

Journal of Medical Sciences

ISSN 1682-4474

science alert

ANSInet
an open access publisher
http://ansinet.com

OPEN ACCESS Journal of Medical Sciences

ISSN 1682-4474
DOI: 10.3923/jms.2026.124.127

Editorial
Quick Point-of-Care Testing for Human Norovirus and Rotavirus: A Pressing Need to Restrict AMR Infections in the Developing World

[1]Priyanka Khopkar-Kale, [2]Suneeta Panicker and [3]Srikanth Tripathy

[1]Department of Biotechnology, School of Basic and Applied Sciences, JSPM University, Wagholi, Pune 412201, Maharashtra, India
[2]Department of Microbiology, Dr. D.Y. Patil Arts, Commerce and Science College Pimpri, Pune-411018, Maharashtra, India
[3]Central Research Facility, Dr. D.Y. Patil Medical College, Hospital and Research Centre,
Dr D Y Patil Vidyapeeth (Deemed-to-be-University), Sant Tukaram Nagar, Pimpri, Pune-411018, Maharashtra, India

Key words: Norovirus, rotavirus, acute gastroenteritis (AGE), anti-microbial resistance (AMR), Point-of-Care (PoC)

Citation: Khopkar-Kale, P., S. Panicker and S. Tripathy, 2026. Quick point-of-care testing for human norovirus and rotavirus: A pressing need to restrict amr infections in the developing world. J. Med. Sci., 26: 124-127.

Corresponding Author: Suneeta Panicker, Department of Microbiology, Dr. D.Y. Patil Arts, Commerce and Science College Pimpri, Pune-411018, Maharashtra, India

Copyright: © 2026 Panicker *et al.* This is an open access article distributed under the terms of the creative commons attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

Acute gastroenteritis (AGE) is a major public health problem in developing countries, where it is often caused by viruses such as Norovirus (NoV) and Rotavirus (RoV), is diagnosed empirically and is treated with antibiotics. This editorial discusses the importance of rapid Point-of-Care (PoC) diagnostics for NoV and RoV for the effective management of AGE outbreaks, appropriate etiological diagnosis and prevention of antibiotic misuse as a driver of antimicrobial resistance (AMR). The originality of this editorial is the combination of the discussion around a single theme– the importance of viral PoC diagnostics (GI and GII.4 Norovirus, alongside Rotavirus) for the management of outbreaks of acute gastroenteritis (AGE) in both humans and animals, within the One Health and antimicrobial management frameworks. The findings have shown that enteric viruses are the most significant pathogens in acute gastroenteritis. Rotavirus (RoV) is considered one of the leading causes of diarrhoea worldwide, even though other viruses like Enterovirus, Astrovirus and Norovirus (NoV) are known to cause diarrhoea[1]. A RoV causes substantial morbidity and mortality. Since the introduction of the RoV vaccine, NoV has become the most common cause of AGE. The prevalence of NoV-associated diarrhoea is 18% worldwide[2] and ranges from 1.4% to 44% in India, particularly in young children[3]. The low infectious dose (only 10-18 virus particles) and high contagiousness of NoV make it easy to spread and produce outbreaks in a variety of settings[4].

Patients may be infected with more than one enteric virus and such co-infections may cause more severe diarrhoea than single infections. Rapid and accurate identification of the causative pathogen is important because some infections require specific management, some require infection-control measures to prevent transmission and pathogen identification can guide clinical decision-making. Therefore, differentiating rotaviral from non-rotaviral diarrhoea is essential. A RoV-induced gastroenteritis cannot be clinically differentiated from other enteric pathogen-induced diarrhoea; therefore, fecal materials must be tested using commercially available tests for diagnosis.

As there is currently no vaccine, prevention, early detection and control are the only ways to effectively reduce the impact of Norovirus epidemics. The gold standard ethods (Real-Time PCR/Sequencing) require specialized equipment, skilled manpower, expense, longer time and therefore pose hurdles for field deployability.

In developing countries, non-specific pan-antibiotics are used due to limited basic medical facilities in the rural outbreak areas, leading to irrational drug usage and contributing to increased mortality and antimicrobial resistance. Antibiotic exposure has drastically changed over time, causing a breeding ground for AMR as illustrated in Fig. 1.

In the age of modern medicine, the developing world is facing the threat of AMR and with the limited choices of drugs that we have, it is critical to determine the actual causative agent before starting treatment to avoid the wrong antibiotics that can lead to drug resistance. It is equally important to determine its genotype to know the circulating strains and decide on the control strategies. This could not only define a clear treatment but also minimize the problems cropping up with AMR due to the irrational use of antibiotics that facilitate it.

Interventional strategies facilitating Point-of-Care (PoC) diagnostics need to be in place, as they may facilitate early detection and management during NoV outbreaks. Rapid diagnostic tests (RDT) of NoV and RoV commonly used at PoCs for outbreak screening and patient management have high specificity but low sensitivity.

Recent advances in PoC diagnostics have led to rapid viral detection assays with great potential to manage gastroenteritis outbreaks. Isothermal nucleic acid amplification techniques such as Reverse Transcription Loop-Mediated Isothermal Amplification (RT-LAMP) or recombinase polymerase amplification (RPA) allow for sensitive and specific detection of RNA viruses at a constant temperature, thus eliminating the need for thermocyclers and reducing turnaround time[5,6]. Meanwhile, the use of microfluidic lab-on-a-chip technologies and paper-based biosensors has allowed for decreased volumes of biological samples and reagents to perform multiplex assays for various enteric pathogens[5,7]. Furthermore, recent developments in Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)-based diagnostics leveraging the RNA-cleaving activity of Cas12 or Cas13 effectors combined with isothermal amplification methods have enabled the sensitive and specific detection of RNA viruses with promising potential for field application at the PoC[8,9].

Despite these advances, important limitations remain. Many rapid antigen-based assays for Norovirus exhibit suboptimal sensitivity, particularly at low viral loads or with genetically diverse circulating strains[5]. Isothermal methods are vulnerable to carry-over contamination and non-specific

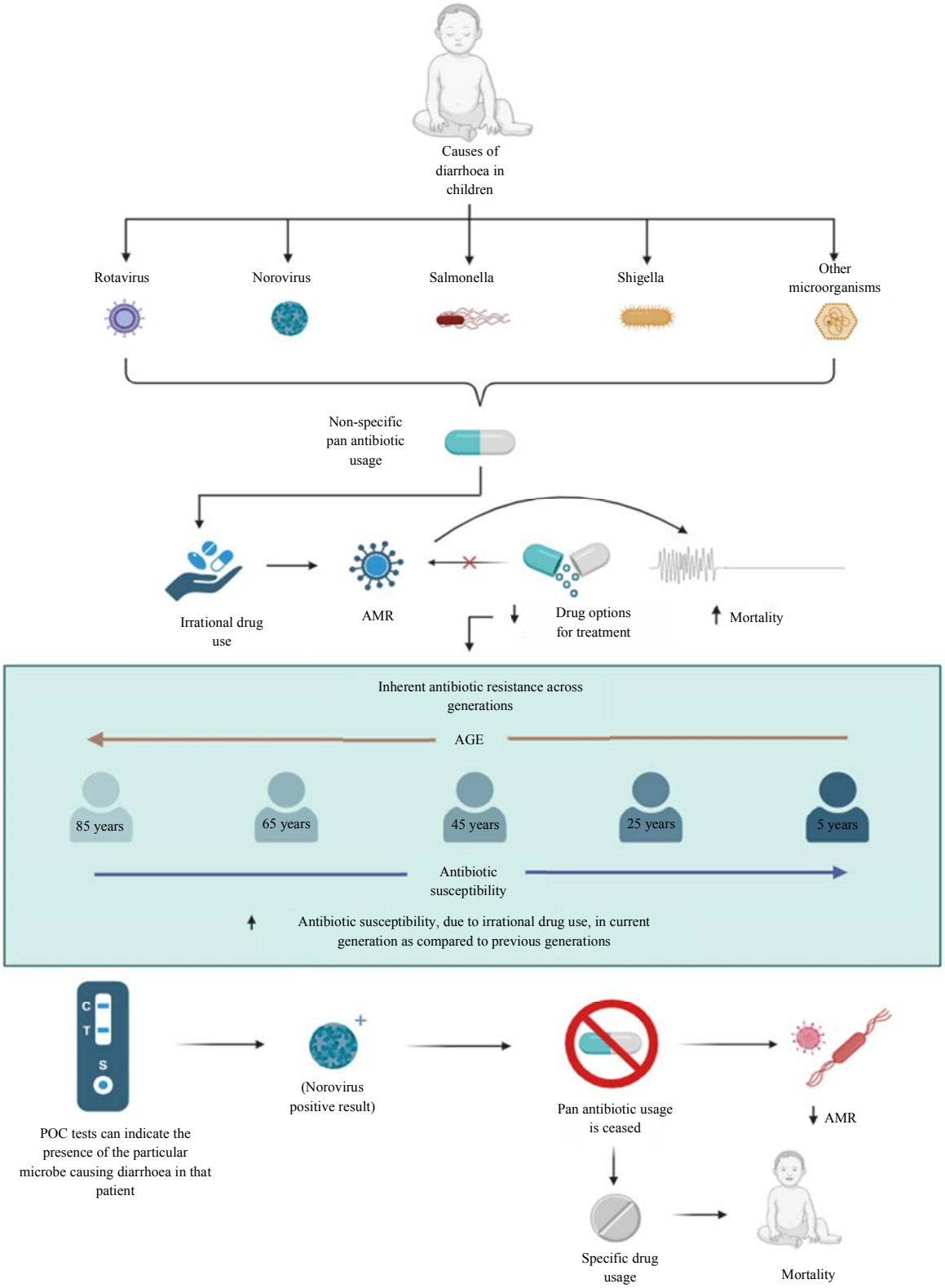


Fig. 1: Schematic illustration of the AMR cascade facilitated by irrational drug use and the role of point-of-care (PoC) detection of Norovirus and Rotavirus as a targeted intervention strategy

amplification[6], while CRISPR-based platforms often still require RNA extraction, amplification steps, cold-chain reagent storage and further clinical validation in real-world outbreak settings[8,9]. In addition, the cost of consumables, regulatory approval, quality assurance and integration into routine surveillance systems continue to limit widespread implementation in low-resource settings[5,7]. Therefore, although emerging PoC technologies represent an important step toward rapid viral diagnosis, further optimization, multicenter validation and cost-effectiveness studies are necessary before they can be adopted widely for large-scale outbreak management and antimicrobial stewardship programs[5].

Rapid screening of the infectious agent and its genotypes at the PoCs with minimal laboratory facility is an ultimate need for such outbreaks. A rapid, highly sensitive, easy-to-use diagnostic test for either, individual or combined detection of GI, GII.4 human NoV and RoV would be highly valuable for improving the rapid identification of the causative pathogen and its genotype and for addressing current limitations of PoC diagnostic tools. It will not only be useful in areas where well-equipped laboratory facilities are not available but also in places where there are high chances of diarrhoeal infections.

CONCLUSION

Rapid PoC diagnostics in relation to Norovirus and Rotavirus could potentially be a great opportunity for effective treatment of gastroenteritis outbreaks. Not only can it help identify and characterize the causative agents of the disease, but it can also limit the misuse of antibiotics for bacterial infections and lower the risk of developing AMR. Moreover, a combination of these diagnostic tools and effective surveillance measures can improve antimicrobial stewardship programs, ensure optimal management of the diseases and even monitor the spread of resistant strains[10]. Therefore, the idea of implementing these techniques for the treatment of viral gastroenteritis in both human and animal populations within the One Health framework is definitely a great way to go.

Thus, we propose a rapid, highly sensitive, easy-to-use diagnostic test for the combined detection of GI, GII.4 human NoV and RoV in AGE outbreaks.

ACKNOWLEDGMENT

All the authors would like to thank Dr J.S. Bhawalkar Dean, Dr. D.Y. Patil Medical College Hospital and Research Centre for his support and encouragement. All authors would like to thank Ms Vaishnavi Nair for assistance with the graphical illustration.

REFERENCES

1. Nasab, S.D.M., F. Sabahi, M. Makvandi, S.M. Samiee, S.A. Nadji and M. Ravanshad, 2016. Epidemiology of rotavirus-norovirus co-infection and determination of norovirus genogrouping among children with acute gastroenteritis in Tehran, Iran. Iran. Biomed. J., 20: 280-286.
2. Bányai, K., M.K. Estes, V. Martella and U.D. Parashar, 2018. Viral gastroenteritis. Lancet, 392: 175-186.
3. Lo, M., Y.H. Doan, S. Mitra, R. Saha and S.I. Miyoshi *et al.*, 2024. Comprehensive full genome analysis of norovirus strains from Eastern India, 2017-2021. Gut Pathog., Vol. 16. 10.1186/s13099-023-00594-5.
4. Teunis, P.F., C.L. Moe, P. Liu, S.E. Miller and L. Lindesmith *et al.*, 2008. Norwalk virus: How infectious is it? J. Med. Virol., 80: 1468-1476.
5. P.K. Drain, 2024. Point-of-care diagnostics (POCD) in resource-limited settings. Diagnostics, Vol. 14. 10.3390/diagnostics14171926.
6. Kellner, M.J., J.G. Koob, J.S. Gootenberg, O.O. Abudayyeh and F. Zhang, 2019. SHERLOCK: Nucleic acid detection with CRISPR nucleases. Nat. Protoc., 14: 2986-3012.
7. Becherer, L., N. Borst, M. Bakheit, S. Frischmann, R. Zengerle and F. von Stetten, 2020. Loop-mediated isothermal amplification (LAMP)-review and classification of methods for sequence-specific detection. Anal. Methods, 12: 717-746.
8. Laleh, S., B. Ibarlucea, M. Stadtmüller, G. Cuniberti and M. Medina-Sánchez, 2023. Portable microfluidic impedance biosensor for SARS-CoV-2 detection. Biosens. Bioelectron., Vol. 236. 10.1016/j.bios.2023.115362.
9. Huang, Y., T. Yin, Y. Wen, S. Qian and Y. Wu, 2025. Recent advances in CRISPR- and RCA-based biosensing chips and devices for POCT and *in situ* detection. Moore More, Vol. 2. 10.1007/s44275-025-00038-z.
10. Alotaibi, G., 2024. Prevalence, pandemic, preventions and policies to overcome antimicrobial resistance. Saudi J. Biol. Sci., Vol. 31. 10.1016/j.sjbs.2024.104032.