

The Expanding Definition of 'Enteric Virus': Beyond Traditional Gastroenteritis

Ashutosh Kumar Singh

VIT Bhopal University, Madhya Pradesh, India.

Article Info

Received: March 05, 2026

Accepted: March 11, 2026

Published: March 16, 2026

***Corresponding author:** Ashutosh Kumar Singh, VIT Bhopal University, Madhya Pradesh, India.

Citation: Ashutosh K Singh. (2026) “The Expanding Definition of 'Enteric Virus': Beyond Traditional Gastroenteritis.”, *Clinical Medical Case Reports and Case Series*, 3(1); DOI: 10.61148/3065-7644/CMCRCS/060.

Copyright: © 2026. Ashutosh Kumar Singh. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract:

The COVID-19 pandemic has fundamentally shifted our understanding of what defines an “enteric virus.” Traditionally associated with pathogens causing acute gastroenteritis, the term is now expanding as evidence accumulates that SARS-CoV-2—primarily viewed as a respiratory virus—readily infects the gastrointestinal tract. The presence of ACE2 receptors in the gut, frequent fecal shedding of viral RNA, and the success of wastewater surveillance have highlighted an underappreciated enteric dimension of COVID-19. Persistent gastrointestinal symptoms and microbiome alterations in post-acute cases highlight the critical role of the gut in both acute and chronic viral diseases. This new perspective extends beyond SARS-CoV-2: many viruses categorized by their primary symptoms, such as adenoviruses, enteroviruses, and herpesviruses, can display significant enteric involvement, especially in vulnerable hosts. As a result, traditional boundaries between respiratory, neurological, and enteric viruses have become increasingly blurred. This broader view calls for integrated diagnostics, surveillance strategies that include wastewater monitoring, and a stronger focus on the gut’s role in viral pathogenesis. Ultimately, redefining “enteric virus” fosters better pandemic preparedness and more comprehensive care for viral disease, urging infectious disease research to move beyond outdated classifications in favor of a system-wide approach.

Keywords: enteric viruses, SARS-CoV-2, viral tropism, gastrointestinal infection, wastewater surveillance, gut-brain axis, microbiome, pandemic preparedness

Introduction:

For years, “enteric virus” has almost exclusively brought to mind the familiar set of pathogens linked to gastroenteritis—rotavirus, norovirus, adenovirus, and astrovirus—well-known for causing nausea, diarrhea, and dehydration. This traditional framing has shaped not just our scientific understanding but also how clinicians diagnose cases and public health officials manage outbreaks. The arrival of COVID-19, however, has fundamentally disrupted this once-stable picture.

SARS-CoV-2—long classified as a respiratory virus—has proven that viral infections do not always respect tidy definitions. Its ability to infect cells in the gastrointestinal tract, trigger digestive symptoms, and shed viral RNA in feces has blurred the once-clear line between respiratory and enteric viruses.

These findings force us to rethink the core assumptions that guide research into viral behavior and disease. Rather than fitting viruses neatly into separate categories, we now face a more complex reality where the boundaries are fluid, and “enteric” involvement can be just as important as respiratory—or even come to the forefront. This shift compels us to revisit our approaches to diagnostics, surveillance, and treatment, making space for a more nuanced and adaptable view of how viruses interact with the human body.

SARS-CoV-2: The Catalyst for Conceptual Revolution

Evidence of Profound Enteric Tropism

The gastrointestinal tract has emerged as a critical battleground for SARS-CoV-2 infection, with ACE2 receptors expressed at far higher levels in the small intestine than in the respiratory tract (1). This receptor distribution pattern creates a biological foundation for significant enteric involvement. Studies have consistently demonstrated that SARS-CoV-2 can directly infect and replicate within intestinal epithelial cells (2, 3), with viral RNA and nucleocapsid proteins detected in gastric, duodenal, and rectal epithelia (2).

The clinical manifestations of this enteric tropism are substantial. Gastrointestinal symptoms occur in 25% of COVID-19 patients (4), with diarrhea affecting 8-17% of cases(3). Importantly, these symptoms can precede respiratory manifestations or occur independently, challenging the traditional respiratory-centric view of COVID-19 (3). The virus demonstrates remarkable persistence in the gastrointestinal tract, with viral RNA detected in feces for up to 5 weeks after respiratory samples test negative (5).

Revolutionary Implications for Transmission

The enteric dimension of SARS-CoV-2 has profound implications for transmission dynamics. Fecal-oral transmission, while not the primary route, represents a plausible and potentially significant secondary pathway (6). Studies have shown that 46.5% of COVID-19 patients had positive stool samples for viral RNA (6), and experimental evidence demonstrates that fecal SARS-CoV-2 can indeed infect cell cultures and animal models (6).

Perhaps most significantly, wastewater surveillance has emerged as an invaluable tool for community-level monitoring (7, 8). The detection of SARS-CoV-2 RNA in wastewater provides early warning signals for outbreaks, often preceding clinical case identification by days to weeks (9). This surveillance approach has proven so effective that it has been implemented in over 55 countries across more than 2,690 monitoring sites (8).

Long-term Gastrointestinal Consequences

The enteric involvement of SARS-CoV-2 extends far beyond acute infection. Long COVID manifests with persistent gastrointestinal symptoms in a significant proportion of patients. Common long-term manifestations include chronic diarrhea, abdominal pain, irritable bowel syndrome-like symptoms, and profound alterations in gut microbiota composition. These persistent symptoms suggest that the virus may establish reservoirs in the gastrointestinal tract or trigger lasting immune dysregulation (10).

The gut-brain axis emerges as a critical pathway for understanding COVID-19's neurological sequelae (11). Gut dysbiosis induced by SARS-CoV-2 infection can lead to increased intestinal permeability, bacterial translocation, and systemic inflammation that ultimately affects brain function (11). This connection illustrates how enteric viral infections can have far-reaching consequences beyond the gastrointestinal system.

Beyond SARS-CoV-2: Redefining the Enteric Virus Landscape

The Broader Spectrum of "Non-Classical" Enteric Viruses

SARS-CoV-2 is not an isolated anomaly but rather a prominent example of how viruses traditionally categorized by their primary clinical manifestation can have significant enteric involvement. Adenoviruses, particularly serotypes 40 and 41, are well-established causes of gastroenteritis(12), but other serotypes may also contribute to gut pathology in broader infections.

Enteroviruses present a fascinating paradigm of viral tropism heterogeneity (13). While known for neurological manifestations like poliomyelitis and hand-foot-mouth disease, these viruses replicate extensively in the gastrointestinal tract. The comparison between EV-D68 (respiratory) and EV-D94 (enteric) demonstrates how closely related viruses can display dramatically different tissue tropism patterns(13).

Herpesviruses, including cytomegalovirus (CMV) and Epstein-Barr virus (EBV), cause significant gastrointestinal disease in immunocompromised individuals (14). CMV colitis is well-recognized in transplant recipients and AIDS patients, while EBV can cause severe hemorrhagic colitis (14). These viruses illustrate how host immune status profoundly influences the manifestation of enteric viral infections.

Respiratory Viruses with Unexpected Gut Connections

Influenza virus infection demonstrates remarkable systemic effects on the gastrointestinal tract despite being primarily respiratory (15). Influenza infection alters gut microbiota composition through type I interferons, leading to intestinal inflammation and barrier dysfunction (15). This systemic effect can predispose patients to secondary bacterial infections and contributes to the gastrointestinal symptoms often observed in influenza patients.

Respiratory syncytial virus (RSV) infection similarly affects gut microbiota through induction of appetite suppression (16). The cellular immune response to lung infection triggers changes in feeding behavior, which in turn alters the gut microbiome and metabolome (16). This connection between respiratory viral infections and gut health represents a fundamental shift in our understanding of viral pathogenesis.

The Path Forward: Transforming Diagnostic and Surveillance Approaches

Enhanced Diagnostic Strategies

As our understanding of enteric viruses broadens, it's become clear that we need more inclusive diagnostic strategies—ones that recognize gastrointestinal symptoms even in viruses not traditionally considered enteric. To get a clearer picture of how these viruses behave, clinicians and researchers must analyze not just stool samples, but also respiratory and blood specimens (17).

Modern molecular tools like RT-qPCR and next-generation sequencing have become essential in this process (18). They offer the accuracy needed to detect viral RNA across different types of samples, and they're especially valuable for tracking how viruses evolve and identifying new variants (18).

Integrated Surveillance Systems

Wastewater-based epidemiology must be integrated with clinical surveillance to create comprehensive monitoring systems. The COVID-19 pandemic has demonstrated the power of combining environmental and clinical data to provide early warning signals and track disease trends (19).

Future surveillance systems should adopt a holistic approach that integrates information from multiple sources. This includes traditional clinical surveillance, environmental monitoring, and

novel data streams such as mobile health applications and citizen science reporting.

Therapeutic Innovations Targeting the Gut-Virus Interface

Microbiome-based therapeutic interventions represent a promising frontier for antiviral therapy (20). Probiotics, prebiotics, and fecal microbiota transplantation have shown efficacy in modulating viral infections by enhancing gut barrier function and immune regulation (20).

Targeting the gut-brain axis offers novel therapeutic approaches for managing the neurological consequences of viral infections. Understanding how gut dysbiosis contributes to neurological symptoms opens new avenues for intervention using microbiome-targeted therapies.

References:

1. Sajdel-Sulkowska EM. A dual-route perspective of SARS-CoV-2 infection: Lung-vs. gut-specific effects of ACE-2 deficiency. *Frontiers in Pharmacology*. 2021;12:684610
2. Shi J, Sun J, Hu Y. Enteric involvement of SARS-CoV-2: Implications for the COVID-19 management, transmission, and infection control. Taylor & Francis; 2020. p. 941-4.
3. Chen T-H, Hsu M-T, Lee M-Y, Chou C-K. Gastrointestinal involvement in SARS-CoV-2 infection. *Viruses*. 2022;14(6):1188
4. Xu J, Chu M, Zhong F, Tan X, Tang G, Mai J, et al. Digestive symptoms of COVID-19 and expression of ACE2 in digestive tract organs. *Cell death discovery*. 2020;6(1):76
5. Gandhi P A, Singh T. Feco-oral transmission of SARS-CoV-2. *Asia Pacific Journal of Public Health*. 2020;32(6-7):370-
6. Termansen MB, Frische S. Fecal-oral transmission of SARS-CoV-2: A systematic review of evidence from epidemiological and experimental studies. *American journal of infection control*. 2023;51(12):1430-7
7. Li L, Mazurowski L, Dewan A, Carine M, Haak L, Guarin TC, et al. Longitudinal monitoring of SARS-CoV-2 in wastewater using viral genetic markers and the estimation of unconfirmed COVID-19 cases. *Science of The Total Environment*. 2022;817:152958
8. Maryam S, Ul Haq I, Yahya G, Ul Haq M, Algammal AM, Saber S, et al. COVID-19 surveillance in wastewater: An epidemiological tool for the monitoring of SARS-CoV-2. *Frontiers in cellular and infection microbiology*. 2023;12:978643
9. Bastardo-Méndez M, Rangel HR, Pujol FH, Grillet M-E, Jaspe RC, Malaver N, et al. Detection of SARS-CoV-2 in wastewater as an earlier predictor of COVID-19 epidemic peaks in Venezuela. *Scientific Reports*. 2024;14(1):27294
10. He K-Y, Lei X-Y, Zhang L, Wu D-H, Li J-Q, Lu L-Y, et al. Development and management of gastrointestinal symptoms in long-term COVID-19. *Frontiers in Microbiology*. 2023;14:1278479
11. Vakili K, Fathi M, Yaghoobpoor S, Sayehmiri F, Nazerian Y, Nazerian A, et al. The contribution of gut-brain axis to development of neurological symptoms in COVID-19 recovered patients: A hypothesis and review of literature. *Frontiers in Cellular and Infection Microbiology*. 2022;12:983089
12. Bishop RF, Kirkwood C. Enteric viruses. Reference Module in Biomedical Sciences. 2014:B978-0-12-801238-3.02566-6
13. Filipe IC, Tee HK, Prados J, Piuz I, Constant S, Huang S, et al. Comparison of tissue tropism and host response to enteric and respiratory enteroviruses. *PLoS Pathogens*. 2022;18(7):e1010632
14. Matsumoto H, Kimura Y, Murao T, Osawa M, Akiyama T, Mannoji K, et al. Severe colitis associated with both epstein-barr virus and cytomegalovirus reactivation in a patient with severe aplastic anemia. *Case reports in gastroenterology*. 2014;8(2):240-4
15. Deriu E, Boxx GM, He X, Pan C, Benavidez SD, Cen L, et al. Influenza virus affects intestinal microbiota and secondary salmonella infection in the gut through type I interferons. *PLoS pathogens*. 2016;12(5):e1005572
16. Groves HT, Higham SL, Moffatt MF, Cox MJ, Tregoning JS. Respiratory viral infection alters the gut microbiota by inducing inappetence. *MBio*. 2020;11(1):10.1128/mbio.03236-19
17. Harvala H, Broberg E, Benschop K, Berginc N, Ladhani S, Susi P, et al. Recommendations for enterovirus diagnostics and characterisation within and beyond Europe. *Journal of clinical virology*. 2018;101:11-7
18. Itani T, Chalapa V, Semenov A, Sergeev A. Laboratory diagnosis of nonpolio enteroviruses: A review of the current literature. *Biosafety and Health*. 2023;5(2):112-9
19. Feizi R, Jaafarzadeh N, Panahi Fard M, Neisi N, Zafarzadeh A, Sabaghan M, et al. Integrating wastewater surveillance for future pandemic preparedness by tracking SARS-CoV-2 RNA in municipal wastewater in Southwest Iran. *Scientific Reports*. 2025;15(1):18219
20. Sadiq FA. Is it time for microbiome-based therapies in viral infections? *Virus Research*. 2021;291:198203.