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**Review Article**

# Prevalence and management of persistent cough in children post-viral infection

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## ABSTRACT

Persistent cough in children following viral respiratory infections is a common presentation in clinical practice, often causing concern among caregivers and prompting repeated healthcare visits. While acute viral illnesses typically resolve within two to three weeks, a subset of children experience prolonged cough that persists beyond this period, sometimes lasting up to eight weeks. The pathophysiology involves a combination of heightened cough reflex sensitivity, lingering airway inflammation, and potential involvement of coexisting conditions such as asthma or protracted bacterial bronchitis. Identifying the underlying cause can be challenging due to overlapping symptoms, variability in caregiver reporting, and the limited availability of pediatric-specific diagnostic tools. Prevalence rates vary significantly across regions, with higher incidences observed in low-resource settings where environmental exposures, overcrowding, and delayed access to care are more common. Differences in viral pathogens also influence outcomes, with viruses such as respiratory syncytial virus, rhinovirus, and adenovirus more likely to be associated with prolonged symptoms. Diagnosis relies heavily on clinical judgment, as cough characteristics and duration alone are often insufficient to distinguish between post-viral cough and more chronic respiratory conditions. Management strategies are inconsistent, with frequent reliance on medications lacking strong evidence of efficacy in pediatric populations. Antitussives, inhaled corticosteroids, and antibiotics are often prescribed without clear indications, contributing to unnecessary treatment and potential harm. Non-pharmacologic approaches, including caregiver reassurance and environmental modifications, are commonly recommended but remain under-researched. Overall, the variability in clinical practice highlights the need for more robust pediatric-focused studies and clearer guidelines to support appropriate diagnosis and treatment. Addressing these gaps is essential to improve patient outcomes, reduce unnecessary interventions, and alleviate the burden on families and healthcare systems.

**Keywords:** Persistent cough, Post-viral infection, Pediatric respiratory, Cough management, Diagnostic challenges

## INTRODUCTION

Persistent cough in children following viral respiratory infections is a frequent clinical challenge encountered in both primary care and pediatric respiratory clinics. While most acute viral respiratory illnesses in children are resolved within two to three weeks, a subset of children continue to exhibit cough that lasts beyond the expected duration. This post-infectious or post-viral cough can persist for weeks, generating concern among caregivers and often leading to repeated medical consultations and unnecessary treatment interventions.

Post-viral cough is commonly defined as a cough that persists for more than three weeks but less than eight weeks following an upper respiratory tract infection in the absence of other identifiable causes. It is typically non-productive and worse at night or with exertion. The mechanisms responsible for persistent cough after a viral illness are multifactorial and involve heightened cough reflex sensitivity, airway inflammation, and postnasal drip due to lingering upper airway inflammation or subclinical infection. In some cases, post-infectious cough may also unmask underlying conditions such as asthma, pertussis, or protracted bacterial bronchitis.[1]

The burden of persistent cough in children is significant, not only because of its prevalence but also due to its impact on quality of life, sleep, school attendance, and parental anxiety. Studies have shown that post-infectious cough is one of the leading causes of subacute cough in children, and in certain populations, accounts for up to 30 percent of all pediatric visits for cough.[2] The diagnosis often remains clinical, based on a thorough history and physical examination. In most cases, no specific testing is required unless there are red flag symptoms or signs of chronic disease. However, inappropriate use of imaging or medications such as antibiotics and cough suppressants is not uncommon, often due to diagnostic uncertainty and parental expectations.[3]

Management strategies emphasize reassurance, watchful waiting, and addressing modifiable environmental factors such as exposure to tobacco smoke or allergens. Pharmacologic treatment is generally discouraged unless a specific underlying condition is identified. Nonetheless, empirical trials of inhaled corticosteroids or bronchodilators are sometimes used, particularly if there is suspicion of airway hyperresponsiveness or asthma. Non-pharmacologic approaches, including honey-based therapies in children over one year and adequate hydration, have shown modest benefit in symptom relief.[4]

## REVIEW

Persistent cough following viral infections in children remains a multifaceted concern in pediatric practice, influenced by variations in immune response, viral type, and pre-existing respiratory vulnerability. While many cases resolve spontaneously, some children experience prolonged symptoms that disrupt daily activities and sleep. Studies suggest that airway hyperresponsiveness post-infection may contribute to the persistence of symptoms, particularly in children predisposed to asthma or with a history of atopy.[5] This overlap often complicates clinical differentiation and may lead to overdiagnosis or unnecessary use of bronchodilators and corticosteroids.

The role of environmental exposures, such as passive smoking and pollution, has been increasingly recognized in prolonging cough symptoms and delaying recovery. These factors not only exacerbate airway inflammation but may also mask the resolution of the initial viral insult, leading to misinterpretation of disease chronicity.6 Management approaches should prioritize accurate diagnosis, caregiver education, and minimizing pharmacologic intervention unless clearly indicated. The need for more high-quality studies to define optimal treatment strategies remains, particularly in distinguishing post-viral cough from early signs of chronic respiratory conditions. By focusing on evidence-based interventions and minimizing unnecessary therapies, clinicians can provide better-targeted care while reducing the burden on families and healthcare systems.

## VARIABILITY IN PREVALENCE ACROSS POPULATIONS AND VIRAL ETIOLOGIES

The prevalence of persistent cough in children following viral respiratory infections is not uniform across populations, geographic regions, or etiological agents. Differences emerge due to multiple interacting variables, including viral strain, host factors, climate, healthcare access, and diagnostic criteria applied across studies. These inconsistencies challenge clinicians and researchers attempting to generalize findings or develop standardized management guidelines.

Certain viral pathogens are more commonly implicated in prolonged cough episodes than others. Respiratory syncytial virus, rhinovirus, and adenovirus have been frequently associated with extended respiratory symptoms in younger children, particularly under five years of age.[7] These viruses are known to trigger lasting changes in the airway, including epithelial damage and increased neuronal sensitivity, which may sustain the cough reflex well beyond the resolution of acute infection. Among them, rhinovirus holds a distinct place due to its capacity to induce airway hyperresponsiveness, a factor closely tied to both persistent cough and the later emergence of asthma symptoms in susceptible children.

Epidemiological data across countries reflect how environmental and socioeconomic contexts shape the expression and burden of post-viral cough. A multi-country cohort study conducted in low- and middle-income countries found a higher incidence of post-viral cough among children exposed to indoor air pollutants and those living in overcrowded conditions.[8] In these

settings, recurrent infections and limited access to healthcare delay diagnosis and appropriate follow-up. Moreover, children may be misdiagnosed with recurrent viral infections when they are experiencing a single prolonged illness.

Climatic and seasonal variations further modulate the prevalence and severity of post-viral cough. During colder months, when respiratory viruses peak, children are not only more frequently infected but also more likely to be exposed to indoor allergens and pollutants due to increased time spent indoors. These environmental exposures can perpetuate inflammation and stimulate cough receptors, extending the symptomatic phase. In contrast, data from tropical regions show a different pattern, where viral outbreaks are less seasonal, but persistent cough is still commonly reported, particularly following influenza and parainfluenza infections.[9] These pathogens have been shown to cause substantial mucosal irritation and immune dysregulation in young airways, contributing to prolonged cough reflex hypersensitivity.

The child's age and immune maturity play equally vital roles in determining vulnerability to prolonged symptoms. Younger children, particularly infants and toddlers, have narrower airways and immature immune responses that can prolong the inflammatory phase following viral clearance. This physiological context often results in lingering symptoms, even after the viral load has diminished. A study examining school-aged children in urban settings highlighted that older children are not exempt; persistent cough occurred frequently after upper respiratory tract infections and was often attributed to non-specific bronchial hyperreactivity or post-nasal drip.[10] However, the frequency and duration were generally lower than those seen in younger cohorts.

## CHALLENGES IN DIAGNOSIS

Diagnosing persistent cough in children following viral infection often becomes a diagnostic maze, complicated by overlapping clinical presentations, evolving symptom trajectories, and variable interpretation of cough duration thresholds. While the most common viral respiratory infections in children are self-limiting, when a cough lingers past the expected recovery window, clinicians face the challenge of determining whether they are witnessing a prolonged post-viral course or an early manifestation of an underlying or coexisting condition.

Diagnostic guidelines differ in how they define subacute versus chronic cough, often leading to inconsistency in the timing of investigations. Some clinicians may initiate extensive testing before the typical 4- to 8-week period of symptom resolution, especially in anxious clinical settings or where follow-up is uncertain. This can result in misclassification and overtreatment, particularly in cases where the cough is dry and not accompanied by systemic or focal signs. Clinical scoring tools and structured history-taking frameworks have been developed, but their adoption remains limited due to time constraints in primary care and variability in clinical training.[11]

Cough quality is another diagnostic variable that is frequently misjudged. Parents or caregivers often describe the cough as productive based on audible characteristics, but studies using cough sound analysis have shown that subjective reports poorly correlate with actual sputum production in children. Wet cough in children can sometimes reflect upper airway secretions rather than lower respiratory tract involvement, further blurring diagnostic clarity.[3] Without objective measurements such as induced sputum analysis or bronchoscopy, decisions must often rely on clinical intuition, which varies widely across practitioners and settings.

Underlying chronic conditions such as protracted bacterial bronchitis, asthma, or upper airway cough syndrome can closely mimic post-viral cough or coexist with it. Distinguishing between these requires not just symptom profiling but also understanding the temporal pattern, response to previous therapies, and physical examination findings. In settings with limited access to pediatric pulmonologists or diagnostic tools like spirometry, clinicians may default to empirical treatment trials with inhaled corticosteroids or antibiotics. These empirical decisions can mask the natural progression of the illness and obscure the diagnostic picture if symptoms later recur or persist beyond expected timelines.[12] Sociocultural factors also shape how persistent cough is reported and investigated. In many regions, parental concern about tuberculosis or whooping cough can heighten pressure on clinicians to act decisively, often prompting investigations that may not be clinically warranted. Language barriers and varying thresholds of concern about cough duration or severity can skew the history, leading to either over- or under-recognition of red flags. Studies have also noted that the presence of background noise in busy clinics can compromise auscultation quality, especially when evaluating subtle findings like wheeze or crackles, resulting in missed cues.[13]

## EFFICACY AND LIMITATIONS OF CURRENT MANAGEMENT STRATEGIES

Antitussives and mucolytics are routinely prescribed, particularly in settings where parents express distress over nocturnal coughing. However, controlled trials have not demonstrated convincing benefit in children. Several guidelines discourage their routine use due to lack of efficacy and potential for harm in young age groups.[14] Over-the-counter cough medications containing dextromethorphan or codeine analogues have been shown to offer minimal advantage over placebo, while carrying risks of sedation, respiratory depression, or misuse. Even so, these medications remain widely used in some regions, often driven by caregiver expectations rather than clinical indication.

Honey-based therapies, while more natural and generally safer, also offer only modest symptomatic improvement. Trials indicate slight reductions in cough frequency and severity with nocturnal administration of honey compared to no treatment or placebo, but the benefit is not robust across all age brackets. Furthermore, these options are contraindicated in children under one year due to the risk of infant botulism, which limits their universal applicability.[15,16] Despite these constraints, many clinicians recommend honey products as a first-line option, particularly when aiming to avoid unnecessary pharmacological exposure.

Inhaled corticosteroids and beta-agonists occupy a controversial place in the management hierarchy. In children with post-viral cough but no prior asthma diagnosis, their effectiveness remains uncertain. Some clinicians initiate short-term trials based on suspected airway hyperresponsiveness, although studies have not consistently confirmed benefit in non-asthmatic populations.[17] The overlap of post-infectious cough with undiagnosed asthma, however, muddies interpretation, especially when the child demonstrates partial improvement. Without objective confirmation, these therapies risk being used as diagnostic tests rather than targeted treatments.

Antibiotics are frequently prescribed when a wet cough persists beyond three to four weeks, often under the presumption of protracted bacterial bronchitis. While there is some support for a trial of antibiotics in children with persistent productive cough and no systemic symptoms, misuse is common. Prescribing patterns often disregard established criteria, particularly in high-pressure clinical environments where follow-up is unlikely. Broad-spectrum antibiotics may be used empirically despite narrow evidence supporting targeted bacterial pathogens, contributing to antimicrobial resistance and unnecessary side effects.[18] The problem is compounded in settings without access to sputum culture or pediatric respiratory specialists, where practitioners may err on the side of overtreatment.

## CONCLUSION

Persistent cough in children post-viral infection remains a frequent and often misunderstood condition requiring nuanced evaluation. While most cases are self-limiting, misdiagnosis and overtreatment are still common due to diagnostic uncertainty. Evidence-based strategies must be emphasized over empirical practices to optimize care. Further research is needed to refine diagnostic tools and establish clearer management protocols.

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