CLINICAL PATHWAYS – INTRODUCTION

Clinical Pathways are guidelines used to assist in the delivery of high-value, effective, efficient, safe, and family-centered care. Pathways have been shown to improve the quality of care for hospitalized children with many conditions and in different settings (1)

A definition of a clinical 'pathway' needs to satisfy four criteria (2)

(1) It is a structured multidisciplinary plan of care.
(2) It is used to translate guidelines or evidence into local practices.
(3) It details the steps in a course of treatment or care in a plan, pathway, algorithm,guideline, protocol, or other "inventory of actions."
(4) It is aimed to assist in standardizingcare or a specific population.

These Clinical Decision-Support (CDS) tools are aimed to assist clinicians at the bedside to deliver evidence-based care. The **Algorithm (SECTION 2**) is a visual aid that helps guide clinicians, step-by-step through the timing, indications, and details of recommended tests and treatments for managing specific conditions.In this case, **Complicated Community Acquired Pneumonia (parapneumonic effusion)** is being addressed.

These PATHWAYS and their specific SECTIONS were developed by a consensus of a subject-matter-expert (SME) team, organized by the Clinical Effectiveness and Pathways (CEP) program at Nicklaus Children's Health System (NCHS). The SME team included clinicians from multiple disciplines and pediatric sub-specialties (see SECTION 7).

These clinical pathways are intended to be used as acompilation of best practice recommendations for practitioners. The practice of evidence-based pediatric medicine involves the use of pathways, the clinicians' experiences and judgment, and finally the patient's perspectives and values.
However, these clinical pathways are not intended to constitute specific medical recommendations for treatment. The practitioners must exercise their own independent judgment in applying these tools.These clinical pathways are not a script or 'cookbook' applicable to allpatients. NCHS cannot certify that CDS documents are accurate or complete in every aspect. NCHS is not responsible for any errors or omissions in the use of clinical pathways or for any outcomes a patient mightexperience where a clinician consulted or followed these CDS in providing clinical care.

1-Rising utilization of inpatient pediatric asthma pathways.Kaiser SV, et al. J Asthma. 2017.
2-Lawal AK RT, Kinsman L, Machotta A, Ronellenfitsch U, Scott SD, Goodridge D, et al. What is a clinical pathway? Refinement of an operational definition to identify clinical pathway studies for a Cochrane systematic review. BMC Med 2016;14)

Complicated Community Acquired Pneumonia (parapneumonic effusion)

ED/UCC/Inpatient/PICU Phases

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Inclusion Criteria
- Children 3 mo to 18 yo
- Suspected or proven Complicated Community Acquired Pneumonia (Parapneumonic effusion)

Exclusion Criteria
- Complex chronic conditions
- Cystic fibrosis
- Immunodeficiency or immunosuppresive therapy

Confirmed diagnosis of pneumonia with Parapneumonic Effusion?

No → Off pathway (see uncomplicated pneumonia pathway)

Yes

Small (< than 10mm rim or < than 1/4 thorax opacified)

- Assess degree of respiratory distress
- Consider CBC/CRP/Blood Cx
- Consider Influenza test and/or RPP 2.1 if clinically indicated
- Other labs as clinically indicated

Does patient have any respiratory distress?

No:
- Consider outpatient treatment as per criteria for outpatient care
- Amoxicillin or Amoxil-Clavulanic as clinically indicated

Does patient meet discharge criteria?

No:
- Continue antibiotics until patient meets discharge criteria

Yes: **Discharge on Amoxicillin or Amoxil-Clavulanic as clinically indicated**

Yes:
- Ampicillin IV or Ceftriaxone IV as clinically indicated
- Admit to Medical Floor

Is patient clinically improving within 48-72hr?

Yes: Does patient meet discharge criteria?

No:
- Consider repeat CXR/Chest US
- Consider ID consult
- Reassess antibiotic choice

Management according to effusion category

Moderate (≥1/4 but <1/2 thorax opacified)

- Assess degree of respiratory distress
- CBC/CRP/Blood Cx
- Consider Influenza test and/or RPP 2.1 if clinically indicated
- Other labs as clinically indicated
- Consider surgical consult as clinically indicated

Does patient have severe respiratory distress?

Yes → Large

No:
- Ceftriaxone IV. Add Vancomycin IV/linezolid IV if suspected MRSA
- Consider ID consult
- Admit to medical floor

Is patient clinically improving within 72hr?

Yes:
- Continue antibiotics until patient meets discharge criteria

No:
- Surgery consult if not currently involved
- Repeat CXR
- Consider IR consult
- Chest US
- Reassess antibiotic choice

Improvement on CXR and/or US?

Yes → Continue antibiotics until patient meets discharge criteria

No: **Move to large effusion category**

Large (≥1/2 thorax opacified)

- Assess degree of respiratory distress
- CBC/CRP/Procalcitonin/Blood Cx
- Consider Influenza test and/or RPP 2.1 if clinically indicated
- Other labs as clinically indicated
- Surgery consult
- ID consult

- Chest US
- Consider Chest CT with IV contrast
- Ceftriaxone IV + Vancomycin IV/Linezolid IV + Azithromycin IV
- Consider IR consult
- Admit to PICU

- Clinical huddle-family involvement
- Consider:
  - Effusion drainage options
  - Fluid sampling-Gram stain, C/S bacterial DNA analysis

- Drainage options (unless contraindicated):
  - Chest tube alone
  - Chest tube + fibrinolytics or VATS

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Criteria for Respiratory Distress in Children with Pneumonia:

1. Tachypnea : respiratory rate/age:
   0 - 2mo: > 60
   2 - 12mo: > 50
   1 - 5yo: > 40
   > 5yo: > 20

2. Dyspnea
3. Retractions (suprasternal, intercostal, or subcostal)
4. Grunting
5. Nasal flaring
6. Apnea
7. Altered mental status
8. Pulse oximetry < 90% on room air

Return to UCC/ED/Inpatient/PICU Phase

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ED/UCC Criteria for Outpatient Care

- Mild severity
- Tolerating oral fluids and medications
- No concerns for home care
- Adequate follow up care
- Consider hospitalization for patients <6 months of age

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Inpatient Discharge Criteria
(all of the following)

- Overall clinical improvement
- Decreased fever for at least 24hr
- pO2 >90% in RA for at least 24hr
- If chest tube required: removal of chest tube for at least 24hr with clinical improvement and no significant reaccumulation of effusion
- Tolerating oral fluids and medications
- No concerns for home care
- Adequate follow up care

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Community Acquired Pneumonia Medications Inpatient Therapy			
Medication	**Pediatric Dose**	**Adult Dose**	**Duration of Therapy**
Ampicillin	75 mg/kg/dose IV Q6H (max/day: 8000 mg)	2000 mg IV Q6H	5-10 days (including IV and PO therapy; guide treatment by severity of illness and causative
Ceftriaxone	Mild disease: 50 mg/kg/dose IV Q24H	Mild disease: 2000 mg IV Q24H	5-10 days IV/PO (including IV and PO therapy; guide treatment by severity of illness and
Vancomycin	Loading Dose*: 25 mg/kg/dose IV Once	Loading Dose*: 2000 mg IV Once	7-21 days(including IV and PO therapy; 2 to 4 weeks for complicated pneumonia; guide
Azithromycin	Initial Therapy: 10 mg/kg/dose IV (max/dose:	Initial Therapy: 500 mg IV Step-down Therapy**: 250	5 days (including IV and PO therapy)
Linezolid	Children under 12 yrs: 10 mg/kg/dose IV/PO Q8H	600 mg IV/PO Q12H	7-21 days (including IV and PO therapy; guide treatment by severity of illness and causative
Outpatient Therapy			
Amoxicillin	30 mg/kg/dose PO TID (max/day: 3000 mg)	1000 mg PO TID OR	5-10 days (guide treatment duration by clinical severity)
Amoxicillin-Clavulanic	45 mg/kg/dose PO BID using the following	2000 mg PO BID using the extended release	5-10 days (guide treatment duration by clinical severity)
Azithromycin	Initial Therapy: 10 mg/kg/dose PO Once	Initial Therapy: 500 mg PO Once	5 days
Penicillin Allergy			
Ceftriaxone	See above	See above	
Cefdinir	7 mg/kg/dose PO BID (max/dose: 300 mg)	300 mg PO BID OR	10 days
Severe Penicillin Allergy and/or Cephalosporin Allergy			
Levofloxacin	Infants≥6 months and Children < 5 yrs: 10	750 mg IV/PO Q24H	5-10 days (including IV and PO therapy; guide treatment duration by clinical stability)
Antivirals			
Tamiflu (initiate within 48 hrs of illness	Infants≤8 mo: 3 mg/kg/dose PO BID	75 mg PO BID	5 days; a longer duration can be considered in severely ill or immunocompromised patients

* Consider in patients with normal renal function requiring initiation of vancomycin therapy for complicated infections and suspected and/or documented MRSA infections or where rapid attainment of target serum concentrations are desired.
**FDA-approved labeling recommends azithromycin IV therapy for at least 2 days in hospitalized patients, then step-down to PO therapy to complete a 7- to 10-day treatment course; the switch to PO therapy should be done at the discretion of the physician and based on the clinical response of the patient.

References:

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2.Clinical Pharmacology [database online]. Tampa, FL: Gold Standard, Inc.; 2020. URL: http:www.clinicalpharmacology.com. Updated July, 2020.
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Return to UCC/ED/Inpatient/PICU Phase

Approval and Citation

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7. Hamm H, Light RW. Parapneumonic effusion and empyema.*European Respiratory Journal*. 1997;10(5):1150-1156.

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10. Long A, Smith-Williams J, Mayell S, Couriel J, Jones MO, Losty PD. 'Less may be best'—Pediatric parapneumonic effusion and empyema management: Lessons from a UK center.*J Pediatr Surg*. 2016;51(4):588-591.

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Quality Metrics

1. Frequency of patients treated according to the pathway (power plan use)
2. PICU length of stay
3. Total hospitalization length of stay
4. Duration of supplemental O2 in days
5. Charges

ICD-10 Codes

- Other diseases of the pleura J90-J94
- Pleural effusion not elsewhere classified J90
- Pneumonia due to streptococcus pneumonia J13
- Abscess of lung with pneumonia j851

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CLINICAL EFFECTIVENESS / PATHWAYS PROGRAM

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