- Acute phase reactants, such as the **ESR**, **CRP** concentration, or serum **procalcitonin** concentration, cannot be used as the sole determinant to distinguish between **viral and bacterial** causes of CAP.

- Acute phase reactants **need not be routinely measured** in fully immunized children with CAP who are managed **as outpatients**, although for more serious disease, acute-phase reactants may provide useful information for clinical management.

In patients with more serious disease, such as

- those requiring **hospitalization** or
- those with pneumonia-associated **complications**, acute phase reactants may be used in conjunction with clinical findings to
- **assess response to therapy**.

- **Routine chest radiographs are not necessary for the confirmation** of suspected CAP in patients well enough to be treated in the **outpatient** setting.
- **Chest radiographs PA and lateral**, should be obtained in patients with
  - suspected or documented hypoxemia or
  - significant respiratory distress and
  - in those with failed initial antibiotic therapy to verify the presence or absence of **complications of pneumonia**, including
  - parapneumonic effusions,
  - necrotizing pneumonia , and
  - pneumothorax.

- **Repeated chest radiographs** should be obtained in children who fail to demonstrate clinical improvement and in those who have progressive symptom or clinical deterioration within 48-72 hr after initiation of antibiotic therapy.
- **Routinely daily chest radiography** is not recommended in children with pneumonia complicated by parapneumonic effusion after chest tube placement or after video-assisted thoracoscopic surgery (VATS), if they remain clinically stable.
- **Follow-up chest radiographs** should be obtained in patients with **worsening respiratory distress or clinical instability**, or in those with **persistent fever that is not responding to therapy over 48-72 hours.**

Repeated chest radiographs **4-6 weeks after the diagnosis of CAP** should be obtained in patients with

- recurrent pneumonia involving the same lobe and in patients with
- lobar collapse at initial chest radiography with suspicion of an
  - anatomic anomaly,
  - chest mass, or
  - foreign body aspiration.

- M. pneumoniae is thought to play a role in the pathogenesis of asthma exacerbations.

- Mouse models have shown that infection with M pneumoniae leads to bronchial constriction and increased resistance to airflow.

- One study found that in patients with asthma, Mycoplasma may worsen symptoms and trigger an asthma exacerbation.

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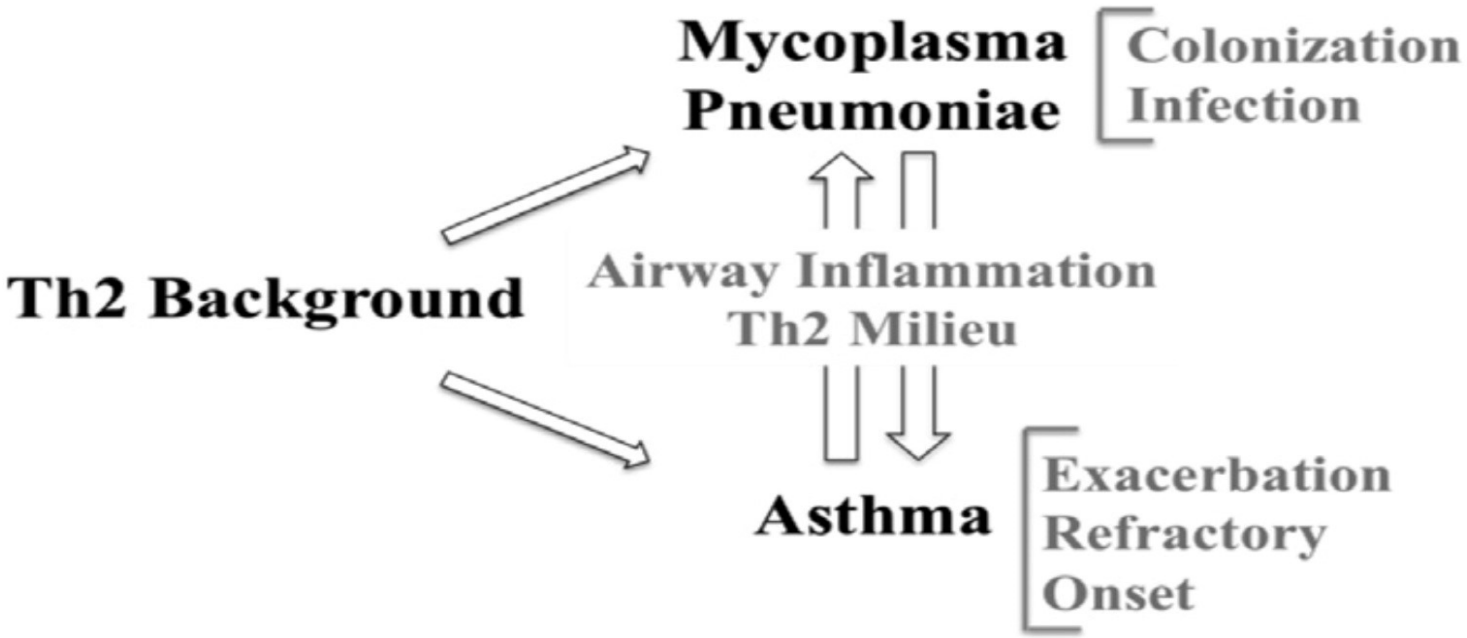

FIG 1. Two-way interaction between *Mycoplasma pneumoniae* infection and asthma.

- In these children, M.pneumonia was detected in 20% of children hospitalized with an asthma exacerbation.

- In children who presented with new onset wheezing, M pneumoniae infection was found in half of the patients, suggesting that Mycoplasma infection can trigger onset of asthma in those who are predisposed to developing the diagnosis of asthma.

- Treatment of infection in children with asthma is thought to be particularly important.

Pediatr Rev 2020;41:12-9.

- The surface capsular polysaccharide of S.pneumonia determines the serotype and provokes a type-specific protective immune response..
- More than 102 pneumococcal serotypes have been identified so far.
- It is not possible to include all serotypes in a pneumococcal vaccine; the serotypes most frequently isolated from patients with **invasive disease** are included in the available vaccines.
- Invasive disease is usually defined by the isolation of pneumococcus from a normally sterile body fluid.
- Pneumococcal pneumonia is considered **to be invasive if it is complicated by empyema or associated with bacteremia.**

- In a meta-analysis of six randomized trials (113000 children) of PCV from several countries, PCV efficacy for preventing vaccine-typed IPD in children <2 years of age was 80%. The efficacy for preventing IPD caused by all serotypes was 58%.
- The effectiveness of PCV in preventing IPD in children <5 years of age is confirmed by dramatic declines in the incidence of IPD after routine infant immunization: Between 1998 and 2019 the overall incidence of IPD in children<5 years of age declined from 95 to 7 cases per 100000 children, and the incidence of IPD caused by PCV13 serotypes declined from 88 to 2 cases per 100000 children.

- H.influenza serotype b was once the most common cause of bacterial meningitis and a frequent cause of other invasive diseases (epiglottitis, pneumonia, septic arthritis, bacteremia), particularly in early childhood.
- Immunogenicity of pentavalent vaccine for Hib was 98.7% in a study from Iran published in 2017.

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- Children who have invasive Hib disease before 24 months can remain at risk for a second episode of invasive Hib disease; natural infection at this age does not reliably result in protective antibody levels. Immunization should be initiated one month after the onset of invasive disease or as soon thereafter as possible.
- Children who have invasive Hib disease after 24 months of age virtually always develop a protective immune response and do not require immunization.

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos
Hepatitis B (HepB)	1st dose	←2nd dose→			←3rd dose→			
Rotavirus (RV) RV1 (2-dose series); RV5 (3-dose series)			1st dose	2nd dose	See notes			
Diphtheria, tetanus, & acellular pertussis (DTaP: <7 yrs)			1st dose	2nd dose	3rd dose			←4th dose→
Haemophilus influenzae type b (Hib)			1st dose	2nd dose	See notes		←3rd or 4th dose, See notes→	
Pneumococcal conjugate (PCV13, PCV15)			1st dose	2nd dose	3rd dose		←4th dose→	
Inactivated poliovirus (IPV: <18 yrs)			1st dose	2nd dose	←3rd dose→			
COVID-19 (1vCOV-mRNA, 2vCOV-mRNA, 1vCOV-aPS)					2- or 3-dose primary series and booster (See notes)			
luenza (IIV4)					Annual vaccination 1 or 2 doses			

Recommendations for Pneumococcal Vaccines Use in Children and Teens

Table 1. Recommended Schedule for Administering Pneumococcal Conjugate Vaccine

Child's age now	Vaccination history of PCV13 or PCV15	Recommended PCV13 or PCV15 Schedule (For minimum interval guidance for catch-up vaccination, see * below)
2 through 6 months	0 doses	3 doses, 8 weeks* apart; 4th dose at age 12–15 months
	1 dose	2 doses, 8 weeks* apart; 4th dose at age 12–15 months
	2 doses	1 dose, 8 weeks* after the most recent dose; 4th dose at age 12–15 months
7 through 11 months	0 doses	2 doses, 8 weeks apart* and a 3rd dose at age 12–15 months
	1 or 2 doses before age 7 months	1 dose at age 7–11 months and a 2nd dose at age 12–15 months, at least 8 weeks after the most recent dose
	1 dose at age 7–11 months	2 doses: 1 dose at age 7–11 months and a 2nd dose at age 12–15 months, at least 8 weeks after the most recent dose
	2 doses at age 7–11 months	1 dose at age 12–15 months
12 through 23 months	0 doses	2 doses, at least 8 weeks apart
	1 dose before age 12 months	2 doses, at least 8 weeks apart
	1 dose at or after age 12 months	1 dose, at least 8 weeks after the most recent dose
	2 or 3 doses before age 12 months	1 dose, at least 8 weeks after the most recent dose
	2 doses at or after age 12 months	0 doses
24 through 59 months (healthy children)	0 doses	1 dose
	Any incomplete schedule†	1 dose, at least 8 weeks after the most recent dose
24 through 71 months (children with underlying medical condition as described in Table 3 below)	Unvaccinated or any incomplete schedule† of less than 3 doses	2 doses: 1st dose at least 8 weeks after most recent dose and a 2nd dose at least 8 weeks later
	Any incomplete schedule† of 3 doses	1 dose, at least 8 weeks after the most recent dose
6 through 18 years with immunocompromising condition, functional or anatomic asplenia (see specific conditions in Table 3 below), cerebrospinal fluid leak, or cochlear implant	No history of PCV13 or PCV15	1 dose

* Minimum interval between doses: For children younger than age 12 months: 4 weeks; for children age 12 months and older: 8 weeks.

† For information on completion of incomplete schedules, visit current "Recommended Immunization Schedule for Children and Adolescents Age 18 Years or Younger—United States" at www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html