COMMUNITY ACQUIRED PNUEMONIA PATHWAY

EXECUTIVE SUMMARY

Physician Owner(s): Andrea Green Hines, MD

Primary Objective

The primary objective for the Community Acquired Pneumonia Clinical Pathway is to provide clinicians with a tool to assist in the diagnosis and management of uncomplicated, simple pediatric community acquired pneumonia (CAP) in otherwise healthy infants and children. This pathway is intended to help direct patient care from the Emergency Department through inpatient management to discharge.

Recommendations

Laboratory Testing

- No initial laboratory testing is necessary in the evaluation of patients with CAP who are well-mildly ill appearing.
- Obtain blood cultures in children requiring hospitalization for presumed bacterial CAP that is moderate to severe.
- Obtain rapid respiratory viral testing (including influenza) in the evaluation of patients with CAP who are moderately-severely ill.
- Obtain tracheal aspirate for cell count with diff and culture at the time of intubation in patients with CAP who require mechanical ventilation.
- Procalcitonin levels have predictive properties similar to those of pneumonia severity index and are associated with increased LOS. [1, 3, 10] It can also distinguish bacterial CAP from asthma and acute exacerbation of chronic obstructive pulmonary disease. [1, 6, 7]

Radiographic Imaging

- Posteroanterior and lateral chest radiographs should be obtained in all patients hospitalized for CAP but should not be routinely repeated in children who recover uneventfully from an episode of CAP. [2, 11]

Antibiotic Recommendations

- The most common etiologies of pediatric CAP are viruses.[4]
- The most common bacterial etiologies of pediatric CAP in hospitalized patients are *Mycoplasma pneumoniae* and *Streptococcus pneumoniae*.[4]
- Ampicillin or penicillin G should be given as first-line antibiotic for fully immunized infants or school-aged children without a documented penicillin allergy admitted with CAP. [2]
    - If patient is not fully immunized, ceftriaxone can be used. [2]
    - For patients with a documented penicillin allergy, levofloxacin can be used to cover *Streptococcus pneumoniae, Haemophilus influenza, Mycoplasma pneumoniae, Chlamydophila pneumoniae*. [2]
    - There is insufficient evidence to support or refute treatment of *M. pneumoniae* in pediatric CAP. [5]
- For Severe pneumonia requiring ICU admission, adding vancomycin is necessary to cover for MRSA or resistant *Streptococcus pneumoniae*. [2]
- The duration of antibiotic therapy for mild to moderate pneumonia is 5-7 days. [8, 9, 12]
- The duration of antibiotic therapy for severe pneumonia is 7-10 days due to illness severity.[2]

CLINICAL EFFECTIVENESS

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- Atypical pneumonia etiologies include *Mycoplasma pneumoniae* and *Chlamydophila pneumoniae*, therefore, are covered by azithromycin and levofloxacin. [2]

Rationale

Safety will be improved by reducing the use of unnecessary antimicrobials, thereby reducing potential harm and antibiotic resistance. Quality of care will improve by ensuring effective evaluation and management of presumed CAP in accordance with published evidence-based guidelines. Costs will be reduced by eliminating the use of inappropriate laboratory testing, radiologic imaging, antibiotic usage, and unnecessary hospitalizations. Delivery will be improved by streamlining the care of patients with uncomplicated CAP. Engagement will be created and supported by the involvement of a multidisciplinary team in the development and maintenance of the pathway which includes infectious disease physicians, hospitalists, and emergency room physicians. Patient/Family Satisfaction will be improved by providing the highest quality care based on established guidelines and the latest evidence available in the literature.

Metrics

1. Increase the proportion of CAP admissions that an order set is used to 25% by December 2023. (Process Metric)
2. Increase proportion of non-ICU patients without a documented penicillin allergy diagnosed with CAP who receive first line antibiotics (ampicillin, amoxicillin, penicillin, or azithromycin) to 80% by December 2023. (Outcome Metric)
3. Increase proportion of non-ICU patients with a documented penicillin allergy that receive levofloxacin, amoxicillin, or penicillin G to 40% by December 2023. (Outcome Metric)
4. Maintain proportion of CAP encounters in ED/UC that are prescribed first line antibiotics (ampicillin, amoxicillin, penicillin, levofloxacin, or azithromycin) >80% by December 2023. (Outcome Metric)
5. Monitor patients that received first line antibiotics (ampicillin, amoxicillin, penicillin, or azithromycin) during hospitalization that have a respiratory (sputum, endotracheal aspirate < 48 hours after intubation), blood, or pleural fluid culture data that are resistant to ampicillin or penicillin with 7 days of initial visit. (Balancing Metric)

Team Members

Project Champion(s): Andrea Green Hines, MD (Infectious Disease)

Team Members

- Jennifer Zwiener, PharmD (Antibiotic Stewardship; Pharmacy)
- Allison Ashford, MD (Pediatric Hospital Medicine)
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- Kari Simonsen, MD (Infectious Disease)
- Jennifer Wang, DO (Medical Director Emergency Medicine)
- Heidi Killefer, MD (Interim Division Chief of Urgent Care)
- Ashley Deschamp, MD (Pulmonology)
- Andrea Talukdar, MD (Pediatric Critical Care Medicine)
- Kelsey Spackler, DNP, APRN-NP (Clinical Effectiveness)
- Abby Vipond, MSN, APRN (Clinical Effectiveness)

Evidence

1. Berg P, Lindhardt BØ. The role of procalcitonin in adult patients with community-acquired pneumonia--a systematic review. Dan Med J. 2012 Mar;59(3):A4357. PMID: 22381083.
2. Bradley J.S., Byington C.L., Shah S.S. The management of community-acquired pneumonia in infants and children older than 3 months of age: clinical practice guidelines by the pediatric infectious diseases society and the infectious diseases society of America. *Clin Infect Dis.* 2011;53(7):e25–e76.
3. Florin TA, Ambroggio L, Brokamp C, Zhang Y, Rattan M, Crotty E, Belsky MA, Krueger S, Epperson TN 4th, Kachelmeyer A, Ruddy R, Shah SS. Biomarkers and Disease Severity in Children With Community-Acquired Pneumonia. Pediatrics. 2020 Jun;145(6):e20193728. doi: 10.1542/peds.2019-3728. Epub 2020 May 13. Erratum in: Pediatrics. 2020 Sep;146(3): PMID: 32404432; PMCID: PMC7263054.
4. Katz SE, Williams DJ. Pediatric Community-Acquired Pneumonia in the United States: Changing Epidemiology, Diagnostic and Therapeutic Challenges, and Areas for Future Research. Infect Dis Clin North Am. 2018 Mar;32(1):47-63. doi: 10.1016/j.idc.2017.11.002. Epub 2017 Dec 18. PMID: 29269189; PMCID: PMC5801082.
5. McCulloh http://doi.org/10.1542/peds.2013-3729
6. Nascimento-Carvalho CM. Community-acquired pneumonia among children: the latest evidence for an updated management. J Pediatr (Rio J). 2020 Mar-Apr;96 Suppl 1(Suppl 1):29-38. doi: 10.1016/j.jped.2019.08.003. Epub 2019 Sep 10. PMID: 31518547; PMCID: PMC7094337.
7. Principi N, Esposito S. Biomarkers in Pediatric Community-Acquired Pneumonia. Int J Mol Sci. 2017 Feb 19;18(2):447. doi: 10.3390/ijms18020447. PMID: 28218726; PMCID: PMC5343981.
8. R Marques I, P Calvi I, A Cruz S, M F Sanchez L, F Baroni I, Oommen C, H Padrao EM, C Mari P. Shorter versus longer duration of Amoxicillin-based treatment for pediatric patients with community-acquired pneumonia: a systematic review and meta-analysis. Eur J Pediatr. 2022 Nov;181(11):3795-3804.---5 DOT equal efficacy to 10 day of treatment with amox for uncomplicated CAP <10yo
9. Same RG, Amoah J, Hsu AJ, Hersh AL, Sklansky DJ, Cosgrove SE, Tamma PD. The Association of Antibiotic Duration With Successful Treatment of Community-Acquired Pneumonia in Children. J Pediatric Infect Dis Soc. 2021 Apr 3;10(3):267-273)
10. Sartori LF, Zhu Y, Grijalva CG, Ampofo K, Gesteland P, Johnson J, McHenry R, Arnold DH, Pavia AT, Edwards KM, Williams DJ. Pneumonia Severity in Children: Utility of Procalcitonin in Risk Stratification. Hosp Pediatr. 2021 Mar;11(3):215-222. doi: 10.1542/hpeds.2020-001842. Epub 2021 Feb 12. PMID: 33579748; PMCID: PMC7898232.
11. Virkki, R., Juven, T., Mertsola, J. and Ruuskanen, O. (2005), Radiographic follow-up of pneumonia in children. Pediatr. Pulmonol., 40: 223-227. https://doi.org/10.1002/ppul.20258
12. Williams DJ, Creech CB, Walter EB, Martin JM, Gerber JS, Newland JG, Howard L, Hofto ME, Staat MA, Oler RE, Tuyishimire B, Conrad TM, Lee MS, Ghazaryan V, Pettigrew MM, Fowler VG Jr, Chambers HF, Zaoutis TE, Evans S, Huskins WC; The DMID 14-0079 Study Team. Short- vs Standard-Course Outpatient Antibiotic Therapy for Community-Acquired Pneumonia in Children: The SCOUT-CAP Randomized Clinical Trial. JAMA Pediatr. 2022 Mar 1;176(3):253-261.

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