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Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplementary appendix

Re-infection with new variants of SARS-CoV-2 following natural infection: a prospective observational cohort, April 2020 to January 2021, England, UK

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Group		Number	Age (years) median (inter-quartile range)	Sex (Number of Females)	Mean Number of PCRs/person	Mean Number of Serology/per person
Complete	Staff	933	48.5 (38 – 57.1)	764	13.8	1.7
	Residents	692	86.8 (80 – 92)	487	11.2	1.8
Follow Up	Staff	810	48.8 (39.2 – 57.4)	667	15.5	1.7
	Residents	567	86.7 (80.4 – 91.6)	394	13.1	1.9
PCR cohort	Staff	786	48.7 (39.2 – 57.4)	651	15.9	1.7
	Residents	566	86.7 (80.4 – 91.6)	394	13.1	1.9
Serology cohort	Staff	712	48.7 (38.8 – 57.3)	587	16.0	1.7
	Residents	459	86.8 (81.2 – 91.6)	322	13.9	2.0
Possible reinfections	Staff	13	40.4 (29.7 – 44.1)	9	13.5	2.4
	Residents	10	84.8 (83.6 – 88.9)	7	12.4	2.6
Confirmed reinfections	Staff	5	37.6 (29.7 – 40.2)	4	15.2	3.2
	Residents	5	87.9 (84.3 – 95.6)	5	10.6	2.6

Supplementary Table 1: Cohort demographics at each stage of follow up.

	N events	Person-time (days)	Cox model		Poisson regression	
			HR (95% CI)	% protection (100x(1-HR))	RR (95% CI)	% protection (100x(1-RR))
Residents only						
Susceptible	88	30049				
History of infection	5	46709	0.04 (0.02 - 0.11)	95.8% (88.7 - 98.4%)	0.04 (0.02 - 0.11)	95.9% (88.9 - 98.5%)
Staff only						
Susceptible	77	57082				
History of infection	5	56848	0.09 (0.03 - 0.24)	91.0% (75.9 - 96.7%)	0.08 (0.03 - 0.21)	91.8% (78.6 - 96.8%)

Supplementary Table 2: Assessment of protective effectiveness separately by resident / staff

status. HR – Hazard Ratio; RR – Relative Risk

rho	Chi^2	df	$Prob>chi^2$
Susceptibility			
history of infection	0.34	1	0.5573
Role			
staff	0.11	1	0.7366
Gender			
M	1.53	1	0.2157
Age / period			
age 16-29, Aug-Sept	1.1	1	0.2939
age 16-29, Oct-Jan	0.04	1	0.85
age 30-69			
age 70+	0	1	0.9446
global test	4.45	6	0.6164

**Supplementary Table 3: Test of linearity of Schoenfeld residuals over time**
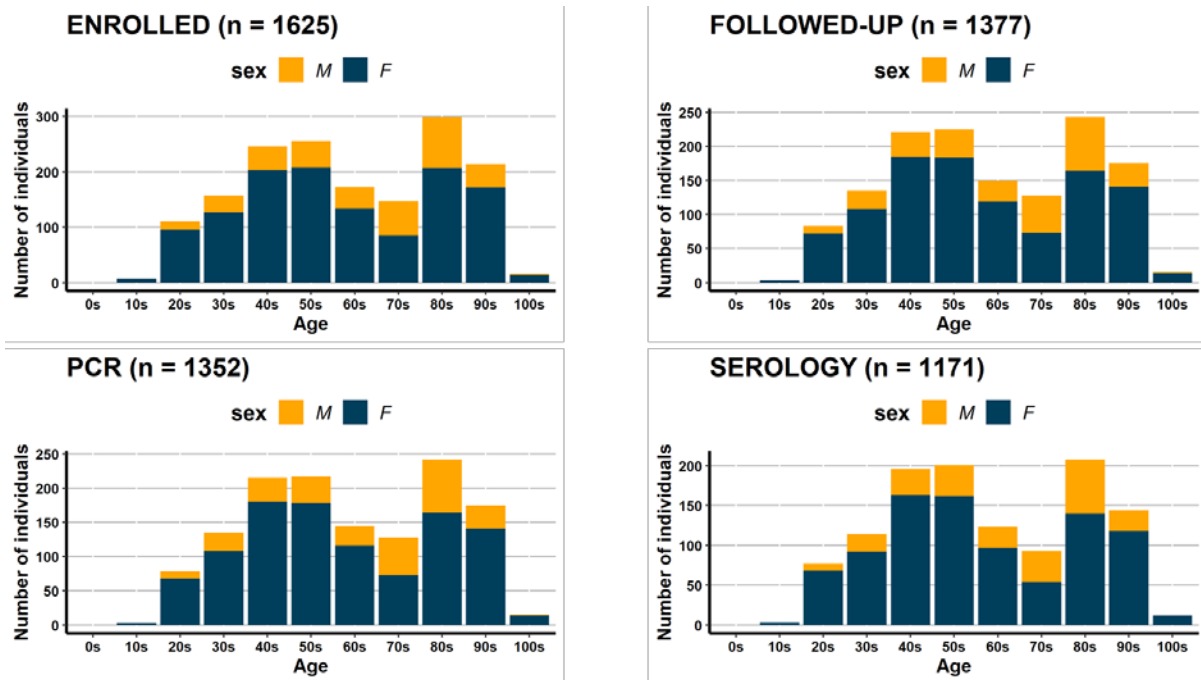
Supplementary Figure 1: Age and sex distribution for each stage of the cohort defined in Figure 1.

M: Male; F: Female.
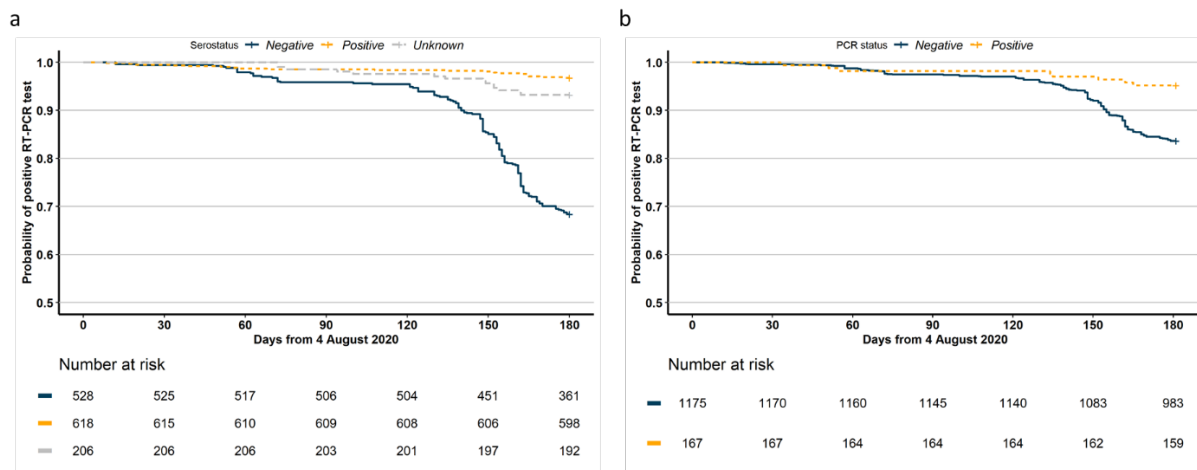
Supplementary figure 2: a) Kaplan Meier plot showing probability of SARS-CoV-2 RT-PCR positivity during the follow up period from 4 August 2020 in non-susceptible individuals based on T1 serological analysis (serostatus positive – yellow line), susceptible individuals (serostatus negative – blue line), and those with no previous serological results (unknown – grey line). Number of individuals at risk per subgroup over time is shown.

b) Kaplan Meier plot showing probability of SARS-CoV-2 RT-PCR positivity during the follow up period from 4 August 2020 in non-susceptible individuals based on T0 RT-PCR status: not susceptible (PCR positive – yellow line), susceptible (PCR negative – blue line). Number of individuals at risk per subgroup over time is shown.
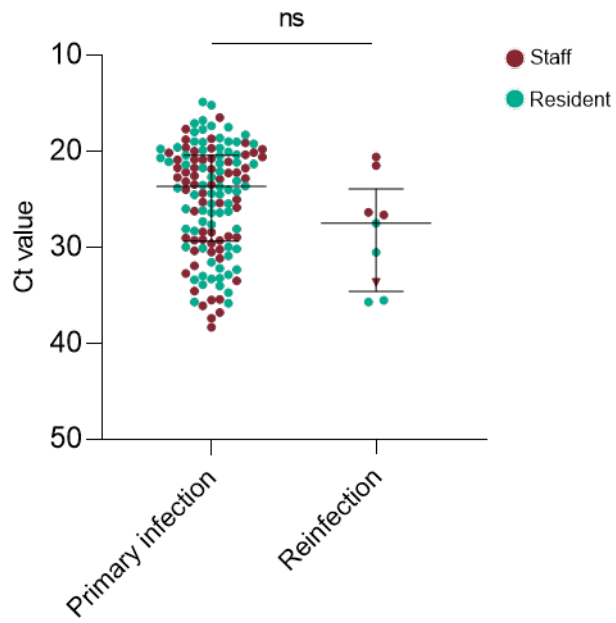
Supplementary Figure 3: SARS-CoV-2 Orf1ab gene RT-PCR values from individuals with primary infection and reinfection during the same time period (September 2020 – January 2021). Statistical analysis using Mann-Whitney U Test, p=0.056. Bars indicate median and interquartile range.
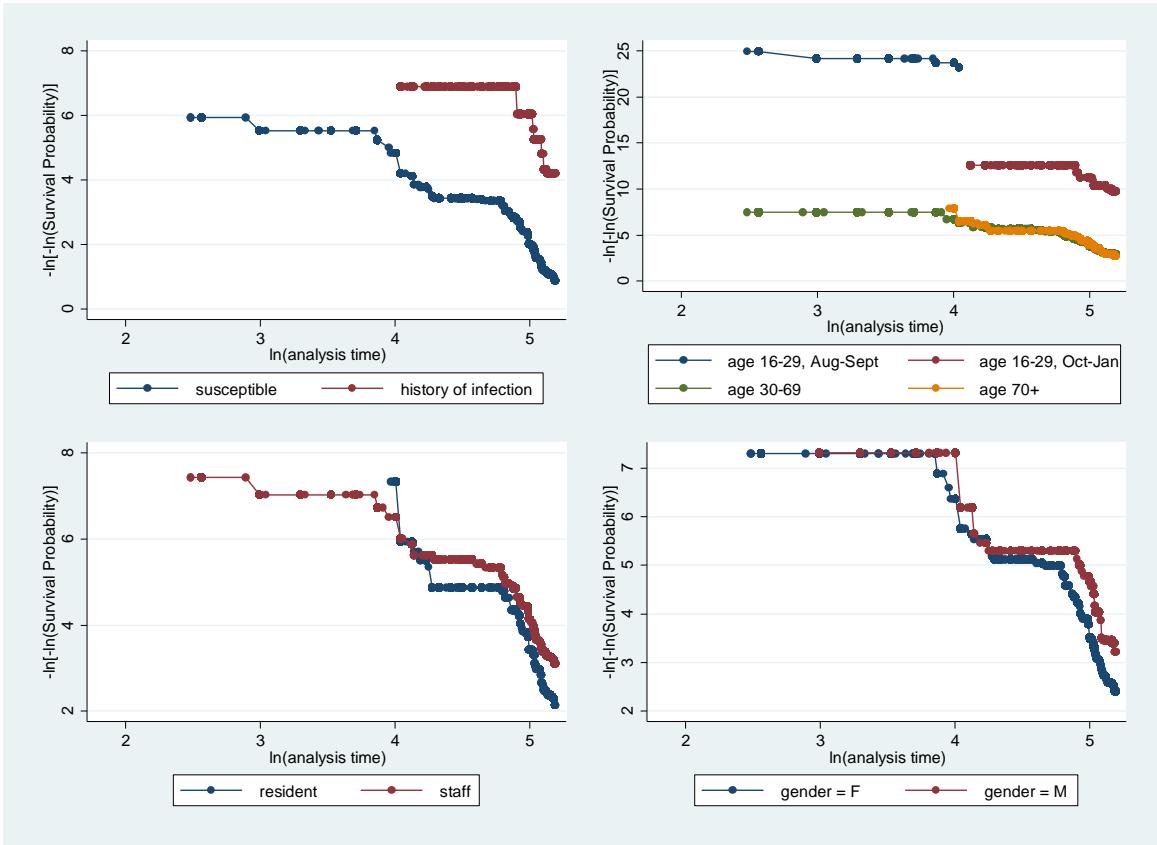
Supplementary Figure 4: **Assessment of Cox model proportional hazards assumption**. Log-log plot of Survival (against infection/reinfection) for each of the variables included in the model. Note that models included stratification by care home, but plots are for all data together.