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Characterising long COVID: a living systematic review

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ABSTRACT

Background While it is now apparent clinical sequelae (long COVID) may persist after acute COVID-19, their nature, frequency and aetiology are poorly characterised. This study aims to regularly synthesise evidence on long COVID characteristics, to help inform clinical management, rehabilitation strategies and interventional studies to improve long-term outcomes.

Methods A living systematic review. Medline, CINAHL (EBSCO), Global Health (Ovid), WHO Global Research on COVID-19 database, LitCovid and Google Scholar were searched till 17 March 2021. Studies including at least 100 people with confirmed or clinically suspected COVID-19 at 12 weeks or more post onset were included. Risk of bias was assessed using the tool produced by Hoy *et al.* Results were analysed using descriptive statistics and metaanalyses to estimate prevalence.

Results A total of 39 studies were included: 32 cohort, 6 cross-sectional and 1 case-control. Most showed high or moderate risk of bias. None were set in low-income countries and few included children. Studies reported on 10951 people (48% female) in 12 countries. Most included previously hospitalised people (78%, 8520/10 951). The longest mean follow-up time was 221.7 (SD: 10.9) days post COVID-19 onset. Over 60 physical and psychological signs and symptoms with wide prevalence were reported, most commonly weakness (41%; 95% Cl 25% to 59%), general malaise (33%; 95% Cl 15% to 57%), fatigue (31%; 95% Cl 24% to 39%), concentration impairment (26%; 95% Cl 21% to 32%) and breathlessness (25%; 95% Cl 18% to 34%). 37% (95% Cl 18% to 60%) of patients reported reduced quality of life; 26% (10/39) of studies presented evidence of reduced pulmonary function.

Conclusion Long COVID is a complex condition with prolonged heterogeneous symptoms. The nature of studies precludes a precise case definition or risk evaluation. There is an urgent need for prospective, robust, standardised, controlled studies into aetiology, risk factors and biomarkers to characterise long COVID in different at-risk populations and settings.

PROSPERO registration number CRD42020211131.

INTRODUCTION

SARS-CoV-2 first emerged in December 2019 causing a widespread pandemic. Most people

Key questions

What is already known?

- A significant number of people continue to describe ongoing symptoms long after the acute phase of COVID-19, often referred to as long COVID.
- Long COVID is a heterogeneous condition with an uncertain prevalence, for which there is currently no precise case definition.

What are the new findings?

- The breadth of reported symptoms suggests a complex, heterogeneous condition affecting both those who were hospitalised and those managed in the community.
- Our review identifies weakness (41%; 95% Cl 25% to 59%), general malaise (33%; 95% Cl 15% to 57%), fatigue (31%; 95% Cl 24% to 39%), concentration impairment (26%; 95% Cl 21% to 32%) and breathlessness (25%; 95% Cl 18% to 34%) as the most common symptoms reported.

What do the new findings imply?

- The current evidence base of the clinical spectrum of long COVID is limited, based on heterogenous data, and vulnerable to biases, hence caution should be used when interpreting or generalising the results.
- Our review identifies areas where further long COVID research is critically needed to help characterise long COVID in different populations and define its aetiology, risk factors and biomarkers, as well as the impact on variants of concern and vaccination on long-term outcomes.

experience asymptomatic or mild-to-moderate acute COVID-19 symptoms, while around 15% of people are estimated to progress to more severe disease requiring hospitalisation and approximately 5% become critically ill.¹

While the acute phase of the disease was characterised early, there are still limited data on long-term outcomes.² Symptoms of long-lasting COVID-19 sequelae and complications, termed long COVID by people living with long COVID,³ have been

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reported worldwide. Yet the underlying aetiology behind prolonged or fluctuating symptomatology is limited and there is no widely accepted uniformed case definition.⁴ Instead, long COVID has been defined pragmatically as 'not recovering for several weeks or months following the start of symptoms'.⁴ Others have distinguished between postacute COVID-19, referring to symptoms beyond 3 weeks, and chronic COVID-19, referring to symptoms beyond 12 weeks,⁵ while the National Institute for Health and Care Excellence distinguishes between ongoing symptomatic COVID-19 lasting from 4 to 12 weeks and post COVID-19 syndrome continuing for over 12 weeks.⁶

The number of people living with long COVID is unknown. Attempts to quantify the prevalence of long COVID use different methods, including national surveys and patient-led studies, making it difficult to compare across studies. The UK's Office for National Statistics has estimated that on average 1 in 5 people have symptoms beyond 5 weeks, while 1 in 10 have symptoms persisting over 12 weeks.⁷ A patient-led survey found that in survival analysis, the chance of full recovery by day 50 was smaller than 20%⁸ and a COVID-19 symptom app study found that 13.3% (558/4182) patients had symptoms lasting 28 days or more, 4.5% (189/4182) patients had symptoms for 8 or more weeks and 2.3% (95/4182) patients had symptoms lasting over 12 weeks.⁹

The symptoms of long COVID are equally ill-defined, with patients describing it as a fluctuating illness of disparate symptoms.^{8 10} Indeed, the National Institute for Health Research has suggested that postacute COVID-19 may consist of several distinct clinical syndromes including: a postintensive care syndrome, chronic fatigue syndrome, long-term COVID-19 syndrome and disease from SARS-CoV-2 inflicted organ damage.¹¹ Additionally, even with an expanding knowledge of risk factors in the acute phase, little is currently known on predictive factors for developing long COVID.⁹ Despite suggested classifications, there is yet no clear consensus.

Our early understanding of long COVID has been accumulated from case reports and cross-sectional online survey studies as the pandemic global research focus has largely been on studies of hospitalised patients during the acute phase. As the pandemic progresses, emerging studies have followed up patients to present the fluctuating multiorgan sequelae of acute COVID-19, yet evidence is still scarce. There continues to be a call to further understand and acknowledge this condition by incorporating patient knowledge and experiences, together with standardised studies, exploring underlying aetiologies behind different syndromes.^{12 13}

Given the enormous number of people worldwide who have suffered from COVID-19, it is essential to establish a precise categorisation of long COVID. Such categorisation will not only help people better understand their symptoms but also direct research into prevention, treatment and support, ultimately allowing us to understand and prepare to respond to the long-term consequences inflicted by the COVID-19 pandemic. Our review seeks to synthesise and continually update the evidence on the character and prevalence of long COVID.

METHODS

Systematic reviews conducted early during the COVID-19 pandemic soon became redundant due to the rapidity with which new research was released. In recognition of this, many reviewers have moved towards the concept of a 'living systematic review' (LSR), which compared with traditional systematic reviews has in-built mechanisms for regular update and renewal.^{14 15} We conducted a 'living' systematic review to provide frequently updated evidence on the symptoms and complications of long COVID. This review was developed in collaboration with infectious disease clinicians, public health professionals, information specialists, review methodologists with experience in clinical epidemic research and members of the global Long COVID Support Group, which includes people living with long COVID. This is the first version of this LSR, which will be updated approximately every 6 months as new evidence emerges, using the established protocol and review platform. The updates will be led by the International Severe Acute Respiratory and emerging Infection Consortium (ISARIC) systematic review team in collaboration with members of Long COVID Support. Previous versions will be archived in online supplemental materials. The findings will be disseminated via BMJ Global Health and on a dedicated webpage with infographics and a brief summary for lay people and professionals.

Protocol registration

This report was structured according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement guidelines.¹⁶ The protocol was registered with PROSPERO and published in a peer-reviewed journal.¹⁷

Search strategy

The following databases were searched: Medline and CINAHL (EBSCO), Global Health (Ovid), WHO Global Research Database on COVID-19 and LitCovid from 1 January 2020 to 17 March 2021. Additionally, we searched Google Scholar on 17 March 2021, screening the first 500 titles. A 'backwards' snowball search was conducted of the references of systematic reviews. Full search terms are included in online supplemental file 1. The search terms and inclusion criteria have, for this first version, been designed to cast a wide net and will be modified in line with new evidence, research priorities and clinical and policy needs.

Eligibility criteria

Peer-reviewed studies were considered eligible if they included at least 100 people with laboratory confirmed and/or clinically diagnosed COVID-19. Without a clear, internationally agreed case definition, we included studies that reported symptoms or outcomes assessed at 12 or more weeks post COVID-19 onset.⁶

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There were no language restrictions. Reviews and opinion pieces were excluded. Studies were excluded if they included fewer than 100 participants, to avoid small study effects,¹⁸ or the follow-up was unclear or less than 12 weeks post onset.

Screening

Screening was performed independently by two systematic reviewers. Any disagreements were resolved via consensus or a third reviewer. Non-English articles were translated using Google Translate and assessed by a systematic reviewer with good knowledge of the language. The data were managed using the review software Rayyan.¹⁹

Data extraction

Data extraction was performed using Microsoft Excel. A data extraction template informed by a previous review²⁰ was reviewed, updated and piloted before being finalised. Data extracted included study design, population characteristics, outcomes, prevalence, duration of symptoms and risk factors. Data extraction was performed by one systematic reviewer and checked by a second reviewer. Disagreements were resolved through consensus. To avoid duplication of data in future updates and ensure robustness, data extraction was not performed for non-peer-reviewed preprints.

Risk of bias assessment

The included studies were assessed for risk of bias using the tool produced by Hoy *et al*²¹ (online supplemental file 2). This assessment checklist is a validated tool for assessing risk of bias in prevalence studies. The checklist has 10 domains for assessing risk of bias, used to calculate a cumulative overall risk of bias for the whole study.

Data analysis

We undertook individual descriptive analysis for each study. We presented symptom proportions by different settings, as presented in the individual studies: hospitalised, non-hospitalised or a mix of both populations if no subset data were available. Symptoms were broadly grouped into physiological clusters through discussion with clinicians. Proportion of symptoms and its 95% CIs were estimated using the exact method.²² If there were two or more studies for each symptom, a meta-analysis was performed using a random intercept logistic regression model with Hartung-Knapp modification due to the heterogeneity and skewed sample sizes.^{23 24} Heterogeneity between estimates was assessed using the I² statistic.²⁵ Additional subgroup analysis was conducted to explore the modification of the following factors on proportion of symptoms: hospitalisation, settings, continents and follow-up timing. We also conducted meta-regression analysis on the percentage of females and intensive care unit (ICU) patients where there were more than 10 studies for the symptom. Sensitivity analyses were conducted to examine the impact of high risk of bias studies and statistical methods, Freeman-Tukey double arcsine transformation using inverse variance meta-analysis, on the estimates. Funnel plots were plotted using proportion of the symptom against the precision and sample sizes²² where there were more than 10 studies for the symptom to explore risk of publication bias. All analysis and data presentation were performed using metaprop²⁶ and ggplot2²⁷ in R (V.4.0.5) via RStudio (V.1.3.1093).²⁸ The data are presented using a combination of infographics, prepared by a design company (Design Science²⁹) and scientific tables to facilitate interpretation by different stakeholders, including non-specialists.

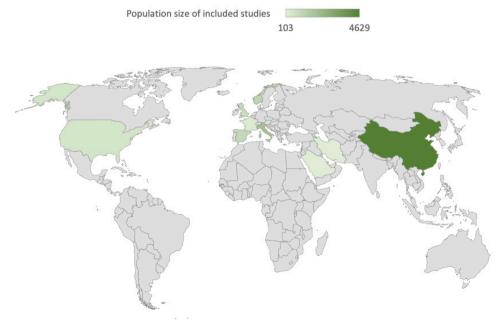


Figure 1 Map of study distribution.

Study Design Country Population size A Non-Inospitalised Israel Country Population size A Non-Inospitalised Cross sectional UK 434 A Klein <i>et al</i> ^{nb} Cohort (P) Israel 103 A Klein <i>et al</i> ^{nb} Cohort (P) Israel 103 A Stavem <i>et al</i> ^{nb} Cohort (P) Israel 103 A Venturelli <i>et al</i> ^{nb} Cohort (P) Israel 103 A Venturelli <i>et al</i> ^{nb} Cohort (P) Italy 767 A Venturelli <i>et al</i> ^{nb} Cohort (P) Italy 767 A Venturelli <i>et al</i> ^{nb} Cohort (P) Italy 767 A Venturelli <i>et al</i> ^{nb} Cohort (P) Italy 767 A Jacobson <i>et al</i> ^{nb} Cohort (P) USA 118 A Jacobson <i>et al</i> ^{nb} Cohort (P) USA 118 A Jacobson <i>et al</i> ^{nb} Cohort (P) USA 116	Age (years)	Sex (% female)	COVID-19	Follow-up time	Follow-up timenoint	
Cross sectional UK 434 Cohort (P) Israel 103 Cohort (P) Faroe Islands 180 Cohort (P) Faroe Islands 180 Crosssectional Norway 451 And Cohort (P) Spain 151 and Cohort (P) Italy 767 at Cohort (P) Italy 767 at Cohort (P) Italy 767 at Cohort (P) Italy 767 cohort (P) Italy 767 cohort (P) Italy 767 cohort (P) Italy 767 cohort (P) USA 118 cohort (P) USA 177 cohort (P) USA 21 (C) cohort (P) Austria 135 ataly Cohort (P) Austria ataly Cohort (P) Austria ataly Cohort (P) Austria ataly Cohort (P) Austria ataly Italy 226 cohort (P) Austria 135 ataly Italy 135 ataly Italy 145 cohort (P) Austria 1			confirmation method	(days)		Follow-up mode
Interse 434 Israel 103 Farce Islands 103 Farce Islands 151 Spain 151 Italy 767 Italy 767 Italy 767 USA 151 USA 117 USA 118 USA 118 Austria 226 Austria 135 Austria 145 Saudi Arabia 127						
Israel 103 Farce Islands 180 Farce Islands 180 Spain 451 Spain 151 Italy 767 Italy 767 Italy 767 Italy 767 USA 151 USA 117 USA 118 USA 118 USA 118 Vastria 135 Austria 135 Austria 145 Saudi Arabia 127	Median (range): 40 (19–77)	75	PCR or serological assays (26.3%)	6 months	First survey	Electronic survey
Faroe Islands180onalNorway451Spain151Spain151Italy767Italy767Italy767Italy767Italy767Italy767Italy767Italy767Italy279USA117USA118USA226Italy226Austria135Austria145Saudi Arabia127	Mean (SD): 35 (12)	38	PCR (RT-PCR)	6 months	Onset	Phone interview
onal Norway 451 Spain 151 Italy 767 Italy 379 Italy 379 Onal Norway 538 OuSA 117 USA 118 USA 118 USA 177 USA 177 USA 177 Austria 135 Austria 135 Austria 135 Austria 135 Saudi Arabia 127	Mean (SD; range): 39.9 (19.4; 0–93)	54	PCR (RT-PCR)	Mean (SD) 125 (17)	Onset	Phone interview
Spain151Italy767Italy767Italy379Norway538USA118USA118USA177USA21(C)Italy226Austria135Austria135Austria145Saudi Arabia127	Mean (SD): 49.8 (15.2)	56	PCR (RT-PCR)	Median (range): 117 (41–193)	Onset	Outpatient visit and survey
ias etCohort (P)Spain151it al ⁶⁰ Cohort (P)Italy767et al ⁴¹ Cohort (P)Italy379et al ⁴¹ Cohort (P)Italy538et al ⁴⁰ Cohort (P)USA118et al ⁴⁰ Cohort (P)USA118l ⁵³ Cohort (P)USA177l ⁶⁵ Cohort (P)USA177l ⁶⁶ Cohort (P)USA177l ⁷⁶ Cohort (P)USA177l ⁷⁶ Cohort (P)Austria135l ⁷⁶ Cohort (P)Austria145l ⁷⁶ Cohort (P)Saudi Arabia127						
trafe0Cohort (P)Italy767et al*1Cohort (P)Italy379et al*1Cohort (P)Italy538forCrossectionalNorway538forCohort (P)USA177forCohort (P)USA21(C)forCohort (P)Haly226forCohort (P)Austria135forCohort (P)Austria145forCohort (P)Austria145forCohort (P)Saudi Arabia127	Mean (range): 55.2 (18–88)	65	PCR (RT-PCR)	Mean (SD): 100.5 (3.3) Admission	Admission	Phone interview
et al ¹¹ Cohort (P) Italy 379 et al ¹⁰ Crosssectional Norway 538 et al ¹⁰ Cohort (P) USA 118 et al ¹⁰ Cohort (P) USA 177 l ³⁵ Cohort (P) USA 177 l ³⁶ Cohort (P) USA 177 l ³⁶ Cohort (P) USA 177 o Cohort (P) Austria 135 or et al ⁴⁸ Cohort (P) Austria 145 o Cohort (P) Saudi Arabia 127	Mean (SD): 63 (13.6)	33	PCR (RT-PCR) (94%); serology (5%) Clinician diagnosis (1.2%)	Median (IQR): 105 (84–127)	Onset	Outpatient visit
67 Crosssectional Norway 538 et al ¹⁰ Cohort (P) USA 118 / ³⁵ Cohort (P) USA 177 / ³⁶ Cohort (P) USA 21 (C) / ³⁰ Cohort (P) Italy 226 / ³⁰ Cohort (P) Italy 226 o Cohort (P) Austria 135 o Cohort (P) Austria 145 o Cohort (P) Saudi Arabia 127	Median (IQR; range): 56 (49–63; 20–80)	54	PCR (RT-PCR)	Median (IQR): 135 (102–175)	Onset	Outpatient visit
et al ¹⁰ Cohort (P) USA 118 / ³⁵ Cohort (P) USA 177 u ¹⁰ Cohort (P) USA 21 (C) u ¹⁰ Cohort (P) Italy 226 u ¹⁰ Cohort (P) Italy 226 u ¹⁰ Cohort (P) Austria 135 u ¹¹ Cohort (P) Austria 145 u ¹¹ Cohort (P) Saudi Arabia 127	Mean (SD) 57.7 (14.2) (hospital) 49.6 (15.3)	42 (hospital) 56	PCR (RT-PCR)	Mean (SD): 112 (30) (hospital) 118 (27)	Onset	Outpatient visit and survey
A ⁵⁵ Cohort (P) USA 177 u ⁷⁰ Cohort (P) Italy 21 (C) 0 Cohort (P) Italy 226 0 Cohort (P) Austria 135 1 ret ar ¹⁸ Cohort (P) Austria 145 a f ⁵⁴ Cohort (P) Saudi Arabia 127	Mean (SD): 43.3 (14.4)	47	PCR (RT-PCR)	Mean (SD): 119.3 (33)	Diagnosis	Outpatient visit
u ⁷⁰ Cohort (P) Italy 226 0 Cohort (P) Austria 135 r et a ^{nts} Cohort (P) Austria 145 a ^{fal} Cohort (P) Saudi Arabia 127	Mean (SD): 48 (15.2)	57	Lab confirmed	Median (range): 169 (31–300)	Onset	Electronic survey
⁰ Cohort (P) Austria 135 ir <i>et al</i> ⁴⁸ Cohort (P) Austria 145 al ⁵⁴ Cohort (P) Saudi Arabia 127	Mean (SD; range): 58 (12.8; 26–87)	34	PCR (RT-PCR)	Mean (SD): 90 (13.4)	Discharge	Phone interview
ir et ai ^{r48} Cohort (P) Austria 145 ai ⁶⁴ Cohort (P) Saudi Arabia 127	Median (IQR; range) 56 (48–68; 19–87)	39	PCR (RT-PCR)	Median (IQR): 102 (91–110)	Onset	Outpatient visit
a ⁶⁴ Cohort (P) Saudi Arabia 127	Mean (SD): 57 (14)	43	PCR (RT-PCR)	Mean (SD): 103 (21)	Diagnosis	Outpatient visit
Cohort (P) Saudi Arabia 127						
	Mean (SD): 47 (11.38)	21	PCR (RT-PCR)	4 months	Discharge	Outpatient visit
Arnold <i>et al³⁷</i> Cohort (P) UK 110 N (4)	Median (IQR): 60 (46–73)	38	PCR or radiological diagnosis	Median (IQR): 90 (80–97)	Onset	Outpatient visit
Baricich et af ⁶³ Crosssectional Italy 204 N (7	Mean (SD): 57.9 (12.8)	40	NR	Mean (SD): 124.7 (17.5)	Discharge	Outpatient visit

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Study	Desian	Country	Population size	Age (vears)	Sex (% female)	COVID-19 confirmation method	Follow-up time (davs)	Follow-up timepoint	Follow-up mode
Bellan <i>et al⁴²</i>	Cohort (P)	Italy		Median (IQR): 61 (50-71)	40	PCR (RT-PCR) (97.5%); bronchoalveolar lavage (0.4%); serology/ radiological (2.1%)	3-4 months	Discharge	Outpatient visit
Blanco et al ³⁸	Cohort (P)	Spain	100	Mean (SD) TLco<80: 54.98 (10.72) TLco>80: 54.75 (9.83)	36	PCR (RT-PCR)	Median (IQR): 104 (89.25–126.75)	Onset	Outpatient visit
Doyle et al ⁶⁶	Cohort (P)	ž	129	Mean: 62 (Cambridge) 56 (London)	31 (Cambridge) 27 (London)	PCR (RT-PCR)	Median (range): 113 (96–138)	Discharge	R
Garrigues et al ⁶⁵	Cohort (P)	France	120	Mean (SD): 63.2 (15.7)	38	PCR (RT-PCR)	Mean (SD): 110.9 (11.1)	Admission	Phone interview
Gherlone <i>et al⁵⁷</i>	Cohort (P and R)	Italy	122	Median (IQR): 62.5 (53.9–74.1)	25	PCR (RT-PCR)	Median (IQR): 104 (95–132)	Discharge	Outpatient visit
Han e <i>t al</i> ⁴⁶	Cohort (P)	China	114	Mean (SD; range): 54 (12; 24–82)	30	PCR (RT-PCR)	Mean (SD): 175 (20)	Onset	Outpatient visit
Huang e <i>t al</i> ⁵⁶	Cohort (P and R)	China	1733	Median (IQR): 57 (47–65)	48	Lab confirmed	Median (IQR): 186 (175–199)	Onset	Outpatient visit
Zhang et al ³¹	Cohort (R/S)	China	527	Median (IQR; range): 42.5 (32– 54; 0–91)	44	NR	6 months	Discharge	Outpatient visit
Lerum et a/ ⁶¹	Cohort (P)	Norway	103	Median (25th–75th percentile): 59 (49–72)	48	Nasopharyngeal swab	3 months	Discharge	Outpatient visit
Méndez <i>et al</i> ⁴⁹	Cohort (R/S)	Spain	215	Median (IQR): 55 (47–66)	40	Lab confirmed	Median (IQR): 87 (62-109)	Discharge	Outpatient visit
Nguyen <i>et al</i> ³³	Cohort (P)	France	125	Median (IQR; range): 36 (27–48; 16–85)	55	PCR (RT-PCR)	Mean (SD): 221.7 (10.9)	Onset	Phone interview
Nugent <i>et al³⁶</i>	Cohort (R/S)	NSA	182 1430 (C)	Median (IQR): 67.4 (58.3-80.1)	47	PCR (RT-PCR)	Median (IQR): 92.9 (52.5–127.7)	Discharge	Outpatient visit
Qin <i>et al⁵³</i>	Cohort (P)	China	647	Mean (SD): 58 (15)	56	PCR (RT-PCR)	06	Discharge	Outpatient visit
Qu et al ³⁴	Cohort (P)	China	540	Median (IQR): 47.50 (37–57)	50	PCR (RT-PCR)	3 months	Discharge	Electronic survey
Sibila <i>et al</i> ⁵¹	Cohort (P)	Spain	172	Mean (SD): 56.1 (19.8)	43	R	Mean (SD): 101.5 (19.9)	Discharge	Outpatient visit
Simani et al ⁵⁹	Cohort (P)	Iran	120	Mean (SD): 54.62 (16.94)	33	PCR or radiological diagnosis	6 months	Discharge	Outpatient visit
Suárez-Robles <i>et</i> a ⁶⁴	Crossectional	Spain	134	Mean (SD): 58.53 (18.53)	54	PCR (RT-PCR)	06	Discharge	Phone survey

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Table 1 Continued	led								
Study	Design	Country	Population size	Age (years)	Sex (% female)	COVID-19 confirmation method	Follow-up time (days)	Follow-up timepoint	Follow-up mode
Sykes et al ³⁹	Cohort (P)	ž	134	Median (range): 58 (25–89)	34	PCR (RT-PCR)	Median (range): 113 (46–167)	Discharge	Outpatient visit
Taboada <i>et al⁶²</i>	Cross sectional Spain	Spain	183	Mean (SD): 65.9 (14.1)	40	PCR (RT-PCR)	6 months	Discharge	Unstructured interview
Weng et al ⁴⁵	Cohort (P)	China	117	45.3%≥60years	44	Viral nucleic acid test	06	Discharge	Phone interview
Xiong et al ⁴⁴	Cohort (P)	China	538 184 (C)	Median (IQR; range): 52 (41–62; 22–79)	55	PCR (RT-PCR)	Median (IQR; range): 97.0 (95.0–102.0; 91–116)	Discharge	Phone interview
Xu et al ⁴³	Case-control	China	103 27 (C)	Median (IQR) M/M: 56 (45–63) S/C: 61 (55–68)	M/M: 58.8 S/C: 53.6	NR	3 months	Discharge	Outpatient visit
Zhang et al ⁶²	Cohort (P)	China	310	Median (IQR): 51 (31.8–61)	50	PCR (RT-PCR)	Median (IQR): 92.0 (90-100)	Discharge	Outpatient visit
C, control group; M/M, mild/moderate; NR, not reported; P, prospective; PCR,	, mild/moderate; NF	l, not reported; P,		lymerase chain reactio	n; R, retrospective; F	polymerase chain reaction; R, retrospective; RT, Reverse transcription; S/C, severe/critical; TLco, carbon monoxide transfer factor.	;, severe/critical; TLco, ca	arbon monoxide tra	nsfer factor.

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Patient and public involvement

The study team includes members who have been affected by long-term COVID-19 sequalae, including members of Long COVID Support,¹⁰ a patient support group with global reach, with approximately 40 000 members.

They actively contributed to the development of the study protocol, to inform the research questions and interpretation and presentation of the findings and to communicate the results to different audiences. The results of this LSR will be disseminated to long COVID patient forums for discussion and feedback to inform research priorities and updates.

RESULTS

We identified 6459 studies, of which 39 met the inclusion criteria (online supplemental file 3), all of which were published in English. Of these, 32 were included in the meta-analysis. The remaining studies include single symptoms or imaging and diagnostics and are presented narratively.

Characteristics of included studies

Most studies were set in Europe (62%, 24/39), followed by Asia (23%, 9/39), North America (8%, 3/39) and the Middle East 8% (3/39) (figure 1). There was no study set in a low-middle income country.³⁰ Most were cohort studies (82%, 32/39), followed by cross sectional studies (15%, 6/39) and a case–control study (3%, 1/39). These studies present data on 10951 (range: 100–1733) people in 12 countries, aged from 9 months to 93 years old and 48% (5206/10.951) were females.

The map shows the global distribution of the studies identified and the shading shows the combined studies population size by country.

Most studies included adults, while 10% (4/39) also included children.^{31–34} Only 15% (6/39) of studies reported ethnicity of the participants,^{35–40} but without stratification. Table 1 presents the included study characteristics.

Most studies (67%, 26/39) were cohorts of hospitalised patients post discharge, 10% (4/39) followed up people who were not hospitalised, while 23% (9/39) included both (hospitalised and non-hospitalised populations). Of the inclusions in this review, 78% (8520/10 951) were previously hospitalised during the acute COVID-19 phase . Twenty-two studies included people requiring ICU admission during the acute phase. $^{31}_{33-35}$ $^{37}_{38}$ $^{40-55}_{40-55}$

The longest follow-up period in any study was a mean of 221.7 (SD: 10.9) days post onset. Only 56%(22/39)of COVID-19 studies specified severity, ³¹ ³³⁻³⁵ ³⁷ 40-55 - 38 31% (12/39)treatment received during the acute phase^{36 40 41 45 46 50 53 56-60} and 62% (24/39) described ventilation support requirements. $^{36-42}$ 45 46 $^{48-51}$ 53 54 56 57 $^{60-66}$ Pre-existing comorbidities were reported in the majority of studies (85%, 33/39), with hypertension and diabetes most commonly documented.^{33 35–57 59–63 65 67–69}

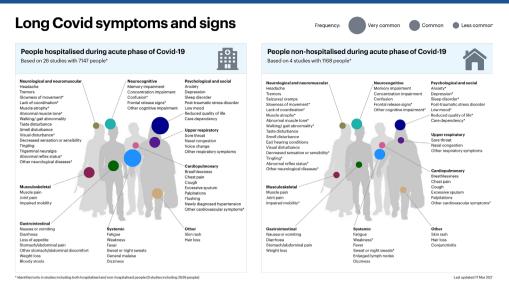


Figure 2 Long COVID signs and symptoms.

Risk of bias

Overall, 12 studies were assessed as high risk of bias, 22 as moderate risk of bias and 5 as low risk of bias. Most studies had a high risk of bias with regard to the generalisability of their results to the wider population with COVID-19. High risk of bias ratings were most common for external validity, with item 1 (representation of target population) and item 3 (random selection) having the most high risk of bias ratings (online supplemental file 2). Further, the recruitment process and response rates were often not well described and several studies applied different data collection methods. Although many studies applied validated measurement methods to assess participants, most were not designed to detect symptoms arising from COVID-19. Only four studies included a comparative control group.^{35 36 43 44}

Symptoms and signs

Patients suffering from long COVID report a wide range of new or persistent symptoms, in both the hospitalised and non-hospitalised populations. Symptoms were broadly organised into physiological 'clusters' for the purpose of presentation and interpretation of this review (figure 2).

The focus of each study included in our analysis varied. Some authors focused solely on a specialty, such as dentistry, or a specific symptom, such as cognition, making comparative analysis difficult. Even among those studies which took a broad approach, the prevalence of symptoms was diverse. Similarly, the prevalence of the more commonly reported symptoms varied markedly.

Within these limitations, we performed a meta-analysis of the most commonly reported symptoms and signs of long COVID. The most commonly described symptoms (with prevalence of 25% or greater) were weakness (41%, 95% CI 25.43 to 59.01), general malaise (33%, 95% CI 14.91 to 57.36), fatigue (31%, 95% CI 23.91 to 39.03), concentration impairment (26%, 95% CI 20.96 to 31.73) and breathlessness (25%, 95% CI 17.86 to 33.97).

Across studies, 37% (95% CI 18.43 to 59.93) of patients reported reduced quality of life. Although high I^2 values (>80%) were observed, they resulted from narrow dispersions in the estimates and well-separated estimates and CIs between studies (online supplemental file 4). The differences between these symptoms and the heterogeneity within them are likely to be, to some extent, due to other factors (eg, study settings, populations and different measurement tools used).

Patients also reported a diverse array of less prevalent symptoms and signs, including sweating, chest pain, sore throat, anxiety and headaches, among others. The prevalence of these symptoms was lower, usually less than 20%. Figure 3 presents the range of documented patient symptoms and signs, including all the studies.

Figure 4 displays these data by population, including the studies that specified hospitalised and non-hospitalised cohorts. We also performed subgroup analysis based on setting (hospitalised vs non-hospitalised) and follow-up time. In several symptoms and signs, the heterogeneity of the results was found to be associated with level of hospitalisation, hospital settings, location of the studies and follow-up timing using subgroup analysis (online supplemental files 5-8). Using meta-regression, the proportion of female patients in the studies was positively associated with headache and smell and taste disturbance (online supplemental file 9), while the proportion of ICU patients in the studies was positively associated with muscle pain (online supplemental file 10). No major difference was found in the sensitivity analyses (online supplemental files 11 and 12). Asymmetries found in the funnel plots suggest reporting biases and poor methodological quality in the included studies (online supplemental file 13).

Imaging and diagnostics

Multiple studies assessed lung sequelae and respiratory performance through outpatient visits follow-up (49%, 19/39).^{31 37-43 46 48 49 51-54 56 60 61 66} Imaging results were reported in 33% (13/39)^{31 37-39 43 46 48 52-54 56 61 66} of the

Systemic	N of study n = 17	n/N 2207/6039		Proportion (95% CI) 30.97 (23.91 to 39.03)	l² (%) 97.99	RoB (%)
Fatigue Weakness	n = 17	186/ 513			96.02	
Fever	n = 2 n = 7	186/ 513 47/3624		41.20 (25.43 to 59.01) 1.08 (0.24 to 4.66)		
Sweat or night sweats	n = 7 n = 2	162/ 683		23.72 (20.68 to 27.05)	91.35 0	
Enlarged lymph nodes/ Lymphadenopathy	n = 1	4/ 451	•	0.89 (0.24 to 2.26)	NA	
General malaise	n = 2	292/ 672		32.68 (14.91 to 57.36)	97.34	
Dizziness	n = 5	162/3141	•	4.50 (2.53 to 7.86)	77.3	
Cardiopulmonary			i -			
Breathlessness/ Exertional dyspnoea	n = 20	1297/5523	_	25.06 (17.86 to 33.97)	96.1	
Chest pain	n = 11	308/4878	-	6.36 (3.15 to 12.42)	93.21	
Cough	n = 16	414/5031	-	8.17 (4.85 to 13.44)	93.68	
Excessive sputum/ Expectoration	n = 6	113/1949	•	5.46 (3.19 to 9.19)	83.32	
Palpitations	n = 8	476/4778	-	9.67 (5.95 to 15.34)	93.89	
Flushing	n = 1	26/ 538	•	4.83 (3.18 to 7.00)	NA	
Newly diagnosed hypertension	n = 1	7/ 538	•	1.30 (0.52 to 2.66)	NA	
Other cardiovascular symptoms	n = 3	79/1952		1.38 (0.01 to 67.44)	96.8	
Jpper Respiratory			- T		0010	
Sore throat	n = 5	127/2896		4.70 (2.42 to 8.91)	82.11	
Nasal congestion	n = 3	50/1003		4.99 (2.73 to 8.92)	0	
Voice change	n = 1	11/ 134		8.21 (4.17 to 14.21)	NA	
Other respiratory symptoms	n = 3	253/1111		15.58 (0.68 to 83.17)	98.21	
Bastrointestinal	n - 0	2001111	-		00.2.1	
Nausea or Vomiting	n = 4	49/821	-	6.69 (1.64 to 23.59)	91.22	
Diarrhoea	n = 10	190/3925	-	4.00 (2.07 to 7.57)	81.37	
Loss of appetite	n = 10 n = 3	202/1906		4.00 (2.07 to 7.57) 17.49 (4.13 to 51.04)	96.73	
Stomach/ Abdominal pain	n = 3 n = 4	30/1427		2.33 (0.54 to 9.42)	90.73 83.22	
Other stomach/ Abdominal discomfort	n = 4 n = 1	21/117	_	2.33 (0.54 to 9.42) 17.95 (11.47 to 26.12)	83.22 NA	
Weight loss	n = 2	97/ 568		20.99 (8.09 to 44.51)	97.79	
Bloody stools / Haematochezia	n = 1			1.71 (0.21 to 6.04)		
•	n = 1	2/ 117		1.71 (0.21 to 6.04)	NA	
/usculoskeletal Muscle pain/ Myalgia	n = 12	378/4782	•	11.29 (6.17 to 19.75)	97.1	
Joint pain/ Arthralgia	n = 12 n = 9	437/3960		9.39 (5.72 to 15.03)	97.1 94.24	
Impaired mobility	n = 6	323/2866		14.42 (4.67 to 36.73)	98.17	
Veurological and neuromuscular	11 - 0	323/2000		14.42 (4.07 10 30.73)	50.17	
Headache	n = 11	227/4535		4.88 (2.30 to 10.06)	94.88	
				4.88 (2.30 to 10.08) 3.53 (0.30 to 30.63)		
Tremors	n = 3	42/1124			89.14	
Seizures/ Cramps	n = 1	6/451	•	1.33 (0.49 to 2.87)	NA	
Slowness of movement/ Bradykinesia	n = 1	7/ 135		5.19 (2.11 to 10.39)	NA	
Lack of coordination/ Dysmetria	n = 1	2/ 135	•	1.48 (0.18 to 5.25)	NA	
Muscle atrophy	n = 1	9/ 135	—	6.67 (3.09 to 12.28)	NA	
Abnormal muscle tone	n = 1	6/ 135	—	4.44 (1.65 to 9.42)	NA	
Walking/ Gait abnormality	n = 3	34/ 809	•	4.20 (2.02 to 8.53)	0	
Taste disturbance	n = 17	687/5423	- - -	13.52 (8.96 to 19.89)	96.75	
Smell disturbance	n = 19	842/5668		15.17 (10.75 to 20.97)	96.2	
Ear/ Hearing conditions	n = 1	5/451	•	1.11 (0.36 to 2.57)	NA	
Visual disturbance	n = 2	28/ 586	•	4.78 (3.32 to 6.83)	26.01	
Speech difficulty/ Dysarthria	n = 1	3/ 135	● -	2.22 (0.46 to 6.36)	NA	
Decreased sensation or sensibility	n = 2	30/ 269	-	10.90 (6.71 to 17.22)	71.76	
Tingling/ Parasthesia	n = 2	33/ 257		9.12 (2.21 to 30.87)	93.07	
Trigeminal neuralgia	n = 1	4/ 122	•	3.28 (0.90 to 8.18)	NA	
Abnormal reflex status	n = 1	31/ 135		22.96 (16.17 to 30.98)	NA	
Other neurological diseases	n = 1	20/ 135	- - -	14.81 (9.29 to 21.95)	NA	
Psychological and social						
Anxiety	n = 7	650/3551	_ - -	18.73 (8.89 to 35.25)	97.2	
Depression	n = 6	485/3662	-•	8.06 (4.14 to 15.10)	97.45	
Sleep disorder	n = 9	742/3442	—	18.15 (9.61 to 31.63)	93.87	
PTSD	n = 6	329/2057	-•	9.14 (3.66 to 21.04)	96.44	
Low mood/ Dysphoria	n = 3	62/898	•	1.79 (0.00 to 98.74)	97.83	
Reduced quality of life	n = 3	340/ 807	-	36.76 (18.43 to 59.93)	91.07	
Care dependency	n = 3	160/2555	•	5.89 (0.46 to 45.96)	98.37	
leurocognitive						
Memory impairment	n = 5	151/ 886	— •——	17.94 (5.26 to 46.25)	95.08	
Concentration impairment	n = 2	66/254	-•-	25.98 (20.96 to 31.73)	0	
Confusion	n = 2	33/1218	•	2.71 (1.93 to 3.79)	0	
Frontal release signs	n = 1	20/ 135	—	14.81 (9.29 to 21.95)	NA	
	n = 3	122/ 441	•	17.77 (0.08 to 98.23)	98.68	
Other cognitive impairment						
Other cognitive impairment Other						
	n = 4	67/2374	•-	2.83 (0.95 to 8.16)	80.76	
Other	n = 4 n = 5	67/2374 563/2810	•- -•	2.83 (0.95 to 8.16) 14.34 (5.33 to 33.23)	80.76 94.64	



cohort studies, with one including controls⁴³ and one with a population including children.³¹ Authors used heterogenous measurement techniques with an observed tendency towards novel imaging, including artificial intelligence and point-of-care ultrasound.⁴³ ⁵⁴ Studies found abnormal CT results, including consolidation, reticulation, residual ground glass opacity, interstitial thickening and fibrotic changes. Some of these studies presented comparisons between initial CT findings and those at follow-up, showing improvements in pulmonary clinical measures and radiologic resolutions at follow-up visits.^{37 39 46 48 54} One study assessing thrombotic

complications in COVID-19 with a minimum of 90-day follow-up from critical care admission found low rates of hospital-associated venous thromboembolism post discharge.⁶⁶

Pulmonary function tests were reported in 26% (10/39) of studies, ³⁷ ³⁸ ^{41–43} ⁴⁸ ⁴⁹ ⁵¹ ⁵³ ⁶¹ including spirometry, diffusion capacity, lung volume and exercise tests. These studies found evidence of altered pulmonary function, most frequently significant reduction of carbon monoxide transfer factor.

One study assessed kidney function in people with COVID-19-associated acute kidney injury (AKI) compared

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Systemic	Population	N of study	n/N		Proportion (95% CI)	l ² (%)	p−valu
Fatigue	Non-hospitalised	n = 4	200/ 813	-	24.60 (20.11 to 29.72)	0	0.012
	Hospitalised	n = 11	1762/4147		37.10 (26.54 to 49.06)	98.23	
Fever	Non-hospitalised	n = 3	25/ 981		1.41 (0.06 to 24.82)	84.73	0.702
	Hospitalised	n = 4	17/1876		0.85 (0.02 to 24.20)	92.05	
Dizziness	Hospitalised	n = 2	115/2193	•	4.21 (0.08 to 71.53)	89.39	0.189
	Non-hospitalised	n = 1	29/ 434	+	6.68 (4.68 to 9.45)	NA	
Cardiopulmonary							
Breathlessness/ Exertional dyspnoea	Non-hospitalised	n = 4	151/1084		13.72 (8.51 to 21.37)	72.13	0.003
	Hospitalised	n = 14	765/3148		28.68 (18.48 to 41.64)	96.19	
Chest pain	Non-hospitalised	n = 1	14/96	—	14.58 (8.83 to 23.13)	NA	0.043
	Hospitalised	n = 9	225/3636	-	5.92 (2.45 to 13.63)	92.86	
Cough	Non-hospitalised	n = 3	61/981	-	5.95 (1.53 to 20.50)	56.24	0.15
	Hospitalised	n = 11	299/2769		10.52 (5.93 to 17.98)	93.05	
Excessive sputum/ Expectoration	Non-hospitalised	n = 1	16/ 451	•	3.55 (2.18 to 5.71)	NA	0.112
	Hospitalised	n = 5	97/1498	-	6.02 (3.20 to 11.03)	82.16	
Palpitations	Non-hospitalised	n = 1	7/ 96	-	7.29 (3.52 to 14.51)	NA	0.181
	Hospitalised	n = 6	416/3536		12.43 (7.78 to 19.29)	91.7	
Jpper Respiratory							
Sore throat	Non-hospitalised	n = 2	24/ 547	•	4.39 (0.32 to 39.44)	0	0.815
	Hospitalised	n = 4	103/2349		4.81 (1.60 to 13.60)	85.83	
Nasal congestion	Hospitalised	n = 1	1/ 22		4.55 (0.64 to 26.15)	NA	0.924
	Non-hospitalised	n = 3	49/ 981	÷	4.99 (2.72 to 8.99)	0	
Other respiratory symptoms	Non-hospitalised	n = 1	13/ 451	•	2.88 (1.68 to 4.90)	NA	<0.001
	Hospitalised	n = 2	240/ 660		32.43 (2.22 to 91.02)	88.57	
Gastrointestinal							
Nausea or Vomiting	Non-hospitalised	n = 2	16/ 547		3.66 (0.00 to 98.24)	89.91	0.771
	Hospitalised	n = 2	21/ 139	-	5.84 (0.00 to 100.00)	0	
Diarrhoea	Non-hospitalised	n = 3	40/ 981	•	4.16 (0.72 to 20.65)	84.27	0.573
	Hospitalised	n = 7	138/2809	-	2.93 (0.90 to 9.12)	81.91	
Stomach/ Abdominal pain	Non-hospitalised	n = 1	15/ 451	-	3.33 (2.01 to 5.44)	NA	0.475
	Hospitalised	n = 2	10/ 209		4.63 (0.03 to 89.20)	54.79	
Weight loss	Hospitalised	n = 1	50/ 134		37.31 (29.55 to 45.79)	NA	<0.001
Weight 1000	Non-hospitalised	n = 1	47/ 434		10.83 (8.23 to 14.12)	NA	-0.001
Musculoskeletal	non noopialioou				10.00 (0.20 (0 11.12)		
Muscle pain/ Myalgia	Non-hospitalised	n = 2	51/ 547		10.76 (0.24 to 85.64)	85.87	0.768
Muscle partir Myaigia	Hospitalised	n = 7	199/2819		12.46 (4.30 to 31.09)	98.05	0.700
Joint pain/ Arthralgia	Non-hospitalised	n = 1	42/451		9.31 (6.95 to 12.36)	NA	0.987
Joint pain/ Artinaigia	Hospitalised	n = 8	395/3509		9.36 (5.25 to 16.14)	94.81	0.507
Nourclogical and nouromuscular	Hospitaliseu	11 - 0	393/3309		9.30 (5.25 to 10.14)	54.01	
Neurological and neuromuscular Headache	Non-hospitalised	n = 4	116/1161		8.82 (4.41 to 16.85)	86.25	0.106
Headache	Hospitalised	n = 4 n = 5	71/2093	_	2.98 (0.47 to 16.53)	96.56	0.106
Tremors		n = 5 n = 1					
Tremors	Hospitalised		25/ 538	-	4.65 (3.16 to 6.79)	NA	0.002
	Non-hospitalised	n = 1	4/ 451	-	0.89 (0.33 to 2.34)	NA	
Taste disturbance	Non-hospitalised	n = 5	258/1264		16.83 (7.91 to 32.26)	95.66	0.199
	Hospitalised	n = 8	232/2550		11.07 (6.90 to 17.28)	89.1	
Smell disturbance	Non-hospitalised	n = 5	324/1264		22.19 (11.69 to 38.04)	96.3	0.035
	Hospitalised	n = 9	308/2660		12.16 (7.98 to 18.10)	85.48	
Psychological and social				1			
PTSD	Non-hospitalised	n = 1	32/ 455	+	7.03 (5.02 to 9.78)	NA	0.216
1	Hospitalised	n = 3	59/ 474	-	10.52 (3.06 to 30.44)	80.04	
Neurocognitive				1			
Memory impairment	Non-hospitalised	n = 1	15/96	—	15.62 (9.64 to 24.32)	NA	0.001
	Hospitalised	n = 3	96/ 276		34.78 (23.64 to 47.88)	0	
2//							
Other				1 L			
Other Skin rash	Non-hospitalised	n = 1	7/ 451	•	1.55 (0.74 to 3.22)	NA	0.112
	Non-hospitalised Hospitalised Non-hospitalised	n = 1 n = 3 n = 1	7/ 451 60/1923 10/ 96	-	1.55 (0.74 to 3.22) 3.53 (0.75 to 15.11) 10.42 (5.70 to 18.29)	NA 82.97 NA	0.112

Figure 4 Sign and symptoms in hospitalised and non-hospitalised cohorts.

Note: The data on sign and symptoms from studies with data on hospitalised or non-hospitalised cohorts, it does not include studies that included mixed cohorts without subcategorisation. PTSD, post-traumatic stress disorder.

50% Proportion (%)

with people with non-COVID-19-associated AKI, found that COVID-19-related AKI was associated with decreased kidney recovery during outpatient follow-up.³⁶

Risk factors

Exploring the literature, we sought to produce a metaanalysis of risk factors for long COVID. We found a considerable diversity of reported risk factors, including age, sex, comorbidities, ethnicity and severity of the acute phase.

Several cohorts (64%, 25/39) assessed whether there was an association between the severity of initial COVID-19, including symptom load, level of hospital care, need for

mechanical ventilation and the risk of persisting sequelae. An association between female gender and long COVID risk has also been noted in longitudinal studies (20.5%, 8/39), as has the association between presence of comorbidity, ^{40 55 57 63 68 70} increasing age^{32 34 50 55 62 63} and minority ethnicity, ^{40 67} with long COVID and long COVID risk.

The limitations of the existing evidence base and inconsistency of reported findings preclude confident conclusions at this time. Instead, we have summarised the reported significant associations to date (online supplemental file 14) and suggest that these associations be explored in prospective controlled trials.

DISCUSSION

Our work represents the most comprehensive review of evidence regarding long COVID yet produced. Accurate to 17 March 2021, this LSR captures the breadth of persistent symptoms reported in 39 studies, including over 10000 people. These data suggest long COVID is a syndrome affecting both previously hospitalised and nonhospitalised people, characterised by marked fatigue, weakness, general malaise, breathlessness and concentration impairment lasting for a prolonged period of time. Besides these common symptoms, there is a diverse array of secondary symptoms. The findings in this review show symptoms and prevalence aligned to current knowledge on long COVID. The Office for National Statistics (ONS) Cohort Study, including control participants, reports the most common symptoms persisting for 12 or more weeks included fatigue (8.3%), headache (7.2%), cough (7%)and myalgia (5.6%).

A deeper understanding of long COVID is currently prevented by the limitations of the published literature. The studies included in our review were highly heterogeneous due to differences in their study designs, settings, populations, follow-up time and symptom ascertainment methods. In addition, studies used inconsistent terminology describing symptoms and limited details and stratification on pre-existing comorbidities, the severity of COVID-19 and treatment methods. This inconsistency and limited reporting partly explain the high degree of variability observed. The lack of case-control studies prevent a direct attribution of symptoms solely to COVID-19; larger prospective studies with matched control groups are needed. We note that there are large, robust prospective cohort studies of hospitalised patients⁷¹ and non-hospitalised people.⁷² Simultaneously, qualitative studies are ongoing to better explore the long COVID patient experience.⁴

The findings have identified several research gaps and priorities. The majority of long COVID cohorts were conducted in Western Europe on patients recently discharged from hospital. There is a paucity of evidence on the long-term effects of COVID-19 in low-to-middle income countries and in people who were not hospitalised. Similarly, there were no studies identified focusing on children, despite evidence showing that children and young people are also affected by long COVID.⁷⁴ Additionally, no study stratified by ethnicity, an important risk factor for the acute phase.

Our review also highlights a need for standardised and validated COVID-19 research tools to harmonise data collection, improve quality and reduce reporting variability. For instance, fatigue is one of the most commonly reported symptoms of long COVID. However, the symptom alone is not clearly defined and it is open to different interpretations, hence it requires a validated tool such as the Visual Analogue Scale, graded fatigue scale for robust, objective and comparative analysis. ISARIC has developed open access research tools available to sites globally to facilitate standardisation of data collection, analysis and interpretation for adults and children of an age.⁷⁵ We support the broader use of this tool

as well as initiatives to standardise outcome measures for long COVID.

Similarly, our study highlights the need for further research to refine the many circulating interim case definitions and precisely characterise long COVID, including the potential impacts of variants of concern and vaccination on long COVID.

As this is an LSR, emerging themes from this first version will inform future updates. The LSR will be updated periodically, as new research is published internationally, in order to provide relevant up to date information for clinicians, patients, researchers, policy-makers and health-service commissioners. Version changes will be identified and previous reports will be archived.

CONCLUSION

This LSR summarises published evidence on the spectrum of long-term COVID-19-associated symptoms and sequelae (as of 17 March 2021). It is clear that long COVID affects different populations, with a wide range of symptomatology. Our findings suggest this multiorgan syndrome is characterised by fatigue, weakness, malaise, breathlessness and concentration impairment, among other less frequent symptoms. Currently, the strength of the available evidence is limited and prone to bias. The long-term effects of COVID-19, in both hospitalised and non-hospitalised individuals, including children and at-risk populations, should be a priority for future research using standardised and controlled study designs. Robust research is needed to characterise and define long COVID and identify risk factors and underlying aetiology, in order to inform prevention, rehabilitation, clinical and public health management to improve recovery and long-term COVID-19 outcomes. This LSR will be updated approximately every 6 months as new evidence emerges for up to 2 years.

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Supplement 1: Search strategy summary

Database	Strategy	Results (16/3/2021)
Medline (EBSCOhost)	(COVID-19 OR covid OR SARS-CoV-2. ab) AND (symptom* OR "clinical features" OR signs OR characteristic* OR sequela* OR complication*.ab)	1952
	AND ("long-term Covid" OR long-term OR consequence* OR "long-term impact" OR "long-term effect" OR "post-acute"	
	OR long-tail OR persist* OR "chronic-COVID" OR "long-COVID" OR post-discharge OR postdischarge OR "prolonged symptom" OR "long-haul" .ab) Limits: 2020-	
CINAHL (EBSCOhost)	(COVID-19 OR covid OR SARS-CoV-2. ab) AND	384
	(symptom* OR "clinical features" OR signs OR characteristic* OR sequela* OR complication*.ab) AND	
	("long-term Covid" OR long-term OR consequence* OR "long-term impact" OR "long-term effect" OR "post-acute" OR long-tail OR persist* OR "chronic-COVID" OR "long-COVID" OR post-discharge OR postdischarge OR "prolonged symptom" OR "long-haul" .ab) Limits: 2020-	
Global Health	(COVID-19 or covid or SARS-CoV-2) AND	35
	(symptom* or "clinical features" or signs or characteristic* or sequelae or complication*) AND	
	((("long-term Covid" or long-term) adj2 consequence*) or "long-term impact" or "long-term effect" or "post-acute" or long-tail or persist* or "chronic-COVID" or "long-COVID" or post-discharge or postdischarge or "prolonged symptom" or "long-haul")).ab. Limits: 2020-	
WHO COVID-19 (WHO COVID, ELSEVIER and Lanzhou University/CNKI)	tw:((ab:(covid-19 OR covid OR sars-cov-2)) AND (ab:(symptom OR "clinical features" OR signs OR characteristic OR sequela OR complication)) AND (ab:("long-term Covid" OR "long-term consequence" OR "long-term impact" OR "long-term effect" OR "post-acute" OR long-tail OR persist* OR "chronic-COVID" OR "long-COVID" OR post-discharge OR postdischarge OR "prolonged symptom" OR "long-haul"))) AND db:("COVIDWHO" OR "ELSEVIER" OR "CNKI_Lanzhou")	195

2

Supplemental material

Lit Covid	("persistent symptoms" OR "after covid-19 infection").ti,ab,kw	1432
	OR	
	(("outcomes " OR "characteristics" OR "features" OR "symptoms" OR "inflammation" OR "function" OR	
	"complications" OR "syndrome" OR "manifestation") ADJ10 ("long-haul" OR "recovery" OR "recovered" OR	
	"recovering" OR "survivors" OR "post-discharge" OR "postdischarge" OR "discharge" OR "persisting" OR "prolonged"	
	OR "long-term" OR "after admission" OR "post-COVID-19" OR "post-COVID")).ti,ab.	
	OR	
	(("outcomes " OR "characteristics" OR "features" OR "symptoms" OR "inflammation" OR "function" OR	
	"complications" OR "syndrome" OR "manifestation") ADJ/10 ("after admission" OR "after hospital" OR "after	
	hospitalisation" OR "after hospitalization" OR "after COVID-19" OR "after SARS-CoV-2")).ti,ab.	
Google Scholar	post COVID after discharge persistent symptom	1000
Ovid Embase (top-up) [17 Mar	See Appendix 1	483
2021]	Limit: 2020-	
Ovid Medline (top-up) [17 Mar	See Appendix 2	336
2021]	Limit: 2020-	
WHO (top-up)	See Appendix 3	340
[19 Mar 2021]		
(excluded: PREPRINT-BIORXVI,		
PREPRINT-MEDRXVI, PREPRINT-		
other preprint, ITCRP)		

Appendix 1

Database(s): Embase 1974 to 2021 March 17

#	Searches	Results
1	(long* adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	462
2	(persist* adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	265
3	(chronic adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	191
4	((long term or long-term or longterm) adj3 effect* adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	59
5	(sequela* adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	150
6	((post acute or post-acute or postacute) adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	38
7	((longhaul* or long haul* or long-haul*) adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	18
8	((post-covid* or postcovid*) adj2 (syndrome or condition)).mp.	32
9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	1123
10	symptom/	151132
11	symptom assessment/	8515
12	exp complication/	1237024
13	(symptom* or "clinical feature*" or signs or characteristic* or sequela* or complication*).mp.	6906139
14	exp physical disease by body function/	9306422
15	10 or 11 or 12 or 13 or 14	13028765
16	9 and 15	748
17	limit 16 to yr="2020"	483

Appendix 2

Database(s): Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily 1946 to March 17, 2021

#	Searches	Results
1	(long* adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	507
2	(persist* adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	273
3	(chronic adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	173
4	((long term or long-term or longterm) adj3 effect* adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	62
5	(sequela* adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	159
6	((post acute or post-acute or postacute) adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	66
7	((longhaul* or long haul* or long-haul*) adj3 (covid* or ncov* or novel coronavirus or novel betacoronavirus or sars-ncov-2 or sars-cov-2)).mp.	25
8	((post-covid* or postcovid*) adj2 (syndrome or condition)).mp.	36

9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	1179
10	exp "signs and symptoms"/	2127623
11	(symptom* or "clinical feature*" or signs or characteristic* or sequela* or complication*).tw.	3644236
12	10 or 11	5362470
13	9 and 12	591
14	limit 13 to yr="2020"	336

Appendix 3

There are only three strings of syntax:

- 1. keywords and phrases associated with "long COVID"
- 2. keywords and phrases associated with "hospitalisation" and "quarantine"
- 3. keywords and phrases associated with "symptoms" and "complications"

The combinations of <u>1 AND 3</u> and <u>2 AND 3</u> were used to search in the combinations of title, abstract and TW (title + abstract + subjects) in the database. These consist of 18 searches as follows:

#	Syntax	Hits
1	(ti:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-CoV-2" OR postCOVID* OR "post nCov*" OR "long* COVID*" OR "long* nCov*" OR "long* novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long-term COVID*" OR "long-term nCov*" OR "long-term novel coronavirus" OR "long-term novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long-term SARS-CoV-2" OR "long-term COVID*" OR "long-term COVID*" OR "post acute COVID*" OR "postacute COVID*" OR "longhaul* COVID*" OR "long haul* COVID*" OR "long-term SARS-CoV-2" OR "long-term COVID*" OR "long term COVID*" OR "post acute COVID*" OR "postacute COVID*" OR "longhaul* COVID*" OR "long haul* COVID*" OR "long-haul* nCov*" OR "long-term nCov*" OR "post acute nCov*" OR "longhaul* nCov*" OR "longhaul* nCov*" OR "long-haul* nCov*" OR "post acute novel coronavirus" OR "postacute novel coronavirus" OR "longhaul* ncov*" OR "long-haul* ncov*" OR "long-haul* nCov*" OR "long-haul* ncov*" OR "post acute novel coronavirus" OR "post acute novel coronavirus" OR "longhaul* novel coronavirus" OR "long-haul* novel coronavirus" OR "post acute novel coronavirus" OR "postacute novel coronavirus" OR "longhaul* novel betacoronavirus" OR "long-term novel betacoronavirus" OR "post acute novel betacoronavirus" OR "postacute novel betacoronavirus" OR "longhaul* novel betacoronavirus" OR "	135
2	(ti:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-isolat*" OR "post self-quarantine") AND ti:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR syndrome))	11

3	(ti:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-CoV-2" OR postCOVID* OR "post nCov*" OR "long* COVID*" OR "long* nCov*" OR "long* novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long* SARS-CoV-2" OR "long* term COVID*" OR "long-term nCov*" OR "long-term novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long* sars-COVID*" OR "long* sars-COVID*" OR "long* sars-COVID*" OR "long* sars-COVID*" OR "long* sars-COV-2" OR "long* sars-COV-2" OR "long* sars-COV-	352
	coronavirus" OR "chronic* novel coronavirus" OR "prolonged* novel coronavirus" OR "presist* novel coronavirus" OR "long-term novel betacoronavirus" OR "longterm novel betacoronavirus" OR "botacoronavirus" OR "botacoronavirus" OR "long term novel betacoronavirus" OR "botacoronavirus" OR "botacoronavirus" OR "long term novel betacoronavirus" OR "botacoronavirus" OR "botacoronavirus	
	OR "long-haul* novel betacoronavirus" OR "chronic* novel betacoronavirus" OR "prolonged* novel betacoronavirus" OR "presist* novel betacoronavirus" OR "long-term SARS- nCoV-2" OR "longterm SARS-nCoV-2" OR "post acute SARS-nCoV-2" OR "postacute SARS-nCoV-2" OR "longhaul* SARS-nCoV-2" OR "long haul* SARS-nCoV-2" OR "long-haul*	
	SARS-nCoV-2" OR "chronic* SARS-nCoV-2" OR "prolonged* SARS-nCoV-2" OR "presist* SARS-nCoV-2" OR "long-term SARS-CoV-2" OR "longterm SARS-CoV-2" OR "post acute SARS-CoV-2" OR "postacute SARS-CoV-2" OR "longhaul* SARS-CoV-2" OR "long haul* SARS-CoV-2" OR "long-haul* SARS-CoV-2" OR "chronic* SARS-CoV-2" OR "prolonged* SARS-CoV-2" OR "presist* SARS-CoV-2") AND ab:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR	
	dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR syndrome))	
4	(ti:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-isolat*" OR "post self-quarantine") AND ab:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR	35
	inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR syndrome))	
5	(ti:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-CoV-2" OR postCOVID* OR "post nCov*" OR "long* COVID*" OR "long* nCov*" OR "long* novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long-term COVID*" OR "long-term nCov*" OR "long-term novel coronavirus" OR "long-term novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long-term SARS-CoV-2" OR "long-term COVID*" OR "long-term nCov*" OR "long-term novel coronavirus" OR "postacute COVID*" OR "longhaul* COVID*" OR "long haul* COVID*" OR "long-haul* ncov*" OR "postacute ncov*" OR "postacute ncov*" OR "long-haul* cov*" OR "long-haul* ncov*" OR "postacute ncov! OR "long-haul* ncov*" OR "long-haul* ncov*! betacoronavirus" OR "long-haul* ncov*! betacoronavirus" OR "long-haul* ncov*! betacoronavirus" OR "long-haul* novel betacoronavirus" OR "long-haul* ncov+! betacoronavirus" OR "	508
6	(ti:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-isolat*" OR "post self-quarantine") AND tw:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR syndrome))	38
7	(ab:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-CoV-2" OR postCOVID* OR "post nCov*" OR "long* COVID*" OR "long* nCov*" OR "long* novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long* the coving state of the coving	159

	OR "long-term nCov*" OR "long-term novel coronavirus" OR "long-term novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long-term SARS-CoV-2" OR "long-term SARS-CoV-2" OR "long-term COVID*" OR "post acute COVID*" OR "postacute COVID*" OR "longhaul* COVID*" OR "long haul* COVID*" OR "long-haul* COVID*" OR "long-haul* COVID*" OR "post acute COVID*" OR "postacute COVID*" OR "long-term nCov*" OR "long-term nCov*" OR "post acute nCov*" OR "postacute nCov*" OR "long-haul* ncovel coronavirus" OR "long-haul* ncovel coronavirus" OR "postacute novel coronavirus" OR "long-haul* novel coronavirus" OR "long-haul* novel coronavirus" OR "long-haul* novel coronavirus" OR "long-haul* novel betacoronavirus" OR "long-haul* novel betacoronavirus" OR "postacute novel coronavirus" OR "long-haul* novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long-term SARS-nCoV-2" OR "long-haul* novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long-haul* SARS-nCoV-2" OR "long-ha	
8	(ab:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-isolat*" OR "post self-quarantine") AND ti:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR syndrome))	202
9	(ab:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-CoV-2" OR postCOVID* OR "post novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long* SARS-CoV-2" OR "long* term COVID*" OR "long* term novel coronavirus" OR "long* novel betacoronavirus" OR "long* term SARS-CoV-2" OR "long* SARS-CoV-2" OR "long* term COVID*" OR "long* term novel coronavirus" OR "long* novel betacoronavirus" OR "long term SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long* term COVID*" OR "long* term novel coronavirus" OR "long* term novel betacoronavirus" OR "long term SARS-nCoV-2" OR "long* term SARS-CoV-2" OR "long* term COVID*" OR "post acute COVID*" OR "post acute COVID*" OR "post acute COVID*" OR "post acute COVID*" OR "long* term novel "OR "long* term novel "OR "long haul* COVID*" OR "long* term novel coronavirus" OR "long* term novel "OR "long* term novel coronavirus" OR "long* novel betacoronavirus" OR "long* term novel betacoronavirus" OR "long* novel betacoronavirus" OR "long* novel betacoronavirus" OR "long* term novel betacoronavirus" OR "long* term SARS-nCoV-2" OR "long haul* novel betacoronavirus" OR "long* term SARS-nCoV-2" OR "long haul* novel betacoronavirus" OR "long* term SARS-nCoV-2" OR "long haul* novel betacor	800
10	(ab:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-isolat*" OR "post self-quarantine") AND ab:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR syndrome))	680
11	(ab:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-CoV-2" OR postCOVID* OR "post nCov*" OR "long* COVID*" OR "long* nCov*" OR "long* novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long* SARS-CoV-2" OR "long* term COVID*" OR "long-term nCov*" OR "long-term novel coronavirus" OR "long-term novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long-term COVID*" OR "long-term nCov*" OR "long-term novel coronavirus" OR "long-term novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long-term SARS-CoV-2" OR "long-term COVID*" OR "long-term nCov*" OR "long-term novel coronavirus" OR "long-term novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long-term SARS-CoV-2" OR "long-term COVID*" OR "longterm COVID*" OR "post acute COVID*" OR "postacute COVID*" OR "longhaul* COVID*" OR "long haul* COVID*" OR "long-haul* COVID*" OR "long-term COVID*" OR "long-te	830

	COVID*" OR "prolonged* COVID*" OR "presist* COVID*" OR "long-term nCov*" OR "longterm nCov*" OR "post acute nCov*" OR "postacute nCov*" OR "longhaul* SARS-nCoV-2" OR "longhaul*	
12	(ab:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-quarantine") AND tw:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR syndrome))	681
13	(tw:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-COV-2" OR postCOVID* OR "post nCov*" OR "long* COVID*" OR "long* nCov*" OR "long* novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long-term COVID*" OR "long-term nCov*" OR "long-term novel coronavirus" OR "long-term novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long-term COVID*" OR "post acute COVID*" OR "post acute COVID*" OR "long-term novel COVID*" OR "long-term novel COVID*" OR "long-term novel Coronavirus" OR "long-term novel coronavirus" OR "long-term novel coronavirus" OR "post acute novel coronavirus" OR "postacute novel coronavirus" OR "post acute novel betacoronavirus" OR "post acute sARS-nCoV-2" OR "long-term sARS-nCOV	167
14	(tw:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-isolat*" OR "post self-quarantine") AND ti:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR syndrome))	93
15	(tw:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-CoV-2" OR postCOVID* OR "post nCov*" OR "long* COVID*" OR "long* nCov*" OR "long* novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long* SARS-CoV-2" OR "long* term COVID*" OR "long* term nCov*" OR "long* ncov*" OR "long* novel coronavirus" OR "long* novel betacoronavirus" OR "long* SARS-nCoV-2" OR "long* SARS-CoV-2" OR "long* term COVID*" OR "long* term nCov*" OR "long-term novel coronavirus" OR "long-term novel betacoronavirus" OR "long-term SARS-nCoV-2" OR "long-term SARS-CoV-2" OR "long-term COVID*" OR "longterm COVID*" OR "post acute COVID*" OR "long-term novel betacoronavirus" OR "longhaul* COVID*" OR "long haul* COVID*" OR "long-haul* COVID*" OR "longhaul* nCov*" OR "long-haul* nCov*" OR "longhaul* nCov*" OR "long-term novel "long haul* nCov*" OR "long-haul* nCov*" OR "long-term novel coronavirus" OR "long+term novel coronavirus" OR "longhaul* nCov*" OR "long-term novel coronavirus" OR "long-term novel	752

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	coronavirus" OR "post acute novel coronavirus" OR "postacute novel coronavirus" OR "longhaul* novel coronavirus" OR "long haul* novel coronavirus" OR "long-haul* novel coronavirus" OR "prolonged* novel coronavirus" OR "presist* novel coronavirus" OR "long-term novel betacoronavirus" OR "post acute novel betacoronavirus" OR "postacute novel betacoronavirus" OR "longhaul* novel betacoronavirus" OR "long-term novel betacoronavirus" OR "post acute novel betacoronavirus" OR "postacute novel betacoronavirus" OR "longhaul* novel betacoronavirus" OR "long-haul* novel betacoronavirus" OR "post acute SARS-nCoV-2" OR "long-haul* novel betacoronavirus" OR "long-haul* SARS-nCoV-2" OR "lon	
16	(tw:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-isolat*" OR "post self-quarantine") AND ab:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR problem* OR sequela* OR sign* OR symptom* OR symptome))	339
17	(tw:(post-COVID* OR post-nCov* OR "post novel coronavirus" OR "post novel betacoronavirus" OR "post SARS-nCoV-2" OR "post SARS-COV-2" OR postCOVID* OR "long* ncov*" OR "long* ncov* OR "long* ncov*" OR "long* ncov* OR "	906
18	(tw:("after admission" OR "after discharg*" OR "after hospital*" OR "after isolat*" OR "after quarantine" OR "after self isolat*" OR "after self-isolat*" OR "after self-quarantine" OR "post admission" OR "post discharg*" OR "post hospital*" OR "post isolat*" OR "post quarantine" OR "post self isolat*" OR "post self-isolat*" OR "post self-quarantine") AND tw:("clinical feature*" OR abnormal* OR characteristic* OR complication* OR condition* OR convalescence OR disorder* OR dysfunction OR illness* OR impair* OR inflammation OR manifestation OR outcome* OR prevalence OR problem* OR sequela* OR sign* OR symptom* OR symptome))	340

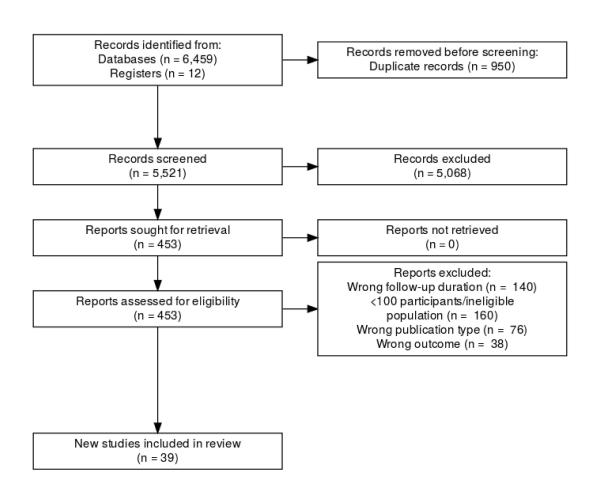
Supplement 2: Risk of bias assessment

Study	Representation of national population (e.g. age, sex, occupation)	Sampling frame true or close representation of target population	Random selection used to select sample, OR, census undertaken	Likelihood of non- response bias minimal	Data collected directly from subjects (opposed to proxy)	Acceptable case definition used	Instrument to measure parameter of interest has reliability and validity (if necessary)	Same mode of data collection used for all subjects	Length of shortest prevalence period for parameter of interest appropriate	Numerator(s)/ denominator(s) for parameter of interest appropriate	Overall risk of bias
Alharthy et al.	0	۲	0	0	0	0	0	0	۲	٢	0
Anastasio et al.	0	0	0	0	•	•	0	0	0	0	0
Arnold et al.	0	۲	0		•	•	0	0	۲	۲	0
Baricich et al.	0	0	0	0	0	0	0	0	0	0	0
Bellan et al.	0	٢	0	0	0	0	0	0	0	0	0
Blanco et al.	0	0	0	0	•	•	0	0	0	۲	0
Doyle et al.	0	0	0			0	0	0	0	0	0
Einvik et al.	0		0			•	0		0	0	õ
Garrigues et al.		0		0				0	0	0	ŏ
Gherlone et al.							0	0	ő	0	
Han et al.	0	0		6	0		0	0	0	0	0
Hopkins et al.				0				0	ő		
		0		0				0	0	0	
Huang et al.						CONTRACTOR OF					
Jacobson et al.	•	0		•	•	•	•	0	0	0	0
Klein et al.	0	9	•	9	•	•	0	0	0	٢	0
Lerum et al.	0	۲	•	•	0	•		0	۲	۲	0
Logue et al.	۲	۲	0	9	•	•	۲	۲	۲	٢	0
Mazza et al.	0	0	0	0	0		0	0	۲	0	0
Mendez et al.	0	۲	0	0	0	۲	0	0	0	۲	0
Nguyen et al.	0	۲	0	0	•	0	0	0	0	0	0
Nugent et al.	0	۲	0	0	۲	•	0	0	۲	0	\bigcirc
Parente-Arias et al.	0	0	0	0	•	•	0	0	0	0	0
Petersen et al.	٥	0	0	0	0	0	0	0	0	0	0
Qin et al.	0	0	0	0	•	•	0	0	0	0	0
Qu et al.	0	۲	0	0	•	0	0	0	0	0	0
Rass et al.	0	0	0	0	•	0	0	0	0	۲	0
Sibila et al.	0	0	0	0	0	0	0	0	0	0	0
Simani et al.	0	0	0	0	0		0	0	0	0	0
Sonnweber et al.	0				•	•	0		0		0
Stavem et al.	0	0	0		•		0		0	0	0
Suarez-Robles et al.	0	ĕ	õ	0				0			
Sykes et al.		ŏ	0							0	ŏ
Taboada et al.		ŏ						0			ŏ
Venturelli et al.								0		0	ŏ
			0	0		0	0	0	0	0	0
Weng et al.		0	0					0			0
Xiong et al.	•					•	0	-	٢	0	0
Xuetal.	0	0	•	0	•	•	0	0	0	0	
Zhang et al. (a)	0	0	0	0	0	0	0	0	٢	0	0
Zhang et al. (b)	0	0		0		0		0	0	0	0

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Supplement 3: PRISMA diagram





Supplement 4: Individual forest plots in main results

Study	n	Total		Proportion (%)	95% CI
Breathlessness/ Exertional	dyspn	oea			
Bellan et al.	13	238	+	5.46	[2.94; 9.16]
Klein et al.	8	103		7.77	[3.41; 14.73]
Qin et al.	56	647	•	8.66	[6.60; 11.09]
Taboada et al.	19	183	+	10.38	[6.37; 15.74]
Hopkins et al.	50	434	•	11.52	[8.67; 14.91]
Han et al.	16	114		14.04	[8.24; 21.79]
Stavem et al.	73	451	+	16.19	[12.91; 19.92]
Xiong et al.	115	538	+	21.38	[17.98; 25.09]
Venturelli et al.	167	767		21.77	[18.90; 24.86]
Qu et al.	141	540	-	26.11	[22.45; 30.03]
Jacobson et al.	31	118		26.27	[18.60; 35.17]
Sonnweber et al.	52	145		35.86	[28.07; 44.24]
Arnold et al.	43	110	——	39.09	[29.93; 48.86]
Sibila et al.	68	172		39.53	[32.18; 47.26]
Suárez-Robles et al.	54	134		40.30	[31.92; 49.11]
Garriques et al.	50	120		41.67	[32.74; 51.02]
Anastasio et al.	162	379	-=-	42.74	[37.71; 47.90]
Alharthy et al.	62	127	- e	48.82	[39.85; 57.84]
Lerum et al.	37	69	— e —	53.62	[41.20; 65.72]
Sykes et al.	80	134	_ _	59.70	[50.89; 68.08]
Random effects	1297	5523	-	25.06	[18.27; 33.36]
Hartung-Knapp correction Prediction interval			-	25.06	[17.86; 33.97] [4.59; 69.93]
Heterogeneity: $I^2 = 96\%$, $\tau^2 = 0$.	81, p <	0.01			• • •
Chest pain					
Bellan et al.	1	238	•	0.42	[0.01; 2.32]
Qin et al.	6	647	0	0.93	[0.34; 2.01]
Venturelli et al.	24	767	0	3.13	[2.01; 4.62]
Huang et al.	75	1655	0	4.53	[3.58; 5.65]
Sibila et al.	14	172	+	8.14	[4.52; 13.28]
Garrigues et al.	13	120		10.83	[5.90; 17.81]
Anastasio et al.	45	379	-	11.87	[8.79; 15.56]
Arnold et al.	14	110	-	12.73	[7.14; 20.43]
Jacobson et al.	16	118		13,56	[7.95; 21.08]
Xiong et al.	76	538	-	14.13	[11.29; 17.36]
Sykes et al.	24	134		17.91	[11.83; 25.47]
Random effects	308	4878	<u> </u>	6.36	[3.43; 11.49]
Hartung-Knapp correction	300	4070	-	6.36	[3.15; 12.42]
Prediction interval				0.50	[0.56; 45.11]
Heterogeneity: $I^2 = 93\%$, $\tau^2 = 1$.	11, p <	0.01			
Cough			_	0.05	
Jacobson et al.	1	118	•	0.85	[0.02; 4.63]
Venturelli et al.	8	767	E	1.04	[0.45; 2.04]
Bellan et al.	6	238	∎•	2.52	[0.93; 5.41]
Qin et al.	38	647	•	5.87	[4.19; 7.97]
Stavem et al.	27	451	•	5.99	[3.98; 8.59]
Anastasio et al.	23	379	•	6.07	[3.89; 8.97]
Han et al.	7	114	-	6.14	[2.50; 12.24]
Xiong et al.	38	538	•	7.06	[5.05; 9.57]
Hopkins et al.	33	434	•	7.60	[5.29; 10.51]
Qu et al.	63	540	+	11.67	[9.08; 14.68]
Arnold et al.	13	110		11.82	[6.45; 19.36]
Garrigues et al.	20	120		16.67	[10.49; 24.56]
Sonnweber et al.	23	135		17.04	[11.12; 24.46]
Sibila et al.	31	172		18.02	[12.59; 24.60]
Suárez-Robles et al.	36	134		26.87	[19.58; 35.20]
Sykes et al.	47	134		35.07	[27.04; 43.79]
Random effects	414	5031	-	8.17	[5.06; 12.93]
Hartung-Knapp correction			-	8.17	[4.85; 13.44]
Prediction interval					[0.95; 45.20]
Heterogeneity: $I^2 = 94\%$, $\tau^2 = 1$.	01, p <	0.01		_	
				Г	
			0 20 40 60 80 1	00	
			Proportion (%)		

Figure 1. Cardiopulmonary

Study	n	Total	Pro	oportion (%)	95% CI
Excessive sputum/ Expected	oratio	n			
Xiong et al.	16	538	•	2.97	[1.71; 4.78]
Stavem et al.	16	451	•	3.55	[2.04; 5.70]
Suárez-Robles et al.	7	134	₽ -	5.22	[2.13; 10.47]
Sibila et al.	9	172	-	5.23	[2.42; 9.70]
Han et al.	11	114		9.65	[4.92; 16.61]
Qu et al.	54	540	+	10.00	[7.60; 12.85]
Random effects	113	1949	•	5.46	[3.63; 8.14]
Hartung-Knapp correction			•	5.46	[3.19; 9.19]
Prediction interval					[1.41; 18.89]
Heterogeneity: $I^2 = 83\%$, $\tau^2 = 0$.20, p	< 0.01			
Palpitations					
Venturelli et al.	30	767		3.91	[2.65; 5.54]
Jacobson et al.	7	118	+	5.93	[2.42; 11.84]
Anastasio et al.	23	379	+	6.07	[3.89; 8.97]
Huang et al.	154	1655	0	9.31	[7.95; 10.81]
Qin et al.	63	647	•	9.74	[7.56; 12.29]
Xiong et al.	60	538	•	11.15	[8.62; 14.12]
Qu et al.	110	540	+	20.37	[17.05; 24.02]
Suárez-Robles et al.	29	134		21.64	[15.00; 29.58]
Random effects	476	4778	•	9.67	[6.48; 14.21]
Hartung-Knapp correction			-	9.67	[5.95; 15.34]
Prediction interval	•	•			[2.19; 33.83]
Heterogeneity: $I^2 = 94\%$, $\tau^2 = 0$.36, p	< 0.01			
Flushing					
Xiong et al.	26	538	•	4.83	[3.18; 7.00]
Random effects	26	538	•	4.83	[3.31; 7.00]
Hartung-Knapp correction			•	4.83	[3.31; 7.00]
Prediction interval	•	•			
Heterogeneity: not applicable					
Newly diagnosed hyperten					
Xiong et al.	7	538	0	1.30	[0.52; 2.66]
Random effects	7	538	•	1.30	[0.62; 2.70]
Hartung-Knapp correction			•	1.30	[0.62; 2.70]
Prediction interval	•	•			
Heterogeneity: not applicable					
Other cardiovascular symp					
Venturelli et al.	1	767	0	0.13	[0.00; 0.72]
Qin et al.	8	647	•	1.24	[0.54; 2.42]
Xiong et al.	70	538	•	13.01	[10.29; 16.15]
Random effects	79	1952		1.38	[0.14; 12.00]
Hartung-Knapp correction				1.38	[0.01; 67.44]
Prediction interval					[0.00; 100.00]
Heterogeneity: $I^2 = 97\%$, $\tau^2 = 3$./1, p	< 0.01			
			0 20 40 60 80 100		
			Proportion (%)		
(2)					

Figure 2.Cardiopulmonary (page 2)

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Study	n	Total		Proportion (%)	95% CI
Nausea or Vomiting					
Stavem et al.	8	451	•	1.77	[0.77; 3.47]
Jacobson et al.	8	118		6.78	[2.97; 12.92]
Sonnweber et al.	12	135		8.89	[4.68; 15.01]
Weng et al.	21	117		17.95	[11.47; 26.12]
Random effects	49	821	-	6.69	[2.83; 14.98]
Hartung-Knapp correction				6.69	[1.64; 23.59]
Prediction interval Heterogeneity: $I^2 = 91\%$, $\tau^2 = 0$	74 0				[0.11; 82.63]
Heterogeneity: $T = 91\%$, $\tau = 0$.74, p	< 0.01			
Diarrhoea					
Sibila et al.	1	172		0.58	[0.01; 3.20]
Bellan et al.	3	238		1.26	[0.26; 3.64]
Arnold et al.	1	65	- -	1.54	[0.04; 8.28]
Stavem et al.	7	451		1.55	[0.63; 3.17]
Huang et al.	80	1655	-	4.83	[3.85; 5.98]
Hopkins et al.	25	434	-	5.76	[3.76; 8.39]
Qu et al.	36	540		6.67	[4.71; 9.11]
Jacobson et al.	8	118	-=-	6.78	[2.97; 12.92]
Sonnweber et al.	12	135	.	8.89	[4.68; 15.01]
Weng et al.	17	117		14.53	[8.70; 22.24]
Random effects	190	3925	•	4.00	[2.26; 6.96]
Hartung-Knapp correction			•	4.00	[2.07; 7.57]
Prediction interval					[0.53; 24.54]
Heterogeneity: $I^2 = 81\%$, $\tau^2 = 0$.70, p	< 0.01			
Loss of appetite					
Huang et al.	138	1655	D	8.34	[7.05; 9.78]
Weng et al.	28	117		23.93	[16.53; 32.70]
Suárez-Robles et al.	36	134		26.87	[19.58; 35.20]
Random effects	202	1906		17.49	[9.31; 30.46]
Hartung-Knapp correction				17.49	[4.13; 51.04]
Prediction interval					[0.00; 99.95]
Heterogeneity: $I^2 = 97\%$, $\tau^2 = 0$.38, p	< 0.01			[
Stomach/ Abdominal pain					
Venturelli et al.	5	767		0.65	[0.21; 1.51]
Arnold et al.	2	92		2.17	[0.26; 7.63]
Stavem et al.	15	451		3.33	[1.87; 5.43]
Weng et al.	8	117	-	6.84	[3.00; 13.03]
Random effects	30	1427	-	2.33	[0.95; 5.57]
Hartung-Knapp correction		1421	-	2.33	[0.54; 9.42]
Prediction interval				2.00	[0.04; 56.80]
Heterogeneity: $I^2 = 83\%$, $\tau^2 = 0$	65 p	< 0.01			[0.04, 00.00]
	, p				
Other stomach/ Abdominal	disco	omfort			
Weng et al.	21	117		17.95	[11.47; 26.12]
Random effects	21	117	-	17.95	[12.00; 25.97]
Hartung-Knapp correction			-	17.95	[12.00; 25.97]
Prediction interval					
Heterogeneity: not applicable					
Weight loss					
Hopkins et al.	47	434	.	10.83	[8.07; 14.14]
Suárez-Robles et al.	50	134		37.31	[29.12; 46.08]
Random effects	97	568		20.99	[8.09; 44.51]
Hartung-Knapp correction				20.99	[0.02; 99.71]
Prediction interval					
Heterogeneity: $I^2 = 98\%$, $\tau^2 = 0$.61, p	< 0.01			
Bloody stools / Haematoch	ezia				
Weng et al.	2	117	•	1.71	[0.21; 6.04]
Random effects	2	117	-	1.71	[0.21; 0.04] [0.43; 6.58]
Hartung-Knapp correction	~		-	1.71	[0.43; 6.58]
Prediction interval					[0.00]
Heterogeneity: not applicable	•	•			
				1	
			0 20 40 60 80 10	00	
			Proportion (%)		

Figure 3. Gastrointestinal

Muscle pain/ Myalgia Huang et al. 39 1655 Venturelli et al. 29 76 378 [2.55, 5.39] Xiong et al. 24 538 4.46 [2.88; 6.57] Bellan et al. 14 228 - 5.88 [3.25; 9.67] Anastasio et al. 52 379 - 13.72 [1.64; 3.21] Anastasio et al. 52 379 - 13.72 [1.64; 3.25] Jacobson et al. 21 118 - 17.80 [11.37; 25.91] Gherlone et al. 23 122 - 18.85 [12.34; 26.93] Sykes et al. 69 134 - 22.73 [15.62; 31.70] Sonnweber et al. 33 135 - 22.44 [12.9] [6.60; 18.63] Hartong-Knapp correction Prediction interval Prediction interval 	Study	n	Total		Proportion (%)	95% CI
Venturelli et al. 29 767 • 378 [2,55; 5,39] Xiong et al. 24 538 • 4.46 [2,88; 6,57] Stavem et al. 14 238 • 5.88 [3,25; 9,67] Stavem et al. 14 135 • 10.37 [5,79; 16,79] Anastasio et al. 23 72 • 13.72 [10,42; 17:60] Jacobson et al. 21 118 • 17.80 [11,37; 25:91] Gherlone et al. 23 122 • 18.85 [12,34; 26,93] Sykes et al. 69 134 • 22.73 [15,28; 31.70] Sonnweber et al. 378 4762 11.29 [6,60; 18.63] Hartung-Knapp correction Prediction interval . 11.29 [6,60; 18.63] Prediction interval . . 4.55 [1.49; 10.29] Sibiale et al. 8 172 . 5.88 [3.25; 9.67] Gherlone et al. 9 12 - 7.38 [3.43; 13.54] Xiong et al. 14 238	Muscle pain/ Myalgia					
Xiong et al. 24 538 44.6 [2.88; 6.57] Bellan et al. 14 238 • 5.88 [3.25; 9.67] Stavem et al. 35 451 • 7.76 [5.46; 10.63] Anastasio et al. 52 379 • 13.72 [10.42; 17.60] Jacobson et al. 21 118 • 17.80 [11.37; 25.91] Gherlone et al. 23 122 • 18.85 [12.34; 26.93] Arnold et al. 25 110 • 22.73 [15.28; 31.70) Sonnweber et al. 33 135 • 24.44 [17.46; 32.58] Sytes et al. 69 134 • 11.29 [6.17; 19.75] Prediction interval . . [1.9; 57.41] [1.9; 57.41] Heterogeneity: I ² = 97%, r ² = 1.03, p < 0.01	Huang et al.	39	1655	0	2.36	[1.68; 3.21]
Belian et al. 14 238 Stavem et al. 35 451 Arasset al. 14 135 Arasset al. 14 135 Bellan et al. 14 22 540 Arasset al. 15 232 Arasset al. 13 136 Arasset al. 13 136 Arasset al. 13 137 Arasset al. 13 132 Arasset al. 131 1622 Bellan et al. 14 22 540 Arasset al. 7 135 Bellan et al. 13 132 Arasset al. 7 135 Bellan et al. 14 22 540 Arasset al. 7 135 Bellan et al. 13 132 Arasset al. 7 135 Bellan et al. 14 22 540 Arasset al. 7 135 Bellan et al. 14 13 1622 Arasset al. 7 135 Bellan et al. 14 13 1622 Bellan et al. 15 22 102 Arasset al. 7 135 Bellan et al. 14 13 1622 Bellan et al. 15 238 Bellan et al. 15 238 Bellan et al. 16 204 Arbarthy et al. 62 127 Arbarthy	Venturelli et al.	29	767	•	3.78	[2.55; 5.39]
Stavem et al. 35 451 Rass et al. 14 135 Anastasio et al. 52 379 Anastasio et al. 21 118 Anastasio et al. 22 179 Gherione et al. 23 122 Armold et al. 25 110 Sykes et al. 69 134 Frediction interval Huang et al. 154 1655 Sufare et al. 25 110 Joint pain/Arthragia Armold et al. 5 110 Joint pain/Arthragia Armold et al. 6 172 Huang et al. 154 1655 Sufare. Arbolic et al. 9 122 Juang et al. 41 538 Quarter. Arbolic et al. 9 122 Juang et al. 41 538 Quarter. Arbolic et al. 9 122 Juang et al. 42 451 Quarter. Arbolic et al. 9 122 Juang et al. 154 1655 Arbolic et al. 9 31 [7.95; 10.81] Random effects 437 3960 Huang et al. 7 135 Heterogeneity: $l^2 = 94\%$, $\tau^2 = 0.42$, $p < 0.01$ Juang et al. 7 135 Huang et al. 62 217 Huang et al. 62 217 Huang et al. 63 238 Juang et al. 62 217 Huang et al. 62 217 Huang et al. 62 127 Huang et al. 62 127 Huang et al. 62 127 Juang et al	Xiong et al.	24	538	•	4.46	[2.88; 6.57]
Rass et al. 14 135 10.37 [5.79; 16.79] Anastasio et al. 52 379 - 10.37 [1.42; 17.60] Jacobson et al. 21 118 1885 [12.34; 26.93] Amold et al. 25 110 22.73 [15.72; 16.79] Sonweber et al. 33 135 24.44 [17.46; 32.58] Sykes et al. 69 134 51.49 [42.71; 60.21] Random effects 378 4782 11.29 [6.60; 18.63] Hartung-Knapp correction 11.29 [6.60; 18.63] [1.19; 57.41] Heterogeneity: $l^2 = 97\%$, $\tau^2 = 1.03$, $p < 0.01$ 4.65 [2.03; 8.96] Sibila et al. 5 110 4.65 [2.03; 8.96] Gherlone et al. 9122 - 7.38 [3.43; 13.54] Xiong et al. 154 1655 9.31 [7.59; 10.81] Gue tal. 131 540 - 24.26 [20.70; 28.10] Suárez-Robles et al. 33 13	Bellan et al.	14	238	+	5.88	[3.25; 9.67]
Anastasio et al. 52 379 Jacobson et al. 21 118 Gherlone et al. 23 122 Arnold et al. 25 110 Sonnweber et al. 33 135 Arnold et al. 25 110 Sonnweber et al. 33 135 Hartung-Knapp correction Prediction interval Huang et al. 44 11.29 Sibile et al. 5 110 Joint pain/ Arthralgia Arnold et al. 5 110 Joint pain/ Arthralgia Arnold et al. 5 110 Joint pain/ Arthralgia Arnold et al. 5 110 Sibile et al. 8 172 Huang et al. 14 238 Gherlone et al. 9 122 Huang et al. 154 1655 Uave: Arborn Structure Subárez et al. 41 Stavem et al. 42 Subárez robles et al. 31 34 Huang et al. 154 Subárez et al. 7 135 Heterogeneity: $l^2 = 94\%$, $r^2 = 1.4, p < 0.01$ Impaired mobility Que tal. 7 135 Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34, p < 0.01$ Impaired mobility Que tal. 131 1642 Huang et al. 131 1622 Hartung-Knapp correction Prediction interval Arnold et al. 53 238 Hartung-Knapp correction Prediction interval Huang et al. 131 640 Hartung-Knapp correction Prediction interval Huang et al. 66 204 Hartung-Knapp correction Prediction interval Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$	Stavem et al.	35	451	•	7.76	[5.46; 10.63]
Jacobson et al. 21 118 Gherione et al. 23 122 Armold et al. 25 110 Somweber et al. 33 135 Sykes et al. 69 134 Random effects 378 4782 Hartung-Knapp correction Prediction interval Armold et al. 5 110 Joint pain/ Arthralgia Armold et al. 5 110 Sibila et al. 8 172 Gherione et al. 9 122 Huang et al. 154 1655 Suavem et al. 41 538 Stavem et al. 42 451 Stavem et al. 42 451 Suavem et al. 42 451 Suavem et al. 43 134 Hartung-Knapp correction Hartung-Knapp correction Hartung-Knapp correction Huang et al. 154 1655 Random effects 437 3960 Baricich et al. 62 127 Hartung-Knapp correction Prediction interval Hartung-Knapp correction Prediction interval Heterogeneity: $l^2 = 94\%$, $r^2 = 0.42$, $p < 0.01$ Huang et al. 62 127 Random effects 323 2866 Hartung-Knapp correction Prediction interval Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 98\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 98\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 98\%$, $r^2 = 1.34$, $p < 0.01$	Rass et al.	14	135		10.37	[5.79; 16.79]
Gherlone et al. 23 122 18.85 [12.34; 26.93] Armoid et al. 25 110 22.73 [15.28; 31.70] Sonnweber et al. 33 135 24.44 [17.46; 32.58] Sykes et al. 69 134 51.49 [42.71; 60.21] Random effects 378 4782 11.29 [6.60; 18.63] Hartung-Knapp correction 11.29 [6.60; 18.63] [1.19; 57.41] [1.19; 57.41] Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ 4.55 [1.49; 10.29] Joint pain/ Arthralgia - 4.65 [2.03; 8.96] Bellan et al. 8 172 - 4.65 [2.03; 8.96] Bellan et al. 9 122 - 7.38 [3.43; 13.54] Viong et al. 13 540 588 [3.25; 10.20] 11.09 Huang et al. 134 540 - 24.26 [2.07; 28.10] Qu et al. 131 540 - 24.63 [17.60; 32.81] Random effects 437	Anastasio et al.	52	379	+	13.72	
Arnold et al. 25 110 Sonnweber et al. 33 135 Sykes et al. 69 134 Fradicion effects 378 4782 Hartung-Knapp correction Prediction interval Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Heterogeneity: $l^2 = 97\%$, $r^2 = 1.03$, $p < 0.01$ Huang et al. 14 238 Qu et al. 25 110 Heterogeneity: $l^2 = 94\%$, $r^2 = 0.42$, $p < 0.01$ Heterogeneity: $l^2 = 94\%$, $r^2 = 0.42$, $p < 0.01$ Heterogeneity: $l^2 = 94\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 98\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 98\%$, $r^2 = 1.34$, $p < 0.01$ Heterogeneity: $l^2 = 98\%$, $r^2 = 1.34$, $p < 0.01$	Jacobson et al.	21	118		17.80	[11.37; 25.91]
Sonnweber et al. 33 135 Sykes et al. 69 134 Random effects 378 4782 Hartung-Knapp correction Prediction interval Armold et al. 5 110 Sibila et al. 8 172 Gherlone et al. 9 122 Huang et al. 14 238 Gherlone et al. 9 122 Huang et al. 154 1655 Stavem et al. 41 538 Cu et al. 131 540 Suárez-Robles et al. 7 135 Hartung-Knapp correction Prediction interval Hartung-Knapp correction Hartung-Knapp correction Hartung-Knapp correction Hartung-Knapp correction Hartung-Knapp corection	Gherlone et al.	23	122		18.85	[12.34; 26.93]
Sykes et al. 69 134 Random effects 378 4782 Hartung-Knapp correction Prediction interval Heterogeneity: $l^2 = 97\%$, $\tau^2 = 1.03$, $p < 0.01$ Joint pain/ Arthralgia Armold et al. 5 110 Sibila et al. 8 172 Bellan et al. 14 238 Gherlone et al. 9 122 Huang et al. 154 1655 Subject al. 131 540 Subarez-Robles et al. 33 134 Hartung-Knapp correction Prediction interval Heterogeneity: $l^2 = 94\%$, $\tau^2 = 0.42$, $p < 0.01$ Impaired mobility Qu et al. 22 540 Heterogeneity: $l^2 = 94\%$, $\tau^2 = 1.03$, $p < 0.01$ $Interval = 1. 131 542 = Heterogeneity: l^2 = 94\%, \tau^2 = 0.42, p < 0.01Interval = 1. 133 1622 = Heterogeneity: l^2 = 94\%, \tau^2 = 1.34, p < 0.01Interval = 1. 133 1622 = Heterogeneity: l^2 = 94\%, \tau^2 = 1.34, p < 0.01Interval = 1. 133 1622 = Heterogeneity: l^2 = 94\%, \tau^2 = 1.34, p < 0.01Interval = 1. 133 1622 = Heterogeneity: l^2 = 94\%, \tau^2 = 1.34, p < 0.01Interval = Heterogeneity: l^2 = 98\%, \tau^2 = 1.34, p < 0.01$	Arnold et al.				22.73	[15.28; 31.70]
Random effects 378 4782 11.29 [6.60; 18.63] Hartung-Knapp correction 11.29 [6.60; 18.63] Prediction interval Heterogeneity: $l^2 = 97\%$, $\tau^2 = 1.03$, $p < 0.01$ Joint pain/ Arthralgia .						
Hartung-Knapp correction 11.29 [6.17; 19.75] Prediction interval . . [1.19; 57.41] Heterogeneity: $l^2 = 97\%$, $\tau^2 = 1.03$, $p < 0.01$ - 4.55 [1.49; 10.29] Joint pain/ Arthralgia - 4.65 [2.03; 8.96] Arnold et al. 8 172 - 4.65 [2.03; 8.96] Bellan et al. 14 238 - 7.38 [3.43; 13.54] Xiong et al. 41 538 - 7.38 [3.43; 13.54] Stavem et al. 42 451 9.31 [6.79; 12.38] Qu et al. 131 540 - 24.62 [2.07; 28.108] Stavem et al. 131 540 - 24.63 [17.60; 32.81] Random effects 437 3960 - 9.39 [6.17; 14.04] Hartung-Knapp correction 9.39 [6.17; 14.04] - 24.63 [17.60; 32.81] Random effects 437 3960 - - 5.19 [2.11; 10.39] Qu et al. 7 135 - - 5.19 [2.17; 14						
Prediction interval Heterogeneity: $l^2 = 97\%$, $\tau^2 = 1.03, p < 0.01$ (1.19; 57.41) Joint pain/ Arthralgia Armold et al. 5 110 Armold et al. 5 110 Sibila et al. 8 172 Bellan et al. 14 238 Gherlone et al. 9 122 Huang et al. 154 1655 Stavem et al. 42 451 Suárez-Robles et al. 33 134 Random effects 437 3960 Heterogeneity: $l^2 = 94\%$, $\tau^2 = 0.42$, $p < 0.01$ 9.39 [6.17; 14.04] Impaired mobility . . . Qu et al. 22 540 . . Heterogeneity: $l^2 = 94\%$, $\tau^2 = 0.42$, $p < 0.01$. . . Impaired mobility Qu et al. 22 540 Impaired mobility Qu et al. 22 540 <td></td> <td>378</td> <td>4782</td> <td>-</td> <td></td> <td></td>		378	4782	-		
Heterogeneity: $l^2 = 97\%$, $\tau^2 = 1.03$, $p < 0.01$ Joint pain/ Arthralgia Arnold et al. 5 110 Sibila et al. 6 172 Bellan et al. 14 238 Cheroine et al. 9 122 Gheroine et al. 9 122 Huang et al. 154 1655 Qu et al. 131 540 Stavem et al. 42 451 Qu et al. 131 540 Hartung-Knapp correction Prediction interval Heterogeneity: $l^2 = 94\%$, $\tau^2 = 0.42$, $p < 0.01$ Inpaired mobility Qu et al. 113 1622 Bellan et al. 62 127 Hartung-Knapp correction Prediction interval Hartung-Knapp correction Prediction interval Hartung-Knapp correction Prediction interval Heterogeneity: $l^2 = 98\%$, $\tau^2 = 1.34$, $p < 0.01$ Interval = 0.01 Interval					11.29	
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Arnold et al. 5 110 4.55 [1.49; 10.29] Sibila et al. 8 172 4.65 [2.03; 8.96] Bellan et al. 14 238 - 5.88 [3.25; 9.67] Gherione et al. 9 122 - 7.38 [3.43; 13.54] Xiong et al. 154 1655 9.31 [7.52; 10.20] Huang et al. 154 1655 9.31 [7.67; 12.38] Que tal. 33 134 - 24.63 [17.60; 32.81] Random effects 437 3960 - 9.39 [6.77; 14.04] Hartung-Knapp correction - 9.39 [5.72; 15.03] [2.00; 34.52] Heterogeneity: $l^2 = 94\%$, $\tau^2 = 0.42$, $p < 0.01$ - 5.19 [2.11; 10.38] Huang et al. 113 1622 - 5.19 [2.11; 10.38] Baricich et al. 66 204 - 323 286 Alharthy et al. 62 127 - 48.82 [39.85; 57.84] Random effects 323 286 - <t< td=""><td>Heterogeneity: $I^2 = 97\%$, $\tau^2 = 1$.</td><td>03, p <</td><td>0.01</td><td></td><td></td><td></td></t<>	Heterogeneity: $I^2 = 97\%$, $\tau^2 = 1$.	03, p <	0.01			
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0 20 40 60 80 100		•••				[0.51; 84.60]
0 20 40 60 80 100	Heterogeneity: $I^{-} = 98\%$, $\tau^{+} = 1$.	34, p <	0.01		1	
					00	

Figure 4. Musculoskeletal

Study	n	Total		Proportion (%)	95% CI
Memory impairment					
Anastasio et al.	10	379	•	2.64	[1.27; 4.80]
Jacobson et al.	20	118		16.95	[10.67; 24.96]
Rass et al.	30	135		22.22	[15.52; 30.18]
Garrigues et al.	41	120		34.17	[25.76; 43.38]
Sykes et al.	50	134		37.31	[29.12; 46.08]
Random effects	151	886		17.94	[7.67; 36.51]
Hartung-Knapp correction				17.94	[5.26; 46.25]
Prediction interval					[0.50; 90.51]
Heterogeneity: $I^2 = 95\%$, $\tau^2 = 1$.16, <i>p</i>	< 0.01			
Concentration impairment					
Sykes et al.	34	134		25.37	[18.26; 33.61]
Garrigues et al.	32	120		26.67	[19.01; 35.51]
Random effects	66	254	-	25.98	[20.96; 31.73]
Hartung-Knapp correction				25.98	[5.39; 68.38]
Prediction interval					
Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$,	p = 0.	81			
Confusion					
Stavem et al.	10	451	•	2.22	[1.07; 4.04]
Venturelli et al.	23	767	•	3.00	[1.91; 4.47]
Random effects	33	1218	•	2.71	[1.93; 3.79]
Hartung-Knapp correction				2.71	[0.29; 20.78]
Prediction interval					
Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$,	p = 0.	42			
Frontal release signs					
Rass et al.	20	135		14.81	[9.29; 21.95]
Random effects	20	135	-	14.81	[9.76; 21.85]
Hartung-Knapp correction			-	14.81	[9.76; 21.85]
Prediction interval	•	•			
Heterogeneity: not applicable					
Other cognitive impairmen	t				
Logue et al.	4	177	•	2.26	[0.62; 5.68]
Sykes et al.	13	134		9.70	[5.27; 16.02]
Mazza et al.	105	130		80.77	[72.93; 87.15]
Random effects	122	441		17.77	[1.70; 73.04]
Hartung-Knapp correction				17.77	[0.08; 98.23]
Prediction interval		•		-	[0.00; 100.00]
Heterogeneity: $I^2 = 99\%$, $\tau^2 = 4$.86, p	< 0.01		-	
			0 20 40 60 80 1	00	
			0 20 40 60 80 1	00	

20 40 60 80 Proportion (%)

Figure 5. Neurocognitive

Study	n	Total		Proportion (%)	95% CI
Headache					
Venturelli et al.	4	767	0	0.52	[0.14; 1.33]
Sibila et al.	3	172	•	1.74	[0.36; 5.01]
Arnold et al.	2	110	-	1.82	[0.22; 6.41]
Huang et al.	33	1655	0	1.99	[1.38; 2.79]
Anastasio et al.	20	379	•	5.28	[3.25; 8.03]
Jacobson et al.	7	118	-=-	5.93	[2.42; 11.84]
Stavem et al.	29	451		6.43	[4.35; 9.10]
Petersen et al.	13	180	-=-	7.22	[3.90; 12.03]
Rass et al.	16	135		11.85	[6.93; 18.53]
Hopkins et al.	67	434	+	15.44	[12.17; 19.19]
Suárez-Robles et al.	33	134		24.63	[17.60; 32.81]
Random effects	227	4535	•	4.88	[2.52; 9.25]
Hartung-Knapp correction			-	4.88	[2.30; 10.06]
Prediction interval					[0.37; 41.32]
Heterogeneity: $I^2 = 95\%$, $\tau^2 = 1$.	22, p	< 0.01			
Tremors					
Stavem et al.	4	451	8	0.89	[0.24; 2.26]
Xiong et al.	25	538	•	4.65	[3.03; 6.78]
Rass et al.	13	135		9.63	[5.23; 15.90]
Random effects	42	1124	-	3.53	[1.17; 10.22]
Hartung-Knapp correction				3.53	[0.30; 30.63]
Prediction interval				-	[0.00; 100.00]
Heterogeneity: $I^2 = 89\%$, $\tau^2 = 0$.	89, p	< 0.01			
Seizures/ Cramps					
Stavem et al.	6	451	•	1.33	[0.49; 2.87]
Random effects	6	451	•	1.33	[0.60; 2.93]
Hartung-Knapp correction			•	1.33	[0.60; 2.93]
Prediction interval					
Heterogeneity: not applicable					
Slowness of movement/ Bra Rass et al.	adyki 7	n esia 135	-	5.19	[2 11: 10 20]
Random effects	7	135	-	5.19	[2.11; 10.39]
	'	135			[2.49; 10.48]
Hartung-Knapp correction Prediction interval			-	5.19	[2.49; 10.48]
Heterogeneity: not applicable	•	•			
Therefogeneity. Not applicable					
Lack of coordination/ Dysm					
Rass et al.	2	135	₽-	1.48	[0.18; 5.25]
Random effects	2	135	•	1.48	[0.37; 5.73]
Hartung-Knapp correction			•	1.48	[0.37; 5.73]
Prediction interval	•	•			
Heterogeneity: not applicable					
Muscle atrophy					
Rass et al.	9	135	+	6.67	[3.09; 12.28]
Random effects	9	135	-	6.67	[3.50; 12.32]
Hartung-Knapp correction			-	6.67	[3.50; 12.32]
Prediction interval	•				
Heterogeneity: not applicable					
Abnormal muscle tone					
Rass et al.	6	135	-	4.44	[1.65; 9.42]
Random effects	6	135	•	4.44	[2.01; 9.54]
Hartung-Knapp correction			•	4.44	[2.01; 9.54]
Prediction interval					
Heterogeneity: not applicable					
Walking/ Gait abnormality					
Suárez-Robles et al.	5	134	.	3.73	[1.22; 8.49]
Qu et al.	22	540	•	4.07	[2.57; 6.10]
Rass et al.	7	135	-	5.19	[2.11; 10.39]
Random effects	34	809	•	4.20	[3.02; 5.82]
Hartung-Knapp correction	••		-	4.20	[2.02; 8.53]
Prediction interval					[0.47; 28.90]
Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$, I	۵ = ۵۶	31			, 20.00]
				1	
			0 20 40 60 80 1	00	
			Proportion (%)		
ical and neuromuscular					

Figure 6. Neurological and neuromuscular

Study	n	Total		Proportion (%)	95% CI
Taste disturbance					
Venturelli et al.	23	767		3.00	[1.91; 4.47]
Bellan et al.	12	238	+	5.04	[2.63; 8.64]
Huang et al.	120	1655		7.25	[6.05; 8.61]
Klein et al.	8	103		7.77	[3.41; 14.73]
Sykes et al.	12	134		8.96	[4.71; 15.12]
Stavem et al.	45	451	•	9.98	[7.37; 13.12]
Anastasio et al.	39	379	•	10.29	[7.42; 13.80]
Garrigues et al.	13	120	-	10.83	[5.90; 17.81]
Gherlone et al.	14	122	-	11.48	[6.42; 18.50]
Logue et al.	24	177	-	13.56	[8.88; 19.50]
Rass et al.	20	135		14.81	[9.29; 21.95]
Petersen et al.	29	180		16.11	[11.06; 22.31]
Jacobson et al.	25	118		21.19	[14.20; 29.67]
Suárez-Robles et al.	29	134		21.64	[15.00; 29.58]
Nguyen et al.	30	125	-	24.00	[16.82; 32.46]
Hopkins et al.	153	434	-	35.25	[30.76; 39.95]
Parente-Arias et al.	91	151		60.26	[51.99; 68.13]
Random effects	687	5423	-	13.52	[9.25; 19.34]
Hartung-Knapp correction		5425		13.52	[8.96; 19.89]
Prediction interval				13.52	[2.26; 51.39]
Heterogeneity: $I^2 = 97\%$, $\tau^2 =$	0.76. p <	0.01			[2.26; 51.39]
Smell disturbance					
Venturelli et al.	23	767	8	3.00	[1.91; 4.47]
Bellan et al.	11	238	•	4.62	[2.33; 8.12]
Sykes et al.	13	134	-#	9.70	[5.27; 16.02]
Gherlone et al.	12	122	-#	9.84	[5.19; 16.55]
Anastasio et al.	39	379	+	10.29	[7.42; 13.80]
Huang et al.	176	1655	•	10.63	[9.19; 12.22]
Arnold et al.	13	110		11.82	[6.45; 19.36]
Stavem et al.	56	451	+	12.42	[9.52; 15.82]
Garrigues et al.	16	120		13.33	[7.82; 20.75]
Logue et al.	24	177		13.56	[8.88; 19.50]
Klein et al.	15	103		14.56	[8.39; 22.88]
Rass et al.	23	135		17.04	[11.12; 24.46]
Sonnweber et al.	26	135		19.26	[12.98; 26.93]
Jacobson et al.	25	118		21.19	[14.20; 29.67]
Petersen et al.	43	180		23.89	[17.86; 30.80]
Nguyen et al.	30	125		24.00	[16.82; 32.46]
Suárez-Robles et al.	35	134		26.12	[18.92; 34.41]
Hopkins et al.	187	434		43.09	[38.37; 47.90]
Parente-Arias et al.	75	151		49.67	[41.44; 57.91]
Random effects	842	5668	-	15.17	[11.01; 20.54]
Hartung-Knapp correction			-	15.17	[10.75; 20.97]
Prediction interval					[3.13; 49.73]
Heterogeneity: $I^2 = 96\%$, $\tau^2 =$	0.62. p <	0.01			
	, /-			Г	
			0 20 40 60 80 1	00	
			Proportion (%)		

Figure 7.Neurological and neuromuscular (page 2)

Study	n	Total		Proportion (%)	95% CI
Ear/ Hearing conditions	~	454			1000 057
Stavem et al. Random effects	5 5	451 451		1.11 1.11	[0.36; 2.57]
Hartung-Knapp correction	5	451		1.11	[0.46; 2.64] [0.46; 2.64]
Prediction interval				1.11	[0.40, 2.04]
Heterogeneity: not applicable	•	•			
Heterogeneity: net applicable					
Visual disturbance					
Stavem et al.	19	451	•	4.21	[2.56; 6.50]
Rass et al.	9	135		6.67	[3.09; 12.28]
Random effects	28	586	•	4.78	[3.32; 6.83]
Hartung-Knapp correction				4.78	[0.43; 37.02]
Prediction interval	•	•			
Heterogeneity: $I^2 = 26\%$, $\tau^2 = 0$,	p = 0	.25			
Speech difficulty/ Dysarthria					
Rass et al.	a 3	135	-	2.22	[0.46; 6.36]
Random effects	3	135	-	2.22	[0.72; 6.66]
Hartung-Knapp correction	Ũ		-	2.22	[0.72; 6.66]
Prediction interval					
Heterogeneity: not applicable	-				
Decreased sensation or sen	sibil	ity			
Suárez-Robles et al.	10	134	+ -	7.46	[3.64; 13.30]
Rass et al.	20	135		14.81	[9.29; 21.95]
Random effects	30	269	-	10.90	[6.71; 17.22]
Hartung-Knapp correction				10.90	[0.39; 79.27]
Prediction interval		•			
Heterogeneity: $I^2 = 72\%$, $\tau^2 = 0.1$	07, p	= 0.06			
Tingling/ Parasthesia					
Gherlone et al.	4	122	₽-	3.28	[0.90; 8.18]
Rass et al.	29	135		21.48	[14.88; 29.37]
Random effects	33	257		9.12	[2.21; 30.87]
Hartung-Knapp correction				9.12	[0.00; 99.94]
Prediction interval					
Heterogeneity: $I^2 = 93\%$, $\tau^2 = 1.4$	01, p	< 0.01			
Trigeminal neuralgia		100	_	0.00	10.00 0.101
Gherlone et al.	4 4	122	•	3.28 3.28	[0.90; 8.18]
Random effects Hartung-Knapp correction	4	122		3.28	[1.24; 8.41] [1.24; 8.41]
Prediction interval			-	5.20	[1.24, 0.41]
Heterogeneity: not applicable	•	•			
Abnormal reflex status					
Rass et al.	31	135		22.96	[16.17; 30.98]
Random effects	31	135		22.96	[16.64; 30.80]
Hartung-Knapp correction				22.96	[16.64; 30.80]
Prediction interval	•	•			
Heterogeneity: not applicable					
Other neurological diseases					
Rass et al.	20	135		14.81	[9.29; 21.95]
Random effects	20	135	-	14.81	[9.76; 21.85]
Hartung-Knapp correction			-	14.81	[9.76; 21.85]
Prediction interval					,
Heterogeneity: not applicable					
				1	
				00	
			Proportion (%)		
cal and neuromuscular	(pac	je 3)			

Figure 8. Neurological and neuromuscular (page 3)

Study	n	Total	Proport	tion (%) 95% CI
Skin rash				
Suárez-Robles et al.	2	134	■- 1.4	49 [0.18; 5.29]
Stavem et al.	7	451	■ 1.t	55 [0.63; 3.17]
Huang et al.	47	1655	■ 2.8	84 [2.09; 3.76]
Sykes et al.	11	134	8.2	21 [4.17; 14.21]
Random effects	67	2374	• 2.5	
Hartung-Knapp correction			- 2.8	
Prediction interval	•	•		[0.15; 35.99]
Heterogeneity: $I^2 = 81\%$, $\tau^2 = 0$.35, p	< 0.01		
Hair loss				
Anastasio et al.	12	379	■ 3. ⁻	17 [1.65; 5.47]
Jacobson et al.	14	118	- - - 11.	· · · · ·
Garrigues et al.	24	120	20.	
Huang et al.	359	1655	■ 21.	
Xiong et al.	154	538	28.	.62 [24.84; 32.65]
Random effects	563	2810	14.	.34 [7.20; 26.54]
Hartung-Knapp correction			14.	.34 [5.33; 33.23]
Prediction interval				[0.84; 76.78]
Heterogeneity: $I^2 = 95\%$, $\tau^2 = 0$.72, p	< 0.01		
Conjunctivitis				
Stavem et al.	8	451	• 1.	77 [0.77: 3.47]
Random effects	8	451	• 1.	the second second
Hartung-Knapp correction	v	401	• 1.	
Prediction interval				[0.00, 0.01]
Heterogeneity: not applicable	•	•		
			0 20 40 60 80 100	
			Proportion (%)	

Figure 9. Other

Study	n	Total		Proportion (%)	95% CI
Anxiety					
Xiong et al.	35	538	•	6.51	[4.57; 8.93]
Mazza et al.	20	226	-	8.85	[5.49; 13.34]
Venturelli et al.	82	767	•	10.69	[8.59; 13.10]
Rass et al.	24	135		17.78	[11.74; 25.29]
Huang et al.	367	1617	•	22.70	[20.67; 24.82]
Suárez-Robles et al.	58	134		43.28	[34.76; 52.11]
Sykes et al.	64	134	———	47.76	[39.07; 56.56]
Random effects	650	3551		18.73	[10.37; 31.45]
Hartung-Knapp correction				18.73	[8.89; 35.25]
Prediction interval					[1.83; 74.04]
Heterogeneity: $I^2 = 97\%$, $\tau^2 = 0$.	83, p <	0.01			
Depression					
Xiong et al.	23	538	•	4.28	[2.73; 6.35]
Venturelli et al.	33	767	•	4.30	[2.98; 5.99]
Rass et al.	11	135		8.15	[4.14; 14.11]
Anastasio et al.	31	379	+	8.18	[5.63; 11.41]
Mazza et al.	20	226	+ -	8.85	[5.49; 13.34]
Huang et al.	367	1617	•	22.70	[20.67; 24.82]
Random effects	485	3662	•	8.06	[4.86; 13.07]
Hartung-Knapp correction			-	8.06	[4.14; 15.10]
Prediction interval	. •				[1.25; 37.81]
Heterogeneity: $I^2 = 97\%$, $\tau^2 = 0$.	41, p <	0.01			
Sloop disorder					
Sleep disorder	7	226	-	2 10	[105: 600]
Mazza et al. Apostosio et al		226	1	3.10	[1.25; 6.28]
Anastasio et al. Xiona et al	16 95	379 538	-	4.22	[2.43; 6.77]
Xiong et al. Sonnweber et al.			+ -	17.66	[14.53; 21.15]
	32	145		22.07	[15.61; 29.70]
Arnold et al.	26 437	110 1655		23.64	[16.06; 32.68]
Huang et al.	437 37	120		26.40 30.83	[24.29; 28.60]
Garrigues et al. Rass et al.	45	135		33.33	[22.73; 39.91]
	45 47	135			[25.46; 41.96]
Sykes et al. Bandom offects	742	3442	-	35.07 18.15	[27.04; 43.79] [10.61; 29.30]
Random effects Hartung-Knapp correction	/42	3442		18.15	
Prediction interval				10.15	[9.61; 31.63] [2.11; 69.54]
Heterogeneity: $I^2 = 94\%$, $\tau^2 = 0$.	87 n r	. 0.01			[2.11, 05.54]
Heterogeneity: 7 = 34 %, t = 0.	or, p -	0.01			
PTSD					
Mazza et al.	5	226	•	2.21	[0.72; 5.09]
Simani et al.	7	120	-	5.83	[2.38; 11.65]
Einvik et al.	43	571	•	7.53	[5.50; 10.01]
Rass et al.	11	135	-	8.15	[4.14; 14.11]
Bellan et al.	41	238		17.23	[12.65; 22.64]
Venturelli et al.	222	767	-	28.94	[25.76; 32.30]
Random effects	329	2057	-	9.14	[4.57; 17.45]
Hartung-Knapp correction				9.14	[3.66; 21.04]
Prediction interval					[0.69; 59.18]
Heterogeneity: $I^2 = 96\%$, $\tau^2 = 0$.	78, p <	0.01			
Low mood/ Dysphoria					
Mazza et al.	0	226	•	0.00	[0.00; 1.62]
Xiong et al.	9	538	0	1.67	[0.77; 3.15]
Sykes et al.	53	134		39.55	[31.22; 48.36]
Random effects	62	898		1.79	[0.04; 45.16]
Hartung-Knapp correction				1.79	[0.00; 98.74]
Prediction interval		· · ·		•	[0.00; 100.00]
Heterogeneity: $I^2 = 98\%$, $\tau^2 = 9$.	ı9, р <	0.01			
Poducod quality of life					
Reduced quality of life	52	177	-	29.94	102 201 27 271
Logue et al.	53	177			[23.30; 37.27]
Rass et al. Qu et al.	28 259	90 540		31.11	[21.77; 41.74]
			-	47.96	[43.68; 52.27] [27.43; 47.21]
Random effects Hartung-Knapp correction	340	807		36.76 36.76	[27.43; 47.21] [18.43; 59.93]
Prediction interval				30.70	[18.43; 59.93] [0.34; 99.01]
Heterogeneity: $l^2 = 91\%$, $\tau^2 = 0$.	12 n -	0.01			[0.04, 33.01]
$\tau = 0.0000000000000000000000000000000000$. <u>,</u> p <	5.01			
Care dependency					
Huang et al.	25	1611	0	1.55	[1.01; 2.28]
Logue et al.	14	177	-	7.91	[4.39; 12.91]
Venturelli et al.	121	767	•	15.78	[4.33, 12.31]
Random effects	160	2555		5.89	[1.87; 17.05]
Hartung-Knapp correction				5.89	[0.46; 45.96]
Prediction interval					[0.00; 100.00]
Heterogeneity: $I^2 = 98\%$, $\tau^2 = 1$.	06. n <	0.01			
	- 0, p 1			1	
			0 20 40 60 80 1	00	
			Proportion (%)		
In a family of the state					
logical and social					

Figure 10. Psychological and social

Study	n	Total		Proportion (%)	95% CI
Fatigue					
Qin et al.	87	647	+	13.45	[10.91; 16.32]
Logue et al.	24	177	-	13.56	[8.88; 19.50]
Simani et al.	21	120		17.50	[11.17; 25.50]
Klein et al.	23	103	_ _ _	22.33	[14.71; 31.60]
Petersen et al.	43	180		23.89	[17.86; 30.80]
		767	Ŧ	23.89	
Venturelli et al.	186		-		[21.26; 27.44]
Hopkins et al.	106	434		24.42	[20.45; 28.75]
Rass et al.	35	135		25.93	[18.77; 34.17]
Xiong et al.	152	538	-	28.25	[24.48; 32.26]
Qu et al.	159	540	-	29.44	[25.63; 33.49]
Jacobson et al.	36	118		30.51	[22.37; 39.66]
Arnold et al.	43	110		39.09	[29.93; 48.86]
Sykes et al.	53	134		39.55	[31.22; 48.36]
Alharthy et al.	62	127	_ _	48.82	[39.85: 57.84]
Suárez-Robles et al.	73	134		54.48	[45.65; 63.10]
Garrigues et al.	66	120	_ e _	55.00	[45.65; 64.09]
Huang et al.	1038	1655		62.72	[60.34; 65.05]
Random effects	2207	6039	_	30.97	[24.40; 38.40]
Hartung-Knapp correction	2201	0033		30.97	[23.91; 39.03]
				30.97	
Prediction interval					[9.31; 66.23]
Heterogeneity: $I^2 = 98\%$, $\tau^2 = 0$.45, p <	0.01			
14/2 - 1					
Weakness		070	_	00.00	
Anastasio et al.	113	379	-8-	29.82	[25.25; 34.70]
Suárez-Robles et al.	73	134		54.48	[45.65; 63.10]
Random effects	186	513		41.20	[25.43; 59.01]
Hartung-Knapp correction				41.20	[0.65; 98.68]
Prediction interval					
Heterogeneity: $I^2 = 96\%$, $\tau^2 = 0$.25, p <	0.01			
Fever					
Huang et al.	2	1655	0	0.12	[0.01; 0.44]
Stavem et al.	2	451	0	0.44	[0.05; 1.59]
Venturelli et al.	5	767	0	0.65	[0.21; 1.51]
Jacobson et al.	1	118	-	0.85	[0.02; 4.63]
	1		-		
Arnold et al.		65		1.54	[0.04; 8.28]
Hopkins et al.	22	434	•	5.07	[3.20; 7.57]
Sykes et al.	14	134		10.45	[5.83; 16.91]
Random effects	47	3624	•	1.08	[0.33; 3.50]
Hartung-Knapp correction			•	1.08	[0.24; 4.66]
Prediction interval					[0.02; 39.37]
Heterogeneity: $I^2 = 91\%$, $\tau^2 = 2$.15, p <	0.01			
Sweat or night sweats					
Xiong et al.	127	538		23.61	[20.08; 27.43]
Sonnweber et al.	35	145		24.14	[17.43; 31.94]
Random effects	162	683	•	23.72	[20.68; 27.05]
Hartung-Knapp correction				23.72	[9.02; 49.37]
Prediction interval					,
Heterogeneity: $l^2 = 0\%$, $\tau^2 = 0$,	n = 0.89				
	p = 0.00				
Enlarged lymph nodes/ Lyn	nnhade	nonathy			
Stavem et al.	4	451	6	0.89	[0.24; 2.26]
Random effects	4	451	-	0.89	[0.33; 2.34]
	4	451			
Hartung-Knapp correction			•	0.89	[0.33; 2.34]
Prediction interval	•	•			
Heterogeneity: not applicable					
O an and made in					
General malaise	<u> </u>	40.1	_	10.55	
Suárez-Robles et al.	25	134		18.66	[12.45; 26.30]
Xiong et al.	267	538		49.63	[45.32; 53.94]
Random effects	292	672		32.68	[14.91; 57.36]
Hartung-Knapp correction				32.68	[0.07; 99.72]
Prediction interval					
Heterogeneity: $I^2 = 97\%$, $\tau^2 = 0$.51, p <	0.01			
Dizziness					
Anastasio et al.	9	379	•	2.37	[1.09; 4.46]
Xiong et al.	14	538	•	2.60	[1.43; 4.33]
Huang et al.	101	1655	8	6.10	[5.00; 7.37]
Rass et al.	9	135		6.67	[3.09; 12.28]
Hopkins et al.	29	434	-	6.68	
			-		[4.52; 9.46]
Random effects	162	3141	-	4.50	[3.00; 6.68]
Hartung-Knapp correction			-	4.50	[2.53; 7.86]
Prediction interval	•				[1.08; 16.84]
Heterogeneity: $I^2 = 77\%$, $\tau^2 = 0$.16, p <	0.01		1	
				00	
			Proportion (%)		

Figure 11. Systemic

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Study	n	Total	I	Proportion (%)	95% CI
Sore throat					
Jacobson et al.	3	118	₽-	2.54	[0.53; 7.25]
Xiong et al.	17	538	•	3.16	[1.85; 5.01]
Huang et al.	69	1655	0	4.17	[3.26; 5.25]
Stavem et al.	21	451	•	4.66	[2.91; 7.03]
Sykes et al.	17	134		12.69	[7.57; 19.53]
Random effects	127	2896	•	4.70	[2.95; 7.41]
Hartung-Knapp correction			•	4.70	[2.42; 8.91]
Prediction interval					[0.88; 21.54]
Heterogeneity: $I^2 = 82\%$, $\tau^2 = 0$).23, p	< 0.01			
Nasal congestion					
Stavem et al.	19	451	•	4.21	[2.56; 6.50]
Hopkins et al.	23	434	•	5.30	[3.39; 7.85]
Jacobson et al.	8	118	-8	6.78	[2.97; 12.92]
Random effects	50	1003	•	4.99	[3.80; 6.52]
Hartung-Knapp correction			•	4.99	[2.73; 8.92]
Prediction interval	•.	· ·			[0.82; 24.90]
Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$,	p = 0.	49			
Voice change					
Suárez-Robles et al.	11	134	-	8.21	[4.17; 14.21]
Random effects	11	134	-	8.21	[4.60; 14.22]
Hartung-Knapp correction			-	8.21	[4.60; 14.22]
Prediction interval					
Heterogeneity: not applicable		-			
5 ,					
Other respiratory sympton	าร				
Stavem et al.	13	451	•	2.88	[1.54; 4.88]
Gherlone et al.	30	122		24.59	[17.25; 33.21]
Xiong et al.	210	538		39.03	[34.89; 43.30]
Random effects	253	1111		15.58	[3.96; 45.21]
Hartung-Knapp correction				15.58	[0.68; 83.17]
Prediction interval	•	•			[0.00; 100.00]
Heterogeneity: $I^2 = 98\%$, $\tau^2 = 1$	I.71, p	< 0.01			
			0 20 40 60 80 10	0	
			Proportion (%)		

Figure 12. Upper respiratory

Supplement 5: Subgroup analysis: hospitalisation

Classification	Symptom	Subgroup	N Studies	Event/total	Proportion% (95% Cls)	Heterogeneity (%)	P value
	/	Hospitalised	n = 14	765/3148	28.68 (18.48 to 41.64)	96.19	
	Breathlessness/ Exertional dyspnoea	Mixed	n = 3	381/1291	32.57 (14.26 to 58.38)	96.38	<0.001
	aysphoed	Non-hospitalised	n = 4	151/1084	13.72 (8.51 to 21.37)	72.13	
		Mixed	n = 2	69/1146	6.18 (0.01 to 97.66)	96.65	
	Chest pain	Hospitalised	n = 9	225/3636	5.92 (2.45 to 13.63)	92.86	0.071
		Non-hospitalised	n = 1	14/96	14.58 (8.83 to 23.13)	NA	
		Mixed	n = 3	54/1281	4.91 (0.25 to 51.82)	96.03	
Cardiopulmonary	Cough	Hospitalised	n = 11	299/2769	10.52 (5.93 to 17.98)	93.05	0.265
Larulopullionary		Non-hospitalised	n = 3	61/981	5.95 (1.53 to 20.50)	56.24	
	Excessive sputum/	Hospitalised	n = 5	97/1498	6.02 (3.20 to 11.03)	82.16	0.112
	Expectoration	Non-hospitalised	n = 1	16/451	3.55 (2.18 to 5.71)	NA	0.112
	Other cardiovascular	Hospitalised	n = 2	78/1185	4.20 (0.00 to 99.97)	97.68	0.009
symptoms	Mixed	n = 1	1/767	0.13 (0.02 to 0.92)	NA	0.009	
	Mixed	n = 2	53/1146	4.67 (0.60 to 28.47)	62.05		
	Palpitations	Hospitalised	n = 6	416/3536	12.43 (7.78 to 19.29)	91.7	<0.00
		Non-hospitalised	n = 1	7/ 96	7.29 (3.52 to 14.51)	NA	
		Hospitalised	n = 7	138/2809	2.93 (0.90 to 9.12)	81.91	
	Diarrhoea	Non-hospitalised	n = 3	40/981	4.16 (0.72 to 20.65)	84.27	0.077
		Mixed	n = 1	12/135	8.89 (5.12 to 15.00)	NA	
		Hospitalised	n = 2	21/139	5.84 (0.00 to 100.00)	0	
	Nausea or Vomiting	Non-hospitalised	n = 2	16/547	3.66 (0.00 to 98.24)	89.91	0.343
Gastrointestinal		Mixed	n = 1	12/135	8.89 (5.12 to 15.00)	NA	
		Hospitalised	n = 2	10/209	4.63 (0.03 to 89.20)	54.79	
	Stomach/ Abdominal pain	Non-hospitalised	n = 1	15/451	3.33 (2.01 to 5.44)	NA	0.002
		Mixed	n = 1	5/767	0.65 (0.27 to 1.56)	NA	
	Weight loss	Non-hospitalised	n = 1	47/434	10.83 (8.23 to 14.12)	NA	<0.00
	Weight loss	Hospitalised	n = 1	50/134	37.31 (29.55 to 45.79)	NA	<0.002
Auseuloskoletal	Impaired mobility	Hospitalised	n = 5	316/2731	17.33 (4.75 to 46.83)	98.49	0.020
Musculoskeletal	impaired mobility	Mixed	n = 1	7/135	5.19 (2.49 to 10.48)	NA	0.038

	loint poin (Arthrolain	Hospitalised	n = 8	395/3509	9.36 (5.25 to 16.14)	94.81	0.987
	Joint pain/ Arthralgia	Non-hospitalised	n = 1	42/451	9.31 (6.95 to 12.36)	NA	0.987
		Mixed	n = 4	128/1416	10.86 (3.45 to 29.36)	95.21	
	Muscle pain/ Myalgia	Hospitalised	n = 7	199/2819	12.46 (4.30 to 31.09)	98.05	0.954
		Non-hospitalised	n = 2	51/547	10.76 (0.24 to 85.64)	85.87	
	Confusion	Non-hospitalised	n = 1	10/451	2.22 (1.20 to 4.07)	NA	- 0.419
	confusion	Mixed	n = 1	23/767	3.00 (2.00 to 4.47)	NA	- 0.415
		Mixed	n = 2	40/514	8.06 (0.00 to 99.97)	97.38	
Neurocognitive	Memory impairment	Hospitalised	n = 3	96/276	34.78 (23.64 to 47.88)	0	<0.00
		Non-hospitalised	n = 1	15/96	15.62 (9.64 to 24.32)	NA	
	Other cognitive impeirment	Mixed	n = 2	109/307	23.55 (0.00 to 100.00)	98.87	
	Other cognitive impairment	Hospitalised	n = 1	13/134	9.70 (5.72 to 15.99)	NA	0.58
	Decreased sensation or	Mixed	n = 1	20/135	14.81 (9.76 to 21.85)	NA	0.00
	sensibility	Hospitalised	n = 1	10/134	7.46 (4.06 to 13.31)	NA	
		Mixed	n = 3	40/1281	3.30 (0.12 to 50.20)	93.93	
	Headache	Hospitalised	n = 5	71/2093	2.98 (0.47 to 16.53)	96.56	0.14
	Non-hospitalised	n = 4	116/1161	8.82 (4.41 to 16.85)	86.25		
		Mixed	n = 6	210/1744	14.63 (5.46 to 33.72)	97.32	
	Smell disturbance	Hospitalised	n = 9	308/2660	12.16 (7.98 to 18.10)	85.48	0.10
		Non-hospitalised	n = 5	324/1264	22.19 (11.69 to 38.04)	96.3	
		Mixed	n = 5	197/1609	14.50 (3.40 to 44.98)	98.32	
Neurological and	Taste disturbance	Hospitalised	n = 8	232/2550	11.07 (6.90 to 17.28)	89.1	0.42
neuromuscular		Non-hospitalised	n = 5	258/1264	16.83 (7.91 to 32.26)	95.66	
	Tingling (Developth opin	Hospitalised	n = 1	4/122	3.28 (1.24 to 8.41)	NA	-0.00
	Tingling/ Paraesthesia	Mixed	n = 1	29/135	21.48 (15.36 to 29.21)	NA	
		Mixed	n = 1	13/135	9.63 (5.67 to 15.88)	NA	
	Tremors	Non-hospitalised	n = 1	4/451	0.89 (0.33 to 2.34)	NA	<0.00
		Hospitalised	n = 1	25/538	4.65 (3.16 to 6.79)	NA	
		Mixed	n = 1	9/135	6.67 (3.50 to 12.32)	NA	0.24
	Visual disturbance	Non-hospitalised	n = 1	19/451	4.21 (2.70 to 6.51)	NA	- 0.24
		Hospitalised	n = 2	27/674	4.01 (0.34 to 33.61)	0	0
	Walking/ Gait abnormality	Mixed	n = 1	7/135	5.19 (2.49 to 10.48)	NA	- 0.53

		Mixed	n = 1	12/379	3.17 (1.81 to 5.49)	NA	
	Hair loss	Hospitalised	n = 4	541/2335	23.54 (17.68 to 30.61)	74.84	<0.00
Dther		Non-hospitalised	n = 1	10/96	10.42 (5.70 to 18.29)	NA	
	Skin rash	Hospitalised	n = 3	60/1923	3.53 (0.75 to 15.11)	82.97	0.112
	SKIILLASIT	Non-hospitalised	n = 1	7/451	1.55 (0.74 to 3.22)	NA	- 0.11
	Anviotu	Hospitalised	n = 4	524/2423	25.58 (6.36 to 63.49)	97.85	0.07
	Anxiety	Mixed	n = 3	126/1128	11.60 (6.03 to 21.15)	72	0.07
	Cara danandanau	Hospitalised	n = 1	25/1611	1.55 (1.05 to 2.29)	NA	
	Care dependency	Mixed	n = 2	135/944	12.00 (0.39 to 82.45)	85.63	<0.00
	Depression	Mixed	n = 4	95/1507	6.80 (3.99 to 11.37)	71	
	Depression	Hospitalised	n = 2	390/2155	10.38 (0.00 to 99.83)	98.62	0.50
Psychological and social Low mood/ Dyspl	Low mood / Dyspharia	Mixed	n = 1	0/226	0.00 (0.00 to 100.00)	NA	1.00
	Low mood/ Dysphona	Hospitalised	n = 2	62/672	9.49 (0.00 to 100.00)	98.92	1.00
		Hospitalised	n = 3	59/474	10.52 (3.06 to 30.44)	80.04	
	PTSD	Non-hospitalised	n = 1	32/455	7.03 (5.02 to 9.78)	NA	0.45
		Mixed	n = 3	238/1128	8.73 (0.46 to 66.23)	96.63	
	Doduced quality of life	Mixed	n = 2	81/267	30.34 (7.43 to 70.27)	0	0 0
	Reduced quality of life	Hospitalised	n = 1	259/540	47.96 (43.77 to 52.18)	NA	
	Cloop disordor	Mixed	n = 4	100/885	10.66 (1.76 to 44.22)	96.51	0.00
	Sleep disorder	Hospitalised	n = 5	642/2557	25.81 (18.85 to 34.26)	84.7	
		Mixed	n = 2	18/514	3.78 (0.03 to 83.74)	79.93	
	Dizziness	Non-hospitalised	n = 1	29/434	6.68 (4.68 to 9.45)	NA	0.22
		Hospitalised	n = 2	115/2193	4.21 (0.08 to 71.53)	89.39	
		Hospitalised	n = 11	1762/4147	37.10 (26.54 to 49.06)	98.23	
	Fatigue	Non-hospitalised	n = 4	200/813	24.60 (20.11 to 29.72)	0	0.01
Customia		Mixed	n = 3	245/1079	21.04 (10.48 to 37.75)	79.86	
Systemic		Hospitalised	n = 4	17/1876	0.85 (0.02 to 24.20)	92.05	
	Fever	Non-hospitalised	n = 3	25/981	1.41 (0.06 to 24.82)	84.73	0.66
		Mixed	n = 1	5/767	0.65 (0.27 to 1.56)	NA	
	Cureat an night suggets	Mixed	n = 1	35/145	24.14 (17.87 to 31.76)	NA	0.00
	Sweat or night sweats	Hospitalised	n = 1	127/538	23.61 (20.21 to 27.38)	NA	
	Weakness	Mixed	n = 1	113/379	29.82 (25.42 to 34.61)	NA	<0.0

		Hospitalised	n = 1	73/134	54.48 (46.00 to 62.70)	NA	
	Nasal congestion	Non-hospitalised	n = 3	49/981	4.99 (2.72 to 8.99)	0	0.924
	Nasal congestion	Hospitalised	n = 1	1/ 22	4.55 (0.64 to 26.15)	NA	0.924
Upper receivatory	Other respiratory symptoms	Hospitalised	n = 2	240/660	32.43 (2.22 to 91.02)	88.57	
Upper respiratory	Other respiratory symptoms	Non-hospitalised	n = 1	13/451	2.88 (1.68 to 4.90)	NA	<0.001
	Sore throat	Hospitalised	n = 4	103/2349	4.81 (1.60 to 13.60)	85.83	- 0.815
	Sole throat	Non-hospitalised	n = 2	24/547	4.39 (0.32 to 39.44)	0	0.815

Supplement 6: Subgroup analysis: Setting

Classification	Symptom	Subgroup	N Studies	Event/total	Proportion% (95% Cls)	Heterogeneity (%)	P value
		Multicentre	n = 5	121/1358	6.90 (2.46 to 17.92)	84.05	
	Cough	Single-centre	n = 10	260/3239	9.07 (4.23 to 18.41)	95.62	0.842
		Online survey	n = 1	33/ 434	7.60 (5.46 to 10.50)	NA	
	Chast sois	Single-centre	n = 10	292/4760	5.87 (2.70 to 12.26)	93.7	0.020
	Chest pain	Multicentre	n = 1	16/ 118	13.56 (8.48 to 20.99)	NA	0.039
Cardianulmanaru		Multicentre	n = 6	350/1437	26.79 (15.81 to 41.63)	91.82	
Cardiopulmonary	Breathlessness/ Exertional dyspnoea	Single-centre	n = 12	889/3549	27.78 (17.16 to 41.67)	96.93	<0.001
	dyspridea	Online survey	n = 2	58/ 537	10.80 (2.03 to 41.47)	16.75	
	Delaitations	Single-centre	n = 6	359/4120	9.02 (5.17 to 15.27)	90.72	0 5 7 1
	Palpitations	Multicentre	n = 2	117/ 658	11.96 (0.02 to 98.84)	91.67	0.571
	Excessive sputum/	Multicentre	n = 3	81/1105	6.97 (2.02 to 21.38)	86.45	0.000
	Expectoration	Single-centre	n = 3	32/ 844	3.79 (1.78 to 7.88)	24.53	0.066
Weight loss	Online survey	n = 1	47/ 434	10.83 (8.23 to 14.12)	NA	-0.00	
	weight loss	Single-centre	n = 1	50/ 134	37.31 (29.55 to 45.79)	NA	<0.00
	Stomach (Abdominal pain	Single-centre	n = 2	7/ 859	0.81 (0.01 to 50.51)	52.12	<0.00
	Stomach/ Abdominal pain	Multicentre	n = 2	23/ 568	4.05 (0.28 to 38.69)	64.62	<0.001
Gastrointestinal		Single-centre	n = 2	174/1789	15.09 (0.03 to 98.93)	97.64	0.288
	Loss of appetite	Multicentre	n = 1	28/ 117	23.93 (17.06 to 32.48)	NA	0.288
		Single-centre	n = 4	85/2130	1.81 (0.36 to 8.72)	72.7	
	Diarrhoea	Multicentre	n = 5	80/1361	6.23 (2.49 to 14.76)	85.33	0.082
		Online survey	n = 1	25/ 434	5.76 (3.92 to 8.39)	NA	
		Single-centre	n = 4	294/2191	23.71 (6.53 to 58.01)	98.62	-0.00
	Impaired mobility	Multicentre	n = 2	29/ 675	4.30 (0.40 to 33.37)	0	<0.00
Musculoskeletal	laint nain (Arthralaia	Single-centre	n = 7	264/2969	8.03 (4.64 to 13.55)	86.94	0.116
viusculoskeletai	Joint pain/ Arthralgia	Multicentre	n = 2	173/ 991	15.45 (0.11 to 96.89)	97.19	0.110
	Musslo pain/ Muslaia	Multicentre	n = 4	103/ 839	13.72 (6.26 to 27.48)	89.49	0.508
	Muscle pain/ Myalgia	Single-centre	n = 8	275/3943	10.23 (4.03 to 23.63)	97.97	0.508
Nourocognitivo	Other cognitive	Single-centre	n = 2	118/ 264	40.19 (0.00 to 100.00)	99	0.017
Neurocognitive	impairment	Multicentre	n = 1	4/ 177	2.26 (0.85 to 5.86)	NA	0.017

	Confusion	Multicentre	n = 1	10/ 451	2.22 (1.20 to 4.07)	NA	- 0.419
	Confusion	Single-centre	n = 1	23/ 767	3.00 (2.00 to 4.47)	NA	0.41
	Memory impairment	Multicentre	n = 2	50/ 253	19.76 (3.21 to 64.68)	8.97	- 0.82
	Memory impairment	Single-centre	n = 3	101/ 633	16.93 (0.58 to 87.62)	97.39	0.82
	Walking/ Gait abnormality	Multicentre	n = 2	29/ 675	4.30 (0.40 to 33.37)	0	— 0.76
	Walking/ Gait abrior mailty	Single-centre	n = 1	5/ 134	3.73 (1.56 to 8.65)	NA	0.70
	Tremors	Multicentre	n = 2	17/ 586	2.98 (0.00 to 99.96)	94.5	— 0.61
		Single-centre	n = 1	25/ 538	4.65 (3.16 to 6.79)	NA	0.01
		Single-centre	n = 6	95/3217	2.82 (0.69 to 10.88)	96.4	
	Headache	Multicentre	n = 4	65/ 884	7.35 (5.00 to 10.68)	37.26	<0.00
		Online survey	n = 1	67/ 434	15.44 (12.34 to 19.15)	NA	
	Smell disturbance	Multicentre	n = 6	197/1196	17.21 (13.03 to 22.38)	68.78	
Neurological and		Single-centre	n = 11	443/3935	12.49 (7.13 to 20.97)	95.97	0.23
Taste disturbance	Online survey	n = 2	202/ 537	27.06 (0.04 to 99.70)	96.07		
	Single-centre	n = 10	383/3825	12.21 (6.16 to 22.76)	97.3		
	Multicentre	n = 5	143/1061	14.27 (10.13 to 19.73)	65.8	0.79	
		Online survey	n = 2	161/ 537	18.21 (0.00 to 99.91)	95.82	
	Tingling/ Paraesthesia	Single-centre	n = 1	4/ 122	3.28 (1.24 to 8.41)	NA	-0.0
	Tinging/ Paraestnesia	Multicentre	n = 1	29/ 135	21.48 (15.36 to 29.21)	NA	- <0.00
	Decreased sensation or	Multicentre	n = 1	20/ 135	14.81 (9.76 to 21.85)	NA	0.00
	sensibility	Single-centre	n = 1	10/ 134	7.46 (4.06 to 13.31)	NA	- 0.06
		Multicentre	n = 1	14/ 118	11.86 (7.15 to 19.04)	NA	0.00
Other	Hair loss	Single-centre	n = 4	549/2692	14.99 (3.66 to 45.01)	95.58	- 0.63
Other	Chine weak	Single-centre	n = 3	60/1923	3.53 (0.75 to 15.11)	82.97	0.11
	Skin rash	Multicentre	n = 1	7/451	1.55 (0.74 to 3.22)	NA	- 0.11
	Cana danan danan	Single-centre	n = 2	146/2378	5.16 (0.00 to 99.97)	99.18	0.00
	Care dependency	Multicentre	n = 1	14/ 177	7.91 (4.74 to 12.91)	NA	— 0.62
	DICD	Multicentre	n = 2	54/ 706	7.65 (1.35 to 33.36)	0	0.01
Psychological and social	PTSD	Single-centre	n = 4	275/1351	9.73 (1.74 to 39.56)	95.56	- 0.65
	Class disender	Single-centre	n = 7	665/3162	15.96 (6.78 to 33.15)	95.15	0.14
	Sleep disorder	Multicentre	n = 2	77/ 280	27.41 (2.84 to 82.98)	77.28	- 0.11
	Depression	Single-centre	n = 5	474/3527	8.06 (3.47 to 17.62)	97.89	0.97

		Multicentre	n = 1	11/ 135	8.15 (4.57 to 14.11)	NA	
	Anviotu	Single-centre	n = 6	626/3416	18.92 (7.55 to 40.00)	97.66	- 0.870
	Anxiety	Multicentre	n = 1	24/ 135	17.78 (12.21 to 25.16)	NA	0.870
		Single-centre	n = 3	124/2572	3.55 (1.05 to 11.30)	87.17	
	Dizziness	Online survey	n = 1	29/ 434	6.68 (4.68 to 9.45)	NA	0.138
		Multicentre	n = 1	9/ 135	6.67 (3.50 to 12.32)	NA	
	Sweat or night sweats	Multicentre	n = 1	35/ 145	24.14 (17.87 to 31.76)	NA	0 904
		Single-centre	n = 1	127/ 538	23.61 (20.21 to 27.38)	NA	- 0.894
Systemic		Single-centre	n = 4	22/2621	0.98 (0.06 to 14.94)	94.58	
		Online survey	n = 1	22/ 434	5.07 (3.36 to 7.58)	NA	<0.001
		Multicentre	n = 2	3/ 569	0.53 (0.00 to 89.24)	0	
		Single-centre	n = 10	1781/4352	36.55 (25.00 to 49.88)	98.57	
	Fatigue	Multicentre	n = 5	297/1150	24.28 (17.14 to 33.19)	78.24	0.067
		Online survey	n = 2	129/ 537	24.02 (8.05 to 53.30)	0	
	Other respiratory	Single-centre	n = 2	240/ 660	32.43 (2.22 to 91.02)	88.57	-0.001
	symptoms	Multicentre	n = 1	13/ 451	2.88 (1.68 to 4.90)	NA	
llanor rospiratory	Nasal consection	Online survey	n = 1	23/ 434	5.30 (3.55 to 7.85)	NA	0.600
Upper respiratory	Nasal congestion	Multicentre	n = 2	27/ 569	4.75 (0.41 to 37.90)	25.27	- 0.690
	Cana threat	Single-centre	n = 3	103/2327	5.38 (1.20 to 20.94)	90.55	0 5 2 0
	Sore throat	Multicentre	n = 2	24/ 569	4.22 (0.31 to 38.40)	0.31	- 0.538

Supplement 7: Subgroup analysis: Continents

Classification	Symptom	Subgroup	N Studies	Event/total	Proportion% (95% Cls)	Heterogeneity (%)	P value
		Europe	n = 11	267/3074	9.71 (4.88 to 18.39)	94.92	
	Cough	Asia	n = 4	146/1839	7.64 (4.60 to 12.44)	79.54	0.057
		North America	n = 1	1/ 118	0.85 (0.12 to 5.77)	NA	
		Asia	n = 3	157/2840	4.11 (0.23 to 44.11)	97.52	
	Chest pain	Europe	n = 7	135/1920	6.93 (2.77 to 16.31)	89.56	0.097
		North America	n = 1	16/ 118	13.56 (8.48 to 20.99)	NA	
		Europe	n = 13	868/3336	28.59 (18.52 to 41.35)	96.32	
	Breathlessness/ Exertional	Asia	n = 4	328/1839	16.53 (7.91 to 31.34)	95.25	0.227
Cardiopulmonary	dyspnoea	Middle East	n = 2	70/ 230	22.35 (0.00 to 99.99)	97.16	0.227
		North America	n = 1	31/ 118	26.27 (19.13 to 34.93)	NA	
	Other cardiovascular	Europe	n = 1	1/767	0.13 (0.02 to 0.92)	NA	0.000
	symptoms	Asia	n = 2	78/1185	4.20 (0.00 to 99.97)	97.68	0.009
	Asia	n = 4	387/3380	12.04 (7.03 to 19.85)	93.93		
Palpitations	Europe	n = 3	82/1280	8.10 (1.14 to 40.21)	95.9	0.168	
		North America	n = 1	7/ 118	5.93 (2.85 to 11.92)	NA	
	Excessive sputum/	Asia	n = 3	81/1192	6.56 (1.54 to 23.96)	90.08	0 220
	Expectoration	Europe	n = 3	32/757	4.23 (1.99 to 8.76)	0	0.238
	Stomach (Abdominal pain	Europe	n = 3	22/1310	1.61 (0.22 to 10.84)	80.31	0.011
	Stomach/ Abdominal pain	Asia	n = 1	8/ 117	6.84 (3.46 to 13.08)	NA	0.011
	Loss of apportito	Asia	n = 2	166/1772	13.98 (0.06 to 97.66)	96.44	0.088
	Loss of appetite	Europe	n = 1	36/ 134	26.87 (20.05 to 34.99)	NA	0.088
Contraintentinal		Europe	n = 6	49/1495	2.37 (0.80 to 6.77)	80.93	
Gastrointestinal	Diarrhoea	Asia	n = 3	133/2312	7.38 (2.34 to 20.91)	89.09	0.055
		North America	n = 1	8/ 118	6.78 (3.43 to 12.97)	NA	
		Europe	n = 2	20/ 586	3.92 (0.00 to 98.84)	92.31	
	Nausea or Vomiting	Asia	n = 1	21/ 117	17.95 (12.00 to 25.97)	NA	0.004
		North America	n = 1	8/ 118	6.78 (3.43 to 12.97)	NA	
		Asia	n = 2	135/2162	5.63 (0.46 to 43.57)	82.31	-0.001
Musculoskeletal	Impaired mobility	Europe	n = 3	126/ 577	16.90 (2.10 to 65.88)	92.96	<0.001

		Middle East	n = 1	62/ 127	48.82 (40.25 to 57.46)	NA	
	Joint pain/ Arthralgia	Asia	n = 3	326/2733	12.25 (3.07 to 38.13)	97.8	- 0.295
	Joint paint Artifiaigia	Europe	n = 6	111/1227	8.03 (4.01 to 15.42)	88.36	0.293
		Europe	n = 9	294/2471	14.02 (7.27 to 25.34)	96.38	
	Muscle pain/ Myalgia	Asia	n = 2	63/2193	3.11 (0.16 to 38.54)	83.96	<0.00
		North America	n = 1	21/ 118	17.80 (11.90 to 25.76)	NA	
	Other cognitive	Europe	n = 2	118/ 264	40.19 (0.00 to 100.00)	99	- 0.017
Jourocognitivo	impairment	North America	n = 1	4/ 177	2.26 (0.85 to 5.86)	NA	0.01
leurocognitive	Momory imposium ont	North America	n = 1	20/ 118	16.95 (11.20 to 24.82)	NA	- 0.898
	Memory impairment	Europe	n = 4	131/ 768	18.19 (3.02 to 61.38)	96.14	0.896
	Walking/Cait apparmality	Europe	n = 2	12/ 269	4.46 (0.11 to 66.56)	0	0.70
	Walking/ Gait abnormality	Asia	n = 1	22/ 540	4.07 (2.70 to 6.11)	NA	- 0.79
	Tremors - Headache	Europe	n = 2	17/ 586	2.98 (0.00 to 99.96)	94.5	- 0.61
		Asia	n = 1	25/ 538	4.65 (3.16 to 6.79)	NA	0.01.
		Asia	n = 1	33/1655	1.99 (1.42 to 2.79)	NA	
		Europe	n = 9	187/2762	5.30 (2.12 to 12.66)	92.94	0.00
		North America	n = 1	7/ 118	5.93 (2.85 to 11.92)	NA	
Ieurological and Ieuromuscular		Europe	n = 15	602/3615	15.35 (9.88 to 23.06)	96.43	
leuronnuscular	Concell distants and	Asia	n = 1	176/1655	10.63 (9.24 to 12.21)	NA	0.027
	Smell disturbance	North America	n = 2	49/ 295	16.74 (1.75 to 69.42)	65.9	
		Middle East	n = 1	15/ 103	14.56 (8.97 to 22.76)	NA	
		Asia	n = 1	120/1655	7.25 (6.10 to 8.60)	NA	
	-	Europe	n = 13	510/3370	14.25 (8.44 to 23.06)	96.81	
	Taste disturbance	North America	n = 2	49/ 295	16.74 (1.75 to 69.42)	65.9	
		Middle East	n = 1	8/ 103	7.77 (3.93 to 14.77)	NA	
		North America	n = 1	14/ 118	11.86 (7.15 to 19.04)	NA	
	Hair loss	Asia	n = 2	513/2193	24.69 (5.86 to 63.32)	90.76	0.00
Dther		Europe	n = 2	36/ 499	8.21 (0.00 to 99.89)	96.66	
		Asia	n = 1	47/1655	2.84 (2.14 to 3.76)	NA	0.05
	Skin rash	Europe	n = 3	20/ 719	2.75 (0.30 to 20.89)	86.08	- 0.95
	Cara danandararu	Asia	n = 1	25/1611	1.55 (1.05 to 2.29)	NA	-0.00
Psychosological and social	Care dependency	North America	n = 1	14/ 177	7.91 (4.74 to 12.91)	NA	

		Europe	n = 1	121/ 767	15.78 (13.36 to 18.53)	NA	
		Europe	n = 1	28/90	31.11 (22.42 to 41.37)	NA	
	Reduced quality of life	North America	n = 1	53/ 177	29.94 (23.66 to 37.09)	NA	<0.00
		Asia	n = 1	259/ 540	47.96 (43.77 to 52.18)	NA	
	Low mood/ Dysphoria	Europe	n = 2	53/ 360	0.86 (0.00 to 100.00)	0	- 0.868
		Asia	n = 1	9/ 538	1.67 (0.87 to 3.18)	NA	0.800
	PTSD	Europe	n = 5	322/1937	9.93 (3.21 to 26.84)	96.87	- 0.322
	FISD	Middle East	n = 1	7/ 120	5.83 (2.81 to 11.73)	NA	0.527
	Close disorder	Asia	n = 2	532/2193	22.00 (2.69 to 74.18)	94	- 0.486
	Sleep disorder	Europe	n = 7	210/1249	17.09 (7.01 to 36.03)	94.68	0.480
	Depression	Asia	n = 2	390/2155	10.38 (0.00 to 99.83)	98.62	
	Depression	Europe	n = 4	95/1507	6.80 (3.99 to 11.37)	71	0.500
	Anviotu	Asia	n = 2	402/2155	12.63 (0.02 to 98.99)	98.36	- 0.32
	Anxiety	Europe	n = 5	248/1396	21.85 (8.03 to 47.22)	97.39	0.32
	Distingen	Asia	n = 2	115/2193	4.21 (0.08 to 71.53)	89.39	0.70
Dizziness	Europe	n = 3	47/ 948	4.76 (1.43 to 14.71)	75.61		
		Europe	n = 1	25/ 134	18.66 (12.93 to 26.16)	NA	-0.00
	General malaise	Asia	n = 1	267/ 538	49.63 (45.42 to 53.85)	NA	
	Current en night surgets	Europe	n = 1	35/ 145	24.14 (17.87 to 31.76)	NA	0.00
	Sweat or night sweats	Asia	n = 1	127/ 538	23.61 (20.21 to 27.38)	NA	
Systemic		Europe	n = 5	44/1851	1.91 (0.36 to 9.62)	90.51	
	Fever	Asia	n = 1	2/1655	0.12 (0.03 to 0.48)	NA	0.01
		North America	n = 1	1/ 118	0.85 (0.12 to 5.77)	NA	
		Europe	n = 8	605/2014	34.68 (25.12 to 45.66)	93	
	Fatience	North America	n = 2	60/ 295	20.71 (0.25 to 96.48)	91.68	
	Fatigue	Asia	n = 4	1436/3380	31.33 (10.49 to 63.98)	99.42	- 0.38
		Middle East	n = 3	106/ 350	28.07 (6.94 to 67.15)	93.59	
	Other respiratory	Europe	n = 2	43/ 573	8.88 (0.00 to 99.98)	97.85	0.00
	symptoms	Asia	n = 1	210/ 538	39.03 (35.00 to 43.22)	NA	- 0.02
Jpper respiratory	Nacal and 11	Europe	n = 2	42/ 885	4.75 (0.66 to 27.08)	0	
	Nasal congestion	North America	n = 1	8/ 118	6.78 (3.43 to 12.97)	NA	- 0.34
	Sore throat	Asia	n = 2	86/2193	3.92 (1.00 to 14.17)	8.33	0.16

Europe	n = 2	38/ 585	7.48 (0.06 to 91.61)	90.13
North America	a n = 1	3/ 118	2.54 (0.82 to 7.59)	NA

Supplement 8: Subgroup analysis: Follow-up timing

Classification	Symptom	Subgroup	N Studies	Event/total	Proportion% (95% Cls)	Heterogeneity (%)	P value	
	Court	< 4 months	n = 14	374/4483	8.35 (4.56 to 14.81)	94.34	0.660	
	Cough	>4 months	n = 2	40/548	7.30 (0.97 to 38.82)	0	0.669	
	Chast sois	>4 months	n = 1	75/1655	4.53 (3.63 to 5.65)	NA	0 211	
	Chest pain	< 4 months	n = 10	233/3223	6.55 (2.97 to 13.84)	91.52	0.311	
Cardianulmananu	Breathlessness/ Exertional	< 4 months	n = 15	1142/4562	28.92 (20.29 to 39.41)	96.15	0.075	
Cardiopulmonary	dyspnoea	>4 months	n = 5	155/961	15.41 (5.74 to 35.30)	95.81	0.075	
	Deluitetiane	>4 months	n = 1	154/1655	9.31 (8.00 to 10.80)	NA	0.963	
	Palpitations	< 4 months	n = 7	322/3123	9.71 (5.42 to 16.78)	94.42	0.863	
	Excessive sputum/	>4 months	n = 1	11/114	9.65 (5.42 to 16.59)	NA	0.000	
	Expectoration	< 4 months	n = 5	102/1835	4.95 (2.64 to 9.09)	85.74	0.069	
		>4 months	n = 1	47/434	10.83 (8.23 to 14.12)	NA	-0.001	
	Weight loss	< 4 months	n = 1	50/134	37.31 (29.55 to 45.79)	NA	<0.001	
Gastrointestinal		>4 months	n = 1	138/1655	8.34 (7.10 to 9.77)	NA	-0.00	
	Loss of appetite	< 4 months	n = 2	64/251	25.50 (5.15 to 68.31)	0	<0.001	
	Diarrhada	< 4 months	n = 8	85/1836	3.53 (1.41 to 8.59)	84.4	<0.001	
	Diarrhoea	>4 months	n = 2	105/2089	5.03 (1.46 to 15.89)	0	0.371	
		>4 months	n = 3	241/1953	24.29 (2.15 to 82.41)	99.05	0.400	
	Impaired mobility	< 4 months	n = 3	82/913	8.07 (0.95 to 44.49)	96.49	0.108	
		>4 months	n = 1	154/1655	9.31 (8.00 to 10.80)	NA	0.000	
Musculoskeletal	Joint pain/ Arthralgia	< 4 months	n = 8	283/2305	9.35 (5.22 to 16.17)	94.04	0.986	
		< 4 months	n = 11	339/3127	12.95 (7.31 to 21.91)	96.15	-0.00	
	Muscle pain/ Myalgia	> 4 months	n = 1	39/1655	2.36 (1.73 to 3.21)	NA	<0.00	
N	Other cognitive	< 4 months	n = 2	118/264	40.19 (0.00 to 100.00)	99	0.047	
Neurocognitive	impairment	> 4 months	n = 1	4/177	2.26 (0.85 to 5.86)	NA	0.017	
	l la cala cha	> 4 months	n = 3	113/2269	6.11 (0.65 to 39.33)	97.98	0.000	
	Headache	< 4 months	n = 8	114/2266	4.42 (1.60 to 11.59)	92.68	0.620	
Neurological and	Cross II, diatus I	< 4 months	n = 13	367/2994	13.26 (8.37 to 20.37)	94.8	0.465	
neuromuscular	Smell disturbance	> 4 months	n = 6	475/2674	19.96 (11.27 to 32.87)	97.79	0.166	
	Taste disturbance	> 4 months	n = 6	364/2674	15.36 (7.94 to 27.63)	97.61	0.580	

		< 4 months	n = 11	323/2749	12.61 (6.95 to 21.81)	96.44		
		< 4 months	n = 4	204/1155	12.72 (3.10 to 39.89)			
	Hair loss	> 4 months	n = 1	359/1655	21.69 (19.77 to 23.74)	89) 95.98 0.18 .74) NA 0.95 6) NA 0.95 39) 86.08 0.95 56) 95.89 0.00 .53) NA 0.00 52) 88.36 0.11 .69) NA 0.32 .73) NA 0.32 .58) NA 0.13	- 0.181	
Other		> 4 months	n = 1	47/1655	5 2.84 (2.14 to 3.76) NA			
	Skin rash	< 4 months	n = 3	20/719	2.75 (0.30 to 20.89)	86.08	- 0.952	
		> 4 months	n = 2	39/1788	3.38 (0.00 to 98.56)	95.89	0.000	
	Care dependency	< 4 months	n = 1	121/767	15.78 (13.36 to 18.53)	NA	- 0.006	
	Deduced suchts of life	< 4 months	n = 2	287/630	40.64 (2.65 to 94.52)	88.36	0 1 1 0	
	Reduced quality of life	> 4 months	n = 1	53/177	29.94 (23.66 to 37.09)	NA	- 0.119	
	PTSD	< 4 months	n = 5	322/1937	9.93 (3.21 to 26.84)	96.87	0 2 2 2	
Psychological and social	PISD	> 4 months	n = 1	7/120	5.83 (2.81 to 11.73)	NA	- 0.322	
	Clean disorder	> 4 months	n = 1	437/1655	26.40 (24.34 to 28.58)	NA	0 1 2 0	
	Sleep disorder	< 4 months	n = 8	305/1787	17.20 (8.21 to 32.54)	94.08	0.150	
	Depression	> 4 months	n = 1	367/1617	22.70 (20.72 to 24.80)	NA <0.00	<0.001	
	Depression	< 4 months	n = 5	118/2045	6.16 (3.99 to 9.40)	71.69	<0.001	
	Anviotu	> 4 months	n = 1	367/1617	22.70 (20.72 to 24.80)	NA	0 402	
	Anxiety	< 4 months	n = 6	283/1934	18.10 (7.16 to 38.77)	97.51	0.492	
	Dizziness	> 4 months	n = 2	130/2089	6.22 (2.06 to 17.34)	0	0.011	
	DIZZINESS	< 4 months	n = 3	32/1052	3.20 (1.08 to 9.12)	68.78	0.011	
Sustania	Four	< 4 months	n = 5	23/1535	1.26 (0.22 to 7.01)	90.73	0.762	
Systemic	Fever	> 4 months	n = 2	24/2089	0.79 (0.00 to 100.00)	96.18	— 0.492 — 0.011 — 0.762	
	Fatigue	< 4 months	n = 10	890/3243	32.50 (23.93 to 42.42)	94.57	- 0.608	
	raligue	> 4 months	n = 7	1317/2796	28.61 (16.00 to 45.73)	98.47	0.008	
	Nasal congestion	> 4 months	n = 1	23/434	5.30 (3.55 to 7.85)	NA	- 0.690	
Innor respiratory	Nasal congestion	< 4 months	n = 2	27/569	4.75 (0.41 to 37.90)	25.27	0.090	
Upper respiratory	Sore throat	> 4 months	n = 1	69/1655	4.17 (3.31 to 5.25)	NA	- 0.655	
	Sole till Oat	< 4 months	n = 4	58/1241	4.84 (1.76 to 12.65)	85.28	0.000	

Classification	Symptom	N Studies	Constant (SE)	Beta (SE)	R ²	P value
	Breathlessness/					
Cardiopulmonary	Exertional	20	-0.23 (0.79)	-1.93 (1.71)	0.07	0.258
	dyspnoea					
	Chest pain	11	-2.13 (1.85)	-1.27 (4.11)	0.01	0.758
	Cough	16	-2.43 (1.12)	0.02 (2.32)	0.00	0.994
Gastrointestinal	Diarrhoea	10	-3.9 (1.46)	1.46 (2.87)	0.00	0.612
Systemic	Fatigue	17	-0.08 (0.61)	-1.58 (1.29)	0.09	0.222
Musculoskeletal	Muscle pain/ Myalgia	12	-0.37 (1.33)	-3.97 (3.05)	0.13	0.194
	Headache	11	-6.29 (1.27)	6.7 (2.46)	0.43	0.007
Neurological and	Smell disturbance	19	-4.07 (0.53)	4.95 (1.08)	0.56	<0.001
neuromuscular	Taste disturbance	17	-4.29 (0.63)	5.04 (1.27)	0.51	<0.001

Supplement 9: Meta-regression: % Female

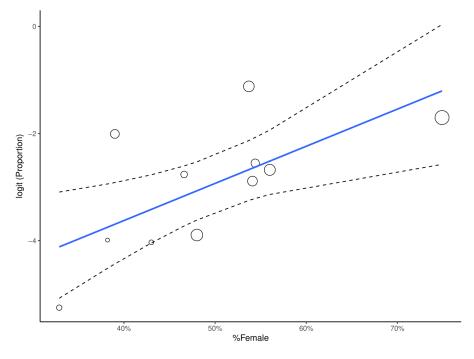


Figure 13. Metaregression on percentage of female. Neurological and neuromuscular (Headache)

The bubble plot presents the association between the proportions of females and people experienced headache (p<0.05). Each circle represents the value of an individual study, and the size of each circle is proportional to the study weight by inverse-variance weighting.

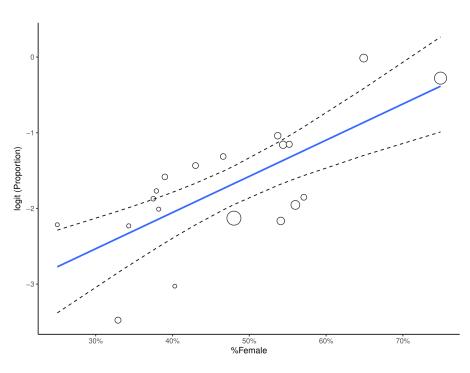


Figure 14. Metaregression on percentage of female. Neurological and neuromuscular (Small disturbance).

The bubble plot presents the association between the proportions of females and people experienced smell disturbance (p<0.05). Each circle represents the value of an individual study, and the size of each circle is proportional to the study weight by inverse-variance weighting.

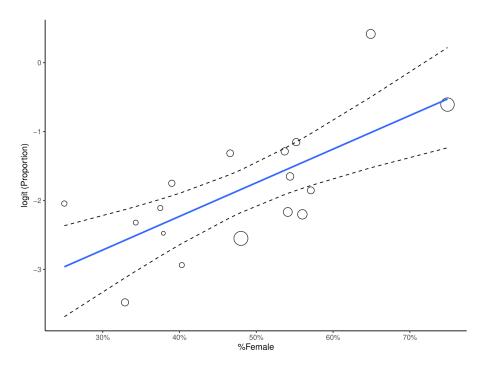


Figure 15. Metaregression on percentage of female. Neurological and neuromuscular (Taste disturbance).

The bubble plot presents the association between the proportions of females and people experienced taste disturbance (p<0.05). Each circle represents the value of an individual study, and the size of each circle is proportional to the study weight by inverse-variance weighting.

Classification	Symptom	N Studies	Constant (SE)	Beta (SE)	R ²	P value
	Breathlessness/					
Cardiopulmonary	Exertional	14	-1.03 (0.31)	1.02 (0.89)	0.09	0.254
	dyspnoea					
	Cough	11	-2.25 (0.63)	-0.75 (2.73)	-0.01*	0.783
Systemic	Fatigue	11	-0.67 (0.29)	0.4 (0.81)	0.02	0.620
Musculoskeletal	Muscle pain/ Myalgia	11	-2.71 (0.46)	4.19 (2.12)	0.27	0.048
Neurological and	Smell disturbance	14	-2.24 (0.26)	1.32 (1.3)	0.08	0.311
neuromuscular	Taste disturbance	12	-2.45 (0.25)	1.72 (1.23)	0.16	0.161

Supplement 10: Meta-regression: % ICU patients

*poor fitting

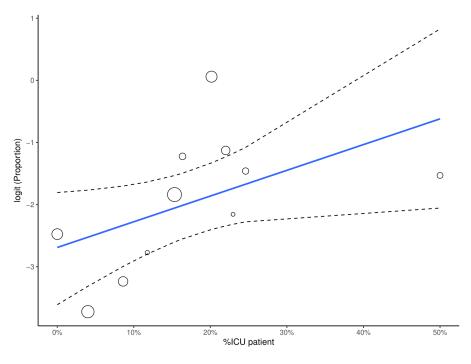


Figure 16. Metaregression on percentage of ICU patients. Musculoskeletal (Muscle pain/ Myalgia).

The bubble plot presents the association between the proportions of ICU patients and patients experienced muscle pain/myalgia (p<0.05). Each circle represents the value of an individual study, and the size of each circle is proportional to the study weight by inverse-variance weighting.

Supplement 11: Sensitivity analysis: versus removing high risk of bias studies

	Sumptom		Main	results	Main results after removing high risk of bias studies			
Classification	Symptom	N Studies	n/Total	Prop (95% Cls)	N Studies	n/Total	Prop (95% Cls)	
	Other cardiovascular symptoms	n = 3	79/1952	1.38 (0.01 to 67.44)	n = 2	71/1305	1.37 (0.04 to 32.38)	
	Palpitations	n = 8	476/4778	9.67 (5.95 to 15.34)	n = 7	413/4131	9.65 (5.39 to 16.66)	
Cardiopulmonary	Excessive sputum/ Expectoration	n = 6	113/1949	5.46 (3.19 to 9.19)	n = 4	88/1326	6.22 (2.62 to 14.05)	
	Cough	n = 16	414/5031	8.17 (4.85 to 13.44)	n = 11	265/3207	7.42 (3.38 to 15.55)	
	Chest pain	n = 11	308/4878	6.36 (3.15 to 12.42)	n = 8	275/3939	7.33 (3.25 to 15.68)	
	Breathlessness/ Exertional dyspnoea	n = 20	1297/5523	25.06 (17.86 to 33.97)	n = 14	992/3596	28.85 (19.67 to 40.16)	
Gastrointestinal	Weight loss	n = 2	97/568	20.99 (8.09 to 44.51)	n = 1	50/134	37.31 (29.12 to 46.08)	
	Stomach/ Abdominal pain	n = 4	30/1427	2.33 (0.54 to 9.42)	n = 2	7/859	0.81 (0.39 to 1.70)	
	Loss of appetite	n = 3	202/1906	17.49 (4.13 to 51.04)	n = 2	174/1789	15.09 (6.35 to 31.80)	
	Diarrhoea	n = 10	190/3925	4.00 (2.07 to 7.57)	n = 6	140/2751	4.68 (2.49 to 8.66)	
	Nausea or Vomiting	n = 4	49/821	6.69 (1.64 to 23.59)	n = 2	20/253	7.91 (5.16 to 11.93)	
	Impaired mobility	n = 6	323/2866	14.42 (4.67 to 36.73)	n = 5	257/2662	12.00 (3.02 to 37.39)	
Musculoskeletal	Joint pain/ Arthralgia	n = 9	437/3960	9.39 (5.72 to 15.03)	n = 6	378/3215	10.79 (5.21 to 21.00)	
	Muscle pain/ Myalgia	n = 12	378/4782	11.29 (6.17 to 19.75)	n = 10	320/4209	11.14 (5.35 to 21.75)	
	Other cognitive impairment	n = 3	122/441	17.77 (0.08 to 98.23)	n = 3	122/441	17.77 (0.08 to 98.23)	
	Confusion	n = 2	33/1218	2.71 (1.93 to 3.79)	n = 1	23/767	3.00 (1.91 to 4.47)	
Neurocognitive	Concentration impairment	n = 2	66/254	25.98 (20.96 to 31.73)	n = 1	34/134	25.37 (18.26 to 33.61)	
	Memory impairment	n = 5	151/886	17.94 (5.26 to 46.25)	n = 4	110/766	14.93 (2.77 to 51.97)	
	Tingling/ Paraesthesia	n = 2	33/257	9.12 (2.21 to 30.87)	n = 1	29/135	21.48 (14.88 to 29.37)	
	Visual disturbance	n = 2	28/586	4.78 (3.32 to 6.83)	n = 1	9/135	6.67 (3.09 to 12.28)	
Neurological and	Smell disturbance	n = 19	842/5668	15.17 (10.75 to 20.97)	n = 13	513/4258	14.08 (8.87 to 21.62)	
neuromuscular	Taste disturbance	n = 17	687/5423	13.52 (8.96 to 19.89)	n = 11	425/4013	13.44 (7.31 to 23.42)	
	Tremors	n = 3	42/1124	3.53 (0.30 to 30.63)	n = 2	38/673	6.20 (3.68 to 10.26)	
	Headache	n = 11	227/4535	4.88 (2.30 to 10.06)	n = 7	115/3298	4.19 (1.30 to 12.71)	
Other	Hair loss	n = 5	563/2810	14.34 (5.33 to 33.23)	n = 4	539/2690	13.14 (3.17 to 41.12)	

	Skin rash	n = 4	67/2374	2.83 (0.95 to 8.16)	n = 3	60/1923	3.53 (0.75 to 15.11)
Psychological and social	Sleep disorder	n = 9	742/3442	18.15 (9.61 to 31.63)	n = 8	705/3322	16.88 (8.18 to 31.65)
	Dizziness	n = 5	162/3141	4.50 (2.53 to 7.86)	n = 4	133/2707	4.02 (1.87 to 8.42)
Systemic	Fever	n = 7	47/3624	1.08 (0.24 to 4.66)	n = 5	23/2739	0.91 (0.11 to 7.18)
	Fatigue	n = 17	2207/6039	30.97 (23.91 to 39.03)	n = 12	1882/4555	33.24 (24.57 to 43.22)
	Other respiratory symptoms	n = 3	253/1111	15.58 (0.68 to 83.17)	n = 1	210/538	39.03 (34.89 to 43.30)
Upper respiratory	Nasal congestion	n = 3	50/1003	4.99 (2.73 to 8.92)	n = 1	8/118	6.78 (2.97 to 12.92)
	Sore throat	n = 5	127/2896	4.70 (2.42 to 8.91)	n = 4	106/2445	4.70 (1.73 to 12.10)

Supplement 12: Sensitivity analysis: versus statistical methods

Classification	Symptom	N Studies	n/Total	Main results	FTDAT/IV*
	Symptom	N Studies	ily rotal	Prop (95% Cls)	Prop (95% Cls)
	Breathlessness/ Exertional dyspnoea	n = 20	1297/5523	25.06 (17.86 to 33.97)	26.68 (20.36 to 33.51
	Palpitations	n = 8	476/4778	9.67 (5.95 to 15.34)	10.21 (6.76 to 14.26
	Cough	n = 16	414/5031	8.17 (4.85 to 13.44)	9.52 (6.16 to 13.50)
	Chest pain	n = 11	308/4878	6.36 (3.15 to 12.42)	7.52 (4.29 to 11.52)
Cardiopulmonary	Excessive sputum/ Expectoration	n = 6	113/1949	5.46 (3.19 to 9.19)	5.69 (3.23 to 8.75)
	Flushing	n = 1	26/538	4.83 (3.18 to 7.00)	4.83 (3.17 to 6.82)
	Newly diagnosed hypertension	n = 1	7/538	1.30 (0.52 to 2.66)	1.30 (0.49 to 2.46)
	Other cardiovascular symptoms	n = 3	79/1952	1.38 (0.01 to 67.44)	2.99 (0.00 to 12.59)
	Weight loss	n = 2	97/568	20.99 (8.09 to 44.51)	22.47 (3.00 to 52.50
	Other stomach/ Abdominal discomfort	n = 1	21/117	17.95 (11.47 to 26.12)	17.95 (11.47 to 25.47
	Loss of appetite	n = 3	202/1906	17.49 (4.13 to 51.04)	18.57 (6.35 to 35.21
Gastrointestinal	Nausea or Vomiting	n = 4	49/821	6.69 (1.64 to 23.59)	7.69 (1.89 to 16.67)
	Diarrhoea	n = 10	190/3925	4.00 (2.07 to 7.57)	4.41 (2.65 to 6.57)
	Bloody stools / Haematochezia	n = 1	2/117	1.71 (0.21 to 6.04)	1.71 (0.03 to 5.08)
	Stomach/ Abdominal pain	n = 4	30/1427	2.33 (0.54 to 9.42)	2.63 (0.56 to 5.93)
Musculoskeletal	Impaired mobility	n = 6	323/2866	14.42 (4.67 to 36.73)	17.09 (7.35 to 29.77
	Muscle pain/ Myalgia	n = 12	378/4782	11.29 (6.17 to 19.75)	13.09 (7.71 to 19.59
	Joint pain/ Arthralgia	n = 9	437/3960	9.39 (5.72 to 15.03)	10.04 (6.33 to 14.46
	Concentration impairment	n = 2	66/254	25.98 (20.96 to 31.73)	25.98 (20.74 to 31.59
	Memory impairment	n = 5	151/886	17.94 (5.26 to 46.25)	20.55 (6.54 to 39.62
Neurocognitive	Other cognitive impairment	n = 3	122/441	17.77 (0.08 to 98.23)	25.51 (0.00 to 79.72
	Frontal release signs	n = 1	20/135	14.81 (9.29 to 21.95)	14.81 (9.27 to 21.35
	Confusion	n = 2	33/1218	2.71 (1.93 to 3.79)	2.69 (1.84 to 3.69)
	Abnormal reflex status	n = 1	31/135	22.96 (16.17 to 30.98)	22.96 (16.22 to 30.47
	Other neurological diseases	n = 1	20/135	14.81 (9.29 to 21.95)	14.81 (9.27 to 21.35
	Smell disturbance	n = 19	842/5668	15.17 (10.75 to 20.97)	16.48 (11.36 to 22.31
	Taste disturbance	n = 17	687/5423	13.52 (8.96 to 19.89)	14.99 (9.76 to 21.09
	Decreased sensation or sensibility	n = 2	30/269	10.90 (6.71 to 17.22)	10.88 (4.73 to 19.05
	Tingling/ Paraesthesia	n = 2	33/257	9.12 (2.21 to 30.87)	10.74 (0.02 to 34.12
Neurological and	Muscle atrophy	n = 1	9/135	6.67 (3.09 to 12.28)	6.67 (2.98 to 11.58)
neuromuscular	Headache	n = 11	227/4535	4.88 (2.30 to 10.06)	6.12 (2.97 to 10.25)
	Slowness of movement/ Bradykinesia	n = 1	7/135	5.19 (2.11 to 10.39)	5.19 (1.98 to 9.67)
	Visual disturbance	n = 2	28/586	4.78 (3.32 to 6.83)	4.86 (2.79 to 7.43)
	Abnormal muscle tone	n = 1	6/135	4.44 (1.65 to 9.42)	4.44 (1.50 to 8.68)
	Tremors	n = 3	42/1124	3.53 (0.30 to 30.63)	4.12 (0.76 to 9.75)
	Walking/ Gait abnormality	n = 3	34/809	4.20 (2.02 to 8.53)	4.11 (2.80 to 5.63)

	Trigeminal neuralgia	n = 1	4/122	3.28 (0.90 to 8.18)	3.28 (0.71 to 7.33)
	Speech difficulty/ Dysarthria	n = 1	3/135	2.22 (0.46 to 6.36)	222 (0.28 to 5.56)
	Ear/ Hearing conditions	n = 1	5/451	1.11 (0.36 to 2.57)	1.11 (0.31 to 2.33)
	Lack of coordination/ Dysmetria	n = 1	2/135	1.48 (0.18 to 5.25)	1.48 (0.02 to 4.41)
	Seizures/ Cramps	n = 1	6/451	1.33 (0.49 to 2.87)	1.33 (0.44 to 2.63)
	Hair loss	n = 5	563/2810	14.34 (5.33 to 33.23)	15.86 (7.42 to 26.68)
Other	Skin rash	n = 4	67/2374	2.83 (0.95 to 8.16)	2.86 (1.29 to 4.96)
	Conjunctivitis	n = 1	8/451	1.77 (0.77 to 3.47)	1.77 (0.73 to 3.23)
	Reduced quality of life	n = 3	340/807	36.76 (18.43 to 59.93)	36.60 (23.89 to 50.32
	Anxiety	n = 7	650/3551	18.73 (8.89 to 35.25)	20.39 (11.95 to 30.38
	Sleep disorder	n = 9	742/3442	18.15 (9.61 to 31.63)	20.01 (12.32 to 28.99
Psychological and social	PTSD	n = 6	329/2057	9.14 (3.66 to 21.04)	10.41 (3.36 to 20.59)
300101	Depression	n = 6	485/3662	8.06 (4.14 to 15.10)	8.72 (3.02 to 16.93)
	Care dependency	n = 3	160/2555	5.89 (0.46 to 45.96)	7.24 (0.36 to 21.24)
	Low mood/ Dysphoria	n = 3	62/898	1.79 (0.00 to 98.74)	7.49 (0.00 to 31.80)
	Weakness	n = 2	186/513	41.20 (25.43 to 59.01)	41.62 (19.16 to 66.08
	General malaise	n = 2	292/672	32.68 (14.91 to 57.36)	33.47 (8.11 to 65.59)
	Fatigue	n = 17	2207/6039	30.97 (23.91 to 39.03)	31.75 (22.81 to 41.41
Systemic	Sweat or night sweats	n = 2	162/683	23.72 (20.68 to 27.05)	23.68 (20.55 to 26.96
oystelline	Dizziness	n = 5	162/3141	4.50 (2.53 to 7.86)	4.58 (2.80 to 6.76)
	Enlarged lymph nodes/ Lymphadenopathy	n = 1	4/451	0.89 (0.24 to 2.26)	0.89 (0.19 to 2.01)
	Fever	n = 7	47/3624	1.08 (0.24 to 4.66)	1.74 (0.28 to 4.14)
	Other respiratory symptoms	n = 3	253/1111	15.58 (0.68 to 83.17)	19.30 (0.95 to 52.06)
Upper respiratory	Voice change	n = 1	11/134	8.21 (4.17 to 14.21)	8.21 (4.08 to 13.53)
	Nasal congestion	n = 3	50/1003	4.99 (2.73 to 8.92)	4.89 (3.61 to 6.34)
	Sore throat	n = 5	127/2896	4.70 (2.42 to 8.91)	4.66 (2.94 to 6.74)

* FTDAT/IV: Freeman-Tukey Double arcsine transformation within inverse Variance Method

Supplement 13: Funnel plots

The following funnel plots present the proportion of people experienced with certain symptoms against the standard errors (Egger's method) or sample size (Peter's method) to assess potential publication bias and small study effects. Only symptoms reported 10 or more are presented here.

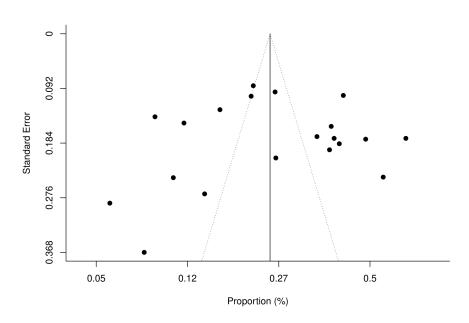


Figure 17. Funnel plot. Cardiopulmonary (Breathlessness or Exertional dyspnoea) by Egger's method

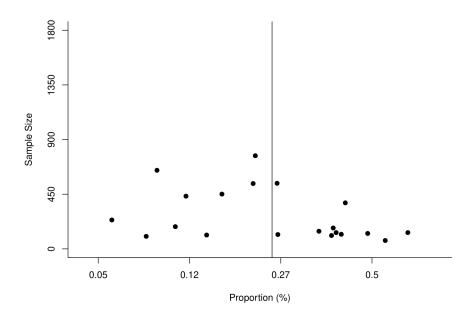


Figure 18. Funnel plot. Cardiopulmonary (Breathlessness or Exertional dyspnoea) by Peter's method

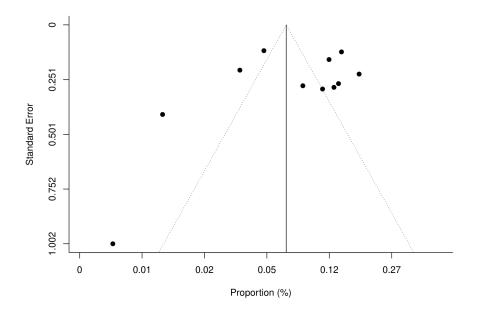


Figure 19. Funnel plot. Cardiopulmonary (Chest pain) by Egger's method

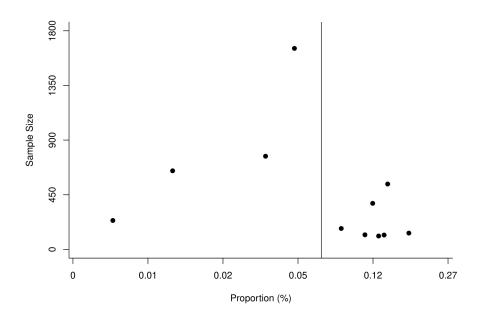


Figure 20. Funnel plot. Cardiopulmonary (Chest pain) by Peter's method

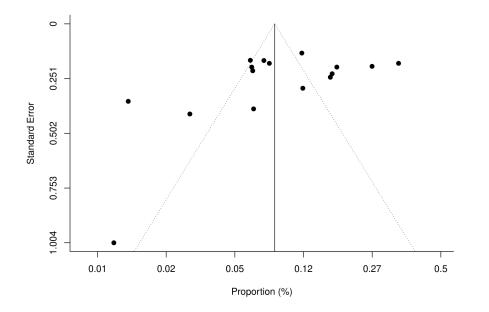


Figure 21. Funnel plot. Cardiopulmonary (Cough) by Egger's method

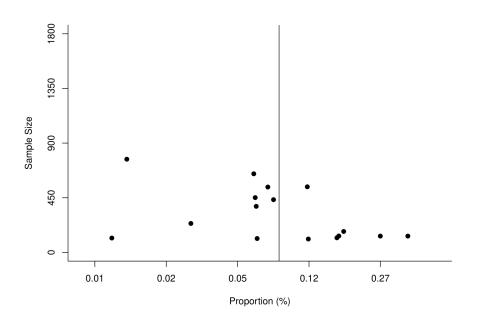


Figure 22. Funnel plot. Cardiopulmonary (Cough) by Peter's method

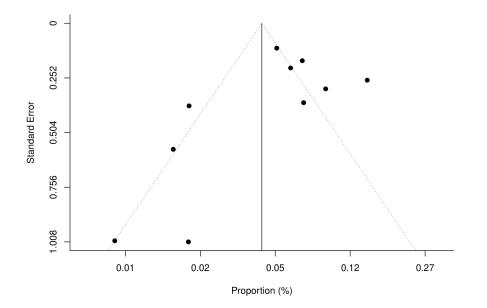


Figure 23. Funnel plot. Gastrointestinal (Diarrhoea) by Egger's method

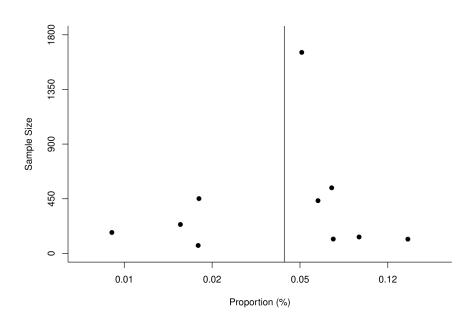


Figure 24. Funnel plot. Gastrointestinal (Diarrhoea) by Peter's method

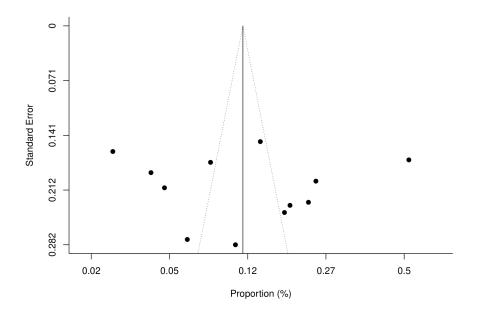


Figure 25. Funnel plot. Musculoskeletal (Muscle pain or Myalgia) by Egger's method

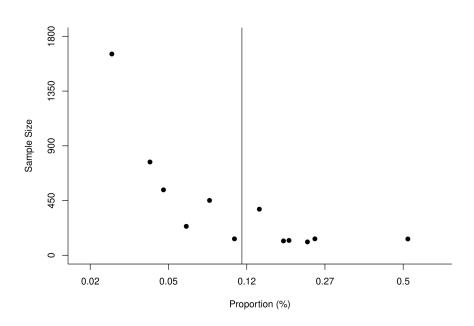


Figure 26. Funnel plot. Musculoskeletal (Muscle pain or Myalgia) by Peter's method

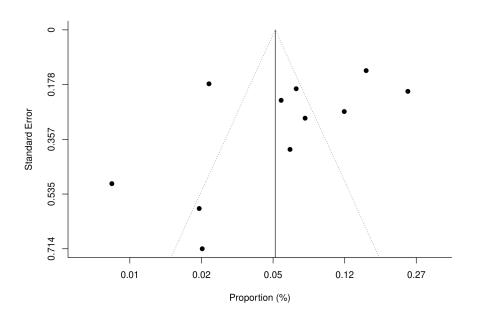


Figure 27. Funnel plot. Neurological and neuromuscular (Headache) by Egger's method

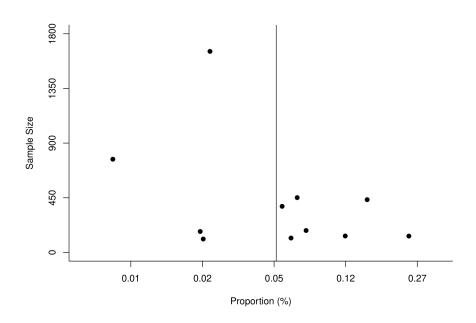


Figure 28. Neurological and neuromuscular (Headache) by Peter's method

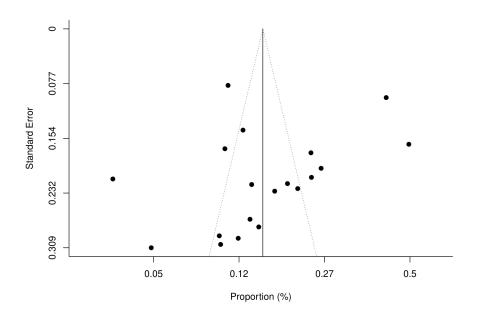


Figure 29. Funnel plot. Neurological and neuromuscular (Smell disturbance) by Egger's method

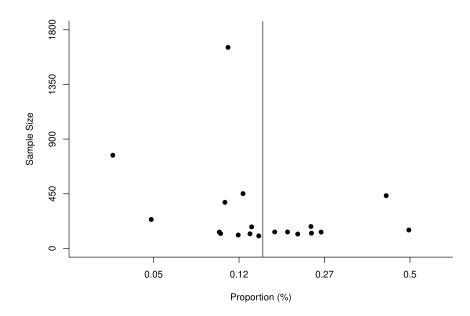


Figure 30. Neurological and neuromuscular (Smell disturbance) by Peter's method

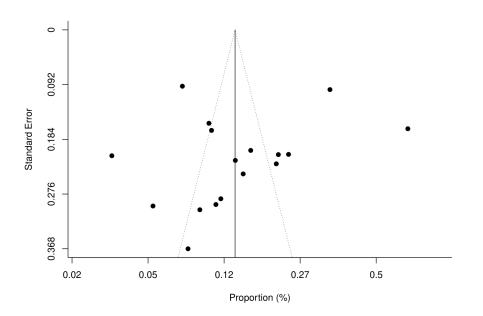


Figure 31. Funnel plot. Neurological and neuromuscular (Taste disturbance) by Egger's method

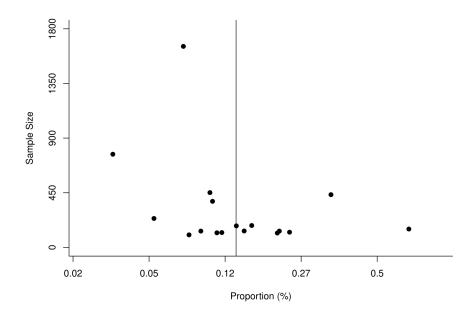


Figure 32. Funnel plot. Neurological and neuromuscular (Taste disturbance) by Peter's method

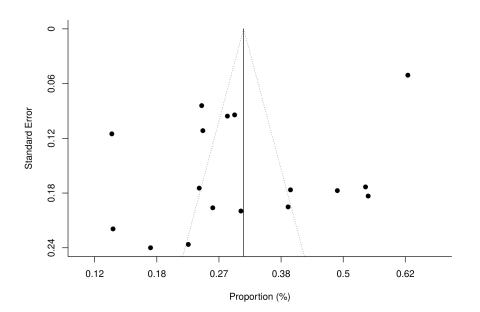


Figure 33. Funnel plot. Systemic (Fatigue) by Egger's method

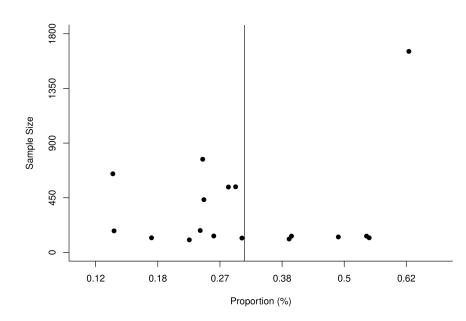


Figure 34. Funnel plot. Systemic (Fatigue) by Peter's method

Supplement 14: Risk factors

Study	Category	Risk factor	Associated with	Method	P Value/ CI	
Nguyen et al.	Sex	Female sex	Persistent symptoms	Chi-squared or the Fisher exact test	p = 0.02	
	Sex	Female sex			(Wilks' λ = 0.92; F = 5.76; p = 0.003)	
Mazza et al.	Comorbidities	Previous psychiatric diagnosis	Persistence of depressive	Multivariate GLM	(Wilks' λ = 0.93; F = 5.29; p = 0.006)	
	Severity	Presence of psychopathology at one-month	symptomatology	analysis	(Wilks' λ = 0.82; F = 15.16; p < 0.001)	
	Age	<60 years			p = 0.028	
Parentes-Arias et al.	Sex	Female sex	Olfactory dysfunction	Multivariable-adjusted ORs	p = 0.003	
et al.	Comorbidities	1 comorbidity		013	p = 0.031	
	Sex	Female sex	Covid-19 sequelae	Multivariable logistic regression model	Physical decline/fatigue (p < 0.01) Postactivity polypnoea (p= 0.04) Alopecia (p < 0.01)	
Xiong et al.	Severity	Dyspnea during hospitalisation	Physical decline/fatigue, postactivity polypnoea and resting heart rate increases	Univariate analysis	Physical decline/fatigue (p=.02) Postactivity polypnoea (p=.01) Resting heart rate increases (p=.01)	
Sykes et al.	Sex	Female sex	Persistent symptoms	Chi-Square and Mann– Whitney U testing	Anxiety (p=0.001),low mood (p=0.031), myalgia (p=0.022), fatigue (p=0.004), sleep disturbance (p=0.009), and memory impairment (p=0.001)	
	Age	Age	Limitations in the		(OR = 2.600, 95% CI: 1.192–5.671)	
Taboada et al.	Severity	Length of hospital stay	Limitations in the functional status (grade II-	Multivariate logistic	(OR = 1.049, 95% CI: 1.009–1.090)	
	Severity	Admission to ICU / mechanical ventilation	IV of PCSF)	regression model	P < 0.001	
	Sex	Female sex			(OR: 1.79, 95% CI: 1.04–3.06)	
Qu et al.	Age	Older age (≥60 years)	Poor QoL scores	Logistic regression	(OR: 2.44, 95% CI: 1.33–4.47)	
αα ει αι.	Severity	Physical symptom after discharge			(OR: 40.15, 95% CI: 9.68–166.49)	
Finvils at al	Sex	Female sex	Symptoms of post-	Multivariable linear	ND	
Einvik et al.	Ethnicity	Born outside Norway	traumatic stress	regression	NR	

	Severity	Dyspnoea during COVID-19			
Gherlone et al.	Comorbidities	COPD	Dry mouth	Multivariable analysis	(OR= 9.10, 95% CI: 1.8 -68.49)
	Severity	Number of symptoms (10–23)		Multivariable negative	(OR= 4.16, 95% CI:2.57 to 6.72, p<0.001)
Stavem et al.	Comorbidities	≥2	Symptoms at follow-up	binomial regression analysis	(OR=2.52, 95%CI: 1.58 to 4.02, p<0.001)
	Severity	ICU admission	Physical impairment		(OR: 3.1, 95%Cl: 1.3-7.9, p=0.01)
	Age	Age	walking ability (SPPB)		p <0.02
Baricich et al.	Comorbidities	Number or comorbidities	walking ability (SPPB) 2MWT	Multivariable logistic regression model	p <0.01 p <0.04
	Sex	Male gender	SPPB total score		p <0.01
	Ethnicity	Latin ethnicity	lower expected 6-MWT		(-7.40 [-11.55-{-3.25}], p=0.001
Jacobson et al.	Comorbidities	BMI	lower expected 6-lvrv r	Multivariate analysis	(-0.52 [-0.81-{-0.22}], p=0.001)
Jacobson et al.	Severity	Persistence of symptoms at follow up	Shortness of breath	Wullvariate analysis	P=0.004
Petersen et al.	Age	Individuals in age group 50-66 compared with the youngest groups: 0-17 years 18-34 years	Persistent symptoms	Age-stratified analysis	p=0.003 p=0.001
Alharthy et al.	Severity	Increased incidence of dyspnoea and fever prior to hospital admission, decreased ICU admission PaO2/FiO2 ratio < 100, longer duration of mechanical ventilation, increased inflammatory biomarkers such as lactate dehydrogenase, ferritin, and D-dimers on ICU admission, and significant lung abnormalities detected by LUS	Persistent symptoms	Continuous variables using the Wilcoxon rank sum or the student's t- test. Categorical variables were examined using the Fisher's exact test or the Chi square test	p < 0.05

Anastasio et al.	Severity	Pneumonia and ARDS	Shortness of breath	Pearson's correlation coefficient and Cox regression were used	Patients who developed ARDS showed higher SBP (p=0.05) and DBP (p=0.02) and lower SpO2 during 6 MWT (p=0.004), FVC (p=0.004) and TLC (p<0.001). Patients without ARDS showed higher SR (p<0.001), RV (p<0.001), TLC (p<0.001) and RV/TLC (p=0.05).
Han et al.	Severity	Higher baseline CT lung involvement score (>=18 out of a possible score of 25)	Fibrotic-like changes in the lung at 6 months	Multivariate analysis	(OR: 4.2, 95%CI: 1.2-14)
Blanco et al.	Severity	Severity of the disease	DLCO <80% and a lower serum lactate dehydrogenase level	Multivariate analysis	DLCO<80% (OR 5.92; 95%Cl 2.28–15.37; p < 0.0001) Serum lactate dehydrogenase (OR 0.98; 95%Cl 0.97–0.99)
Lerum et al.	Severity	ICU admission	Persistent CT abnormalities and problems in usual activities	Mann–Whitney U-tests or Chi-squared tests	p=.031
Bellan et al.	Severity	Higher DLCO	Decreased risk of physical impairment	Univariate analysis and	(OR, 0.96 [95% CI, 0.94-0.98]; P < .001)
Bellaff et al.	Comorbidities	COPD	Increase risk of physical impairment	logistic regression models	(OR, 12.70 [95% CI, 1.41-114.85]; P = .02)
Sonnweber et al.	Severity	Age, gender, and pre-existing diseases such as cardiovascular diseases, pulmonary diseases, diabetes mellitus type 2, and malignancy	Persistence of symptoms, patient performance status, and CT findings at follow-up	Friedman's or Wilcoxon signed-rank test	p=0.042 to p<0.001
	Sex	Female sex	Impaired DLCO		0.002
Mendez et al.	Course with a	ICU patients	Pulmonary embolism	Linear regression	p<0.001
	Severity	D-dimer levels	Impaired DLCO	analysis	p= 0.011
Blanco et al.	Severity	Lower serum LDH levels	Impaired DLCO	Multivariate analysis	OR 0.98; 95% Cl 0.97-0.99; p 0.002
Qin et al.	Severity	Higher TSS of the chest and ARDS lymphocyte count, MPA diameter on admission and ARDS	Impaired DLCO	Univariable analysis	TSS>10.5 (OR: 10.5; 95%CI: 2.5-44.1; P=0.001) ARDS (OR: 4.6; 95%CI: 1.4-15.5; P=0.014)
		Long hospital stay	Lung sequelae		

Rass et al.	Severity	ICU patients	New neurological diseases	Chi-square or Kruskal- Wallis test	P=0.001
	Age	Elderly	Neurological signs	NR	NR
Worgstal	Soucritu	Less severe (Lower frequency of supplemental oxygen therapy (79% vs 94%; p=0.016), and lower frequency of ICU admission	Contraintenting	Univariable and	p=0·016
Weng et al. Severity	Severity	Treated more often with proton pump inhibitors (PPIs) and corticosteroids and were less frequently treated with enteral nutrition	- Gastrointestinal sequelae	multivariable logistic regressions	PPI (p=0.000) Corticosteroids (p=0.024) Enteral nutrition (p=0.007)
Arnold et al.	Severity	Severe cases	Lower physical score	Mann Whitney-U and Kruskal Wallis tests for continuous data and Fisher's exact test or Chi-squared testing for categorical data.	NR
	Sex	Male gender			Reduced FEV1: (76.9% vs 51.2%, p = 0.005) Reduced FVC: (76.3% vs 51.6%, p = 0.008)
Sibila et al.	Comorbidities	Cardiovascular disease and diabetes	Spirometric abnormalities 3 months after discharge,=	NR	Reduced FEV1: Cardiovascular disease (34.2% vs 9.4%, p = 0.001) Diabetes (28.9% vs 12%, p = 0.02) Reduced FVC: Cardiovascular disease (29.7% vs 11.0%, p = 0.009)
	Severity	Participants with severity scale 5–6	Higher risk of lung diffusion impairment,		OR 4·60 (95% Cl 1·85–11·48) for diffusion impairment, OR 1·77 (1·05–2·97) for anxiety or
Huang et al.	Sex	Female sex	anxiety or depression, and fatigue or muscle weakness	Multivariable analysis	depression, and OR 2.69 ($1.46-4.96$) for fatigue or muscle weakness

ARDS: Acute respiratory distress syndrome; BMI: Body mass index; CT: Computerised Topography; DCLO: diffusing capacity for carbon monoxide; ICU: Intensive care unit; LDH: Lactate dehydrogenase; LUS: lung ultrasound; MWT: minute walking test; NR: Not reported; OR: Odds Ratio; PCSF: post covid functional status; QoL: Quality of life; SPPB: Short Physical Performance Battery test; TSS: Toxic shock syndrome