

Patient and public involvement within epidemiological studies of Long Covid in the United Kingdom

Routen, Ash ; O'Mahoney, Lauren L ; Aiyegbusi, Olalekan Lee; Alder , Yvonne ; Banerjee, Ami; Buckland, Lewis ; Brightling, Christopher E; Calvert, Melanie; Camaradou, Jenny ; Chaturvedi, Nishi ; Chong, Amy ; Dalrymple, Emma ; Eggo, Rosalind M.; Elliott, Paul; Evans, Rachael A ; Gibson, Andy; Haroon, Shamil; Herrett, Emily ; Houchen-Wolloff, : Linzy ; Hughes, Sarah

DOI:

[10.1038/s41591-023-02251-5](https://doi.org/10.1038/s41591-023-02251-5)

License:

Other (please specify with Rights Statement)

Document Version

Peer reviewed version

Citation for published version (Harvard):

Routen, A, O'Mahoney, LL, Aiyegbusi, OL, Alder , Y, Banerjee, A, Buckland, L, Brightling, CE, Calvert, M, Camaradou, J, Chaturvedi, N, Chong, A, Dalrymple, E, Eggo, RM, Elliott, P, Evans, RA, Gibson, A, Haroon, S, Herrett, E, Houchen-Wolloff, L, Hughes, S, Jeyes, F, Matthews, K, McMullan, C, Morley, J, Shafran, R, Smith, N, Stanton, DE, Stephenson, T, Sterne, JAC, Turner, G, Ward, H & Khunti, K 2023, 'Patient and public involvement within epidemiological studies of Long Covid in the United Kingdom', *Nature Medicine*.
<https://doi.org/10.1038/s41591-023-02251-5>

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

Publisher Rights Statement:

This version of the article has been accepted for publication, after peer review (when applicable) and is subject to Springer Nature's AM terms of use, but is not the Version of Record and does not reflect post-acceptance improvements, or any corrections. The Version of Record is available online at: <https://doi.org/10.1038/s41591-023-02251-5>

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.

1 **Patient and public involvement within epidemiological studies of Long Covid**
2 **in the United Kingdom**

3

4 **Author Names:** **Ash Routen¹, Lauren O'Mahoney¹, Olalekan Lee Aiyegbusi^{4,5,6,7,16},
5 Yvonne Alder^{4,9}, Amitava Banerjee², Lewis Buckland^{4,9}, Chris Brightling³, Melanie
6 Calvert^{4,5,6,7,8,16}, Jenny Camaradou^{4,9}, Nishi Chaturvedi¹⁰, Amy Chong^{4,9}, Emma
7 Dalrymple¹³, Rosalind M Eggo¹¹, Paul Elliott¹², Rachael A Evans³, Andy Gibson¹⁹,
8 Shamil Haroon⁴, Emily Herrett¹⁰, Linzy Houchen-Wolloff³, Sarah E Hughes^{4,5,6,7,16},
9 Flic Jeyes^{4,9}, Karen Matthews^{4,9}, Christel McMullan^{4,6,8,15,16}, Jessica Morley^{17,9}, Roz
10 Shafran¹³, Nikki Smith¹⁸, David Stanton⁴, Terence Stephenson¹³, Jonathan Sterne¹⁴
11 ,Grace M Turner⁴, Helen Ward¹², Kamlesh Khunti¹.

12 **Corresponding author

13

14 **Author Affiliations:**

15 1. Diabetes Research Centre, Leicester General Hospital, University of Leicester,
16 Leicester, UK.

17 2. Institute of Health Informatics, Faculty of Population Health Sciences, University
18 College London, London, UK.

19 3. Department of Respiratory Sciences, University of Leicester, Leicester, UK.

20 4. Institute of Applied Health Research, University of Birmingham, Birmingham, UK.

21 5. National Institute for Health Research (NIHR) Applied Research Collaboration
22 West Midlands, Birmingham, UK.

23 6. NIHR Birmingham Biomedical Research Centre, University of Birmingham,
24 Birmingham, UK.

- 25 7. Birmingham Health Partners Centre for Regulatory Science and Innovation,
26 University of Birmingham, Birmingham, UK.
- 27 8. NIHR Surgical Reconstruction and Microbiology Research Centre, University of
28 Birmingham, Birmingham, UK.
- 29 9. Patient and public contributor, UK.
- 30 10. Department of Population Science and Experimental Medicine, University
31 College London, London, UK.
- 32 11. Department of Epidemiology and Population Health, London School of Hygiene
33 and Tropical Medicine, London, UK.
- 34 12. Faculty of Medicine, School of Public Health, Imperial College London, London,
35 UK.
- 36 13. Great Ormond Street Institute of Child Health, University College London,
37 London, UK.
- 38 14. Population Health Sciences, Bristol Medical School, University of Bristol, Bristol,
39 UK.
- 40 15. Centre for Trauma Science Research, University of Birmingham, Birmingham,
41 UK
- 42 16. NIHR Oxford-Birmingham Blood and Transplant Research Unit (BTRU) in
43 Precision Therapeutics
- 44 17. Bennett Institute for Applied Data Science, University of Oxford, Oxford, UK
- 45 18. Expert by lived experience, provides PPI to the REACT-LC and PHOSP-COVID
46 studies, UK.
- 47 19. Department of Health and Social Sciences, University of West England, UK.
48
49

50 **Corresponding author:** Dr Ash Routen, Diabetes Research Centre, Leicester
51 General Hospital, University of Leicester, Leicester, UK. Email:
52 ar516@leicester.ac.uk

53

54 Several major epidemiological studies have been funded in the UK to better
55 understand the epidemiology of persistent symptoms following SARS-CoV-2
56 infection. Investigators from nine of these studies formed the National Long COVID
57 Research Working Group in 2021 to share key findings and methodological
58 developments, and explore ways of working across projects ¹.

59

60 Seven of these studies have substantively worked with diverse public and patient
61 members and support groups, and have gone on to create patient involvement
62 groups or panels specific to their research (Table 1). The large volume of patients
63 living with Long Covid ², and the willingness of patients and support groups to
64 engage with these studies, as well as the barriers of operating during periods of
65 pandemic control measures have provided unique opportunities and challenges for
66 patient and public involvement (PPI).

67

68 A particular example of the success of PPI is the Therapies for Long COVID in non-
69 hospitalised individuals (TLC) study ³, where patient partners identified the need to
70 develop a new Symptom Burden Questionnaire™ for Long COVID (SBQ™-LC)⁴.
71 Patients with Long Covid were actively involved in the generation of item content for
72 the SBQ™ and assisted with recruitment from Long Covid patient groups. The
73 SBQ™-LC has since been licensed over 90 times across 50 countries. In addition to
74 this important contribution, patient partners also actively co-produced a study to test

75 the feasibility and acceptability of delivering non-pharmacological, self-management
76 interventions remotely in the community, shaping the study design and co-selecting
77 intervention resources.

78 Advocacy and support groups have been invaluable to patients with Long Covid and
79 a conduit for their involvement in research studies, through a diverse network of
80 patients and carers with a wide range of lived experience. Members of these groups
81 often assist with public engagement, which helps with the recruitment of study
82 participants, as well as publicising events such as study webinars, the distribution of
83 questionnaires, and dissemination of results. However, there is often a lack of
84 diversity among patient contributors, who are often of similar age, sex, ethnicity,
85 education level, and professional status. As a result, the CONVALESCENCE Long
86 Covid study proactively recruited from under-served communities and included
87 questions on equality and diversity in its PPI recruitment materials. Extensive training
88 from the study PPI team was also provided so that patients felt qualified to contribute
89 in areas such as quantitative data interpretation. When selecting patients, studies
90 from the National Working Group have included a diverse PPI membership,
91 delivering individualised training and discussions on preferences on involvement.

92

93 A particular area of learning regards the establishment of patient advisory groups
94 (PAGs). Diversity of participants can be improved through recruitment from several
95 PPI networks, avoiding recruitment from a single source. Clear pathways for inviting
96 new members to join PAG's are needed to ensure that they are sustainable. It is
97 important that PPI members receive regular updates and information on the project
98 and are clearly informed of the purpose and importance of their involvement. PPI
99 activities can be greatly strengthened, coordinated and made sustainable throughout

100 a project by a dedicated and trained PPI lead, which is a crucial role in long Covid
101 research.

102

103 Researchers should continually revisit what different PPI members want to contribute
104 and can contribute, based on skill set, interests, return to work and other
105 commitments, and the restrictions that come with having a chronic condition with a
106 relapsing and remitting nature where a main symptom is fatigue. Different studies, or
107 different aspects of a study, may have different requirements of PPI members, or
108 may benefit from PPI members with specific experiences, knowledge or skills.

109 Certain studies are more complicated, more cognitively challenging, or more
110 demanding on PPI members' time than others. Studies can benefit from working with
111 PPI members with significant knowledge and extensive experience of Long Covid, as
112 well as PPI members who are able to attend and actively contribute to frequent
113 meetings, in order to ensure effective PPI is ingrained throughout the study. This can
114 include working on various aspects of the study such as study design, contributing to
115 patient-facing materials, interpreting results, co-authoring papers and participating in
116 public engagement events.

117

118 Researchers may not always be aware of how much PPI is needed to improve their
119 research. Researchers should consider the experience, skills, and capabilities of
120 each PPI member and what they want to contribute to, rather than this being
121 decided, perhaps inappropriately, by the research team.

122

123 Patients with Long COVID often suffer from fatigue and can also experience some
124 cognitive dysfunction, which may require adjustments as with any disability. PPI

125 meetings should be flexible (for example on timing and duration) and consider
126 patient needs, with all materials and documents for review provided with sufficient
127 advance notice. Other meeting adjustments should include the potential need for
128 breaks and allowing cameras to be optional as PPI members may tire, be
129 experiencing sensory or vision issues, or be concerned about appearing on camera.

130

131 The pandemic presented logistical challenges to working with patients on research
132 due to strict public health measures such as social distancing. However, a rapid
133 upskilling in the use of online communication technology has resulted in the studies
134 from the Working Group having access to a wide range of patient contributors from
135 across the UK. Although online PPI activities raise concerns around digital exclusion,
136 studies such as CLoCk have found that online recruitment and virtual meetings
137 helped achieve more representative geographical coverage and diversity from
138 across the UK, both in terms of ethnicity and socioeconomic status.

139

140 The level of patient involvement we have experienced has undoubtedly strengthened
141 the applicability and rigour of our findings, and increased public trust in the veracity
142 of these studies. There remains a limited understanding on the causes of Long Covid
143 and the development of effective treatments, and so placing patients at the heart of
144 future research in this area continues to remain imperative ⁵.

145

146 **Acknowledgments**

147 Some of the studies described in this correspondence were jointly supported by the
148 National Institute for Health Research and UK Research and Innovation
149 (OpenPROMPT: Ref: COV-LT2-0073). The views expressed in this article are those

150 of the author(s) and not necessarily those of UKRI, the NIHR, or the Department of
151 Health and Social Care.

152

153 **Competing Interests**

154 MC receives funding from NIHR Birmingham Biomedical Research Centre, the NIHR
155 Surgical Reconstruction and Microbiology Research Centre and NIHR ARC West
156 Midlands at the University of Birmingham and University Hospitals Birmingham NHS
157 Foundation Trust, Health Data Research UK, Innovate UK (part of UK Research and
158 Innovation), Macmillan Cancer Support, UCB and GSK Pharma; personal fees from
159 Astellas, Aparito Ltd, CIS Oncology, Takeda, Merck, Daiichi Sankyo, Glaukos, GSK
160 and the Patient-Centered Outcomes Research Institute (PCORI) outside the
161 submitted work. OLA receives funding from the NIHR Birmingham Biomedical
162 Research Centre (BRC), NIHR ARC West Midlands, NIHR Birmingham-Oxford
163 Blood and Transplant Research Unit (BTRU) in Precision Transplant and Cellular
164 Therapeutics, The Health Foundation, Innovate UK (part of UK Research and
165 Innovation), Janssen Pharmaceuticals, Gilead Sciences Ltd, GSK, and Sarcoma UK;
166 declares personal fees from Gilead Sciences Ltd, GSK and Merck outside the
167 submitted work. AB has received research grants from Astra Zeneca, National
168 Institute for Health and Care Research (including as CI of the STIMULATE-ICP
169 study: COV-LT2-0043, European Union, British Medical Association; and is a
170 Trustee of Long Covid SOS. CM receives funding from NIHR Surgical
171 Reconstruction and Microbiology Research Centre (SRMRC), the NIHR Oxford-
172 Birmingham Blood and Transplant Research Unit (BTRU) in Precision Therapeutics
173 UKRI, and declares personal fees from Aparito Ltd outside the submitted work. SEH
174 receives funding from the NIHR Oxford-Birmingham Blood and Transplant Research

175 Unit (BTRU) in Precision Therapeutics, UK Research and Innovation (UKRI), UK
176 SPINE and declares personal fees from Cochlear Ltd, Astra Zeneca, CIS Oncology,
177 and Aparito Ltd. NC has received funding from AstraZeneca to serve on Data Safety
178 and Monitoring Committees for clinical trials. KK is a trustee of the South Asian
179 Health Foundation, chair of the Ethnicity Subgroup of the Scientific Advisory Group
180 for Emergencies (SAGE), and member of SAGE. PE, ED, SH, RS and TS receive
181 funding from NIHR and UKRI. TS is Chair of the Health Research Authority and
182 therefore recused himself from the CLoCk Research Ethics Application. RAE
183 receives funding from NIHR, UKRI/MRC, BMJ and Wolfson Foundation.

184

185 **References**

- 186 1. Routen, A., *et al. Nature Medicine* **28**, 11-15 (2022).
- 187 2. O'Mahoney, L.L., *et al. eClinicalMedicine* **55**(2023).
- 188 3. Haroon, S., *et al. BMJ Open* **12**, e060413 (2022).
- 189 4. Hughes, S.E., *et al. BMJ* **377**, e070230 (2022).
- 190 5. Shaffer, L. *Proceedings of the National Academy of Sciences* **119**, e2213524119
191 (2022).
- 192 6. Houchen-Wolloff, L., *et al. Thorax* **77**, 717 (2022).

193

194

195

196

Study	Number of patient advisors	Profile of participants	Regularity and location of meetings	Main outcomes
CLoCK	13	All aged 11-17 years; 67% white; all deprivation deciles included	Online quarterly meetings	<ul style="list-style-type: none"> • Delphi definition of Long Covid • Dissemination of findings • Changes to survey questions • Input into qualitative design • Input into data presentation • Long Covid artwork • Changes to newsletters • Awards for involvement
CONVALESCENCE	12	Diverse social and ethnic backgrounds	5 training workshops and 7 tailored workshops; 2 PAG members attend quarterly executive meeting	<ul style="list-style-type: none"> • Changes to questionnaires and other instrument design • Refinement of ethics • Communications • Materials development for internal and external use • Changes to researchers' interpretations of qualitative work
TLC	15	Diverse in terms of age, ethnicity and employment status	Ongoing online opportunities throughout lifetime of project.	<ul style="list-style-type: none"> • Identifying need for new Symptom Burden Questionnaire™ and need to survey patients about self-management strategies

				<ul style="list-style-type: none"> • Changes to recruitment strategy • Improved participant facing study materials • Coproduction of feasibility study • Co-selected pacing resources • Co-design of study processes and app testing • Supported community engagement and recruitment • Identified key messages for research outputs • Dissemination of research outputs
REACT-Long COVID	13 (plus 161 members of REACT: COVID-19 Community Network)	9 women and 4 men. Diverse group that includes people with lived experience of Long Covid and participants in the original REACT studies.	Quarterly online meetings. Each advisor is allocated to one of four work streams for close working with researchers; community network send updates and involvement opportunities	<ul style="list-style-type: none"> • Changes to questionnaire design • Improved participant-facing study materials • Interpretation of pilot qualitative findings • Involvement in publications and dissemination • Worked with researchers to establish an online research involvement hub on VOICE- Global

PHOSP-COVID	50 advisors and 11 charities	Diverse group in terms of age, ethnicity, socioeconomic status, including patients and carers with lived experience of acute COVID-19 and Long COVID, including hospitalised and non-hospitalised	PPI embedded throughout all stages of project, with regular meetings depending on project needs, conducted via email, phone or teleconference	<ul style="list-style-type: none"> • Input into study design and conduct • Joint Research Question Priority Setting ⁶ • Improved participant facing study materials • Reviewed and tested new study processes • Public webinars and newsletters for dissemination
STIMULATE-ICP	11	PPI advisory group represents social, ethnic and geographic diversity	PPI attendance at monthly consortium meetings and separate monthly PPI online team meetings	<ul style="list-style-type: none"> • Involvement in research publications • Educational videos • PPI blog on study website • Media and social media engagement • Policy and other articles in non-scientific publications • PPI-led eBook about experience of Long Covid
OpenPROMPT	3	PPI advisory group is comprised of 3 individuals, and OpenSAFELY Digital Critical Friends (DCF) Group, feeds into the group on specific issues	Online webinar at study start; PPI attendance at online OpenPROMPT meetings every 6 months, with additional email feedback on research plans;	<ul style="list-style-type: none"> • Adaptations to study protocols • Improved public facing study materials • Co-designed public explainer materials for OpenSAFELY

		related to the data collection platform	OpenSAFELY DCF online meeting every 3 months; Ad hoc PPI online focus groups on specific topics.	
--	--	---	--	--

197
198
199
200
201
202