The transmission dynamics of Norovirus in England: a genotype-specific modelling study

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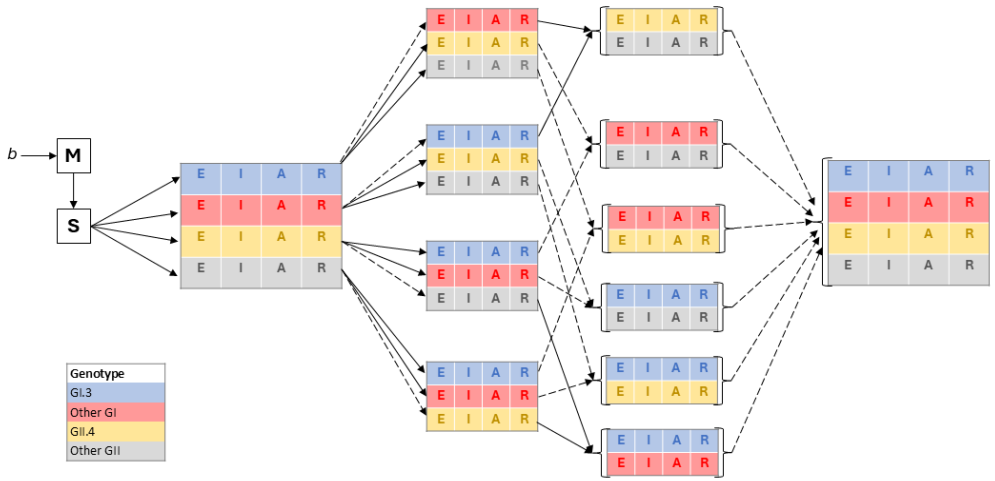
- **Background**
- Seasonal acute gastroenteritis virus, mostly active in winter
- In the UK it causes ~3.7 million infections a year[1]
- Severe cases affect older people and infants
- Costing the NHS over £100 million annually[2]
- Currently no vaccines are available
- **Aims**
- Understand transmission dynamics of Norovirus in England and Wales
- Assess the impact of introducing a new vaccine formulation, and the optimal roll-out and targets

- **Methods**
- Age-structured, multi-strain, stochastic compartmental transmission model
- Calibrated to
  - weekly surveillance time series (UKHSA)
  - Genogroup specific community incidence estimates
  - GII4. Seroprevalence in Children
- Model selection to assess alternative mechanisms of immunity

Target	Pre-clinical	Phase I	Phase IIA	Phase IIB	Phase III
Bivalent GI.1 GII.4			NVSI		~~Hillevax~~
GI.1 GI.3 GII.4 GII.17			Anhui		
Monovalent GI.1 or GII.4			Vaxart		
Trivalent GI.1 GII.3 GII.4					Moderna

NVSI National Vaccine and Serum Institute, China - Recombinant polysaccharide conjugate; Anhui Zhifei Biologic Pharmacy Ltd, China - Recombinant polysaccharide conjugate; Vaxart, USA – Viral vector vaccine
Moderna USA (UK Trial) – mRNA

- 39 sites across the UK
- 2,500 participants in the UK between October 2024 and early 2025
- Part of the Moderna-UK Strategic partnership



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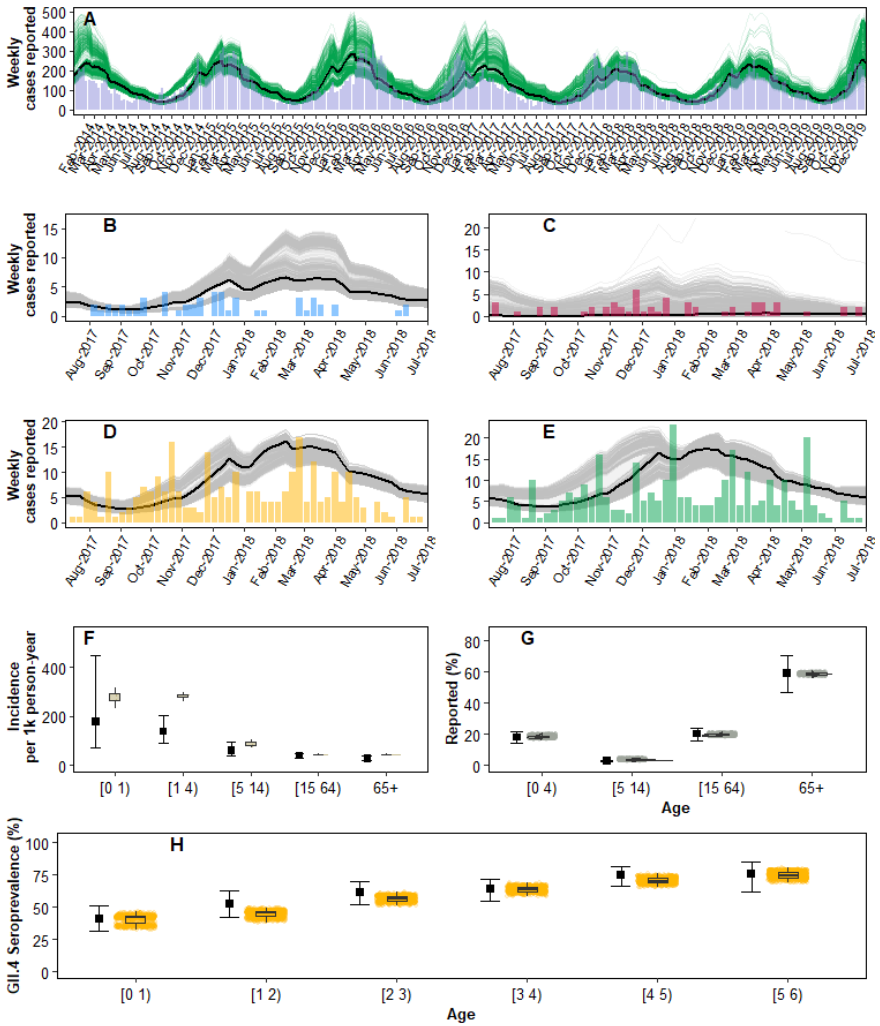
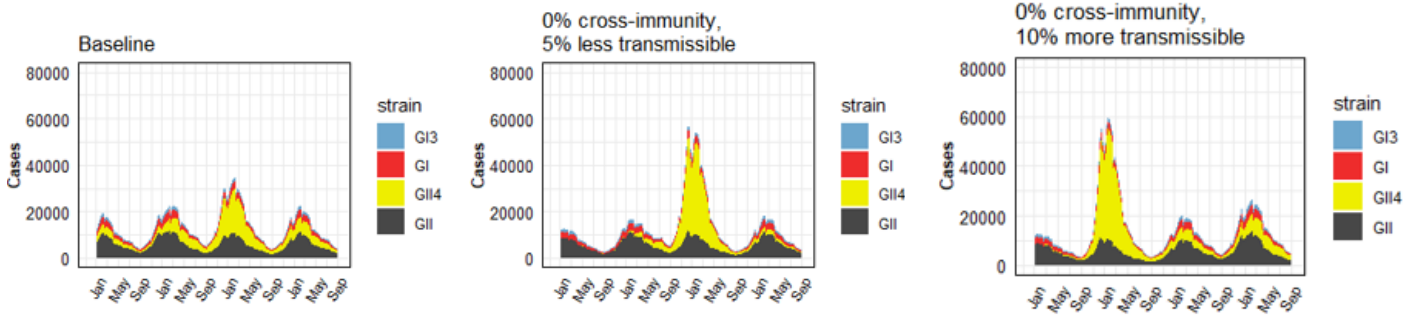


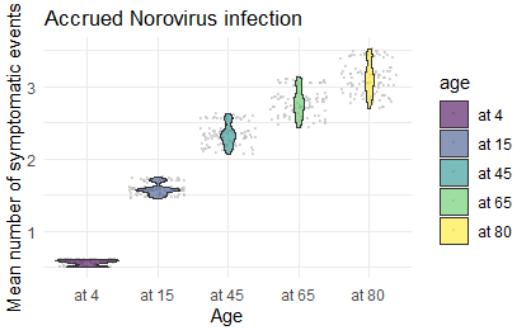
Model selection favors a calibration with a model involving 2 immunity parameters

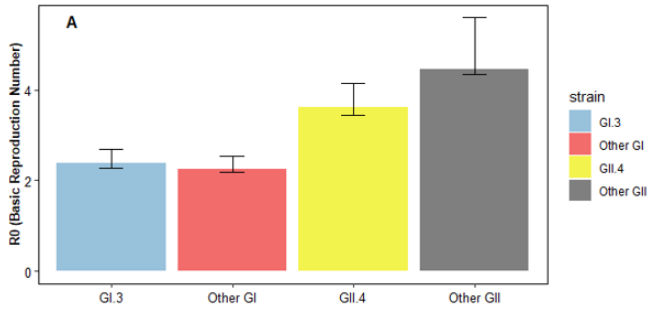
- Maternal antibodies have an estimated mean protection of 239 days
- Waning immunity after a first symptomatic episode lasts a mean of 16 years
- Genogroup specific cross-protection estimates (e.g., protection against G.II4 after a single episode of other GII strains) indicates low cross-protection between GI strains (5%, and negligible protection within the GII group (1%).



Emergence of a novel GII.4 variant will cause a large season of Noro cases, and the peak is determined by the potential relative transmissibility.

On average in the Uk an individual will have ~3 symptomatic events over a lifetime





R0 ~ 3-4 for GII genogroups and ~ 2.2 for GI