AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 5. No 12. December ,2025

MYCOPLASMA AND CHLAMYDIA BRONCHITIS IN CHILDREN

Obidova Baxtiyora Alijon qizi
Andijan State Medical Institute

ABSTRACT: Mycoplasma pneumoniae and Chlamydia pneumoniae are important atypical pathogens responsible for respiratory infections in children, most commonly presenting as bronchitis or community-acquired pneumonia. This review discusses epidemiology, clinical features and diagnostics of these organisms as described in the literature between 2015 and 2025, and both pathogens are most commonly observed in school-aged children and teenagers. However, recent studies have reported a resurgence of M. pneumoniae after relaxation of COVID-19 restrictions, including an increase in younger children. Clinically, these infections usually manifest as a viral-like illness with a chronic dry cough and mild systemic symptoms, and cannot be differentiated based on examination or routine laboratory testing, because co-infections are common and may contribute to increased severity or obscure the clinical picture. Diagnostics have shifted towards PCR, which enables earlier and more accurate detection compared to traditional serology, the latter of which is hampered by a delayed antibody response and possible cross-reactivity, therefore early recognition is essential for management. Macrolides remain first-line therapy, but increasing macrolide resistance has emerged, particularly in some Asian areas, and a better understanding of local epidemiology and use of molecular diagnostics may help clinicians more effectively target therapy and avoid unnecessary antibiotics.
Keywords: mycoplasma pneumoniae, chlamydia pneumoniae, pediatric bronchitis, atypical pneumonia.

INTRODUCTION

Mycoplasma pneumoniae and Chlamydia pneumoniae are two atypical bacteria that are common causes of respiratory infections in children, usually presenting as bronchitis or “walking pneumonia”. These organisms are significant causes of community-acquired infection in school-aged children and usually result in mild to moderate illness, but outbreaks and complications can occur, and M. pneumoniae recurs in cycles every 3 to 7 years, and there have been recent reports of an increased frequency of this organism, including in the United States in 2024 and in France in 2023-2024 [1,6–11]. C. pneumoniae has seasonal and cyclical trends, peaking in the fall and winter every 4 years, and it is a smaller percentage of pediatric pneumonia, approximately 1 to 2 percent, but still significant, as a recent pediatric series from China showed that 19% of hospitalized children with respiratory infections had serologic evidence of C. pneumoniae, and this organism is an important cause of bronchitis [12–17]. Therefore, it is crucial that pediatricians be aware of the presentation of atypical infections and be knowledgeable about appropriate diagnostic tests, and we undertook a review of peer-reviewed literature from 2015–2025 concerning pediatric M. pneumoniae and C. pneumoniae bronchitis, with an emphasis on epidemiology, clinical presentation, and diagnostic approaches.

METHODOLOGY

The English language medical literature was reviewed from 2015 onward, using PubMed, Google Scholar, CDC/NIH publications and key journals, and search terms were “Mycoplasma

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 12. December ,2025

pneumoniae pediatric", "Chlamydia pneumoniae children", "bronchitis", "pneumonia", "diagnosis", "epidemiology". Prioritization of peer reviewed articles, systematic reviews, clinical guidelines and large cohort studies was done, and reports were prioritized that addressed clinical features, epidemiology, or diagnostic testing in pediatric populations worldwide. Data were extracted from each study for age distribution, seasonal patterns, symptoms, laboratory findings, imaging, co-infections, and diagnostic methods, such as culture, PCR, and serology. This was a narrative review, therefore no formal quality scoring or pooled statistics were performed, but instead evidence was synthesized qualitatively to provide a practical, integrated clinical overview.

RESULTS

1. Epidemiology

M. pneumoniae and C. pneumoniae are typically more common in school-aged children, and M. pneumoniae is generally most common in children aged 5–17 years [2–5,7,9]. According to the CDC, the highest percentage of pediatric M. pneumoniae community-acquired pneumonia cases were in children aged 6–12 years, around 43%, with a smaller but still substantial proportion in children aged 2–5 years, around 26%, and similarly, in the 2023–24 Marseille outbreak, most cases were in children less than 15 years of age, with a median age of 10 years [2–5]. Some of the recent outbreaks have occurred at a younger age than is usual, because in the United States in 2024, there was also an increase in the 2–5 year age group compared with previous years [2–5,10]. C. pneumoniae also tends towards infection of older children, with the highest prevalence in school-aged and early adolescent age groups, and in a Chinese pediatric cohort, the highest prevalence of C. pneumoniae was in children aged 7–16 years, 68% of cases, though infants less than one year of age made up 22% [17,18]. Overall, children older than 6 years of age tend to have higher rates of C. pneumoniae than younger children.

Both organisms have cyclic and seasonal behaviour, and M. pneumoniae tends to appear in waves every 3 to 7 years. During the trough that occurred during 2020-21, as a consequence of COVID-19-related interventions, cases rebounded in 2023–24 in various countries, thus, in Marseille, 218 cases were reported during January 2023 to February 2024, almost equal to the 231 cases reported during the preceding 9 years [2,6–9,16]. The number of cases increases during winter months, and C. pneumoniae has a roughly 4-year cycle, with transmission being facilitated during cooler temperatures [12-14]. Seropositivity for C. pneumoniae was significantly higher in winter than in other seasons in the Wuxi, China series, because transmission is facilitated during cooler temperatures [18].

Because the diseases are often underdiagnosed or variably tested, exact incidence is hard to determine, and Mycoplasma pneumoniae causes about 10–30% of pediatric community acquired pneumonia [2–5]. The CDC reported a high of 53.8% of pediatric CAP cases being M. pneumoniae in July 2024, versus a baseline of 11%, although Chlamydia pneumoniae is generally less common, accounting for less than 2% of pediatric CAP, but may peak in certain regions in certain seasons or cycles [10,15–17]. In a large Chinese single center study, 19% of children with respiratory infection were IgM positive for C. pneumoniae, though more than half of those positives were also coinfected, making it difficult to interpret, because rates vary by setting, age group, and diagnostic technique [18]. However, overall it appears that C.

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 12. December ,2025

pneumoniae remains an important pediatric respiratory pathogen, even if it accounts for a lower percentage than M. pneumoniae.

Co-infections are very common with both, and 36–46% of children tested positive for a virus, such as rhinovirus, influenza, or RSV, during the Marseille Mycoplasma pneumoniae outbreak. Meanwhile, 61% of the Chinese Chlamydia pneumoniae series had a co-pathogen present, most commonly rhinovirus, Haemophilus influenzae, or Streptococcus pneumoniae. For M. pneumoniae, rates of co-infection in the 50–60% range are often reported as well, therefore, the take home point is that neither of these pathogens is "protective" against other infections, so in children with persistent or mixed symptoms, they should be thought of as part of a polymicrobial picture [11,18].

2. Clinical Presentation

Mycoplasma pneumoniae and Chlamydia pneumoniae infections are often indistinguishable from viral infections, and a characteristic presentation is a prolonged tracheobronchitis or a mild pneumonia marked by an intermittent, irritating "hacking" cough. Fever is low-grade, and patients may report headache, malaise, and myalgias because cough was a frequent manifestation of M. pneumoniae community-acquired pneumonia in CDC data. In children, chest pain or ear pain may occur from coughing, while extrapulmonary manifestations such as rash, hemolytic anemia, or neurologic symptoms are not characteristic of uncomplicated bronchitis, but have been described in M. pneumoniae infections, which are relatively rare [19,20].

C. pneumoniae infections are often mild or even asymptomatic, and most people are asymptomatic or have mild symptoms. In children, common symptoms include cough and mild or moderate fever, and if symptoms occur, they may include cough, fever, headache, and malaise. Some children may have rhinorrhea, pharyngitis, hoarseness, or a croup-like cough, because symptoms are non-specific and similar to those of viral colds in the early stage, C. pneumoniae infections are difficult to diagnose clinically. The persistent cough of C. pneumoniae infection can be a useful diagnostic clue, as cough may last for weeks to months and is often referred to as protracted bronchitis. Mild fever may persist, and severe disease is rare in otherwise healthy children, but the infection may precipitate an asthma exacerbation, and, rarely, encephalitis [1,12,13].

Crackles or wheezes may be revealed on auscultation of the chest, and in one Chinese study of C. pneumoniae, crackles were found in nearly all cases (99%). M. pneumoniae may also result in scattered crackles or wheezes, because neither organism is likely to cause high fever or localizing findings in the lungs, such as lobar consolidation, unless actual pneumonia has developed [17]. Physical examination findings are usually subtle and non-specific, therefore laboratory testing is often needed to determine the cause.

Routine laboratory tests (e.g., CBC and CRP) are non-specific, and in M. pneumoniae, the white blood cell count (WBC) is often normal or mildly elevated, with a predominance of either lymphocytes or neutrophils. Inflammatory markers (CRP, ESR) are only mildly elevated, consistent with the atypical nature of the infection, because no blood test is reliable to distinguish atypical pneumonia from viral or other bacterial infections [19]. In C. pneumoniae in children, there is a high WBC with a predominance of neutrophils, but a normal or mildly elevated CRP, therefore diagnosis is confirmed by organism-specific serology (IgM, IgG) or PCR [17].

Chest radiography is not indicated in bronchitis, but if obtained, most likely, there would be patchy infiltrates or bronchial wall thickening, but not classical lobar consolidation. Bilateral

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 12. December ,2025

involvement was present in 50% of patients in one C. pneumoniae cohort, and there is no specific radiographic pattern that definitively indicates either pathogen. Advanced imaging, such as CT, is rarely indicated in uncomplicated bronchitis, whereas in patients who undergo bronchoscopy, typically the more severe cases, the bronchial mucosa usually appears edematous with inflammatory secretions, which is compatible with tracheobronchitis [17].

Both infections result in a chronic cough with minimal constitutional symptoms in the older child and adolescent, and Mycoplasma pneumoniae is more likely to cause a more severe chronic cough, and outbreaks of disease are commonly observed in the community or school. Chlamydia pneumoniae infection tends to have a more insidious onset, while fever and fatigue are more common with Mycoplasma pneumoniae infection. Chlamydia pneumoniae infection may start with symptoms of upper respiratory tract infection, such as sore throat or sinusitis, and progress to a bronchitis-like illness [21]. Both organisms can exacerbate symptoms of asthma, therefore, considering the age of the child and the epidemiology of the community is a practical point. If many school-aged children in a community have developed a dry cough over several weeks, Mycoplasma pneumoniae infection is most likely, however, if an older child has a chronic cough that is not responding to conventional treatment, it is reasonable to test for both Mycoplasma pneumoniae and Chlamydia pneumoniae.

3. Diagnostic Strategies

Accurate diagnosis requires laboratory testing as the clinical presentation overlaps with viral infections, and culturing M. pneumoniae and C. pneumoniae is not practical for routine clinical care because it requires specialized media and colonies may take weeks to grow. Modern diagnostic testing has shifted primarily to molecular and serologic methods.

PCR of respiratory specimens (throat/nasopharyngeal swabs or sputum) is the current gold standard for both M. pneumoniae and C. pneumoniae detection [19,22,23]. For M. pneumoniae, PCR is highly sensitive and specific and may be positive early in the course of the illness, but for C. pneumoniae, PCR is crucial because of the decreased sensitivity of serology and the obligate intracellular nature of the organism, making a DNA-targeted PCR a more definitive result [14,19,22,23]. Many laboratories are now using multiplex PCR panels that can detect both organisms simultaneously, which is especially useful for rapid syndromic diagnosis during outbreaks [11,14]. Results are typically available in hours to days, therefore enabling earlier treatment decisions.

Specific antibody tests (IgM and IgG) on acute and convalescent serum samples have been used for many years, and a high or rising IgM titre against Mycoplasma pneumoniae or Chlamydia pneumoniae indicates recent infection. However, serology has a number of drawbacks: antibodies are often not detectable until 1-2 weeks after the onset of symptoms, and a single serum sample can be difficult to interpret, because M. pneumoniae IgM is generally considered more reliable in children, who are less likely to have been previously infected, than in adults, while for C. pneumoniae, IgM can cross-react with other chlamydial infections. For these reasons, many guidelines recommend paired acute and convalescent samples or a rising IgG titre to confirm the diagnosis [22,23]. Taking into account these limitations, PCR is the preferred method of early diagnosis, while serology is of greater utility in retrospective diagnosis or in the absence of PCR facilities.

Commercially available rapid antigen detection tests for M. pneumoniae are available, but vary in quality, and they detect bacterial antigens in throat swabs. They produce results quickly, but

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 12. December ,2025

they are not as sensitive as PCR testing, because they may produce false negatives [19]. They may be useful in outpatient clinics for quick screening, therefore, they can be a valuable tool in certain situations. If physicians strongly suspect infection, they should confirm a negative test using PCR or serology, thus ensuring a more accurate diagnosis. Rapid antigen tests for C. pneumoniae are not widely available, so alternative testing methods are often used instead.

Routine lab tests, such as CBC, inflammatory markers, and chest radiographs, are neither sensitive nor specific for Mycoplasma pneumoniae or Chlamydia pneumoniae and are best used for evaluating the severity of illness and ruling out other diagnoses, (e.g., a markedly elevated white blood cell count or a classic lobar consolidation may suggest typical bacterial pneumonia), since sputum Gram stain and culture have little diagnostic value because M. pneumoniae is cell wall deficient and C. pneumoniae is an intracellular organism.

Recent studies have evaluated the usefulness of targeted next-generation sequencing of respiratory samples to detect a wide range of pathogens (including C. pneumoniae and M. pneumoniae) in a single test. These tests are not commonly used in routine clinical practice, but they are of particular value in diagnosing difficult-to-culture or mixed infections in complex or atypical cases, because they may be the only means of detection; however, these tests are used primarily in the research setting or in specialized centers [14].

In practice, testing is most often determined by clinical suspicion and venue of care, and hospitalized children, as well as clinicians during outbreaks, will order PCR panels including atypical bacteria. In the outpatient setting, many clinicians empirically treat suspected Mycoplasma pneumoniae without testing or send serology in protracted illness, because Chlamydia pneumoniae may present with cough or mild URI symptoms only, so testing may be warranted in persistent cases or known local circulation.

DISCUSSION

The review highlights that Mycoplasma pneumoniae and Chlamydia pneumoniae are key causes of bronchitis and atypical pneumonia in children, but both are mainly limited to school-aged children, often present with a chronic dry cough, and almost always require specific laboratory testing to diagnose. However, there are a few differences: M. pneumoniae has been shown to cause periodic epidemics, more prominent cough and fever, and community-wide outbreaks, as has been reported recently, although C. pneumoniae infections are usually milder or more insidious and mimic a lingering viral URI. Moreover, C. pneumoniae infections do occur in clusters and are linked to wheezing and asthma exacerbation in children.

Studies across various regions support these patterns. In the United States, a mid-2024 surge elevated M. pneumoniae to the primary cause of hospitalizations for pediatric community-acquired pneumonia. European countries, including France and Spain, reported increased M. pneumoniae activity starting in 2023. International data on C. pneumoniae remain limited. However, European surveillance detected a notable rise in 2024. Asian regions show M. pneumoniae contributing substantially to pediatric pneumonia cases. In China, it accounts for 25–37% of such infections, with emerging macrolide resistance. A Chinese review stressed this growing resistance and advocated doxycycline for severe cases. Global differences persist. Macrolide-resistant M. pneumoniae prevails in Asia but occurs rarely (under 10%) in the U.S. and Europe.

Clinicians should recognize that a definitive diagnosis can only be established with targeted testing, and PCR should be used for both pathogens if possible. Serology may support PCR

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 12. December ,2025

results but is fraught with limitations, and imaging and routine labs alone cannot reliably distinguish between atypical and typical infections. Interpretation is further complicated by the possibility of co-infections and asymptomatic carriage, particularly with M. pneumoniae, because asymptomatic carriage rates in children may be as high as 20–50%. Therefore, a positive PCR result in the context of a mild case should always be interpreted in the context of the clinical picture.

In depth discussion is outside the scope of this review, but a brief discussion of the standard treatment for the pathogens is helpful. Both organisms are cell wall deficient and therefore beta-lactams, such as penicillins and cephalosporins, are not useful. Macrolides, including azithromycin or clarithromycin, are the first line choice for both M. pneumoniae and C. pneumoniae in children, and azithromycin is preferred over clarithromycin due to the simplicity of its dosing regimen. In the United States and Europe, most strains of M. pneumoniae isolated from pediatric patients remain susceptible to macrolides, however, in some parts of Asia, there has been increasing macrolide resistance, leading to consideration of second line agents in the case of severe illness. Doxycycline is acceptable in older children and adolescents, typically eight years and older, for C. pneumoniae, but tetracyclines are generally avoided in younger children because of the risk of tooth discoloration. Fluoroquinolones, such as levofloxacin, are potent against both organisms, but are used very infrequently in children, given their safety profile, and are reserved for life-threatening infections where other options are not feasible. Supportive care is important, therefore, hydration, antipyretics, and bronchodilators are used as needed for wheezing, and in some cases of severe M. pneumoniae, particularly in Asia, corticosteroids have been used for suspected immune-mediated lung injury. There are no licensed vaccines for either organism, although research is ongoing.

In practice, it is not possible to distinguish M. pneumoniae bronchitis from C. pneumoniae bronchitis on the basis of clinical presentation or routine laboratory tests, as both are atypical and lack distinguishing clinical clues. Epidemiology may guide the diagnosis: M. pneumoniae should be suspected in the setting of classic summer outbreaks, and C. pneumoniae should be suspected year round, especially in the fall and winter or when M. pneumoniae test results are negative, and in a school-aged child with a chronic cough without evidence of viral etiology, empiric coverage of atypical bacteria may be started. Tests should be ordered only when the result would alter management, such as in hospitalized patients or outbreaks.

CONCLUSION

Mycoplasma pneumoniae and Chlamydia pneumoniae are among the most important causes of bronchitis and atypical pneumonia in children, but have several unique features that may influence their epidemiology and clinical presentation, and therefore pediatricians should be aware of these unique features when evaluating school-aged children with a persistent cough or an “atypical” presentation. Wherever possible, the diagnosis should be confirmed using PCR testing and, if necessary, serology, because awareness of local epidemiology and guidelines can aid in recognition and management. Macrolides remain the cornerstone of treatment, but alternative therapies should be considered in the event of macrolide resistance or severe disease, and thus ongoing surveillance and research, particularly in the realms of molecular diagnostics and antibody testing, are paramount in optimising diagnosis and monitoring resistance trends. Consequently, early recognition and appropriate management can significantly reduce the morbidity associated with these frequently overlooked paediatric respiratory pathogens.

AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 5. No 12. December ,2025

REFERENCES:

1. Centers for Disease Control and Prevention. (2025). Clinical overview of Chlamydia pneumoniae infection. https://www.cdc.gov/cpneumoniae/hcp/clinical-overview/index.html
2. Waites, K. B., & Talkington, D. F. (2004). Mycoplasma pneumoniae and its role as a human pathogen. Clinical Microbiology Reviews, 17(4), 697–728. https://doi.org/10.1128/CMR.17.4.697-728.2004
3. Jain, S., Williams, D. J., Arnold, S. R., Ampofo, K., Bramley, A. M., Reed, C., Stockmann, C., Anderson, E. J., Grijalva, C. G., Self, W. H., Zhu, Y., Patel, A., Chappell, J. D., Kaufman, L., McCullers, J. A., Hymas, A. L., Thapa, K., McNary, L., Rampersad, A., ... Finelli, L. (2015). Community-acquired pneumonia requiring hospitalization among U.S. children. New England Journal of Medicine, 372(9), 835–845. https://doi.org/10.1056/NEJMoa1405870
4. Kim, K., Jung, S., Kim, M., Park, S., Yang, H. J., & Lee, E. (2022). Global trends in the proportion of macrolide-resistant Mycoplasma pneumoniae infections: A systematic review and meta-analysis. JAMA Network Open, 5(7), e2220949. https://doi.org/10.1001/jamanetworkopen.2022.20949
5. Waites, K. B., Ratliff, A., Crabb, D. M., Xiao, L., Qin, X., Selvarangan, R., Tang, Y. W., Zheng, X., Dien Bard, J., Hong, T., Prichard, M., Brooks, E., Dallas, S., Duffy, L., Mixon, E., Fowler, K. B., & Atkinson, T. P. (2019). Macrolide-resistant Mycoplasma pneumoniae in the United States as determined from a national surveillance program. Journal of Clinical Microbiology, 57(11), e00968-19. https://doi.org/10.1128/JCM.00968-19
6. Omori, R., Nakata, Y., Tessmer, H. L., Suzuki, S., & Shibayama, K. (2015). The determinant of periodicity in Mycoplasma pneumoniae incidence: An insight from mathematical modelling. Scientific Reports, 5, Article 14473. https://doi.org/10.1038/srep14473
7. Meyer Sauteur, P. M., Beeton, M. L., & European Society of Clinical Microbiology and Infectious Diseases (ESCMID) Study Group for Mycoplasma and Chlamydia Infections (ESGMAC), and the ESGMAC Mycoplasma pneumoniae Surveillance (MAPS) study group. (2024). Mycoplasma pneumoniae: Delayed re-emergence after COVID-19 pandemic restrictions. The Lancet Microbe, 5(2), e100–e101. https://doi.org/10.1016/S2666-5247(23)00344-0
8. Edens, C., Clopper, B. R., DeVies, J., Benitez, A., McKeever, E. R., Johns, D., Wolff, B., Selvarangan, R., Schuster, J. E., Weinberg, G. A., Szilagyi, P. G., Dawood, F. S., Radhakrishnan, L., Quigley, C., Sahni, L. C., Halasa, N., Stewart, L. S., McMorrow, M. L., Whitaker, B., ... Diaz, M. (2024). Notes from the field: Reemergence of Mycoplasma pneumoniae infections in children and adolescents after the COVID-19 pandemic, United States, 2018–2024. Morbidity and Mortality Weekly Report, 73(7), 149–151. https://doi.org/10.15585/mmwr.mm7307a3
9. Nordholm, A. C., Søborg, B., Jokelainen, P., Lauenborg Møller, K., Flink Sørensen, L., Grove Krause, T., Anker Uldum, S., & Emborg, H.-D. (2024). Mycoplasma pneumoniae epidemic in Denmark, October to December, 2023. Eurosurveillance, 29(2), Article 2300707. https://doi.org/10.2807/1560-7917.ES.2024.29.2.2300707
10. Diaz, M. H., Hersh, A. L., Olson, J., Shah, S. S., Hall, M., & Edens, C. (2025, June 26). Mycoplasma pneumoniae infections in hospitalized children — United States, 2018–2024. Morbidity and Mortality Weekly Report, 74(23), 394–400. https://doi.org/10.15585/mmwr.mm7423a1

ISSN NUMBER: 2692 - 5206 Volume 5. No 12. December ,2025

11. Edouard, S., Boughammoura, H., Colson, P., La Scola, B., Fournier, P., & Fenollar, F. (2024). Large-scale outbreak of Mycoplasma pneumoniae infection, Marseille, France, 2023–2024. Emerging Infectious Diseases, 30(7), 1481–1484. https://doi.org/10.3201/eid3007.240315
12. Alves, M. S., da Silva Cariolano, M., dos Santos Ferreira, H. L., Sousa de Abreu Silva, E., Felipe, K. K. P., Monteiro, S. G., de Sousa, E. M., Abreu, A. G., Campbell, L. A., Rosenfeld, M. E., Hirata, M. H., Hirata, R. D. C., Bastos, G. M., de Paula Abreu Silva, I. C., & Lima-Neto, L. G. (2020). High frequency of Chlamydia pneumoniae and risk factors in children with acute respiratory infection. Brazilian Journal of Microbiology, 51(2), 629–636. https://doi.org/10.1007/s42770-020-00229-w
13. Han, H. Y., Moon, J. U., Rhim, J. W., Kang, H. M., Lee, S. J., & Yang, E. A. (2023). Surge of Chlamydia pneumoniae pneumonia in children hospitalized with community-acquired pneumonia at a single center in Korea in 2016. Journal of Infection and Chemotherapy, 29(5), 453–457. https://doi.org/10.1016/j.jiac.2023.01.012
14. Merida Vieyra, J., De Colsa Ranero, A., Palacios Reyes, D., Murata, C., & Aquino Andrade, A. (2023). Chlamydophila pneumoniae-associated community-acquired pneumonia in paediatric patients of a tertiary care hospital in Mexico: Molecular diagnostic and clinical insights. Scientific Reports, 13, Article 21477. https://doi.org/10.1038/s41598-023-48701-5
15. Shim, J. Y. (2020). Current perspectives on atypical pneumonia in children. Clinical and Experimental Pediatrics, 63(12), 469–476. https://doi.org/10.3345/cep.2019.00360
16. Edouard, S., Attamna, R., Million, M., Boschi, C., Delerce, J., Caputo, A., & Colson, P. (2025). Significant rise of Chlamydia pneumoniae infection in 2024 in Marseille, France. International Journal of Infectious Diseases, 155, Article 107897. https://doi.org/10.1016/j.ijid.2025.107897
17. Ma, R., Zhang, Y., Wang, Y., Liu, Y., Ba, C., & Zhang, M. (2025). Epidemiological and clinical analysis of 291 children diagnosed with Chlamydia pneumoniae pneumonia: A 10-year retrospective study in Shijiazhuang, China. Frontiers in Pediatrics, 13, 1681564. https://doi.org/10.3389/fped.2025.1681564
18. Chen, J. R., & Zhou, X. F. (2020). A retrospective survey of Chlamydia pneumoniae infection rates in paediatric patients from a single centre in Wuxi, China. The Journal of international medical research, 48(10), 300060520961720. https://doi.org/10.1177/0300060520961720
19. Gao, L., & Sun, Y. (2024). Laboratory diagnosis and treatment of Mycoplasma pneumoniae infection in children: a review. Annals of medicine, 56(1), 2386636. https://doi.org/10.1080/07853890.2024.2386636
20. Merișescu, M. M., Jugulete, G., Dijmărescu, I., Dragomirescu, A. O., & Răduț, L. M. (2025). The clinical profile of pediatric M. pneumoniae infections in the context of a new post-pandemic wave. Microorganisms, 13(5), Article 1152. https://doi.org/10.3390/microorganisms13051152
21. Nguyen, A. D., Stamm, D. R., & Stankewicz, H. A. (2025). Atypical bacterial pneumonia. In StatPearls [Internet]. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK532239/
22. Morrissey, I., Salman, H., Bakker, S., Farrell, D., Bébéar, C. M., & Ridgway, G. (2002). Serial passage of Chlamydia spp. in sub-inhibitory fluoroquinolone concentrations. Journal of Antimicrobial Chemotherapy, 49(5), 757–761. https://doi.org/10.1093/jac/dkf031
23. Zhou, Y., Yan, Z., Zhou, S., Li, W., Yang, H., Chen, H., Deng, Z., Zeng, Q., Sun, P., & Wu, Y. (2024). ERA-CRISPR/Cas12a-based, fast and specific diagnostic detection for Chlamydia pneumoniae. Frontiers in Cellular and Infection Microbiology, 14, Article 1477422.