THE LANCET
Healthy Longevity

Supplementary appendix

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

Supplement to: Krutikov M, Palmer T, Tut G, et al. Prevalence and duration of detectable SARS-CoV-2 nucleocapsid antibodies in staff and residents of long-term care facilities over the first year of the pandemic (VIVALDI study): prospective cohort study in England. *Lancet Healthy Longev* 2021; published online Dec 16. https://doi.org/10.1016/S2666-7568(21)00282-8.

Supplementary appendix: Prevalence and duration of detectable SARS-CoV-2 nucleocapsid antibody in staff and residents of Long Term Care Facilities over the first year of the pandemic (VIVALDI study): prospective cohort study in England

Figure S1: study inclusion flow diagram

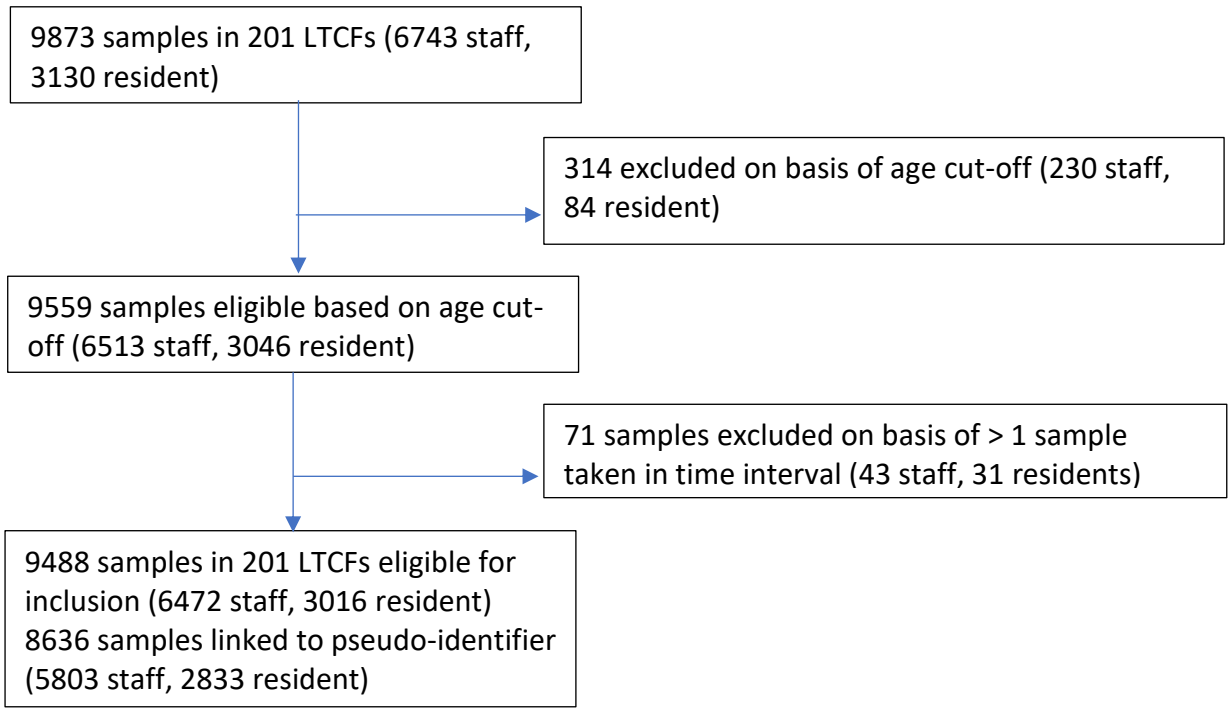


Figure S2: Changes in LTCF weighted seroprevalence over successive sampling rounds according to 'baseline' LTCF seroprevalence in round 1 (n=201)

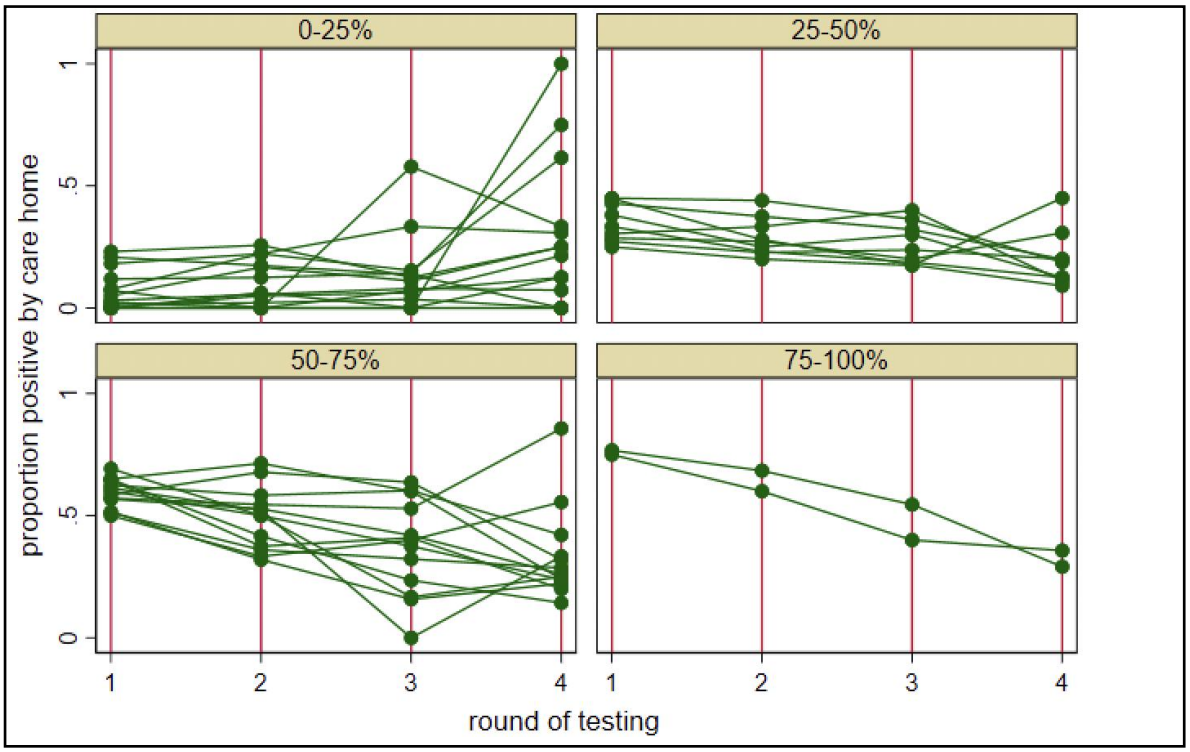
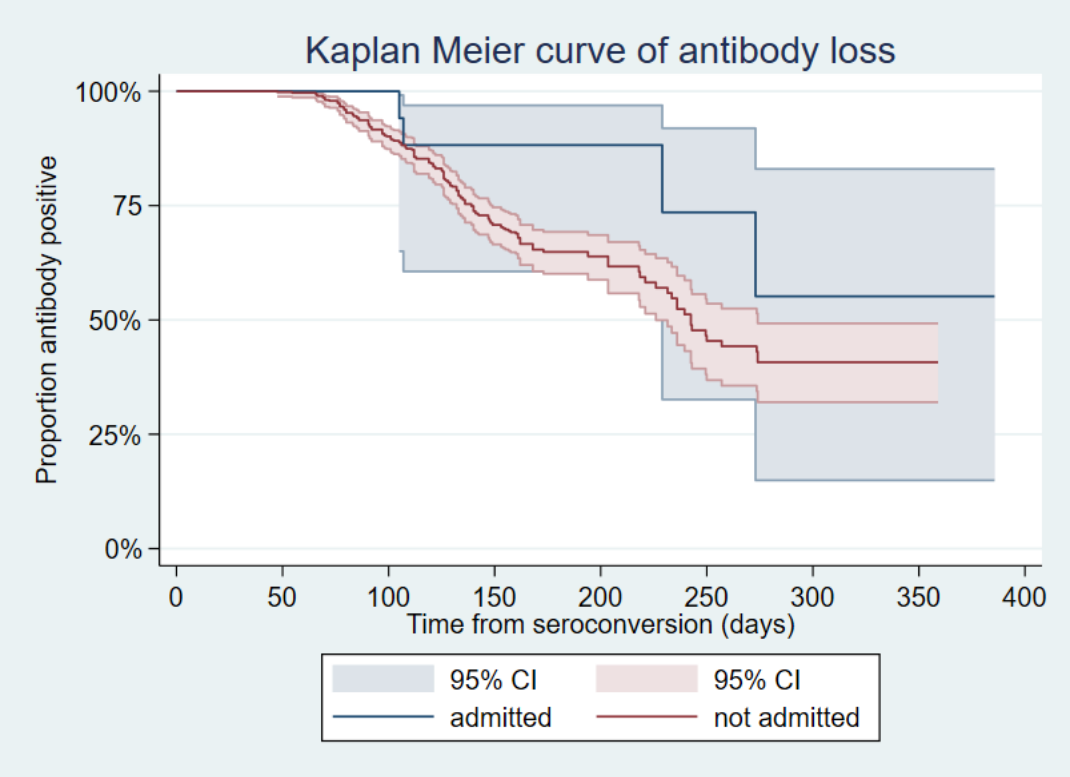
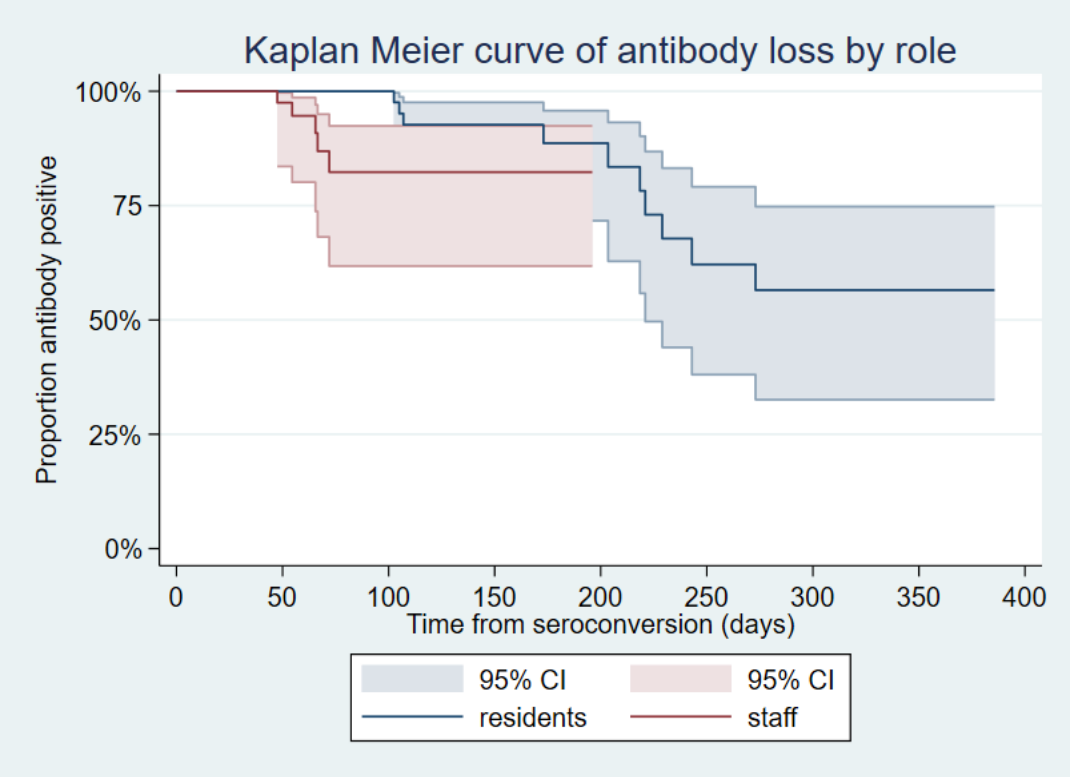


Figure S3: Kaplan Meier plot of time to antibody loss from estimated date of seroconversion according to severity of primary infection (hospital admission vs no hospital admission) in person-days with number censored and number at risk



Number at risk (number censored)									
Time from seroconversion (days	**0**	**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**
Admitted	**20 (0)**	**20 (0)**	**17 (3)**	**12 (3)**	**6 (6)**	**4 (1)**	**3 (0)**	**2 (1)**	**0 (2)**
Not admitted	**599 (0)**	**585 (13)**	**473 (58)**	**293 (90)**	**58 (216)**	**40 (3)**	**21 (14)**	**5 (16)**	**0 (5)**

Figure S4: Kaplan Meier plot of time to antibody loss from estimated date of seroconversion in PCR-confirmed, hospitalised and seroconverted participants, with number censored and number at risk (n=116)



Number at risk (number censored)									
Time from seroconversion (days	**0**	**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**
Staff	**43 (0)**	**35 (7)**	**6 (25)**	**4 (2)**	**0 (4)**	**0 (0)**	**0 (0)**	**0 (0)**	**0 (0)**
Residents	**73 (0)**	**67 (6)**	**41 (26)**	**33 (5)**	**17 (15)**	**11 (1)**	**4 (6)**	**1 (3)**	**0 (1)**

Table S1: Characteristics of included LTCFs

	Number of LTCFs (%)
Total	201
Proportion where residents sampled	176 (87·6)
Proportion where staff sampled	201 (100)
Region	
London	10 (5·0)
South East	40 (19·9)
East of England	13 (6·5)
East Midlands	26 (12·9)
West Midlands	10 (5·0)
South West	39 (19·4)
North West	29 (14·4)
North East	20 (10·0)
Yorkshire & Humber	14 (7·0)
LTCF type	
For-profit chain	118 (58·7)
Not for Profit chain	64 (31·8)
Independent	19 (9·5)
Round of testing	
1	201 (100)
2	175 (87·1)
3	84 (41·8)
4	39 (19·4)
Interval	
1: June-July 2020	96 (19·6)
2: August-September 2020	94 (19·2)
3. October-November 2020	87 (17·8)
4. December 2020-January 2021	53 (10·8)
5. February 2021	59 (12·0)
6. March-April 2021	101 (20·6)
Occupied beds per LTCF, mean (SD)	44·36 (16·5)
Number of staff per LTCF, mean (SD)	56·86 (21·9)
Number of samples per LTCF per round, mean (SD):	
Staff	13·18 (8·61)
Residents	7·60 (6·05)

Table S2: Number of samples included in the analysis by care home role and mean time between samples in days

Testing round	**Number of Residents with antibodies to N (%)**	**Number of Staff with antibodies to N (%)**	**Mean time to next sample in days (SD)**
1	239/239 (100)	377/380 (99·2)	62·5 (26·9)
2	211/239 (88·3)	303/380 (79·7)	61·8 (24·0)
3	119/154 (77·3)	140/218 (64·2)	157·2 (24·9)
4	23/37 (62·2)	8/18 (44·4)	NA

NA = Not Applicable

Table S3: Antibody results by round of testing and round 1 antibody result in a) staff b) residents

a)

		Round 2			Round 3			Round 4		
		Positive (%)	**Negative (%)**	**Total**	**Positive (%)**	**Negative (%)**	**Total**	**Positive (%)**	**Negative (%)**	**Total**
Round 1	**Positive (%)**	300 (79·6)	77 (20·4)	377	137 (63·7)	78 (36·3)	215	7 (41·2)	10 (58·8)	17
	Negative (%)	3 (100)	0 (0)	3	3 (100)	0 (0)	3	1 (100)	0 (0)	1
Total		303	77	380	140	78	218	8	10	18

b)

		Round 2			Round 3			Round 4		
		Positive (%)	**Negative (%)**	**Total**	**Positive (%)**	**Negative (%)**	**Total**	**Positive (%)**	**Negative (%)**	**Total**
Round 1	**Positive (%)**	211 (88·3)	28 (11·7)	239	119 (77·3)	35 (22·7)	154	23 (62·2)	14 (37·8)	37
	Negative (%)	0	0	0	0	0	0	0	0	0
Total		211	28	239	119	35	154	23	14	37

Table S4: Distribution of time to sero-reversion for residents and staff (n=188)*

Time to sero-reversion	**Residents (%)**	**Staff (%)**	**Total (%)**
< 90 days	13 (23·6)	23 (17·3)	36 (19·2)
90-180 days	30 (54·6)	99 (74·4)	129 (68·6)
180-270 days	11 (20·0)	8 (6·0)	19 (10·1)
≥ 270 days	1 (1·8)	3 (2·3)	4 (2·1)
Total	55	133	188

* Among those that sero-reverted, those who did not (censored) are excluded

Table S5: Time at risk and incidence rate of sero-reversion by care home role in person-days

Role	**Number of sero-reversions**	**Time at risk (person-days)**	**Incidence rate (per 1000 person-days)**
Staff	133	54543	2·44
Residents	55	37141	1·48
Overall	188	91684	2·05

Table S6: Time at risk and incidence rate of sero-reversion according to severity of primary infection

Severity of infection	**Number of sero-reversions**	**Time at risk (person-days)**	**Incidence rate (per 1000 person-days)**
Admitted to hospital	4	3639	1·10
Not admitted to hospital	184	88045	2·09

Table S7: Time at risk and incidence rate of sero-reversion in sub-group of PCR-confirmed, hospitalised or sero-converted individuals only (sensitivity analysis) (n=116)

Severity of infection	**Number of sero-reversions**	**Time at risk (person-days)**	**Incidence rate (per 1000 person-days)**
Staff	5	3369	1.48
Residents	10	10756	0.93
Overall	15	14126	1.06

STROBE checklist

	Item No	Recommendation	Page No
Title and abstract			
	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4-5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4-5
Participants	6	*a) Cohort study*? Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*? Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross sectional study*? Give the eligibility criteria, and the sources and methods of selection of participants	4-6
		(*b*) *Cohort study*? For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*? For matched studies, give matching criteria and the number of controls per case	n/a
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-7
Bias	9	Describe any efforts to address potential sources of bias	4-7
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6-7
		(*b*) Describe any methods used to examine subgroups and interactions	6-7
		(*c*) Explain how missing data were addressed	5-7
		(*d*) *Cohort study*? If applicable, explain how loss to follow-up was addressed *Case-control study*? If applicable, explain how matching of cases and controls was addressed *Cross sectional study*? If applicable, describe analytical methods taking account of sampling strategy	5-7
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(*a*) Report numbers of individuals at each stage of study? eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-9, figure S1
		(*b*) Give reasons for non-participation at each stage	7-9 Figure S1

	Item No	Recommendation	Page No
		(*c*) Consider use of a flow diagram	Figure S1 (appendix)
Descriptive data	14*	(*a*)Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-9, table 1, appendix
		(*b*) Indicate number of participants with missing data for each variable of interest	7-9
		(*c*) *Cohort study*? Summarise follow-up time (eg average and total amount)	7-9
Outcome data	15*	*Cohort study*? Report numbers of outcome events or summary measures over time	7-9, table 1-2, appendix
		Case-control study? Report numbers in each exposure category, or summary measures of exposure	
		Cross sectional study? Report numbers of outcome events or summary measures	
Main results	16	(*a*) Report the numbers of individuals at each stage of the study?eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-9, appendix, table1-2
		(*b*) Give reasons for non-participation at each stage	7-9, appendix
		(*c*) Consider use of a flow diagram	
Other analyses	17	Report other analyses done?eg analyses of subgroups and interactions, and sensitivity analyses	8-9, appendix
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9-11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-11
Generalisability	21	Discuss the generalisability (external validity) of the study results	9-11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	7