

## Research Progress of Mycoplasma Pneumonia in Children

Jing Xihui<sup>1</sup>, Yan Chunmei<sup>1</sup>, Zi Heping<sup>1</sup>, Shi Xiaoxiao<sup>2</sup>, Wang Yuqin<sup>2</sup>

<sup>1</sup>Department of Pediatrics, Yulin Hospital of Traditional Chinese Medicine, China

<sup>2</sup>Department of Nursing, Yulin Hospital of Traditional Chinese Medicine, China

### Abstract

Mycoplasma Pneumoniae (MP) is the primary pathogen of acquired pneumonia in children, accounting for approximately 5%-30% of all acquired pneumonia pathogens in pediatric populations. Its transmission routes are primarily droplet transmission and direct contact with the pathogen. The incubation period ranges from 7 to 21 days, during which the pathogen remains infectious until symptom resolution, which may take several weeks. In recent years, refractory and macrolide-resistant Mycoplasma pneumoniae infections have become increasingly prevalent. The nursing philosophy for pediatric Mycoplasma Pneumonia (MPP) has evolved from traditional symptomatic support to a more refined, evidence-based, individualized, and comprehensive approach. This article systematically reviews the optimization and upgrading of core nursing measures, provides an in-depth analysis of research hotspots and latest advancements in critical early warning, medication management, complication control, nutritional and psychological support, and continuous care, summarizes the key characteristics of current nursing models, and outlines future development directions, offering reference for clinical nursing practice.

**Keywords:** Children; Mycoplasma pneumonia; Nursing progress; Severe warning; Continuous care; Complication nursing

### Introduction

Mycoplasma pneumonia,[1] an acute pulmonary inflammation caused by Mycoplasma pneumoniae, frequently coexists with pharyngitis and bronchitis. Characterized by fever and cough, it predominantly affects children and adolescents. With the emergence of drug-resistant Mycoplasma pneumoniae strains and increasing severe cases, the traditional symptom-focused nursing model has become inadequate. Modern nursing practice now prioritizes early severe case identification, prevention of multi-system complications, comprehensive rehabilitation support, and risk reduction of sequelae. This approach emphasizes proactive assessment, targeted interventions, and holistic management, playing an increasingly vital role in improving patient outcomes, shortening disease duration, and enhancing quality of life.

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**Citation:** Xihui J, Chunmei Y, Heping Z, Xiaoxiao S, Yuqin W. Research Progress of Mycoplasma Pneumonia in Children. *Int Case Rep Jour.* 2026;5(1):1-6.

**Received Date:** 04 January, 2026; **Accepted Date:** 07 January, 2026; **Published Date:** 08 January, 2026

**\*Corresponding author:** Wang Yuqin, Department of Nursing, Yulin Hospital of Traditional Chinese Medicine, Yulin, Shaanxi, China

## Tradition and Optimization of Core Nursing Measures

### Fever management

Traditional fever management primarily relies on physical cooling methods and pharmacological antipyretics, with a focus on temperature control. Based on the latest clinical practice, optimized fever management emphasizes clinical observation of fever patterns. Persistent high fever for more than 5 days or fever lasting over 7 days with sustained elevated body temperature may indicate severe illness or the risk of drug-resistant infections, necessitating timely intervention. The focus of care shifts to comfort management and maintenance of fluid balance, including appropriate adjustment of antipyretic dosage according to the child's age and weight, maintaining optimal environmental temperature and humidity, and promptly changing sweat-soaked clothing. Concurrently, dynamic monitoring of urine output and mucosal moisture is essential to prevent dehydration.

### Cough and airway care

Traditional nursing care primarily focuses on back patting to expel phlegm and encouraging fluid intake, lacking targeted and refined interventions. The optimized nursing protocol emphasizes three core requirements: First, refined airway humidification. For children with viscous sputum, active humidification (nebulized saline or medication) can more effectively reduce sputum viscosity and improve ventilation function, which has been proven significantly superior to passive humidification. Second, individualized sputum expectoration guidance. For older children, deep breathing followed by effective coughing training can be implemented.<sup>[2]</sup> For patients with excessive sputum and good tolerance to positional changes, positional drainage may be implemented to enhance sputum expulsion. Alternatively, integrated traditional Chinese and Western medicine nursing combined with comprehensive auricular therapy and gua sha can be employed.<sup>[3]</sup> Alleviate the cough symptoms of pediatric patients.<sup>[4]</sup> Conduct assessment of cough characteristics, incorporating severe irritative dry cough into the nursing evaluation system, with emphasis on recording cough frequency, duration, and its impact on sleep and feeding, to provide a basis for physicians to adjust antitussive regimens.

### Oxygen therapy and respiratory support nursing

Early detection of hypoxemia is a critical component of respiratory support care. Studies emphasize the importance of dynamic monitoring of blood oxygen saturation in pediatric patients, particularly for high-risk groups with extra pulmonary complications or neurological symptoms, necessitating the establishment of continuous monitoring mechanisms. For children requiring oxygen therapy, the focus of nursing care lies in ensuring both efficacy and safety: non-invasive ventilation patients require enhanced postural management to improve patient-machine synchronization and optimized nasal and facial skin protection to prevent pressure ulcers; invasive ventilation patients, on the other hand, demand intensified airway humidification, sputum drainage, and close monitoring of ventilator parameters to promptly identify and address ventilation abnormalities.<sup>[5]</sup>

## Research Hotspots and Emerging Fields

### Early warning nursing for severe and refractory mycoplasma pneumonia

Refractory Mycoplasma Pneumonia (RMPP) refers to Mycoplasma Pneumonia (MPP) that persists with fever after 72 hours of standard drug therapy, with no improvement or further exacerbation of clinical signs and pulmonary imaging. Severe Mycoplasma Pneumonia (SMPP) meets the diagnostic criteria for severe

community-acquired pneumonia and/or carries a risk of sequelae.<sup>[6,7]</sup> As frontline observers, nurses' ability to conduct active assessments is crucial for the early identification of severe cases.

The current study has established a multidimensional early warning assessment checklist, with core indicators including: persistent high fever (lasting more than 5 to 7 days), increased respiratory rate, lethargy or irritability, decreased blood oxygen saturation, and rapid progression of pulmonary imaging findings. Meanwhile, the systemic evaluation concept emphasizes that nursing care should not only focus on respiratory symptoms but also closely monitor extra pulmonary manifestations such as skin and mucous membranes (rashes, ulcers),<sup>[8,9]</sup> cardiovascular system (chest tightness, palpitations), nervous system (headache, vomiting), and musculoskeletal system (joint swelling and pain). This approach facilitates early detection of complications like myocarditis, encephalitis, and erythema multiforme,<sup>[10]</sup> thereby securing time for early medical intervention.

#### **A new perspective on nursing care for pharmacotherapy**

**Drug-related nursing care for drug resistance:** Currently, the issue of resistance to macrolide antibiotics is prominent. For pediatric patients who exhibit poor response after 72 hours of treatment with macrolides such as azithromycin,<sup>[4]</sup> nursing care should implement precise symptom monitoring, including detailed recording of body temperature curves and improvement in cough symptoms. This provides critical evidence for physicians to promptly switch to tetracycline antibiotics (minocycline, doxycycline) or fluoroquinolones.<sup>[11]</sup> For elderly pediatric patients using such medications, it is essential to emphasize pharmacological education, such as the potential for tetracycline-induced tooth discoloration and the risk of chondrotoxicity associated with fluoroquinolones. Parents must be informed in advance to strictly adhere to medical prescriptions, and self-adjustment of dosage or extension of treatment duration is strictly contraindicated.

**Nursing care for immune modulatory drugs:** For pediatric patients with severe MPP, meticulous monitoring is required during the administration of glucocorticoids and immunoglobulin therapy. During glucocorticoid therapy, close monitoring of blood glucose and blood pressure changes is required to assess infection control during Intravenous Immunoglobulin (IVIG) infusion, the infusion rate should be strictly controlled, and allergic reactions should be monitored. Concurrently, immune function,<sup>[12,13]</sup> and improvement indicators should be assessed to provide reference for evaluating treatment efficacy.

#### **Prevention and nursing of complications**

**Emergency nursing care for acute complications:** Pulmonary Bronchiectasis (PB) is a critical complication of MPP, predominantly observed in individuals with personal or familial allergic predisposition. High vigilance is required when pediatric patients present with persistent high fever, wheezing, tachypnea or dyspnea, accompanied by diminished or absent pulmonary breath sounds. Nursing care should include preoperative preparation for emergency bronchial lavage therapy (fasting and fluid restriction, vital signs monitoring) and postoperative management (airway care, hemorrhage observation). Thromboembolic diseases (such as pulmonary embolism) are also severe complications of severe MPP. Nursing care should emphasize the importance of early mobilization (bed turning and limb movement when the condition permits) and physical prevention (elastic stockings, limb massage) for critically ill or bedridden children, especially those in a hypercoagulable state.

**Long-term rehabilitation nursing for sequelae:** The nursing care extends from the acute phase to the rehabilitation phase, with a focus on the prevention and management of sequelae such as obstructive bronchiolitis and bronchiectasis. Studies have confirmed that continuous nursing combined with intensive

respiratory function training can significantly shorten symptom improvement time and enhance pulmonary function and quality of life in pediatric patients. During nursing care, it is essential to guide families in conducting standardized respiratory function training, including diaphragmatic breathing and balloon inflation exercises, while emphasizing the importance of regular follow-up examinations to facilitate early detection and intervention of pulmonary dysfunction.

#### **Nutritional support and psychological care**

**Individualized nutritional support:** Adequate nutritional support is a critical safeguard for the recovery of critically ill MPP (Mucopolysaccharidosis) patients. For children with insufficient intake due to high fever, cough, or gastrointestinal reactions, nursing care should establish individualized nutritional plans. Mild cases should be provided with high-calorie, high-protein, easily digestible liquid or semi-liquid diets, with encouragement for frequent small meals. Severe cases require nutritional risk assessment, and intravenous nutritional support may be administered when necessary to ensure adequate energy and nutrient supply, thereby promoting tissue repair. Dietary management should emphasize scientific rationality, avoiding spicy and irritating foods to maintain normal physiological functions.

**Family-centered psychological care:** Chronic diseases, isolation treatment, and invasive procedures are prone to induce anxiety and fear in children. Nursing care should encourage parental involvement throughout the entire care process (e.g., feeding, comforting, assisting with rehabilitation training) to enhance the child's sense of security. Meanwhile, differentiated psychological interventions can be implemented for children of different age groups. Younger children can divert their attention through games and picture books, while older children can acquire disease knowledge through communication to alleviate psychological burden. When necessary, professional intervention by a psychologist may also be combined.

#### **Outpatient continuity care and health education**

**Information-based continuity of care model:** With the advancement of information technology, continuous care based on specialized educational and scientific APPs, WeChat groups, and other digital platforms has become a research hotspot. The platform enables multiple functions including post-discharge medication guidance, symptom monitoring, follow-up reminder, and rehabilitation exercise instruction. Nurses can provide real-time answers to family members' inquiries, monitor the child's recovery progress, and promptly adjust nursing recommendations. Studies have demonstrated that continuous nursing combined with intensive respiratory function training significantly enhances the child's disease awareness rate and nursing satisfaction, while improving prognosis quality.

**Precision health education:** The key focus of the education is on three aspects. First, cognitive guidance regarding disease progression: inform family members that the course of MPP may be prolonged, with cough symptoms potentially persisting for several weeks, to avoid anxiety caused by symptom duration. Second, the identification of warning signs, clarifying the symptoms of "red alert" (such as recurrent high fever, dyspnea, lethargy, chest pain, hemoptysis, etc.), guiding family members to promptly recognize and return to the hospital for follow-up; Third, disseminate preventive education by explaining key measures for droplet transmission control, such as wearing masks, covering the mouth and nose when coughing, frequent hand washing, and avoiding crowded places, to reduce the risk of cross-infection.

## Summary and Outlook

Significant progress has been made in the current research on the nursing care of pediatric mycoplasma pneumonia, with its core characteristics manifested in four major transformations. First, the nursing intervention is advanced, shifting from passive compliance with medical orders to proactive assessment and early warning; second, the scope of nursing care is expanded, extending from single pulmonary care to comprehensive multi-system monitoring, and from acute-phase nursing to rehabilitation management. Third, evidence-based nursing methods are adopted to optimize nursing practices based on the latest clinical research evidence; Fourth, the nursing center adopts a focused approach, placing greater emphasis on the overall needs and experiences of pediatric patients and their families, and promotes comfortable nursing and family-centered nursing models.

Future research on the nursing care of Mycoplasma pneumonia in children should focus on three major directions. First, explore a risk-based stratified nursing pathway, developing personalized care plans according to factors such as the child's age, disease severity, and drug resistance risk; Secondly, improve the standardized pulmonary rehabilitation nursing protocol for sequelae, optimize the content and frequency of respiratory function training based on evidence-based evidence, and enhance rehabilitation outcomes. Third, accelerate the application of artificial intelligence in nursing by developing symptom monitoring and early warning systems to achieve intelligent analysis and risk alerts for symptoms such as fever and cough, thereby enhancing the precision and efficiency of nursing care. Through continuous innovation and practice, the nursing system for pediatric mycoplasma pneumonia is continuously improved to provide children with higher-quality, more efficient, and comprehensive care services.

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