

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

Cleary, David; Jones, Jessica; Campling, James; Lahuerta, Maria; Hayford, Kyla; Southern, Jo; Gessner, Bradford D; Bentley, Stephen D; Faust, Saul N; Clarke, Stuart C

License:

None: All rights reserved

Document Version

Publisher's PDF, also known as Version of record

Citation for published version (Harvard):

Cleary, D, Jones, J, Campling, J, Lahuerta, M, Hayford, K, Southern, J, Gessner, BD, Bentley, SD, Faust, SN & Clarke, SC 2023, 'Changes in paediatric pneumococcal carriage in Southampton UK during the SARS-CoV2 pandemic', 16th European Meeting on the Molecular Biology of the Pneumococcus, Rithymna, Greece, 23/05/23 - 26/05/23.

[Link to publication on Research at Birmingham portal](#)

General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact UBIRA@lists.bham.ac.uk providing details and we will remove access to the work immediately and investigate.

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

David W. Cleary^{1, 2}, Jessica Jones², James Campling³, Maria Lahuerta⁴, Kyla Hayford⁴, Jo Southern⁴, Bradford D. Gessner⁴, Stephen D. Bentley⁵, Saul N. Faust^{2, 6, 7} and Stuart C. Clarke^{2, 6, 8}

1. Institute of Microbiology and Infection, College of Medical and Dental Sciences, University of Birmingham, UK. 2. Faculty of Medicine, University of Southampton, Southampton, UK. 3. Vaccines Medical Affairs, Pfizer Ltd, Tadworth, UK. 4. Vaccines Medical Development, Scientific and Clinical Affairs, Pfizer Inc, Collegeville, PA, USA. 5. Parasites and microbes, Wellcome Sanger Institute, Hinxton, UK. 6. NIHR Southampton Biomedical Research Centre, University Hospital Southampton Foundation NHS Trust, Southampton, UK. 7. NIHR Southampton Clinical Research Facility, University Hospital Southampton Foundation NHS Trust, Southampton, UK. 8. Global Health Research Institute, University of Southampton, Southampton, UK

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

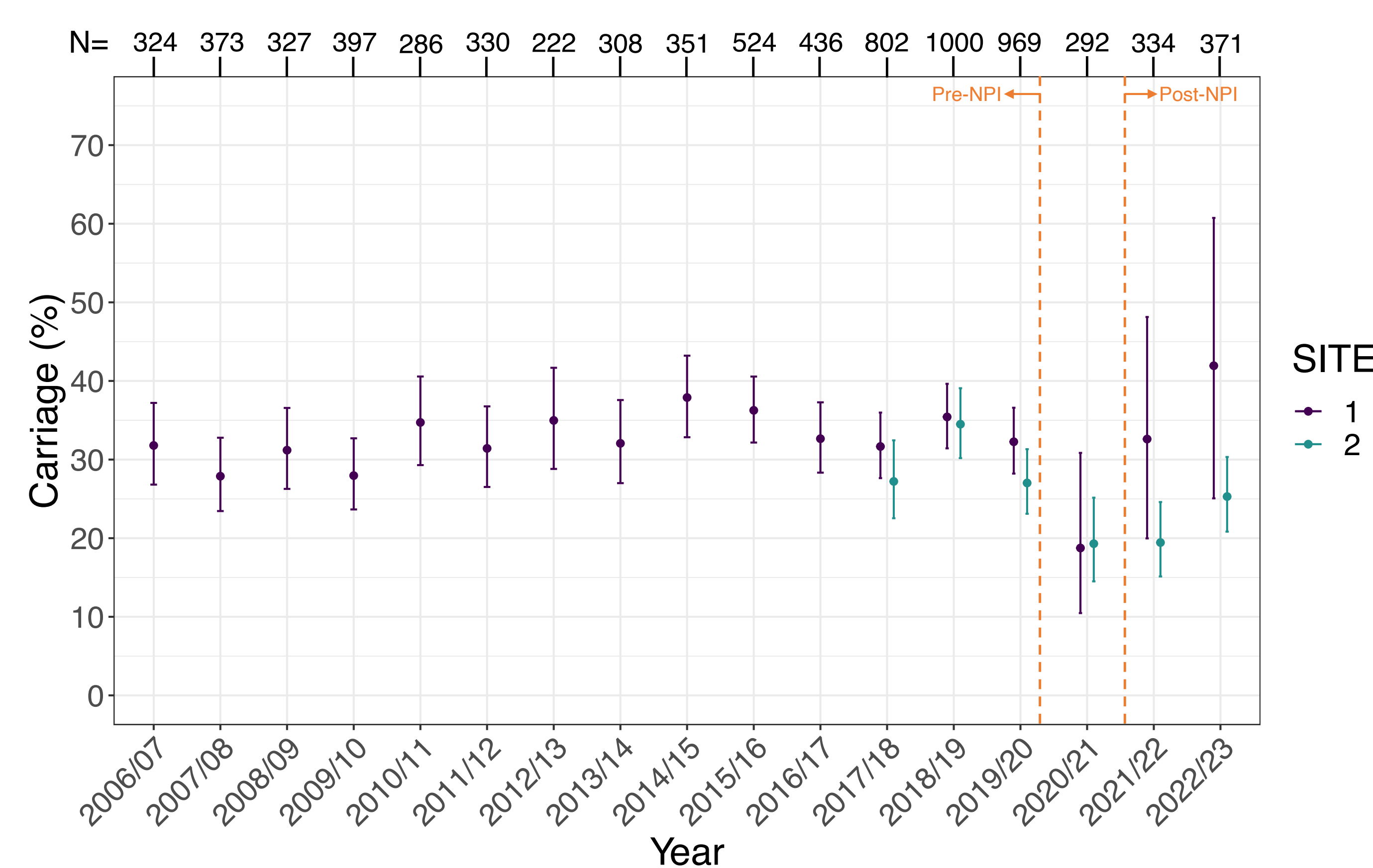


Figure 1 (left): Carriage prevalence (%) of *S. pneumoniae* (all serotypes). Per year recruitment numbers are shown above. Error bars represent 95% CI. From 2017/18 onwards data has been split into Site 1 (University Hospital Southampton NHS Foundation Trust) and Site 2 (community health-care settings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

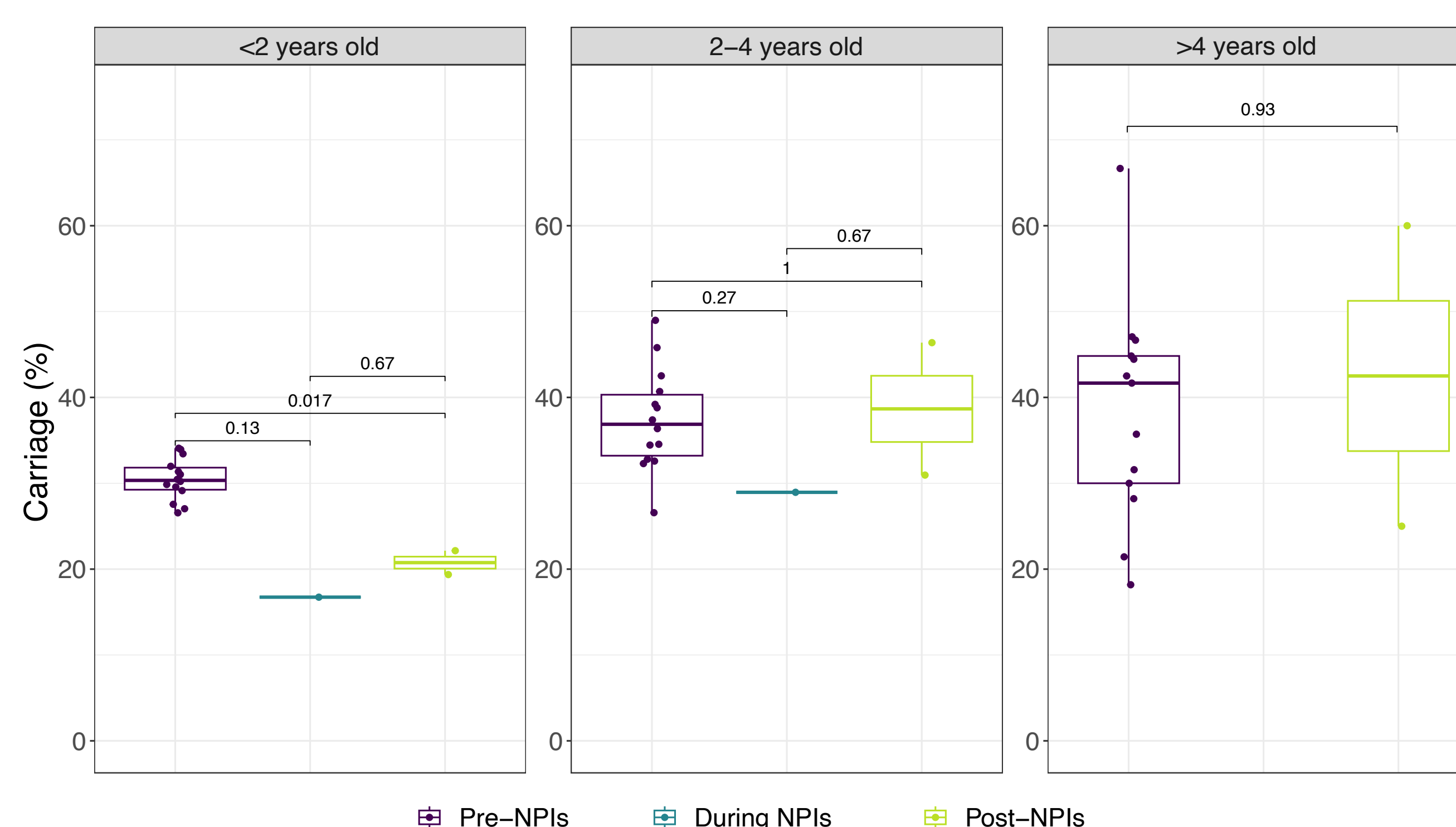


Figure 2 (left): Box and whisker plot of pneumococcal carriage prevalence (%) stratified by age group, with statistical comparisons (Kruskal-Wallis) made between pre-, during (26/03/2020 to 01/07/2021) and post-NPIs. Carriage in children <2 years old is the only age group for whom pneumococcal prevalence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

FUNDING

This was an investigator-led project funded under a collaborative agreement by Pfizer