nature medicine
ARTICLES
https://doi.org/10.1038/s41591-021-01433-3
Check for updates

OPEN

# Long COVID in a prospective cohort of home-isolated patients

Bjørn Blomberg[1,2,3]✉, Kristin Greve-Isdahl Mohn[3,4], Karl Albert Brokstad[5,6], Fan Zhou[4], Dagrun Waag Linchausen[7], Bent-Are Hansen[8], Sarah Lartey[4], Therese Bredholt Onyango[4], Kanika Kuwelker[1,2,3,4], Marianne Sævik[3], Hauke Bartsch[9,10], Camilla Tøndel[11,12], Bård Reiakvam Kittang[1,8], Bergen COVID-19 Research Group*, Rebecca Jane Cox[4,13,14]✉ and Nina Langeland[1,2,3,14]✉

Nature Medicine (2021) Published: 23 June 2021
https://doi.org/10.1038/s41591-021-01433-3

Norway
Bergen
調査結果

**Table 1 | Characteristics of study population available for follow-up at 6 months**

| | Seronegative exposed controls | All patients with COVID-19 | Hospitalized COVID-19 | Home-isolated COVID-19 |
|---|---|---|---|---|
| | % (*n*) | % (*n*) | % (*n*) | % (*n*) |
| | *N* = 60 | *N* = 312 | *N* = 65 | *N* = 247 |
| Female sex | 63% (38) | 51% (160) | 46% (30) | 53% (130) |
| Age, median (IQR) | 29 (14–48) | 46 (30–58) | 55 (45–68) | 43 (27–55) |
| Age categories | | | | |
| 0–15 years | 28% (17) | 5% (16) | 0% (0) | 6% (16) |
| 16–30 years | 23% (14) | 21% (65) | 6% (4) | 25% (61) |
| 31–45 years | 22% (13) | 22% (69) | 17% (11) | 23% (58) |
| 46–60 years | 25% (15) | 29% (90) | 35% (23) | 27% (67) |
| >60 years | 2% (1) | 23% (72) | 42% (27) | 18% (45) |
| BMI, median (IQR) | 23.3 (20.9–25.6) | 24.6 (22.8–27.3) | 27.0 (24.1–29.9) | 24.3 (22.5–26.5) |
| Any comorbidity[a] | 15% (9) | 44% (137) | 69% (45) | 37% (92) |
| Asthma, COPD[b] | 2% (1) | 12% (38) | 22% (14) | 10% (24) |
| Hypertension | 0% (0) | 11% (35) | 25% (16) | 8% (19) |
| Chronic heart disease | 0% (0) | 7% (22) | 18% (12) | 4% (10) |
| Rheumatic disease | 2% (1) | 6% (20) | 12% (8) | 5% (12) |
| Diabetes mellitus | 3% (2) | 4% (13) | 9% (6) | 3% (7) |
| Immunosuppression | 0% (0) | 4% (11) | 8% (5) | 2% (6) |
| Current or prior smoker[c] | 19% (11/57) | 31% (96/310) | 39% (25/64) | 29% (71/246) |
| Severity of disease[d] | | | | |
| Asymptomatic (1) | 53% (30/57)[e] | 2% (5/312) | - | 2% (5/247) |
| Home-isolated with symptoms (2) | 47% (27/57)[e] | 78% (242/312) | - | 98% (242/247) |
| Hospitalized without medical needs (3) | | - | - | - |
| Hospitalized with medical needs (4) | | 10% (31/312) | 48% (31/65) | - |
| Hospitalized needing $O_2$ (5) | | 8% (24/312) | 37% (24/65) | - |
| Hospitalized needing NIV (6) | | 1% (4/312) | 6% (4/65) | - |
| Hospitalized needing respirator (7) | | 2% (6/312) | 9% (6/65) | - |
| Dead (8) | | - | - | - |

nature medicine

ARTICLES

https://doi.org/10.1038/s41591-021-01433-3

Check for updates

OPEN

# Long COVID in a prospective cohort of home-isolated patients

Bjørn Blomberg[1,2,3]✉, Kristin Greve-Isdahl Mohn[3,4], Karl Albert Brokstad[5,6], Fan Zhou[4], Dagrun Waag Linchausen[7], Bent-Are Hansen[8], Sarah Lartey[4], Therese Bredholt Onyango[4], Kanika Kuwelker[1,2,3,4], Marianne Sævik[3], Hauke Bartsch[9,10], Camilla Tøndel[11,12], Bård Reiakvam Kittang[1,8], Bergen COVID-19 Research Group*, Rebecca Jane Cox[4,13,14]✉ and Nina Langeland[1,2,3,14]✉

Nature Medicine (2021) Published: 23 June 2021

https://doi.org/10.1038/s41591-021-01433-3

**Table 2 | Long-term complications by age group in 247 home-isolated patients with COVID-19 at 6-month follow-up**

| Characteristic | All | 0–15 years | 16–30 years | 31–45 years | 46–60 years | Over 60 years |
|---|---|---|---|---|---|---|
| | % (*n*/*N*) | % (*n*) | % (*n*) | % (*n*) | % (*n*) | % (*n*) |
| | *N* = 247 | *N* = 16 | *N* = 61 | *N* = 58 | *N* = 67 | *N* = 45 |
| Age, median (IQR) | 43 (27–55) | 8 (6–12) | 24(22–27) | 37 (34–41) | 53 (49–55) | 67 (63–73) |
| Female gender | 53% (131/247) | 56% (9) | 54% (33) | 52% (30) | 52% (35) | 53% (24) |
| Status at 6 months | | | | | | |
| Any symptoms | 55% (136/247) | 13% (2)* | 52% (32) | 59% (34) | 61% (41) | 60% (27) |
| Fever | 2% (4/247) | 0% (0) | 0% (0) | 5% (3) | 1% (1) | 0% (0) |
| Cough | 6% (15/247) | 0% (0) | 0% (0) | 9% (5) | 4% (3) | 16% (7) |
| Dyspnea | 15% (38/247) | 0% (0) | 13% (8) | 17% (10) | 18% (12) | 18% (8) |
| Palpitations | 6% (15/247) | 0% (0) | 3% (2) | 7% (4) | 9% (6) | 7% (3) |
| Stomach upset | 6% (15/247) | 6% (1) | 5% (3) | 7% (4) | 6% (4) | 7% (3) |
| Disturbed taste/smell | 27% (67/247) | 13% (2) | 28% (17) | 34% (20) | 28% (19) | 20% (9) |
| Fatigue | 30% (69/231) | -[a] | 21% (13) | 31% (18) | 33% (22) | 36% (16) |
| Concentration problems | 19% (44/231) | -[a] | 13% (8) | 19% (11) | 21% (14) | 24% (11) |
| Memory problems | 18% (42/231) | -[a] | 11% (7) | 16% (9) | 22% (15) | 24% (11) |
| Sleep problems | 5% (13/247) | 0% (0) | 5% (3) | 7% (4) | 4% (3) | 7% (3) |
| Headache | 11% (28/247) | 0% (0) | 11% (7) | 14% (8) | 9% (6) | 16% (7) |
| Dizziness | 10% (24/247) | 0% (0) | 7% (4) | 10% (6) | 10% (7) | 16% (7) |
| Tingling in fingers | 4% (9/247) | 0% (0) | 0% (0) | 2% (1) | 4% (3) | 11% (5) |

*Statistically significant difference at level $P < 0.05$ in univariable analysis using binomial logistic regression with age group 46–60 as reference group. [a]Children younger than 16 years were not assessed for these symptoms; therefore, $N = 231$ for these categories.



感染6ヶ月後で自宅療養者・軽症者でも52%が後遺症あり。若齢世代16-30歳でも決して少なくない

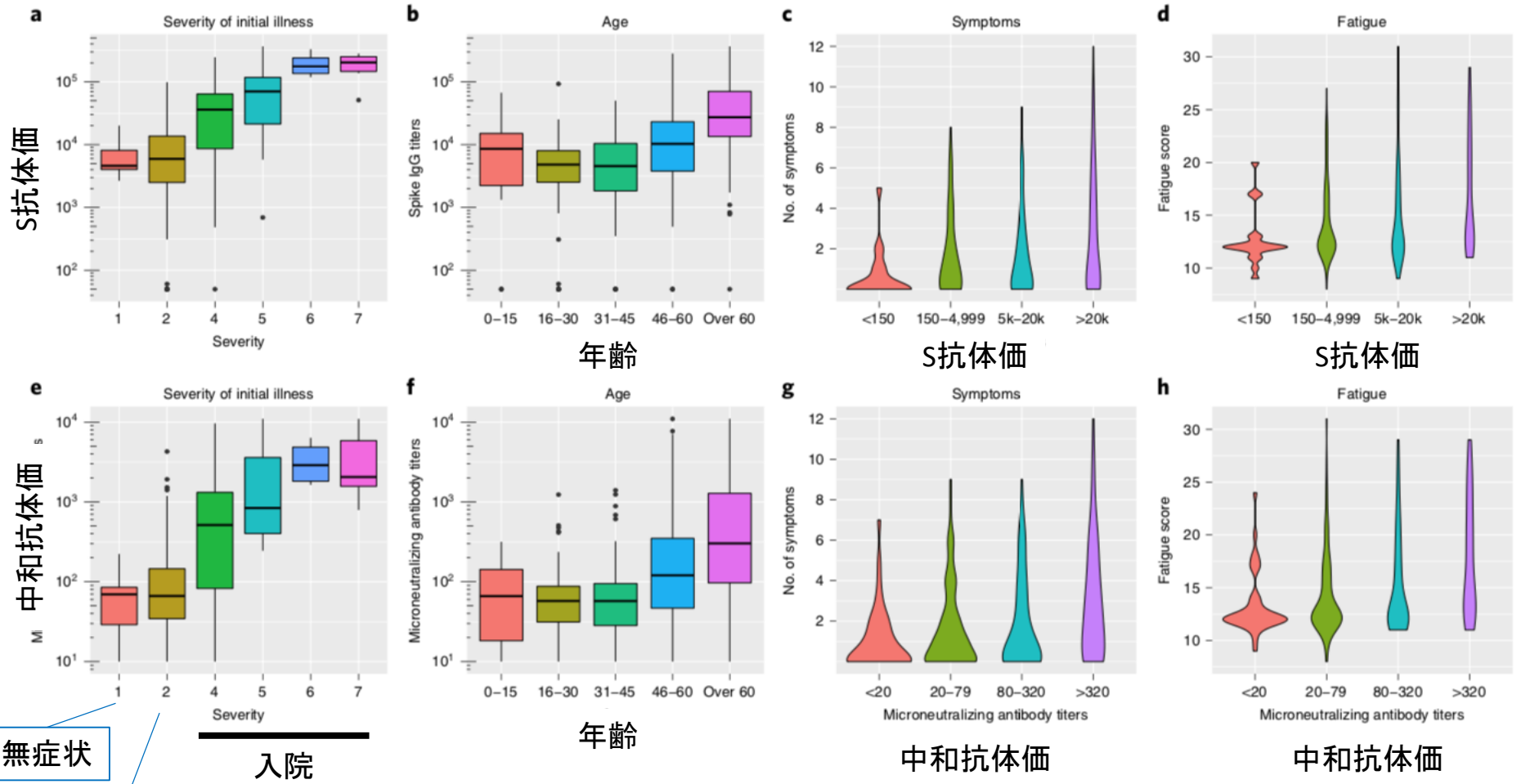
nature medicine
ARTICLES
https://doi.org/10.1038/s41591-021-01433-3
Check for updates

OPEN

# Long COVID in a prospective cohort of home-isolated patients

Bjørn Blomberg[1,2,3] ✉, Kristin Greve-Isdahl Mohn[3,4], Karl Albert Brokstad[5,6], Fan Zhou[4], Dagrun Waag Linchausen[7], Bent-Are Hansen[8], Sarah Lartey[4], Therese Bredholt Onyango[4], Kanika Kuwelker[1,2,3,4], Marianne Sævik[3], Hauke Bartsch[9,10], Camilla Tøndel[11,12], Bård Reiakvam Kittang[1,8], Bergen COVID-19 Research Group*, Rebecca Jane Cox[4,13,14] ✉ and Nina Langeland[1,2,3,14] ✉

Nature Medicine (2021) Published: 23 June 2021
**https://doi.org/10.1038/s41591-021-01433-3**




S抗体価

年齢

S抗体価

S抗体価

中和抗体価

年齢

中和抗体価

中和抗体価

無症状

自宅待機

入院

O2 respi

治療 venti

nature medicine
ARTICLES
https://doi.org/10.1038/s41591-021-01433-3
Check for updates

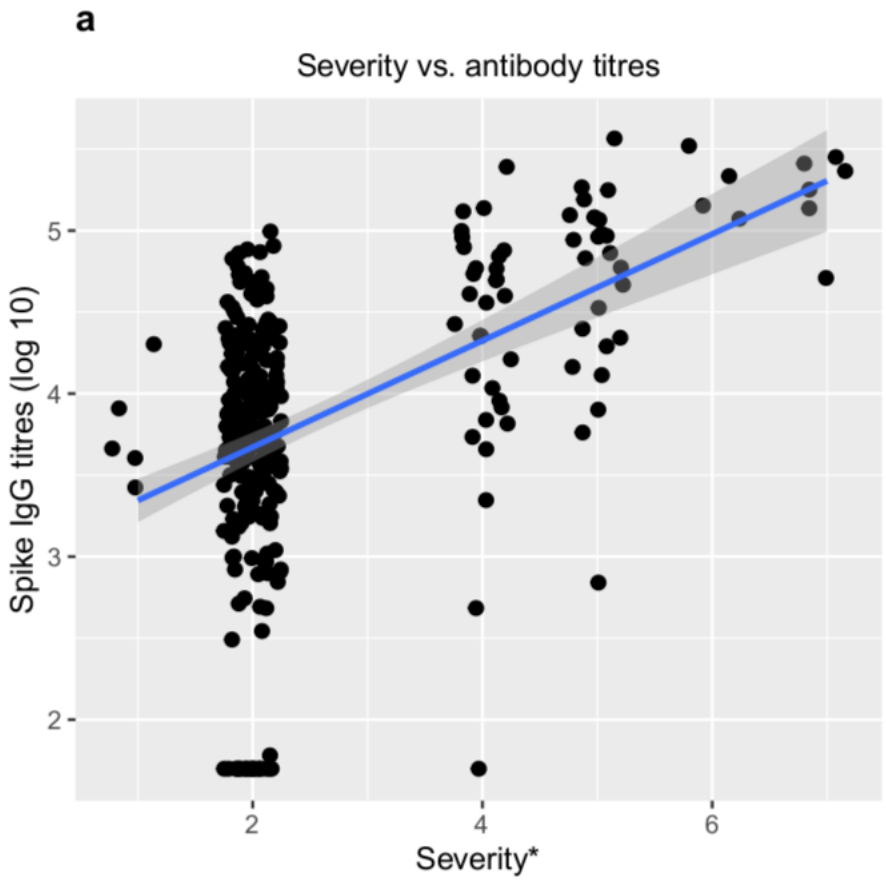
OPEN

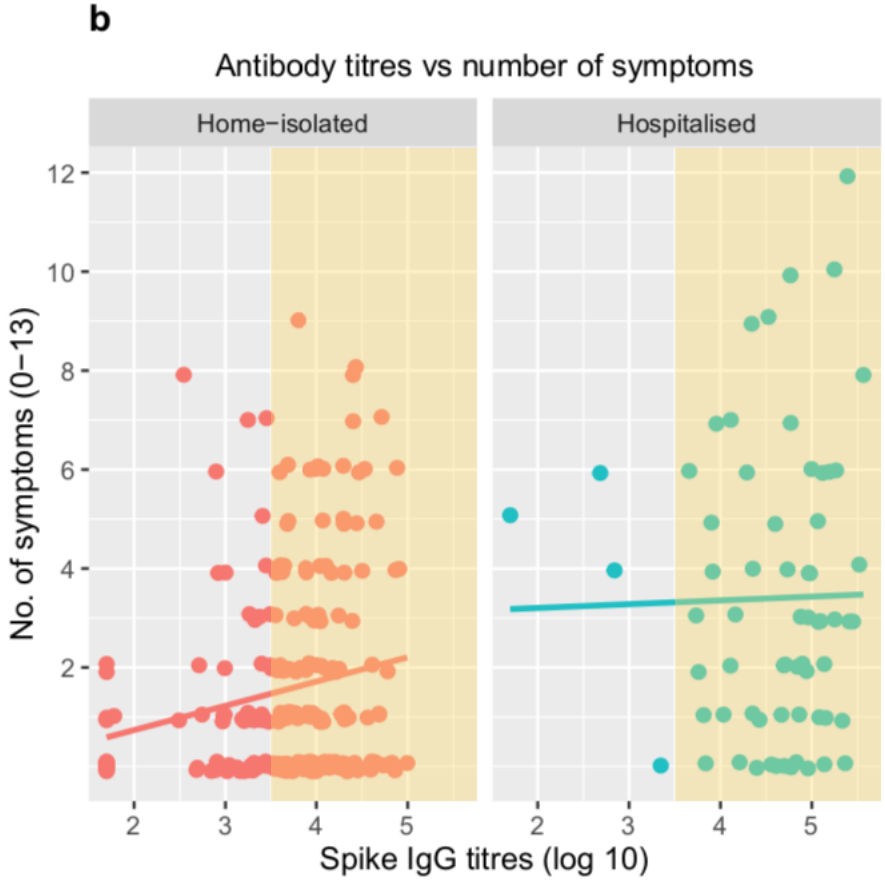
# Long COVID in a prospective cohort of home-isolated patients

Bjørn Blomberg[1,2,3]✉, Kristin Greve-Isdahl Mohn[3,4], Karl Albert Brokstad[5,6], Fan Zhou[4], Dagrun Waag Linchausen[7], Bent-Are Hansen[8], Sarah Lartey[4], Therese Bredholt Onyango[4], Kanika Kuwelker[1,2,3,4], Marianne Sævik[3], Hauke Bartsch[9,10], Camilla Tøndel[11,12], Bård Reiakvam Kittang[1,8], Bergen COVID-19 Research Group*, Rebecca Jane Cox[4,13,14]✉ and Nina Langeland[1,2,3,14]✉

Nature Medicine (2021) Published: 23 June 2021
https://doi.org/10.1038/s41591-021-01433-3

# 抗体価と重症度の関係



nature medicine

ARTICLES

https://doi.org/10.1038/s41591-021-01433-3

Check for updates

OPEN

# Long COVID in a prospective cohort of home-isolated patients

Bjørn Blomberg[1,2,3]✉, Kristin Greve-Isdahl Mohn[3,4], Karl Albert Brokstad[5,6], Fan Zhou[4], Dagrun Waag Linchausen[7], Bent-Are Hansen[8], Sarah Lartey[4], Therese Bredholt Onyango[4], Kanika Kuwelker[1,2,3,4], Marianne Sævik[3], Hauke Bartsch[9,10], Camilla Tøndel[11,12], Bård Reiakvam Kittang[1,8], Bergen COVID-19 Research Group*, Rebecca Jane Cox[4,13,14]✉ and Nina Langeland[1,2,3,14]✉

Nature Medicine (2021) Published: 23 June 2021

https://doi.org/10.1038/s41591-021-01433-3

# 後遺症に関するリスク因子解析

**Table 4 | COVID-19 patient factors associated with increasing number of symptoms and higher fatigue score at 6-month follow-up—negative binomial regression analysis**

| | Number of symptoms (0–13)[a] | | | Fatigue score (0–33)[b] | | |
|---|---|---|---|---|---|---|
| | *n* (%) | RR (CI) *P*[c] | aRR (CI) *P*[d] | *n* (%)[b] | RR (CI) *P*[c] | aRR (CI) *P*[d] |
| | *N* = 312 | | | *N* = 293 | | |
| Female sex | 160 (51%) | 1.28 (0.95–1.73) 0.101 | 1.35 (1.01–1.81) **0.040** | 149 (51%) | 1.09 (1.01–1.16) **0.018** | 1.09 (1.02–1.16) **0.014** |
| Older age (by 10-year intervals) | | 1.18 (1.06–1.28) **<0.001** | 1.08 (0.98–1.19) 0.092 | | 1.03 (1.01–1.05) **0.002** | 1.00 (0.98–1.02) 0.924 |
| BMI | | 1.04 (1.01–1.08) **0.016** | 1.00 (0.97–1.04) 0.876 | | 1.01 (1.00–1.02) **0.048** | 1.00 (0.99–1.01) 0.715 |
| Comorbidity | | | | | | |
| Asthma/COPD | 38 (12%) | 2.00 (1.33–3.07) **0.001** | 1.57 (1.05–2.37) **0.031** | 37 (13%) | 1.22 (1.11–1.34) **<0.001** | 1.14 (1.03–1.25) **0.008** |
| Hypertension | 35 (11%) | 1.44 (0.93–2.30) 0.114 | | 34 (12%) | 1.13 (1.02–1.26) **0.017** | 1.01 (0.90–1.13) 0.902 |
| Chronic heart disease | 22 (7%) | 1.70 (1.01–3.02) 0.057 | 1.23 (0.71–2.18) 0.460 | 21 (7%) | 1.20 (1.06–1.35) **0.005** | 1.08 (0.94–1.23) 0.295 |
| Rheumatic disease | 20 (6%) | 1.35 (0.77–2.50) 0.321 | | 20 (7%) | 1.15 (1.01–1.30) **0.038** | 1.05 (0.92–1.18) 0.460 |
| Diabetes | 13 (4%) | 1.33 (0.67–2.87) 0.438 | | 13 (4%) | 1.14 (0.97–1.34) 0.098 | 1.06 (0.91–1.23) 0.445 |
| Immunosuppression | 11 (4%) | 1.18 (0.56–2.76) 0.679 | | 10 (3%) | 1.12 (0.93–1.34) 0.232 | |
| Current or prior smoker | 96 (31%) | 1.18 (0.86–1.63) 0.305 | | 95 (32%) | 1.05 (0.97–1.12) 0.230 | |
| Severity of initial illness | | 1.28 (1.14–1.44) **<0.001** | 1.17 (1.00–1.37) 0.062 | | 1.08 (1.05–1.10) **<0.001** | 1.06 (1.02–1.10) **0.004** |
| Days in hospital | | 1.02 (1.00–1.05) 1.016 | 0.99 (0.97–1.02) 0.525 | | 1.01 (1.00–1.01) **0.002** | 1.00 (0.99–1.00) 0.464 |
| Spike IgG titer at 2 months[e] | | 1.51 (1.26–1.81) **<0.001** | 1.25 (1.01–1.56) **0.037** | | 1.11 (1.07–1.16) **<0.001** | 1.07 (1.02–1.12) **0.009** |
| Microneutralizing antibody titer at 2 months[e] | | 1.52 (1.25–1.86) **<0.001** | -[f] | | 1.13 (1.08–1.19) **<0.001** | -[f] |

Analysis of associated factors was done by negative binomial regression. aRR, adjusted rate ratio; RR, rate ratio. Statistical significance at the level of $P < 0.05$ is shown in bold text. [a]Patients were assessed for 13 symptoms mentioned in Table 2. [b]Chalder fatigue score is validated only for patients aged ≥16 years ($n = 293$); possible fatigue scores range from 0 (no fatigue) to 33 (worst possible fatigue). [c]Neurological illness ($n = 8$) and malignancy ($n = 5$) were not significantly associated with the outcomes and were not included in the table. [d]Factors with statistical significance of <0.1 were included in the multivariable analysis. [e]SARS-CoV-2 spike protein antibody titers, $\log_{10}$ transformed. [f]Microneutralizing antibody titers were omitted owing to collinearity with spike IgG antibody titers.