

Hantavirus in Pediatric Patients: What Have We Learned and What Should We Expect?

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ABSTRACT

The 2026 Andes virus (ANDV) outbreak aboard the MV Hondius cruise ship, with 13 confirmed or probable cases and three deaths, brought hantaviruses back to global attention and exposed a persistent gap in the literature: the paediatric perspective. Hantaviruses cause two major syndromes, haemorrhagic fever with renal syndrome (HFRS) in Europe and Asia, and hantavirus cardiopulmonary syndrome (HCPS) in the Americas, both potentially severe across all age groups. In children, reported incidence is lower than in adults, but this likely reflects diagnostic underrecognition rather than biological resistance: clinical features are frequently atypical, overlapping with gastroenteritis, nephritis, or viral respiratory illness, and thrombocytopenia with acute organ involvement may be the only laboratory signal. No confirmed paediatric cases emerged from the Hondius outbreak, a finding that reflects the demographics of this expedition cruise rather than any reassuring epidemiological pattern. ANDV's capacity for human-to-human transmission via respiratory secretions during close contact, combined with an incubation period of up to 42 days, makes family exposure scenarios, and delayed paediatric diagnosis, entirely plausible.

Keywords: Hantavirus; Pediatric Hantavirus Infection; Children, Hantavirus Pulmonary Syndrome (HPS); Hemorrhagic Fever with Renal Syndrome (HFRS); Zoonotic Viral Infection; Rodent-Borne Disease; Orthohantavirus

INTRODUCTION

In May 2026, the global health community was reminded that hantaviruses retain epidemic potential. A cluster of the Andes species of hantavirus (ANDV) infections aboard the cruise ship MV Hondius, originating from Argentina and resulting in at least 13 confirmed or probable cases and three deaths, showed how rodent-borne pathogens can spread beyond classical endemic foci once an index case enters a closed, high-density environment [1-2]. The outbreak, characterised by documented human-to-human transmission and a case-fatality ratio approaching 23%, prompted emergency guidance from the World Health Organization (WHO), the European Center of Diseases and European Centre for Disease Prevention and Control (ECDC), and several national health ministries' [1-30]. Yet one population received little attention in the ensuing debate: children.

Despite their clinical significance and increasing travel-related transmission risk, the pediatric literature on hantavirus disease remains sparse and fragmented. This mini-review synthesizes current evidence regarding hantavirus infection in the pediatric

population, addresses diagnostic and therapeutic gaps, and identifies priorities for clinical preparedness and research.

EPIDEMIOLOGY AND TRANSMISSION

Routes of transmission. Hantaviruses are primarily carried by rodents such as mice, rats, and voles and typically spread through the air on particles from rodent urine, droppings or saliva. However, the Andes species can spread between humans who are in a prolonged close contact, such as among family members [4,5]. Although the precise mechanism by which the virus passes between people has not been established, some evidence suggests its transmission via respiratory secretions during close, prolonged contact with a symptomatic individual [4,5].

Incidence in the Pediatric population. Epidemiological data consistently report a lower incidence in the paediatric population than in adults; however, emerging evidence suggests this disparity may reflect underrecognition rather than genuine biological protection. Mocanu et al., in a single-centre Romanian cohort, underscored that reduced incidence in children is likely attributable to limited diagnostic awareness and insufficient

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clinical suspicion rather than intrinsic resistance [6]. In contrast, severe hantavirus disease in children can occur in highly pathogenic strains: in Sochi virus, a Russian Hantavirus genotype, the frequency of clinical cases and the severity of disease course among children were found to be comparable to those in adults [7]. Supporting this finding, between 1999 and 2016, 32 confirmed paediatric HCPS cases were reported in Mato Grosso State, Brazil, with a mortality rate of 34.4%, similar to adult figures [8]. The largest US dataset to date analyzed 719 HPS cases reported to the CDC from 1993 to 2018, confirming that children may progress to death more rapidly than adults, and that elevated haematocrit and creatinine levels at presentation were associated with mortality exclusively in the paediatric group [9]. These few data underscore that age alone does not definitely confer protection against severe hantavirus disease.

CLINICAL PRESENTATION AND DIAGNOSIS

Overview of Hantavirus Syndromes

Hantaviruses cause two major clinical syndromes: haemorrhagic fever with renal syndrome (HFRS), typically known as Korean haemorrhagic fever, predominant in Europe and Asia, and hantavirus cardiopulmonary syndrome (HCPS), predominant in the Americas [4,10]. Both diseases may first mimic a flu-like illness: high fever, headaches, backache, diarrhoea, and vomiting [4]. While HFRS is often mildly symptomatic with patients recovering from flu-like symptoms, HCPS symptoms may soon progress to the so-called cardiopulmonary phase, with patients displaying cough and shortness of breath, progressing to severe disease requiring intensive care support. [9].

Pediatric Clinical Presentation and Diagnostic Pitfalls

The clinical presentation of hantavirus disease in children adds a further layer of diagnostic complexity. In HFRS, the pediatric course may appear milder than in adults, with abdominal pain, vomiting, and fever predominating, features that overlap extensively with common paediatric diagnoses such as gastroenteritis or appendicitis [11]. Thrombocytopenia and acute kidney injury may be the only laboratory clues, and cases have been misdiagnosed as glomerulonephritis, lupus nephritis, or viral encephalitis before serological confirmation [11,12].

In contrast, pediatric HCPS carries substantial severity. A landmark series from the United States and Canada of 13 paediatric cases ages [10–16] with Sin Nombre virus-associated HCPS, documented that 92% developed full HCPS, 67% required mechanical ventilation, and the case-fatality ratio reached 33%—on par with adult outcomes [13]. When critically ill children reach the cardiopulmonary phase, haemodynamic compromise can be fulminant, and access to extracorporeal membrane oxygenation (ECMO) in paediatric centres may be decisive for survival outcome [14]. This has been highlighted in a study cohort conducted by Wernly on 51 HCPS patients with refractory cardiopulmonary failure and predicted mortality of 100%, two thirds survived with venoarterial ECMO support, with survival rates improving significantly in the latter half of the study period [14].

Diagnostic limits

The diagnostic gap is equally pressing: RT-PCR and ANDV-specific serology are not available in routine paediatric laboratories, and clinicians must be aware of biosafety requirements for handling specimens from suspected cases—including appropriate containment measures and triple packaging during transport [3] – which further complicates specimen management in pediatric departments [9]. The rarity of paediatric hantavirus disease implies that clinicians may not consider the diagnosis until late in the illness course, particularly when the presentation overlaps with common childhood respiratory and gastrointestinal infections [9].

MANAGEMENT AND THERAPEUTIC APPROACHES

Current Supportive Care and Clinical Management. There are no approved antivirals or vaccines for hantavirus infection in Europe or the United States [4,15,16]. Current management remains supportive, anchored by early recognition, vigilant haemodynamic monitoring, lung-protective ventilation in HCPS, and renal replacement therapy in severe HFRS. The absence of targeted therapeutics underscores that early clinical suspicion the single most powerful prognostic tool available to pediatricians. Recognition of compatible clinical presentations, like thrombocytopenia combined with acute kidney injury or respiratory failure, in children with relevant exposure histories, is pivotal for timely diagnosis and initiation of supportive care.

Investigational Antiviral Therapies

Ribavirin has demonstrated activity in animal models and early clinical data for HFRS, showing reduced mortality when administered early in the course of infection [15,16]. However, its utility in HCPS remains unproven, and no paediatric dosing protocols have been validated in randomised trials. Among candidate, lactoferrin (LF) has shown in vitro activity against hantavirus entry, with partial reduction of focus formation in animal models and complete inhibition when combined with ribavirin [17]. Griffithsin (GRFT), a lectin from red algae that targets oligomannose glycans on viral surface proteins, has demonstrated broad antiviral activity in vitro against HIV and SARS-CoV; given the heavy glycosylation of hantavirus entry proteins Gn and Gc, it represents a mechanistically plausible candidate, though direct evidence against hantaviruses in paediatric models is still lacking [18].

THE 2026 ANDES VIRUS OUTBREAK

The 2026 MV Hondius cluster confirmed that ANDV, long considered geographically confined to southern South America, can enter international travel networks with little warning [1]. Although its capacity for person-to-person transmission has been documented in family clusters and healthcare settings alike, no paediatric cases were identified among the 13 confirmed or probable cases reported to date [10,19]. While this finding appears reassuring finding, it likely reflects the specific passenger demographics of this expedition cruise rather than any biological protection afforded by pediatric age.

Several factors underscore the possibility of future pediatric cases in similar settings. Close-quarters environments, like cruise ship cabins shared between parents and children, or family households accommodating a returning traveller, represent high-risk contexts for intrafamilial paediatric exposure. Although ANDV's reproductive number stays below 1 under standard precautions, the non-specific flu-like symptoms (fever, headache, myalgia, gastrointestinal upset) may delay initial recognition and microbiological identification. Compounding this risk is ANDV's prolonged incubation period of up to 42 days, during which asymptomatic or minimally symptomatic individuals may transmit the virus to vulnerable household contacts [1-20].

DISCUSSION

Synthesis of Current Evidence

The pediatric hantavirus literature, while growing, remains limited by a few case reports and small case series, particularly from non-endemic regions. The available evidence consistently demonstrates that children are susceptible to severe hantavirus disease at rates comparable to adults, particularly in highly pathogenic strains such as ANDV and Sochi virus [7]. The apparent lower incidence in pediatric cohorts likely reflects underdiagnosis rather than inherent biological resistance, as suggested by the Romanian cohort study and Brazilian case series data [6,10,13]. This critical distinction has major implications for clinical practice, as pediatric clinicians cannot rely on age-related reassurance when evaluating children with compatible exposures and clinical presentations [8,10]. Thorp et al. further demonstrated how the time from symptom onset to death may be shorter in children than in adults, suggesting that the paediatric host may have less tolerance for the haemodynamic and respiratory deterioration that characterises the cardiopulmonary phase [9].

Diagnostic and Clinical Implications

The substantial overlap between early hantavirus symptoms and common pediatric conditions (gastroenteritis, appendicitis, viral respiratory illness, nephritis) creates a significant diagnostic barrier.

Laboratory findings, particularly thrombocytopenia with acute kidney injury or respiratory manifestations, should prompt consideration of hantavirus in children with relevant exposure histories, even in non-endemic regions, to avoid misdiagnosis as other life-threatening conditions like glomerulonephritis, lupus nephritis, or viral encephalitis.

The absence of early serological confirmation and pediatric-specific dosing protocols for investigational antivirals represents a critical knowledge gap. While ribavirin shows promise in HFRS, its role in pediatric HCPS remains undefined, and candidate therapeutics such as lactoferrin and griffithsin showed a mechanistic plausibility, but they still lack paediatric-specific preclinical validation.

CONCLUSIONS

Climate change, habitat disruption, and expanded travel are reshaping rodent reservoir distributions and increasing

opportunities for human-rodent contact [10,19]. The 2026 MV Hondius outbreak demonstrates that ANDV, considered geographically confined to southern South America, can enter international travel networks, and paediatric infectious disease specialists must be included in preparedness planning at the institutional, national, and international levels. From a paediatric perspective, three areas deserve particular attention: recognition of hantavirus among children presenting with compatible clinical syndromes (thrombocytopenia, acute kidney injury, or acute respiratory failure) and exposure histories, generation of paediatric-specific clinical data, and ensuring that future antiviral and vaccine trials may include paediatric cohorts [3].

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Author contributions (Credit)

EP- Conceptualization, Writing (original draft);

FV - Writing (review & editing), Supervision.

AV - Supervision

Conflict of Interest

The authors declare no conflict of interest.

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