

Norovirus outbreak amid COVID-19 in the United Kingdom; priorities for achieving control

Farah Yasmin¹  | Syed Hasan Ali¹  | Irfan Ullah² 

¹Department of Internal Medicine, Dow Medical College, Dow University of Health Sciences, Karachi, Pakistan

²Department of Community Medicine, Kabir Medical College, Gandhara University, Peshawar, Pakistan

Correspondence

Farah Yasmin, Department of Internal Medicine, Dow Medical College, Dow University of Health Sciences, Baba-e-Urdu Rd, Saddar, Karachi 74200, Pakistan.
Email: farahyasmin972@yahoo.com

Abstract

Norovirus, an enteric virus primarily responsible for gastroenteritis outbreaks worldwide, is currently causing outbreaks around the United Kingdom during the COVID-19 pandemic. With an already exhausted health care system, the significant burden norovirus can have on the National Health Service, including economic and social burdens, is immense and cannot be tolerated. Primary challenges and priorities to be focused on due to the increase in norovirus outbreaks include a further depletion of health care services, increase cases in schools, nurseries, and care facilities, underreporting of the cases, and no effective vaccine being available. Therefore, it is essential to increase awareness about norovirus and its transmission in public, take necessary precautions, and increase reporting of cases. This article discusses the impact norovirus has during the COVID-19 pandemic, and the challenges, and recommendations to achieve control before it reaches epidemic levels.

KEYWORDS

Antibody titres, Coronavirus disease-19, Gastroenteritis, Immunity-debt, N orovirus

1 | INTRODUCTION

Norovirus (NoV) is the prevailing cause of gastroenteritis outbreaks globally and the second-leading cause of England's hospital-acquired gastrointestinal illnesses.¹ It is sometimes referred to as the "winter vomiting bug" due to the seasonal pattern it follows, as there is increased virus activity in the colder months.² Outbreaks of this enteric virus (EV) occur quite frequently, reaching epidemic levels, and usually occur in health care settings, educational institutions, long-term care facilities, daycares, and cruise ships.³ The increased incidence of these outbreaks could be owed to the ease of transmission of the virus and no available vaccines to provide immunity. Most of these NoV illnesses are due to the genogroup II genotype 4 (GII.4) variants.⁴

Since the beginning of the COVID-19 pandemic, there have been reports describing underreporting of various diseases around the world, including the NoV illnesses.⁵ The negative impact of the pandemic leading to decreased surveillance and testing for possible endemic diseases may have been the primary factor for said underreporting. Regardless, after relaxing COVID-19 restrictions in the

United Kingdom (UK), there has been a sustained increase in NoV laboratory, and gastroenteritis outbreak reports from the last week of May 2021. A similar pattern of incidence was seen in China following the ease of pandemic restrictions.⁶ As per the Public Health England's (PHE) report, the total tally of EV outbreaks of the 2021/2022 season till the 26th of September has exceeded the previous five seasons' average (from 2014/2015 to 2018/2019) by 35%, of which NoV outbreaks are responsible for 98%. The more concerning part is that more than 60% of these outbreaks occurred in educational settings, nurseries, and childcare facilities.⁷ The PHE issued a press release on 16th July to warn the public about the increasing outbreaks and recommended that they adhere to precautionary measures to reduce the spread of NoV.⁸

With the lifting of the pandemic restrictions, it is possible for an increase in NoV outbreaks to be seen in the upcoming months. Therefore, in this article, the authors discuss the response of the UK to the NoV outbreaks during the COVID-19 pandemic, challenges, priorities for the appropriate response at this time, and recommendations to tackle the outbreak.

1.1 | Impact of NoV amid the response to COVID-19

The COVID-19 cases in the UK are yet again rising. The daily tally of new cases as the 7-day moving average has been recorded to be more than 35 700 in mid-October 2021, with a 13% rise in a week from September 30 to October 6, 2021.⁹ In the latest technical briefing issued by the PHE on September 17, 2021, of the four variants of concern, the delta variant is accountable for almost 99% of the new cases.¹⁰ Most vaccines have decreased effectiveness against symptomatic disease caused by delta variants compared to the others,¹¹ so the earlier statement is alarming. NoV has a significant financial impact as well, as it has been estimated that annual costs to patients and the health services are between £63 and £106 million.

The rise in NoV cases compared to previous years could be multifactorial. However, the likeliest of reasons could be credited to the highly diverse and plastic genomic sequence that may give rise to multiple variants that can cocirculate simultaneously in the human population.^{12,13} Furthermore, NoV detection is difficult as these viruses are highly variable and cannot be propagated in cell culture, thus complicating reverse transcription-polymerase chain reaction-based detection assays.¹⁴ These viruses are highly stable in the environment surviving in both freezing and hot temperatures, resistant to many common chemical disinfectants, persist on surfaces for up to 2 weeks and can spread via several ways, including fecal-oral transmission, ingestion of contaminated foods or water, handling of contaminated utensils followed by hand-to-mouth contact via ingestion of aerosolized particles. Hence, due to their high transmission rate, they can be spread via complex and varied ways and require excellent hygiene practices, which makes the development of effective prevention and control measures difficult.¹⁴ The current methods of NoV control rely on relatively generic measures, such as hand hygiene, environmental disinfection, and isolation of infected individuals.¹⁴ However, because of the difficulty in modifying human behaviors and the knowledge gaps resulting from our inability to cultivate human NoV *in vitro*, these steps are often inadequate.¹⁴ Another reason to be considered is the “immunity debt” that people may now have acquired due to decreased exposure to the NoV as lockdown measures were in place during the previous season (2020–2021). The previous statement coupled with the antigenic variability factor—a significant increase in cases can be speculated.¹⁴

The acute nature of the disease also leads to a lack of reporting to health officials. The national and international diagnostic/surveillance programs are not standardized. However, there has recently been increased recognition of the burden of NoV disease due to significant improvements in NoV diagnostic assays and increased awareness of the need for surveillance standardization.¹⁴

Considering these statistics and the current increase in NoV outbreaks cases that will only worsen in the upcoming winter, the combined negative effect on the National Health Service (NHS) will be profound. Hence, it is vital to prevent an NoV epidemic in the UK and tackle the increased cases of delta variants.

1.2 | Lessons learned from COVID-19 and their effect on the management of the NoV outbreak

For the combat against COVID-19, in addition to vaccine development, nonpharmaceutical interventions (NPIs) assisted in helping decrease the rate of transmission of the virus. Given that NoV is transmitted primarily through the fecal-oral route and secondarily via aerosolized viral particles in vomitus and through food and water, social distancing and hand hygiene protocols are also deemed effective in tackling the NoV outbreak.

It is also necessary to highlight the importance of the health care workers' safety, as many lost lives during the pandemic causing mental and psychological stress on their peers and families, and further exhaustion of the health care system. Therefore, it is required to set up guidelines and systems to support medical professionals to cope with the stress and strains of working under conditions of a pandemic.¹⁵

1.3 | Challenges and priorities for NoV response amid the COVID-19 pandemic

- 1. Health care exhaustion:** The COVID-19 pandemic has been responsible for exhausting health care facilities all around the world. Mental and physical burnout of health personnel during the pandemic has accounted a great deal towards health care exhaustion. Concerns of increased exposure with the possibility to contract the coronavirus in the hospital, increased workload, and psychological effects on witnessing the dramatic increase in deaths, along with other reasons, are causatives of said burnout.^{16,17} Another reason is the sudden increase in hospital-bed admissions, management, and treatment of COVID-19 patients, leading to redirecting and consumption of resources towards managing the pandemic. Due to this, there has been decreased importance and resources to spare in the screening, managing, and treating of other endemic diseases, such as the NoV.
- 2. Increased NoV prevalence in schools, colleges, and child nursing facilities:** The current increase in EV-associated gastroenteritis outbreaks (in 4 weeks to September 26, 2021) occurs mainly in educational and care home settings, around 61% and 34%, respectively, a large proportion of which are caused by NoV. This is concerning because children of all ages and the elderly in long-term care facilities are currently at the highest risk of contracting NoV infections. It should be noted that there is a higher risk of hospitalization in infants¹⁸ and older people due to NoV infections.¹⁹ Therefore, it is vital to prevent further outbreaks in these settings, especially as it may add further strain on the already exhausted health care system.
- 3. Underreporting:** Throughout 2020 and the first half of 2021, NoV activity was documented to be much lower than the previous five seasons' average.⁷ The reason for this is thought to be due to decreased surveillance of various diseases,⁵ as the health care system's entire focus had shifted towards the COVID-19 pandemic. However, it is possible that due to the increased awareness

and implementation of NPIs, there might have been a decrease in transmission and hence outbreaks of NoV.

4. **Vaccination:** The development of an effective vaccine for NoV has proven to be challenging. This is due to the significant genetic diversity of NoVs, short-lived immunity to the infections, and correlating specific antibody titers with protection.^{20,21} Though there are a few in clinical phases of development, the urgency for long-term immunity against the NoV should be highlighted.

2 | RECOMMENDATIONS

On account of the challenges and priorities as mentioned earlier, the following recommendations should be implemented to prevent the worsening of NoV outbreaks:

1. Increase awareness of NoV and its means of transmission in people of all age groups.
2. Continued execution of NPIs as recommended for the COVID-19 pandemic, giving high regard to the importance of adhering to appropriate hand hygiene, especially by caregivers and food handlers.
3. Immediate isolation of all symptomatic patients experiencing diarrhea and/or nausea, vomiting, preferably at home unless critically ill or in-hospital-diagnosed.
4. Appropriate environmental disinfection with hypochlorite solutions of at least 1000 ppm,²² especially in health care settings, nurseries, and schools.
5. Reporting all outbreaks of acute gastroenteritis to the appropriate local health departments and Hospital Norovirus Outbreak Reporting System.²³
6. Psychosocial interventions and support to facilitate the overwhelmed health care workers,²⁴ thereby equipping them with the ability to continue to serve, hence reducing the health care burden.

In addition to the points mentioned above, all health facilities should devise an updated outbreak management guideline, which should come into effect immediately as per the need. Such policies should also be implemented in other NoV outbreak-risk areas such as schools, nursing care, and long-term care facilities. Also, if NoV outbreaks increase further, mainly increased in-hospital diagnoses of the infection, ward closure for 72 hours,²⁵ and restriction of patient activities must be strongly considered. However, it might be tough to execute during the COVID-19 pandemic for primarily two reasons: the need for beds and wards due to the current rise in COVID-19 cases in the UK, and the financial burden due to unoccupied beds (to decrease NoV transmission), staff absenteeism, and opportunity costing.¹

3 | CONCLUSION

The already challenged health care system cannot handle another huge-scale outbreak. Therefore, precautionary measures should be followed by the public. Immediate training of health caregivers and

implementation of outbreak policies should be strongly considered before the “winter pressures” affect the NHS. With the government and health care authorities working together to address these challenges by implementing the recommendations, the UK can prevent further worsening of the NoV outbreaks.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS

Farah Yasmin and Syed Hasan Ali: *Conception of the study, drafting of the work, editing, reviewing, and agreeing to the accuracy of the work.*
Irfan Ullah: *Conception of the study, supervision, critical revision of the manuscript, editing, reviewing, final approval, and agreeing to the accuracy of the work.*

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

ORCID

Farah Yasmin  <http://orcid.org/0000-0002-5264-6140>

Syed Hasan Ali  <http://orcid.org/0000-0003-2726-2601>

Irfan Ullah  <http://orcid.org/0000-0003-1100-101X>

REFERENCES

1. Sandmann FG, Shallcross L, Adams N, et al. Estimating the hospital burden of norovirus-associated gastroenteritis in England and its opportunity costs for nonadmitted patients. *Clin Infect Dis*. 2018; 67(5):693-700. doi:10.1093/cid/ciy167
2. Stegmaier T, Oellingrath E, Himmel M, Fraas S. Differences in epidemic spread patterns of norovirus and influenza seasons of Germany: an application of optical flow analysis in epidemiology. *Sci Rep*. 2020;10(1):14125. doi:10.1038/s41598-020-70973-4
3. Robilotti E, Deresinski S, Pinsky B. Norovirus. *Clin Microbiol Rev*. 2015;28(1):134-164. doi:10.1128/cmr.00075-14
4. Van Beek J, de Graaf M, Xia M, et al. Comparison of norovirus genogroup I, II and IV seroprevalence among children in the Netherlands, 1963, 1983 and 2006. *J Gen Virol*. 2016;97(9):2255-2264. doi:10.1099/jgv.0.000533
5. Douglas A, Sandmann F, Allen D, Celma C, Beard S, Larkin L. Impact of COVID-19 on national surveillance of norovirus in England and potential risk of increased disease activity in 2021. *J Hosp Infect*. 2021;112:124-126. doi:10.1016/j.jhin.2021.03.006
6. Hotham M. Potential future implications of the COVID-19 pandemic on norovirus infections in England. *J Infect*. 2021;83(2):237-279. doi:10.1016/j.jinf.2021.05.003
7. Public Health England. National Norovirus and Rotavirus Bulletin Routine norovirus and rotavirus surveillance in England, 2021 to 2022 season Week 40 report: data to week 38; 2021. Accessed September 20, 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1023731/UKHSA-norovirus-bulletin-2021-22-week-40.pdf
8. Public Health England. Norovirus outbreaks increasing in England [Internet]; 2021. Accessed September 20, 2021. <https://www.gov.uk/government/news/norovirus-outbreaks-increasing-in-england>
9. GOV.UK Coronavirus (COVID-19) in the UK Daily summary: Coronavirus in the UK [Internet]. Daily summary | Coronavirus in the

- UK; 2021. Accessed October 14, 2021. <https://coronavirus.data.gov.uk/>
10. Public Health England. SARS-CoV-2 variants of concern and variants under investigation in England Technical briefing 23; 2021. Accessed September 20, 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1018547/Technical_Briefing_23_21_09_16.pdf
 11. Lopez Bernal J, Andrews N, Gower C, et al. Effectiveness of Covid-19 vaccines against the B.1.617.2 (delta) variant. *N Engl J Med*. 2021; 385(7):585-594. doi:10.1056/nejmoa2108891
 12. Debbink K, Lindesmith L, Donaldson E, Baric R. Norovirus immunity and the great escape. *PLoS Pathog*. 2012;8(10):e1002921. doi:10.1371/journal.ppat.1002921
 13. Parra G. Emergence of norovirus strains: a tale of two genes. *Virus Evol*. 2019;5(2):048. doi:10.1093/ve/vez048
 14. Manouchehr Saljoughian C. Norovirus infection and outbreaks [Internet]. *Usp Pharmacist.com*; 2021. Accessed October 23, 2021. <https://www.uspharmacist.com/article/norovirus-infection-and-outbreaks>
 15. Rawaf S, Allen L, Stigler F, Kringos D, Quezada Yamamoto H, van Weel C. Lessons on the COVID-19 pandemic, for and by primary care professionals worldwide. *Eur J Gen Pract*. 2020;26(1):129-133. doi:10.1080/13814788.2020.1820479
 16. Adams J, Walls R. Supporting the Health Care Workforce during the COVID-19 global epidemic. *JAMA*. 2020;323(15):1439-1440. doi:10.1001/jama.2020.3972
 17. Ho CS, Chee CY, Ho RC. Mental health strategies to combat the psychological impact of COVID-19 beyond paranoia and panic. *Ann Acad Med Singap*. 2020;49(3):155-160.
 18. Shah M, Hall A. Norovirus illnesses in children and adolescents. *Infect Dis Clin North Am*. 2018;32(1):103-118. doi:10.1016/j.idc.2017.11.004
 19. Lindsay L, Wolter J, De Coster I, Van Damme P, Verstraeten T. A decade of norovirus disease risk among older adults in upper-middle- and high-income countries: a systematic review. *BMC Infect Dis*. 2015;15(1):425. doi:10.1186/s12879-015-1168-5
 20. Lucero Y, Vidal R, O'Ryan GM. Norovirus vaccines under development. *Vaccine*. 2018;36(36):5435-5441. doi:10.1016/j.vaccine.2017.06.043
 21. Mattison C, Cardemil C, Hall A. Progress on norovirus vaccine research: public health considerations and future directions. *Expert Rev Vaccines*. 2018;17(9):773-784. doi:10.1080/14760584.2018.1510327
 22. MacCannell T, Umscheid CA, Agarwal RK, et al. Guideline for the prevention and control of norovirus gastroenteritis outbreaks in healthcare settings. *Infect Control Hosp Epidemiol*. 2011;32:939-969. doi:10.1086/662025
 23. Public Health England. Hospital Norovirus Outbreak Reporting System: user guidance (Version 1.0 updated October 2019) [Internet]. PHE Publications; 2021. Accessed September 20, 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/836362/Hospital_Norovirus_Outbreak_Reporting_System_User_Guide.pdf
 24. Cabarkapa S, Nadjidai S, Murgier J, Ng C. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: a rapid systematic review. *Brain Behav Immun Health*. 2020;8:100144. doi:10.1016/j.bbih.2020.100144
 25. Chadwick PR, Beards G, Brown D, et al. Management of hospital outbreaks of gastro-enteritis due to small roundstructured viruses. *J Hosp Infect*. 2000;45(1):1-10. doi:10.1053/jhin.2000.0662

How to cite this article: Yasmin F, Ali SH, Ullah I. Norovirus outbreak amid COVID-19 in the United Kingdom; priorities for achieving control. *J Med Virol*. 2022;94:1232-1235. doi:10.1002/jmv.27426