Worcestershire Acute Hospitals NHS Trust

Pleural Effusion

Key Document code:	WAHT-TP-046
Key Documents Owner:	Dr Onyon/ Dr Watson | Consultant Paediatrician
Approved by:	Paediatric Quality Improvement meeting
Date of Approval:	9th February 2024
Date of review: This is the most current document and should be used until a revised version is in place	9th February 2027

Key Amendments

Date	Amendment	Approved by
9th Feb 24	No changes to document	Paediatric Guideline Review

The following guidance is taken from the Partners in Paediatrics (PIP)

PLEURAL EFFUSION

RECOGNITION AND ASSESSMENT

Symptoms and signs

- Investigate for effusion if persistent pyrexia or unwell 48 hr after treatment started for pneumonia

Differential diagnosis

- Uncomplicated pneumonia
- Malignancy
- Heart failure
- Pancreatitis
- Pulmonary embolism

Investigations

- FBC, clotting screen, U&E, LDH, protein, albumin, glucose, CRP
- Blood cultures
- Sputum culture, if possible
- If recurrent infections, investigate for immune deficiency (first line: FBC, IgG, A, M, functional antibodies and HIV antibody)
- CXR PA or AP (no need for lateral)
- Ultrasound (US) scan to:
  - confirm presence of effusion
  - maximum depth in dependent position
  - differentiate between simple and complicated effusion (e.g. loculations, heterogeneous material)
  - localise effusion at time of drain insertion
- If history, CXR or US suggestive of malignancy, request CT chest
- If risk factors for coagulopathy or thrombocytopenia check and correct before drain insertion
- Pleural fluid analysis for:
  - Gram stain and bacterial culture
  - differential cell count
  - cytology
  - AAFB and TB PCR and culture

If cause likely to be infective, it is not necessary to obtain sample for pleural fluid culture routinely before chest drain insertion. If alternative cause suspected, try to avoid unnecessary chest drain insertion by obtaining diagnostic aspirate of pleural fluid for cytology

IMMEDIATE TREATMENT

Supportive

- ABC
- Oxygen and fluid resuscitation as indicated
- Analgesia

Antibiotic therapy

Type of effusion suspected	Choice of antibiotics
Effusion following community-acquired pneumonia	Co-amoxiclav IV + clindamycin IV (Penicillin allergy: clindamycin IV alone)
Effusion following hospital-acquired pneumonia, trauma, aspiration or in immune-compromised child	Piperacillin/tazobactam (Penicillin allergy: clindamycin IV)
Effusion possibly tuberculous	Discuss with TB team

- Narrow antibiotic spectrum with culture results

Refer to respiratory paediatrician

- Early active treatment reduces length of illness
- Except small effusions (<2 cm deep) which are not enlarging or compromising respiratory function and do not need to be drained
- Underlying cavitating disease may lead to bronchopleural fistulae

Chest drain insertion

- Discuss with respiratory team, consultant paediatrician, paediatric anaesthetic team (usually GA used)
- support may also be required from cardiothoracic team +/- interventional radiologist
- Consider simultaneous insertion of long line during general anaesthetic, if possible
- Ensure vascular access before starting procedure
- CXR after drain insertion

Chest drain management

- Ensure nursing staff trained in care of children with chest drains
- Attach chest drain to low level suction (5–10 cm H_2O) via underwater seal
- If altitude chest drainage system used, set wall suction to 160 mmHg/22 kPa and set dial on drainage system to 20
- Keep underwater seal below level of chest at all times
- If >10 mL/kg/hr has been drained, clamp chest drain for 1 hr to prevent re-expansion pulmonary oedema
- **Never clamp a bubbling chest drain** – this indicates presence of pneumothorax
- If clamped and chest pain or breathlessness, unclamp immediately
- When there is a sudden cessation of fluid draining, the drain must be checked for obstruction (blockage or kinking) by flushing
- Ensure adequate analgesia (see **Analgesia** guideline) and encourage patient to move freely when well enough

Intrapleural fibrinolytics

- Indicated if thick fluid with loculations or pus
- Instill urokinase, as follows:
- ≥10 kg: urokinase 40,000 units in 40 mL sodium chloride 0.9%
- <10 kg: urokinase 10,000 units in 10 mL sodium chloride 0.9%
- administer via chest drain 12-hrly for 3 days (total 6 doses)
- clamp chest drain for 4 hr after instillation of urokinase, then drain for 8 hr
- Record fluid volumes into and out of pleural space carefully and accurately

SUBSEQUENT MANAGEMENT

Act on response to treatment and clinical assessment of patient

- Monitor symptoms and re-examine patient to assess progress
- Repeat CRP as needed
- if falling rapidly, continue with current regimen
- if not falling after 72 hr, treat as non-resolution (see below)
- Chase pleural fluid aspirate results
- if unexpected organisms grown, adjust antibiotic therapy with antibiotic sensitivities
- if differential cell count shows lymphocytosis, discuss with TB team, send aspirate for cytology and consider CT scan of chest
- Chase blood and sputum culture results – if no growth, continue empirical treatment until patient improves
- Remove chest drain when drainage minimal and in agreement with respiratory paediatrician: appose skin with Steri-Strips™ rather than sutures
- Continue IV antibiotics at least until afebrile. Change to oral co-amoxiclav (penicillin allergy: oral clindamycin) when clinical improvement obvious. Complete minimum 14 days antibiotics
- Continue antibiotics until CRP <10
- Encourage early mobilisation and exercise

Non-resolution

- Non-resolution of effusion after 3 days or further complications occur, consider CT scan of chest
- If no fluid draining, check for obstruction by flushing
- If drain cannot be unblocked, remove and replace if significant effusion remains
- Discuss referral for thoracotomy with respiratory paediatrician

Surgery

- Discuss with paediatric thoracic surgeon if:
- effusion has not resolved
- child is still septic

DISCHARGE AND FOLLOW-UP

- Arrange review by respiratory paediatrician, initial appointment 6 weeks after discharge (CXR on arrival)
- if symptoms persist or recur, early referral to respiratory paediatrician