniques have previously been linked with IVH and encephaloclastic porencephaly

Suction

- ETT suctioning (see **Endotracheal tube (ETT) suctioning** guideline)
- Suction only when indicated, not routinely
- Maintain target saturation during procedure by adjusting FiO_2. **Avoid hyperoxia** (see **Oxygen saturation targets** guideline)
- Catheter for open suction should be graduated and have a Mülly tip (larger end hole and 2 opposite pressure relieving side-eyes) and no larger than two-thirds diameter of ETT
- Use measured suction to minimise cardiovascular instability and trauma
- Suction pressures
  - ≤100 mmHg/13 kPa
- Apply suction continuously on withdrawal only
- Oral suction must follow to clear secretions from around ETT – use ≤10 FG catheter

- When not in use, turn suction off to reduce noise

Other considerations

- Do not routinely use sodium chloride 0.9% to mobilise tenacious secretions/mucus plug(s); risk of dislodging bacterial colonies from ETT into lower respiratory tract
- if concerned ETT blocked, instil 0.2–0.3 mL (up to 0.5 mL in term baby) via ETT before suction to lubricate catheter (this should be exception, not routine practice) warm unopened ampoules in incubator
- **High frequency oscillatory ventilation (HFOV)**
- after suction, increase mean airway pressure by 1 cm H_2O to recruit lung at discretion of medical staff
- **Mucoactives**
- may be helpful for viscous secretions with persistent collapse/consolidation. Discuss with medical team
- **Non–ventilated babies**
- oral suction with size 8 or 10 catheter. Always position side-lying for suction – reduces risk of aspiration if baby vomits

AFTERCARE

- Assess and document effectiveness of interventions – document as 'percussion' **not** 'physio'
- If baby shows no improvement, or is worse, seek advice from MDT and refer to physiotherapist
- Assess indication and contraindication for percussion at each episode and discontinue when desired outcomes achieved
- Ensure timely and detailed documentation including time, indications, intervention and outcomes

FURTHER INFORMATION

- For babies with difficulty clearing secretions and for individual/group training, contact a neonatal respiratory physiotherapist