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Circulating Norovirus Strains in Children Under Five Years Old Medically Treated for Acute Gastroenteritis in Three Hospitals in Lima, Peru, 2022-2023

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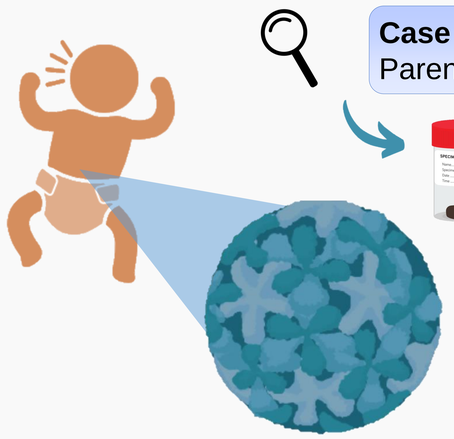
1 Introduction

Norovirus is a leading cause of acute gastroenteritis (AGE) worldwide, affecting approximately 20% of children under 5 years old. In some countries with high rotavirus vaccine coverage (Peru, Brazil, Bolivia) noroviruses may exceed the global average (>20%). These viruses are classified in more than 10 genogroups, 48 genotypes, and 60 P-types, displaying **high genetic diversity with rapid evolving strains.**

New norovirus strains typically emerge frequently, often displacing previously dominant variants, which poses a **challenge for developing broadly effective vaccines.**

Surveillance of the circulating norovirus strains and their genetic characteristics (using dual-typing nomenclature) is crucial for guiding effective public health interventions and informing vaccine strategies. Therefore, **this study aimed to identify and characterize the circulating norovirus strains among children under 5 years of age** who received rehydration treatment for AGE at three hospitals in Lima, Peru, **during 2022-2023**, contributing to the broader epidemiological understanding of norovirus infections in this region.

2 Methods

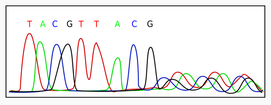


Case identification: AGE cases were sought in daily visits to three hospitals. Parents/legal guardians were contacted if enrollment criteria were met.

Collection: After obtaining informed consent, a stool specimen was collected at the hospitals or households within the 10 first-days of the beginning of the AGE episode.

RNA isolation: 1/10 dilution in PBS + QIAamp Viral ARN mini kit + MS2 internal control.

NoV detection: Multiplexed real time RT-PCR for Nov GI, NoV GII and MS2.



NoV typing: Sanger sequencing + online human calicivirus typing tool + Next generation sequencing (for new strains)

Enrollment criteria:

- **Children < 5 years of age**
- **Attended a hospital with an AGE episode:** ≥3 loose/watery stools or ≥ 1 vomits in 24 hours. Duration no longer than 10 days.
- Received **oral or intravenous rehydration.**

3 Results

Norovirus positivity

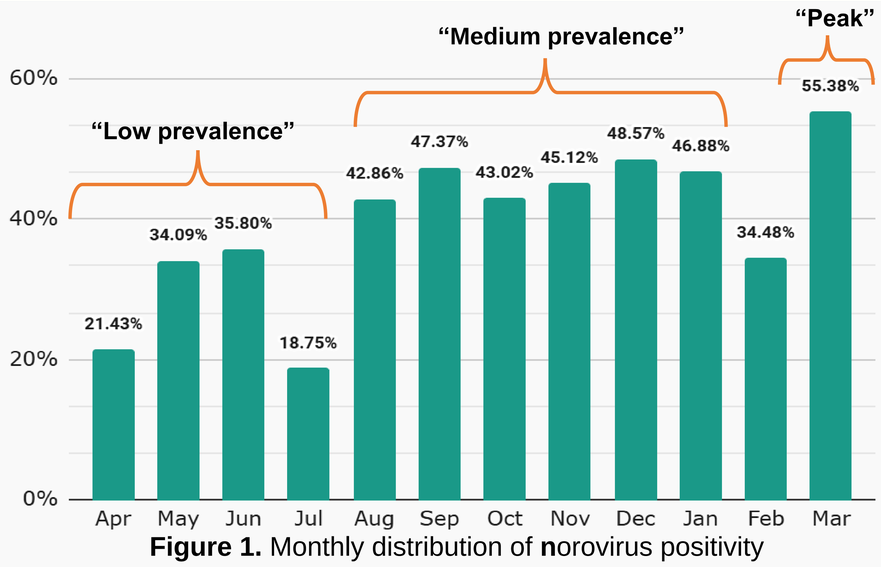


Figure 1. Monthly distribution of **n**orovirus positivity

- **840 samples were analyzed. Norovirus** was detected in 342 stool specimens **(40.7%).**
- **NoV GII viruses** associated with **91.5% of the cases; GI with 8.5%.**

Norovirus circulating strains

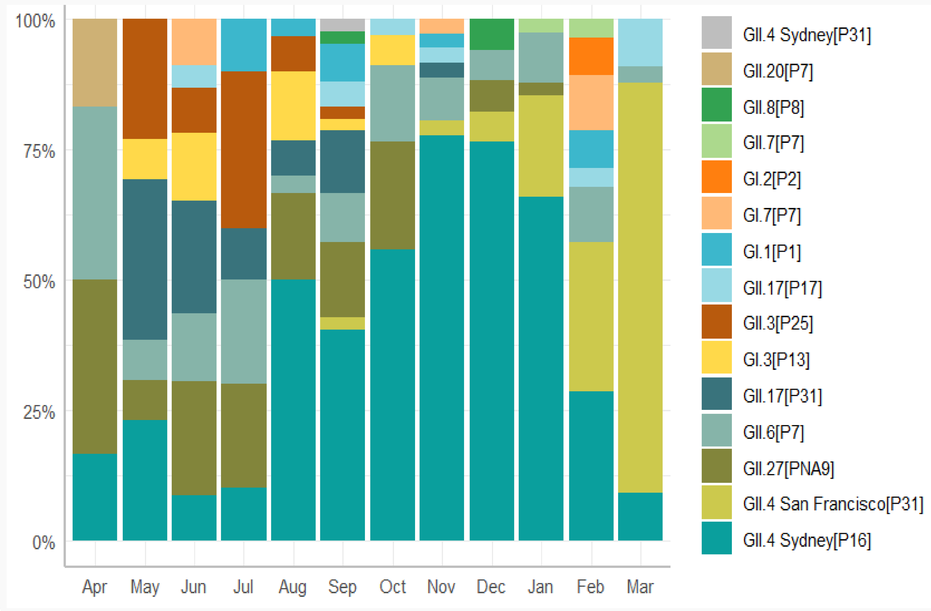


Figure 2. Monthly distribution of norovirus strains

- **91.5% samples were successfully typed** with dual-typing nomenclature (312/342).
- **Norovirus was detected throughout the year** with:
  - **Apr-Jul**: **predominance of rare strains** GII.27 [PNA9], GII.6 [P7], and GII.17[P31].
  - **Aug-Jan:** predominance of **GII.4 Sydney[P16]).**
  - **March:** predominance of novel **GII.4 San Francisco [P31**])

4 Conclusions

- Norovirus plays an important role in children under five years of age requiring rehydration treatment for AGE in Lima, Peru, a country with high rotavirus vaccine coverage (>85), with a prevalence higher than reported in the literature (40.7%).
- Norovirus infections are prevalent during every month of the year with a differential strain pattern.
- In March, where norovirus infections peaked (>50%), novel GII.4 San Francisco [P31] displaced GII.4 Sydney [P16] strains.
- Our data highlight the genetic diversity of noroviruses and the need for ongoing surveillance of norovirus strains in children with AGE to detect the emergence of rare and novel strains, that may be relevant for the development of effective norovirus vaccines.

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References

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