

Case Series

Paediatric acute respiratory infections: a case series based clinical analysis and recommendations in accordance with WHO guidelines

Gautham Krishna*, Nithin Rajan, Aparna B. Asokan, Arya B. Mohan

Department of Pharmacy Practice, Ezhuthachan College of Pharmaceutical Sciences, Trivandrum, Kerala, India

Received: 06 May 2023

Accepted: 06 June 2023

*Correspondence:

Gautham Krishna,

E-mail: gauthemkpillai@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Pneumonia is one of the most common respiratory disorder across the globe. Pneumonia is a leading cause of morbidity and mortality in children younger than the age of 5 years. Bronchopneumonia is one of the typically seen presentation of pneumonia occurring mainly in the pediatric population. If not treated promptly, it might become life-threatening. Since pneumonia is associated with significant morbidity and mortality, promptly diagnosing pneumonia, correctly recognizing any complications or underlying conditions, and appropriately treating patients are of prime importance. This case series aims at providing a discussion of the diagnosis, management and comprehensive plan of care for bronchopneumonia in pediatric population.

Keywords: Paediatric bronchopneumonia, Respiratory tract infection, Diagnosis, Pharmacotherapy

INTRODUCTION

Pneumonia is a leading cause of morbidity and mortality in children younger than the age of 5 years.¹ An inhaled infectious organism must bypass the host's normal nonimmune and immune defence mechanisms in order to cause pneumonia. The nonimmune mechanisms include aerodynamic filtering of inhaled particles based on size, shape, and electrostatic charges; the cough reflex; mucociliary clearance; and several secreted substances (e.g., lysozymes, complement, defensins) under the guidance of Dr. Dhanya Dharman, Prof. (Dr.) Shaiju S Dharan.

Macrophages, neutrophils, lymphocytes, and eosinophils carry out the immune-mediated host defences. Neonates are at risk for bacterial pathogens present in the birth canal, and this includes organisms such as group B *Streptococci*, *Klebsiella*, *Escherichia coli*, and *Listeria monocytogenes*.²⁻⁴ Pneumonia is an invasion of the lower respiratory tract, below the larynx by pathogens either by inhalation, aspiration, respiratory epithelium invasion, or hematogenous spread. There are barriers to infection that

include anatomical structures (nasal hairs, turbinates, epiglottis, cilia), and humoral and cellular immunity.⁵ Childhood asthma is the same lung disease adults get, but kids often have different symptoms. Not all children have the same asthma symptoms.

A child may even have different symptoms from one episode to the next. Children who are immunocompromised should be evaluated for *Pneumocystis jirovecii*, cytomegalovirus, and fungal species if no other organism is identified.⁶ Unvaccinated children are at risk for vaccine-preventable pathogens. This case series emphasized in providing a glimpse of diagnosis, management and comprehensive plan of care for bronchopneumonia in paediatric population.

CASE REPORT

Case 1

A 2 year old female child presented with complaints of fever and reduced food intake for past 5 days, breathing difficulty and nasal block. Patient has no history of similar illness in the past. During admission time the child was

active, afebrile and playful. Bilateral wheeze sounds were heard on chest examination. Abdomen was soft and non-tender.

Case 2

A 2.5 years old female child was presented with cough and rhinitis. The patient also had intermittent fever of one month duration. She has no history of vomiting or loose stools. There was no significant social, family or personal history. During admission time she was conscious, oriented and playful. Chest examination showed fast breathing.

Case 3

A 12 year old male patient was presented with fever, cough and shortness of breath for past 3 days. He's a known case of bronchial asthma, had a similar episode 2 years before. His appetite was decreased for past week. During the time of admission his temperature was elevated (101°F), respiratory rate was 28 per min, rhonchi were present. Child was oriented, abdomen was non tender.

Diagnosis and treatment

Case 1

CBC, serum electrolytes and chest X-ray was taken. Chest X-ray showed white patch on the upper lobe which was suggestive of bronchopneumonia. No parameters were seen abnormal during laboratory investigation. Treated with IV amoxicillin-clavulanic acid for five days, nebulisation of levosalbutamol and budesonide, oral antipyretics (paracetamol syrup). Patient was also fortified with multivitamin drops. After getting symptomatically better, the patient was discharged on the seventh day of hospital admission and follow up was advised after one week.

Case 2

Chest X-ray depicted opacity and lab examination of blood showed leukocytosis, elevated levels of CRP and ESR. She was treated with IV cefuroxime 650 mg twice daily for three days along with nebulisation of levosalbutamol and budesonide every 6 hours for three days. Her hospitalisation period was uneventful and follow up was advised after 7 days.

Case 3

Blood examinations showed elevated CRP and ESR levels. Chest X-ray had white patch, seen on left upper lobe of lung was suggestive of bronchopneumonia. IV antibiotics (ceftriaxone 1.5 g) was given twice daily along with nebulisation of levosalbutamol and ipratropium bromide for five days. Syrup ascoril was given 7 ml each on a frequency of three times a day to relieve cough. Patient got symptomatically better, hence discharged after 5 days and follow up after 1 week.

DISCUSSION

Paediatric pneumonia should be managed by an interprofessional team to improve outcomes. Giving education to patient and caretaker is vital. The primary goal is to treat the underlying infection which will resolve the disease. Some form of pneumonia can be prevented prophylactically by taking appropriate vaccines in accordance with IAP vaccination schedule. Case management following ICMR protocol can be considered as a cornerstone of pneumonia control strategy. It should involve classifying the severity of illness using simple clinical signs such as fast breathing, oxygen saturation level, chest indrawing and general danger signs and then executing the appropriate treatment.

A number of associations were found between respiratory symptoms and low intake of fish, fruit and vegetables in children. Low fish intake was the most consistent predictor of poor respiratory health. Fruit and vegetable intake showed stronger associations with cough than with wheeze, so age appropriate nutrition level should be maintained compulsorily. Vitamin D3 supplementation is a must have one in children up to 6 months. Breast milk usually does not provide all the vitamin D a baby needs, so breastfed babies will need a supplement of 400 IU of vitamin D per day beginning shortly after birth. For babies who are receiving only infant formula, Vitamin D supplementation is not needed. Infant formulas are fortified with vitamin D. Follow-up plan must include home care advice and antibiotics for home therapy if found necessary.⁷

Prognosis

Each year, roughly 3 million children die from pneumonia and the majority of these children also have other comorbidities like congenital heart disease, immunosuppression, or chronic lung disease of prematurity. Many children with recurrent wheezing in early childhood will not have clinically important wheezing later in life. However, many older children and adults with difficult chronic asthma first developed symptoms in early childhood.

CONCLUSION

Healthcare professionals, including physicians, nurses, physician assistants, nurse practitioners, pharmacists should harmoniously work together for optimum patient care. When caring for children with pneumonia, pharmacists can be of significant help with geographic resistance patterns for better treatment outcomes with selected antibiotic choices. Caregivers should be thoroughly counselled about signs of respiratory difficulty and when to seek medical assistance. Only through a multidisciplinary team approach, the pneumonia in children can be treated promptly with minimal morbidity rates. For most of the children, the prognosis is good. Viral

pneumonia tends to resolve without treatment. Long-term sequelae are rare.

Recommendations

As per WHO classification and treatment of childhood pneumonia at health facilities- increase caretakers' recognition of pneumonia signs through extensive health communication activities by strengthening the third component of IMCI (improving family and community practices); antibiotics improve outcomes in those with bacterial pneumonia. Antibiotic choice depends initially on the characteristics of the person affected, such as age, underlying health, and the location the infection was acquired; stay away from people who have colds, the flu, or other respiratory tract infections; parents need to be told to avoid smoking, and the importance of handwashing cannot be overstated; and all clinicians looking after children should emphasize vaccination against pneumococcus and influenza. The use of N95 masks might reduce the risk of viral respiratory infections. In the community setting, a possible reduced risk of influenza-like illness can be achieved by using masks, especially at schools and tuition centres.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Gupta GR. Tackling pneumonia and diarrhoea: the deadliest diseases for the world's poorest children. *Lancet*. 2012;379(9832):2123-4.
2. Arif F. Updated Recommendations Of RcoG On Prevention Of Early Onset Neonatal Group B Streptococcus Infection. *J Ayub Med Coll Abbottabad*. 2018;30(3):490.
3. Chen JC, Jenkins-Marsh S, Flenady V, Ireland S, May M, Grimwood K, et al. Early-onset group B streptococcal disease in a risk factor-based prevention setting: A 15-year population-based study. *Aust N Z J Obstet Gynaecol*. 2019;59(3):422-9.
4. Hazzani AA, Bawazeer RAB, Shehata AI. Epidemiological characterization of serotype group B Streptococci neonatal infections associated with interleukin-6 level as a sensitive parameter for the early diagnosis. *Saudi J Biol Sci*. 2018;25(7):1356-64.
5. Bengoechea JA, Sa Pessoa J. Klebsiella pneumoniae infection biology: living to counteract host defences. *FEMS Microbiol Rev*. 2019;43(2):123-44.
6. Stagno S, Brasfield DM, Brown MB, Cassell GH, Pifer LL, Whitley RJ, et al. Infant pneumonitis associated with cytomegalovirus, Chlamydia, Pneumocystis, and Ureaplasma: a prospective study. *Pediatrics*. 1981;68(3):322-9.
7. Pocket Book of Hospital Care for Children: Guidelines for the Management of Common Childhood Illnesses. 2nd ed. Geneva: WHO; 2013.
8. WHO. Revised WHO classification and treatment of childhood pneumonia at health facilities. WHO; 2014: 4-34. Available at: https://apps.who.int/iris/bitstream/handle/10665/137319/9789241507813_eng.pdf. Accessed on 21 April 2023.

Cite this article as: Krishna G, Rajan N, Asokan AB, Mohan AB. Paediatric acute respiratory infections: a case series based clinical analysis and recommendations in accordance with WHO guidelines. *Int J Contemp Pediatr* 2023;10:1119-21.