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Changes in paediatric pneumococcal carriage in Southampton UK during the SARS-CoV2 pandemic

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BACKGROUND

The Southampton pneumococcal carriage study of children <5-years-old is in its seventeenth year and continued during the COVID-19 pandemic. Whilst it has been shown that invasive disease declined during this period¹, there are data to suggest carriage prevalence remained largely unaffected by social distancing and other Non-pharmaceutical interventions (NPIs)², although pneumococcal carriage density has been shown to have been impacted³.

AIM

To determine if pneumococcal carriage in children <5-years-old was impacted by NPIs (i.e., periods of lockdown) during the SARS-CoV2 pandemic.

METHODS

Nasopharyngeal swabs were collected from children <5-years-old attending outpatient clinics at University Hospital Southampton NHS Foundation Trust (**Site 1**) during seventeen consecutive winters (October-March; 2006/7 to 2022/23). Sampling was also done for the most recent six winters, beginning in 2017/18, at community health-care sites across the Solent NHS Trust area (**Site 2**).

Presumptive *S. pneumoniae* were plated on Columbia blood agar with an optochin disc and confirmed with a ≥ 14 mm diameter inhibition zone.

Pre-NPI carriage was compared to the period during NPIs (26th March 2020 to 1st July 2021) and post-NPI period (on or after the 1st August 2021).

RESULTS

Pneumococcal carriage in the three years preceding the pandemic was 29.9% (95CI: 8.8-33.2), 35.0% (95CI: 32.1-38.1) and 29.7% (95CI: 26.9-32.7) for 2017/18, 2018/19 and 2019/20 respectively. During the period which included NPIs this dropped to 19.2% (95CI: 14.9-24.3) and remained lower at 21.2% (95CI: 17.1-26.1) and 26.6% (95CI: 22.3-31.5) in the two most recent years.

RESULTS (cont.)

When separated into sampling sites (Figure 1 and Table 1), the immediate rebound seen for Site 1 (Hospital) was not seen for Site 2 (community health-care sites). Here carriage fell significantly from 27% (n=127/470) in 2019/20 to 20% (n=44/228) in 2020/21 (χ^2 (1, N=697) = 4.64, $p=.031$). In the most recent period, 2022/23, carriage in Site 2 cohorts has increased to 25.3 (95CI: 20.8-30.3) suggesting that prevalence has rebounded.

Table 1: Recruitment numbers and carriage (point prevalence) for each site from 2017/18 to 2022/23 (the most recent sampling period).

YEAR	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
SITE 1						
Recruitment (n)	480	542	499	64	46	31
Pneumococci (n)	158	192	161	12	15	13
Carriage (%)	31.7	35.4	32.2	18.8	32.6	41.9
SITE 2						
Recruitment (n)	322	458	470	228	288	340
Pneumococci (n)	89	158	127	44	56	86
Carriage (%)	27.2	34.5	27	19.3	19.4	25.3

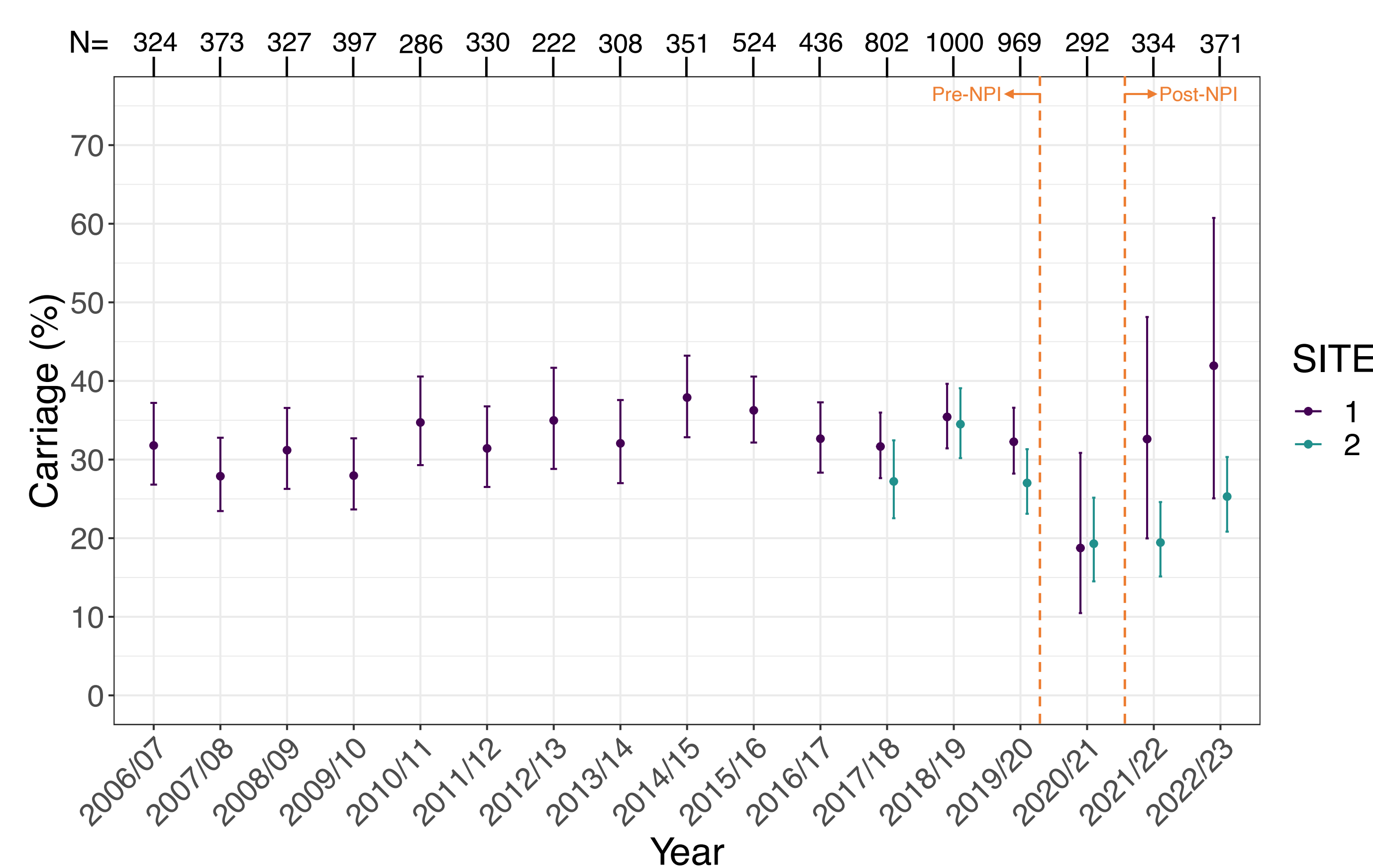


Figure 1 (left): Carriage prevalence (%) of *S. pneumoniae* (all serotypes). Per year recruitment numbers are shown above. Error bars represent 95% CI. From 2017/18 onwards data has been split into Site 1 (University Hospital Southampton NHS Foundation Trust) and Site 2 (community health-care settings in the Solent NHS Trust area).

Carriage prevalence remained significantly lower ($p = 0.017$) in children less than 2 years of age in the post-NPI period compared to pre-NPI periods (Figure 2). Carriage during NPIs for both <2 and 2-4 years of age was lower than pre-pandemic levels, but not statistically so. Prevalence in the post-NPI period for both these age groups is reflective of the levels seen pre-NPI period (Figure 2).

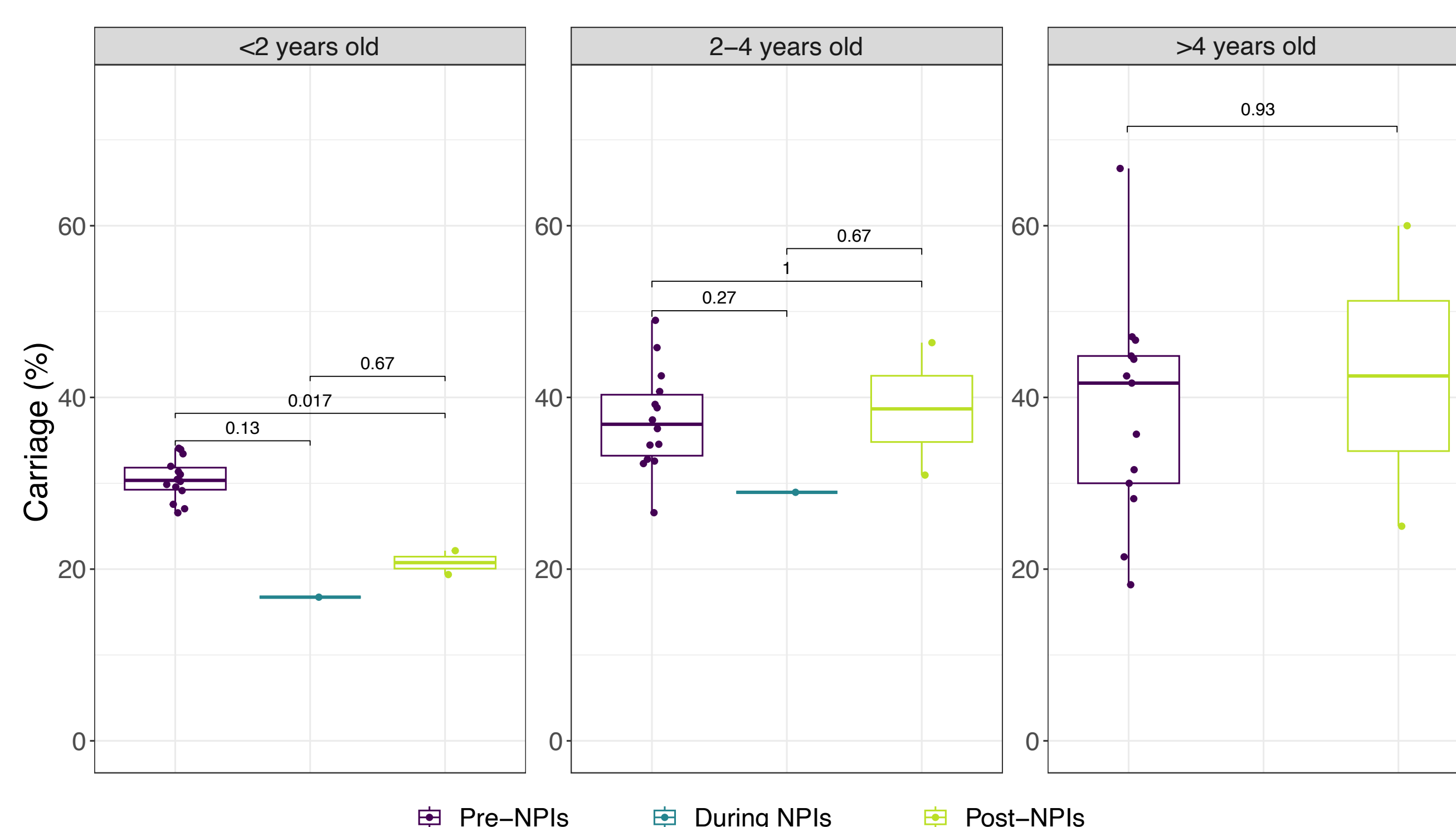


Figure 2 (left): Box and whisker plot of pneumococcal carriage prevalence (%) stratified by age group, with statistical comparisons (Kruskal-Wallis) made between pre-, during (26/03/2020 to 01/07/2021) and post-NPIs. Carriage in children <2 years old is the only age group for whom pneumococcal prevalence has remained low.

CONCLUSION

- Pneumococcal carriage prevalence declined in children <5-years-old (in Southampton, UK) during the SARS-CoV2 pandemic.
- Carriage prevalence has largely rebounded since NPIs were stopped.
- Carriage in those <2 years of age remains statistically lower than pre-pandemic levels.

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