Complicated Pneumonia-Empyema Pathway v2.1:
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Inclusion Criteria
- Children with diagnosis of pneumonia and suspected or confirmed parapneumonic effusion (PPE)/Empyema
  AND
- Plan for admission
  AND
- CXR effusion >10mm or >1/4 hemithorax

Exclusion Criteria
- Cystic Fibrosis
- Trauma
- Recent thoracic surgery or infection

Complicated Pneumonia-Empyema Care

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Complicated Pneumonia-Empyema Pathway v2.1

**Inclusion Criteria**
- Children with diagnosis of pneumonia and suspected or confirmed parapneumonic effusion (PPE)/Empyema AND
- Plan for admission AND
- CXR effusion >10mm or > 1/4 hemithorax
- Suspected necrotizing pneumonia or pulmonary abscess
- Cystic Fibrosis
- Trauma
- Recent thoracic surgery or infection

**Exclusion Criteria**
- Moderate or large effusion
- Complete white out of hemithorax and US that confirms effusion
- Small, moderate or large (without complete white out of hemithorax) effusion without severe respiratory distress, and without mediastinal shift
- Suspect necrotizing pneumonia or pulmonary abscess (based on clinical suspicion of air-fluid levels on CXR); if suspected, recommend chest CT with contrast

**Initial Work-Up**
- Blood Culture, CBC w diff, CRP, Coags, PIV, Chest US and start appropriate IV Antibiotics
- Consult Pulmonary, General Surgery, and Infectious Diseases
- If ED teams are considering drainage, call consultants in ED; if no drainage, admitting (floor) team can call consultant

**Recommend Drainage If Any of the Below:**
- Complete white out of hemithorax and US that confirms effusion
- Moderate or large effusion (without complete white out of hemithorax), with severe respiratory distress (defined as need for HFNC, CPAP, BiPAP or intubation)
- Mediastinal shift on CXR

**Drainage procedure chosen by team consensus:**
1. Preferred option: US guided chest tube placement by IR with fibrinolytics (tPA BID x 4 doses)
2. Video-assisted Thoracoscopic Surgery (VATS)

**Recommend Pleural Fluid Studies:**
- Culture
- Blood Culture
- Coagulation studies
- Bacterial PCR
- CMV PCR
- Adenovirus PCR
- Respiratory virus panel
- Viral load as applicable

**Consider drainage if signs of clinical worsening**
- NO, consider drainage

**After 48 hours, if the following clinical criteria are not met, recommend drainage:**
- Improving appetite
- Decrease in chest pain
- Decrease in O2 support from admission (as applicable)
- AND decrease in tachypnea/work of breathing
- 4. Downstaging CRP (if re-checked)

**Discharge Criteria**
- Clinically improved (pain resolved or improving, and well-managed)
- Off oxygen x 12 hours
- Tolerating full PO
- Fever curve downtrending x 24 hours
- CRP downtrending (if re-checked)

**Discharge Instructions**
- Change to oral antibiotics at discharge/discuss antibiotic choice with ID
- If no drainage procedure:
  - 14 days from admission for mild/moderate disease
  - 21 days from admission for severe disease
- If drainage procedure:
  - 14 days of date of drainage
  - Follow up with PCP in 1 week; pulmonary and/or surgery in 2 months
  - Provide patient/family with radiology images
  - Recommend flu shot before discharge (if indicated)
Complicated Pneumonia-Empyema Pathway v2.1:
Management of MRSA Coverage Among Empyema Patients

All empyema patients receive multi-site MRSA screen

MRSA POS

Keep MRSA coverage if source cultures negative; otherwise base coverage on culture results

MRSA NEG.

ICU patient?

NO

Source cultures negative?

NO

Base coverage on culture results

YES

Keep MRSA coverage but step down therapy when clinically improving:

- TMP/SMX (PO)
- OR
- Clindamycin (PO or IV)

YES

Stop MRSA coverage unless MRSA grows from source culture
Summary of Version Changes

- **Version 1.0 (9/9/2019):** Go live.
- **Version 2.0 (9/15/2020):** Rename pathway from Empyema Pathway to Complicated Pneumonia Empyema Pathway; redesign Algorithm to clarify drain/no drain decision process, timelines, and roles.
- **Version 2.1 (1/7/2021):** MRSA Management link in Complicated Pneumonia Empyema Pathway algorithm corrected.
Approved by the CSW Empyema team for November 26, 2018 go live

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Please cite as:
Evidence Ratings

This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children's. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94.):

Quality ratings are **downgraded** if studies:
- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

Quality ratings are **upgraded** if it is felt that:
- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

Guideline – Recommendation is from a published guideline that used methodology deemed acceptable by the team.

Expert Opinion – Our expert opinion is based on available evidence that does not meet GRADE criteria (for example, case-control studies).

**Certainty of Evidence**
- ★★★★★ High: The authors have a lot of confidence that the true effect is similar to the estimated effect
- ★★★★ Moderate: The authors believe that the true effect is probably close to the estimated effect
- ★★★ Low: The true effect might be markedly different from the estimated effect
- ★★ Very low: The true effect is probably markedly different from the estimated effect

Guideline: Recommendation is from a published guideline that used methodology deemed acceptable by the team
Expert Opinion: Based on available evidence that does not meet GRADE criteria (for example, case-control studies)
Literature Search Methods

Studies were identified by searching electronic databases using search strategies developed and executed by a medical librarian, Susan Groshong. Searches were performed in June, 2018, in the following databases: Ovid Medline, Cochrane Database of Systematic Reviews, Embase, National Guideline Clearinghouse, TRIP and Joanna Briggs Institute. In Medline and Embase, appropriate Medical Subject Headings (MeSH) and Emtree headings were used respectively, along with text words, and the search strategy was adapted for other databases using text words. Concepts searched were empyema and pleural effusion. Retrieval was limited to 2008 to current, English language, humans, and to certain evidence categories, such as relevant publication types, index terms for study types and other similar limits. Additional articles were identified by team members and added to results.

Two reviewers independently screened abstracts and included guidelines and systematic reviews that addressed optimal diagnosis, treatment, and prognosis of patients who meet pathway inclusion/exclusion criteria. One reviewer extracted data and a second reviewer quality checked the results. Differences were resolved by consensus. If articles were added through other sources, briefly explain if they met criteria for search above, and if not, what was rationale for adding. For example, were they carried forward from prior version of pathway.

Literature Search Results

[The search retrieved 209 records. Once duplicates had been removed, we had a total of 208 records. We excluded 160 records based on titles and abstracts. We obtained the full text of the remaining 48 records and excluded NNN. We included 6 studies. The flow diagram summarizes the study selection process.]

Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535
Included Studies


Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

However, in view of the possibility of human error or changes in medical sciences, neither the authors nor Seattle Children’s Healthcare System nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such information.

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