

The risk factors for pediatric *Mycoplasma pneumoniae* associated necrotizing pneumonia: a mixed-methods systematic review

INPLASY202390030

doi: 10.37766/inplasy2023.9.0030

Received: 10 September 2023

Published: 10 September 2023

Yuan, L¹; Wei, X²; Li, SL³; Zhao, QY⁴.**Corresponding author:**

Qianye Zhao

18705130535@163.com

Author Affiliation:

Medical College of Yangzhou University. Pediatric Respiratory Ward I, Lianyungang Maternal and Child Health Care Hospital.

ADMINISTRATIVE INFORMATION

Support - The work was supported by the General Programs of Lianyungang Health and Planning Commission (202027).

Review Stage at time of this submission - Piloting of the study selection process.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202390030

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 September 2023 and was last updated on 10 September 2023.

INTRODUCTION

Review question / Objective *Mycoplasma pneumoniae* infection (MPP) is one of the most common etiology of community-acquired pneumonia (CAP) in children. This mixed-methods systematic review aims to synthesize qualitative evidence on risk factors for pediatric *Mycoplasma pneumoniae* associated necrotising pneumonia (MPNP) to provide the basis of clinical practice.

Condition being studied *Mycoplasma pneumoniae* (MP) is one of the prevalent etiological agents of community-acquired pneumonia in children, and *Mycoplasma pneumoniae* pneumonia (MPP) is traditionally thought to be self-limiting. However, some cases with MPP could result in severe life-threatening diseases, such as acute respiratory distress syndrome, necrotising

pneumonia (NP), and so on. NP was described in children in 1994. The radiographic characteristics of NP was showed as solitary or multiple thin-walled cavities within the areas of consolidation.

METHODS

Search strategy We searched PubMed, Embase, Medline, EBSCO, SpringerLink, Corchrane, Web of Science, China National Knowledge Infrastructure (CNKI), and the Wanfang database up to Mar 31, 2023. The search terms were “necrotising pneumonia”, “*Mycoplasma pneumoniae*”, “MP”, “*Mycoplasma pneumoniae pneumonia*”, “MPP”, “cavitary necrosis”, “cavitary pneumonia”, “cavitatory pneumonia”, “necrotic pneumonia”, “necrotizing pneumonia”. Our searches were not limited by publication date and country.

Participant or population Children (< 14 years of age) with signs or symptoms of *Mycoplasma pneumoniae* associated necrotising pneumonia (MPNP).

Intervention This review is looking at the risk factors for MPNP patients, and intervention treatment measures taken by pediatrician in children with MPNP. (a) presents primary data analysis; (b) uses a qualitative method of data collection and analysis (qualitative studies); (c) discusses the causes of the occurrence of MPNP.

Comparator Bacterial necrotizing pneumonia, or *Mycoplasma pneumoniae* pneumonia without local necrosis, or severe *Mycoplasma pneumoniae* pneumonia, or *Mycoplasma pneumoniae* lobar pneumonia.

Study designs to be included The retrospective and observational case-control study studies will be included.

Eligibility criteria A diagnosis of pneumonia was defined as acute respiratory infection symptoms, such as fever, cough and/or wheezing upon a physical examination and chest imaging with infiltrates. (2) The MP infection was confirmed by conducting a serological test (MP-IgM-positive and an antibody titer $\geq 1:160$ or a four-fold or greater increase in the titer) and MP nucleic acid detection from the nasopharyngeal aspirate and BAL and/or pleural effusion. (3) In plain chest radiographs, necrotic lesions may present as density-reduced areas and cavity lesions. Chest computed tomography (CT) findings of NP were the destruction of normal lung parenchymal structures and a decrease in parenchymal enhancement with structures that were gradually replaced by multiple small air- or fluid-filled cavities with thin, nonenhanced walls. (4) The enrolled population was children < 14 years of age with MPP. Relevant articles were excluded if they were review articles, meta-analysis, commentaries, and letters. Two reviewers (Lei Yuan and Meng Li) independently screened studies according to eligibility criteria. Disagreements were resolved by consensus.

Information sources Electronic databases, such as PubMed, Embase, Medline, EBSCO, SpringerLink, Cochrane, Web of Science, China National Knowledge Infrastructure (CNKI), and the Wanfang database.

Main outcome(s) Solitary or multiple thin-walled cavities were showed within the areas of consolidation in radiographical finding of children with *Mycoplasma pneumoniae* pneumonia.

Data management Two investigators will develop a data extraction form, and this will be piloted initially to achieve a good level of agreement between the data extractors. Relevant data will then be extracted from the studies selected for inclusion. Two reviewers (Lei Yuan and Xiang Wei) independently extracted information from eligible studies using a predefined data extraction form, and then another reviewer (Qianye Zhao) verified them. Disagreements between reviewers were resolved through discussion.

Quality assessment / Risk of bias analysis The risk of bias in each article will be evaluated independently by two investigators. The quality of the quantitative studies was assessed using an adaptation of the STROBE statement. The quality of the qualitative studies was assessed using an adaptation of the Critical Appraisal Skills Programme (CASP) quality-assessment tool.

Strategy of data synthesis Quantitative. We planned to present the risk factors for pediatric MPNP. However, meta-analysis was not possible due to high heterogeneity in the quantitative studies, including inconsistent variables and lack of OR value. Therefore, descriptions of study characteristics, outcome measures, and key findings are presented.

Qualitative. A thematic synthesis approach was used to analyze and synthesize the qualitative data. A spreadsheet was created of all qualitative data extracted from the studies' findings sections, and thematic analysis methods were used to conduct the broad themes. First order themes represent text units grouped together based on common descriptive themes. Second-order themes represent first-order themes grouped together based on higher-level analytic themes. Third-order themes represent overarching high-level analytic themes comprising the first- and second-level themes.

Subgroup analysis No.

Sensitivity analysis No.

Language restriction No language restriction.

Country(ies) involved China (Medical College of Yangzhou University. Pediatric Respiratory Ward I, Lianyungang Maternal and Child Health Care Hospital).

Keywords *Mycoplasma pneumoniae*; risk factors; necrotizing pneumonia; thematic analysis methodca.

Contributions of each author

Author 1 - Yuan Lei.

Email: 1457567824@qq.com

Author 2 - Wei Xiang.

Email: 302973144@qq.com

Author 3 - Li Sheng-li.

Email: 919491664@qq.com

Author 4 - Zhao Qian-ye.

Email: 18705130535@163.com