

eTable 1. Ordered probit regression of leveled outcomes, confirmed-only.

	a β (95% CI)	AdjustedMarginal probability (95% CI)			
		None	Hospitalisation	ICU/Ventilation	Death
Total marginal probabilities (95% CI)		0.77 (0.70, 0.83)	0.15 (0.11, 0.18)	0.06 (0.04, 0.08)	0.03 (0.01, 0.04)
Sex					
Male	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
Female	-0.19 (-0.30, -0.09)*	0.05 (0.02, 0.08)	-0.03 (-0.04, -0.01)	-0.02 (-0.03, -0.01)	-0.01 (-0.02, -0.00)
	<i>p<0.001</i>	<i>p<0.001</i>	<i>p<0.001</i>	<i>p=0.001</i>	<i>p=0.007</i>
Age					
18-<50	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
50-<70	0.29 (0.19, 0.39)*	-0.08 (-0.11, -0.05)	0.04 (0.03, 0.06)	0.03 (0.01, 0.04)	0.01 (0.00, 0.02)
70+	0.59 (0.32, 0.86)*	-0.16 (-0.25, -0.08)	0.09 (0.05, 0.13)	0.05 (0.02, 0.08)	0.03 (0.01, 0.04)
	<i>p<0.001</i>	<i>p<0.001</i>	<i>p<0.001</i>	<i>p<0.001</i>	<i>p=0.001</i>

MS phenotype					
RRMS	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
Progressive	0.25 (0.11, 0.40)*	-0.07 (-0.11, -0.03)	0.04 (0.02, 0.06)	0.02 (0.01, 0.04)	0.01 (0.00, 0.02)
	<i>p<0.001</i>	<i>p=0.001</i>	<i>p=0.001</i>	<i>p=0.001</i>	<i>p=0.009</i>
EDSS					
0-6	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
>6	0.69 (0.55, 0.83)*	-0.19 (-0.24, -0.14)	0.10 (0.08, 0.13)	0.06 (0.04, 0.08)	0.03 (0.01, 0.05)
	<i>p<0.001</i>	<i>p<0.001</i>	<i>p<0.001</i>	<i>p<0.001</i>	<i>p<0.001</i>
DMT					
Untreated	0.35 (0.10, 0.60)*	-0.09 (-0.17, -0.03)	0.05 (0.01, 0.09)	0.03 (0.01, 0.05)	0.02 (0.00, 0.03)
Alemtuzumab	0.21 (-0.26, 0.68)	-0.06 (-0.19, 0.07)	0.03 (-0.04, 0.10)	0.02 (-0.02, 0.06)	0.01 (-0.01, 0.03)
Cladribine	-0.02 (-0.46, 0.43)	0.01 (-0.12, 0.13)	-0.00 (-0.07, 0.06)	-0.00 (-0.04, 0.04)	-0.00 (-0.02, 0.02)
Dimethyl fumarate	-0.06 (-0.31, 0.20)	0.02 (-0.06, 0.09)	-0.01 (-0.05, 0.03)	-0.00 (-0.03, 0.02)	-0.00 (-0.01, 0.01)
Fingolimod	-0.25 (-0.52, 0.03)	0.07 (-0.01, 0.15)	-0.04 (-0.08, 0.00)	-0.02 (-0.05, 0.00)	-0.01 (-0.02, 0.00)
Glatiramer acetate	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
Interferon	-0.12 (-0.42, 0.17)	0.03 (-0.05, 0.12)	-0.02 (-0.06, 0.03)	-0.01 (-0.04, 0.02)	-0.01 (-0.02, 0.01)

Natalizumab	-0.16 (-0.43, 0.11)	0.04 (-0.03, 0.12)	-0.02 (-0.06, 0.02)	-0.01 (-0.04, 0.01)	-0.01 (-0.02, 0.01)
Ocrelizumab	0.29 (0.06, 0.52)	-0.08 (-0.15, -0.02)	0.04 (0.01, 0.08)	0.03 (0.00, 0.05)	0.01 (0.00, 0.03)
Rituximab	0.53 (0.27, 0.79)*	-0.15 (-0.23, -0.07)	0.08 (0.04, 0.12)	0.05 (0.02, 0.07)	0.02 (0.01, 0.04)
Siponimod	0.41 (-0.14, 0.97)	-0.12 (-0.27, 0.04)	0.06 (-0.02, 0.14)	0.04 (-0.01, 0.08)	0.02 (-0.01, 0.05)
Teriflunomide	-0.06 (-0.36, 0.23)	0.02 (-0.06, 0.10)	-0.01 (-0.05, 0.03)	-0.01 (-0.03, 0.02)	-0.00 (-0.02, 0.01)
Other DMT	0.10 (-0.24, 0.44)	-0.03 (-0.12, 0.07)	0.02 (-0.04, 0.07)	0.01 (-0.02, 0.04)	0.00 (-0.01, 0.02)
Pooled Other DMT	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
Ocrelizumab	0.37 (0.25, 0.49)*	-0.10 (-0.14, -0.06)	0.05 (0.03, 0.07)	0.03 (0.02, 0.05)	0.02 (0.01, 0.03)
Rituximab	0.61 (0.44, 0.78)*	-0.17 (-0.23, -0.12)	0.09 (0.06, 0.12)	0.05 (0.03, 0.07)	0.03 (0.01, 0.05)
No DMT	0.42 (0.27, 0.58)*	-0.12 (-0.17, -0.07)	0.06 (0.04, 0.09)	0.04 (0.02, 0.05)	0.02 (0.01, 0.03)
Natalizumab	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
Ocrelizumab	0.45 (0.25, 0.65)*	-0.14 (-0.20, -0.07)	0.07 (0.04, 0.10)	0.05 (0.02, 0.07)	0.02 (0.00, 0.04)
Rituximab	0.75 (0.51, 0.99)*	-0.23 (-0.31, -0.15)	0.12 (0.07, 0.16)	0.08 (0.04, 0.11)	0.03 (0.00, 0.06)

Pooled Other DMT	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
Interferons	-0.22 (-0.44, 0.00)	0.06 (-0.00, 0.12)	-0.03 (-0.06, 0.00)	-0.02 (-0.04, 0.00)	-0.01 (-0.02, 0.00)
	<i>p=0.051</i>	<i>p=0.054</i>	<i>p=0.052</i>	<i>p=0.061</i>	<i>p=0.086</i>
Untreated	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]
Interferons	-0.36 (-0.61, -0.10)	0.11 (0.03, 0.19)	-0.06 (-0.11, -0.02)	-0.03 (-0.05, -0.01)	-0.02 (-0.04, -0.00)
	<i>p=0.007</i>	<i>p=0.008</i>	<i>p=0.009</i>	<i>p=0.016</i>	<i>p=0.028</i>

Analysis by multilevel mixed-effects ordered probit regression, estimating β (95% CI). All models adjusted for age, sex, MS phenotype, and EDSS. Abbreviations:

DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale.

Results in boldface denote statistical significance ($p < 0.05$).

* Significant after family-wise Holm's step down multiple comparisons adjustment.

Note: Other DMT was queried as "On another drug not listed".

e Table 2. Demographic and clinical characteristics of hospitalisation & ICU admission, suspected+confirmed COVID-19.

	Hospitalisation			ICU admission		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
Sex						
Male	255 (20.9%)	1.00 [Ref]	1.00 [Ref]	58 (5.0%)	1.00 [Ref]	1.00 [Ref]
Female	470 (14.1%)	0.61 (0.51, 0.72)*	0.68 (0.57, 0.81)*	119 (3.7%)	0.71 (0.51, 0.98)	0.84 (0.60, 1.17)
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p=0.036</i>	<i>p=0.31</i>
Age						
18-<50	349 (11.4%)	1.00 [Ref]	1.00 [Ref]	71 (2.4%)	1.00 [Ref]	1.00 [Ref]
50-<70	337 (24.4%)	2.47 (2.09, 2.92)*	1.79 (1.49, 2.15)*	95 (7.3%)	3.09 (2.24, 4.25)*	2.04 (1.44, 2.89)*
70+	39 (41.5%)	5.45 (3.55, 8.37)*	2.12 (1.33, 3.40)*	11 (13.3%)	5.95 (3.00, 11.78)*	2.06 (0.98, 4.34)
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
MS phenotype						
RRMS	507 (12.95)	1.00 [Ref]	1.00 [Ref]	112 (3.0%)	1.00 [Ref]	1.00 [Ref]

Progressive	218 (35.6%)	3.67 (3.03, 4.44)*	1.46 (1.14, 1.87)*	65 (11.2%)	4.09 (2.96, 5.63)*	1.44 (0.95, 2.18)
		<i>p<0.001</i>	<i>p=0.003</i>		<i>p<0.001</i>	<i>p=0.088</i>
EDSS						
0-6	467 (12.0%)	1.00 [Ref]	1.00 [Ref]	97 (2.6%)	1.00 [Ref]	1.00 [Ref]
>6	258 (39.1%)	4.84 (4.00, 5.86)*	3.07 (2.42, 3.90)*	80 (13.1%)	5.67 (4.11, 7.82)*	3.50 (2.34, 5.25)*
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
MS disease duration						
0-10 years	252 (12.6%)	1.00 [Ref]	1.00 [Ref]	55 (2.8%)	1.00 [Ref]	1.00 [Ref]
>10 years	370 (18.1%)	1.52 (1.28, 1.81)*	0.86 (0.70, 1.05)	100 (5.1%)	1.82 (1.30, 2.55)*	0.90 (0.62, 1.31)
		<i>p<0.001</i>	<i>p=0.13</i>		<i>p<0.001</i>	<i>p=0.58</i>
Receiving glucocorticoid treatment?						
No	443 (14.9%)	1.00 [Ref]	1.00 [Ref]	109 (3.8%)	1.00 [Ref]	1.00 [Ref]
Yes	38 (35.2%)	2.99 (1.98, 4.52)*	2.85 (1.83, 4.43)*	13 (12.5%)	3.43 (1.85, 6.38)*	3.27 (1.70, 6.28)*

		<i>p</i> <0.001	<i>p</i> <0.001		<i>p</i> <0.001	<i>p</i> <0.001
Has comorbidities						
No	240 (11.6%)	1.00 [Ref]	1.00 [Ref]	53 (2.7%)	1.00 [Ref]	1.00 [Ref]
Yes	372 (23.2%)	2.30 (1.91, 2.76)*	1.75 (1.44, 2.12)*	103 (6.8%)	2.64 (1.87, 3.73)*	1.89 (1.32, 2.70)*
		<i>p</i> <0.001	<i>p</i> <0.001		<i>p</i> <0.001	<i>p</i> =0.001
BMI						
<30	247 (15.2%)	1.00 [Ref]	1.00 [Ref]	49 (3.1%)	1.00 [Ref]	1.00 [Ref]
≥30	197 (21.1%)	1.42 (1.14, 1.76)*	1.55 (1.24, 1.95)*	67 (7.3%)	2.46 (1.69, 3.60)*	2.51 (1.70, 3.72)*
		<i>p</i> =0.002	<i>p</i> <0.001		<i>p</i> <0.001	<i>p</i> <0.001
Current smoker						
No	536 (15.2%)	1.00 [Ref]	1.00 [Ref]	125 (3.7%)	1.00 [Ref]	1.00 [Ref]
Yes	189 (18.7%)	1.19 (0.99, 1.44)	1.06 (0.87, 1.29)	52 (5.3%)	1.36 (0.97, 1.91)	1.20 (0.85, 1.70)
		<i>p</i> =0.065	<i>p</i> =0.57		<i>p</i> =0.074	<i>p</i> =0.30

Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for age, sex, MS phenotype, and EDSS.

Abbreviations: EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio; RRMS = relapsing-remitting multiple sclerosis.

Results in boldface denote statistical significance ($p < 0.05$).

* Significant after family-wise Holm's step down multiple comparisons adjustment.

e Table 3. Demographic and clinical characteristics of ventilation & death, suspected+confirmed COVID-19.

	Ventilation			Death		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
Sex						
Male	54 (5.0%)	1.00 [Ref]	1.00 [Ref]	34 (2.9%)	1.00 [Ref]	1.00 [Ref]
Female	100 (3.3%)	0.63 (0.44, 0.89)*	0.72 (0.50, 1.03)	43 (1.3%)	0.44 (0.28, 0.70)*	0.55 (0.34, 0.88)
		<i>p<0.001</i>	<i>p=0.071</i>		<i>p<0.001</i>	<i>p=0.014</i>
Age						
18-<50	76 (2.7%)	1.00 [Ref]	1.00 [Ref]	18 (0.6%)	1.00 [Ref]	1.00 [Ref]
50-<70	70 (5.7%)	2.47 (1.73, 3.51)*	1.76 (1.20, 2.58)*	45 (3.3%)	5.40 (3.10, 9.42)*	2.56 (1.40, 4.66)*
70+	8 (10.1%)	5.74 (2.55, 12.97)*	2.13 (0.88, 5.17)	14 (14.9%)	27.77 (13.12, 58.79)*	5.79 (2.50, 13.39)*
		<i>p<0.001</i>	<i>p=0.003</i>		<i>p<0.001</i>	<i>p<0.001</i>
MS phenotype						
RRMS	108 (3.0%)	1.00 [Ref]	1.00 [Ref]	35 (0.9%)	1.00 [Ref]	1.00 [Ref]
Progressive	46 (8.6%)	3.64 (2.49, 5.32)*	1.43 (0.88, 2.32)	42 (7.0%)	7.83 (4.94, 12.40)*	1.20 (0.68, 2.10)

		<i>p</i> <0.001	<i>p</i> =0.15		<i>p</i> <0.001	<i>p</i> =0.53
EDSS						
0-6	100 (2.8%)	1.00 [Ref]	1.00 [Ref]	18 (0.5%)	1.00 [Ref]	1.00 [Ref]
>6	54 (9.4%)	5.37 (3.61, 7.97)*	3.41 (2.09, 5.55)*	59 (8.9%)	20.35 (11.92, 34.73)*	11.42 (5.91, 22.05)*
		<i>p</i> <0.001	<i>p</i> <0.001		<i>p</i> <0.001	<i>p</i> <0.001
MS disease duration						
0-10 years	50 (2.7%)	1.00 [Ref]	1.00 [Ref]	16 (0.8%)	1.00 [Ref]	1.00 [Ref]
>10 years	80 (4.3%)	1.77 (1.21, 2.59)*	0.98 (0.64, 1.49)	47 (2.3%)	2.85 (1.61, 5.06)*	0.76 (0.40, 1.45)
		<i>p</i> =0.003	<i>p</i> =0.91		<i>p</i> <0.001	<i>p</i> =0.41
Receiving glucocorticoid treatment?						
No	79 (2.8%)	1.00 [Ref]	1.00 [Ref]	46 (1.5%)	1.00 [Ref]	1.00 [Ref]
Yes	11 (10.8%)	2.82 (1.35, 5.88)*	2.51 (1.17, 5.40)	6 (5.7%)	3.91 (1.63, 9.40)*	3.55 (1.35, 9.31)
		<i>p</i> =0.006	<i>p</i> =0.018		<i>p</i> =0.002	<i>p</i> =0.010

Has comorbidities						
No	43 (2.2%)	1.00 [Ref]	1.00 [Ref]	13 (0.6%)	1.00 [Ref]	1.00 [Ref]
Yes	84 (6.0%)	3.28 (2.17, 4.95)*	2.50 (1.63, 3.85)*	61 (3.9%)	6.63 (3.63, 12.11)*	3.67 (1.95, 6.91)*
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
BMI						
<30	62 (3.9%)	1.00 [Ref]	1.00 [Ref]	30 (1.8%)	1.00 [Ref]	1.00 [Ref]
≥30	44 (4.8%)	1.87 (1.21, 2.91)*	2.00 (1.28, 3.14)*	22 (2.3%)	1.19 (0.67, 2.12)	1.37 (0.75, 2.49)
		<i>p=0.005</i>	<i>p=0.003</i>		<i>p=0.56</i>	<i>p=0.31</i>
Current smoker						
No	110 (3.4%)	1.00 [Ref]	1.00 [Ref]	46 (1.3%)	1.00 [Ref]	1.00 [Ref]
Yes	44 (4.7%)	1.50 (1.02, 2.20)*	1.38 (0.93, 2.05)	31 (3.1%)	2.03 (1.25, 3.29)*	1.66 (1.01, 2.74)
		<i>p=0.040</i>	<i>p=0.11</i>		<i>p=0.004</i>	<i>p=0.045</i>

Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for age, sex, MS phenotype, and EDSS.

Abbreviations: EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio; RRMS = relapsing-remitting multiple sclerosis.

Results in boldface denote statistical significance ($p < 0.05$).

* Significant after family-wise Holm's step down multiple comparisons adjustment.

e Table 4. Clinician-reported demographic and clinical characteristics of hospital & ICU admission, confirmed COVID-19 only.

	Hospitalisation			ICU admission		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
Sex						
Male	240 (23.0%)	1.00 [Ref]	1.00 [Ref]	57 (5.7%)	1.00 [Ref]	1.00 [Ref]
Female	443 (15.8%)	0.62 (0.52, 0.75)*	0.71 (0.59, 0.85)*	115 (4.2%)	0.71 (0.51, 0.99)	0.86 (0.62, 1.21)
		<i>p < 0.001</i>	<i>p < 0.001</i>		<i>p = 0.045</i>	<i>p = 0.40</i>

Age						
18-<50	327 (12.8%)	1.00 [Ref]	1.00 [Ref]	70 (2.8%)	1.00 [Ref]	1.00 [Ref]
50-<70	318 (26.4%)	2.41 (2.02, 2.88)*	1.72 (1.42, 2.09)*	91 (7.9%)	2.87 (2.08, 3.98)*	1.90 (1.33, 2.71)*
70+	38 (44.7%)	5.55 (3.54, 8.69)*	2.15 (1.31, 3.52)*	11 (14.9%)	5.88 (2.95, 11.72)*	2.11 (0.99, 4.46)
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p=0.001</i>
MS phenotype						
RRMS	474 (14.3%)	1.00 [Ref]	1.00 [Ref]	108 (3.4%)	1.00 [Ref]	1.00 [Ref]
Progressive	209 (39.7%)	3.87 (3.16, 4.74)*	1.51 (1.17, 1.96)*	64 (12.9%)	4.21 (3.03, 5.83)*	1.55 (1.01, 2.39)
		<i>p<0.001</i>	<i>p=0.002</i>		<i>p<0.001</i>	<i>p=0.044</i>
EDSS						
0-6	433 (13.3%)	1.00 [Ref]	1.00 [Ref]	95 (3.0%)	1.00 [Ref]	1.00 [Ref]
>6	250 (42.2%)	4.98 (4.07, 6.09)*	3.15 (2.46, 4.04)*	77 (14.0%)	5.35 (3.85, 7.42)*	3.23 (2.13, 4.89)*
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
MS disease duration						
0-10 years	239 (13.9%)	1.00 [Ref]	1.00 [Ref]	54 (3.2%)	1.00 [Ref]	1.00 [Ref]

>10 years	347 (20.0%)	1.54 (1.29, 1.85)*	0.86 (0.70, 1.06)	97 (5.7%)	1.82 (1.29, 2.56)*	0.92 (0.62, 1.35)
		<i>p<0.001</i>	<i>p=0.16</i>		<i>p=0.001</i>	<i>p=0.67</i>
Receiving glucocorticoid treatment?						
No	418 (16.0%)	1.00 [Ref]	1.00 [Ref]	107 (4.2%)	1.00 [Ref]	1.00 [Ref]
Yes	37 (38.5%)	3.20 (2.08, 4.92)*	3.19 (2.01, 5.04)*	13 (14.1%)	3.56 (1.90, 6.66)*	3.57 (1.84, 6.92)*
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
Has comorbidities						
No	226 (12.5%)	1.00 [Ref]	1.00 [Ref]	51 (2.9%)	1.00 [Ref]	1.00 [Ref]
Yes	355 (25.6%)	2.38 (1.97, 2.88)*	1.82 (1.48, 2.23)*	102 (7.7%)	2.75 (1.94, 3.91)*	1.99 (1.38, 2.88)*
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
BMI						
<30	237 (16.5%)	1.00 [Ref]	1.00 [Ref]	49 (3.5%)	1.00 [Ref]	1.00 [Ref]
≥30	188 (21.9%)	1.38 (1.11, 1.73)*	1.51 (1.20, 1.91)*	65 (7.7%)	2.30 (1.57, 3.37)*	2.37 (1.59, 3.51)*

		<i>p=0.004</i>	<i>p=0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
Current smoker						
No	505 (17.0%)	1.00 [Ref]	1.00 [Ref]	123 (4.3%)	1.00 [Ref]	1.00 [Ref]
Yes	178 (20.3%)	1.17 (0.96, 1.42)	1.02 (0.83, 1.26)	49 (5.8%)	1.29 (0.91, 1.83)	1.13 (0.79, 1.62)
		<i>p=0.12</i>	<i>p=0.83</i>		<i>p=0.15</i>	<i>p=0.50</i>

Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for age, sex, MS phenotype, and EDSS.

Abbreviations: EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio; RRMS = relapsing-remitting multiple sclerosis.

Results in boldface denote statistical significance ($p<0.05$).

* Significant after family-wise Holm's step down multiple comparisons adjustment.

e Table 5. Clinician-reported demographic and clinical characteristics of ventilation & death, confirmed COVID-19 only.

	Ventilation			Death		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
Sex						
Male	51 (5.4%)	1.00 [Ref]	1.00 [Ref]	31 (3.0%)	1.00 [Ref]	1.00 [Ref]
Female	92 (3.5%)	0.64 (0.45, 0.93)*	0.76 (0.52, 1.10)	39 (1.4%)	0.45 (0.28, 0.73)*	0.59 (0.35, 0.97)
		<i>p=0.018</i>	<i>p=0.15</i>		<i>p=0.001</i>	<i>p=0.039</i>
Age						
18-<50	70 (3.0%)	1.00 [Ref]	1.00 [Ref]	16 (0.7%)	1.00 [Ref]	1.00 [Ref]
50-<70	65 (5.9%)	2.32 (1.61, 3.35)*	1.64 (1.10, 2.43)	40 (3.3%)	5.19 (2.88, 9.37)*	2.42 (1.28, 4.58)*
70+	8 (11.3%)	5.71 (2.51, 12.98)*	2.14 (0.88, 5.22)	14 (16.5%)	30.16 (13.93, 65.30)*	6.28 (2.64, 14.91)*
		<i>p<0.001</i>	<i>p=0.009</i>		<i>p<0.001</i>	<i>p<0.001</i>
MS phenotype						
RRMS	97 (3.1%)	1.00 [Ref]	1.00 [Ref]	30 (0.9%)	1.00 [Ref]	1.00 [Ref]
Progressive	46 (10.1%)	3.90 (2.65, 5.74)*	1.63 (0.99, 2.68)	40 (7.8%)	8.73 (5.37, 14.19)*	1.37 (0.75, 2.49)

		<i>p</i> <0.001	<i>p</i> =0.053		<i>p</i> <0.001	<i>p</i> =0.30
EDSS						
0-6	92 (3.0%)	1.00 [Ref]	1.00 [Ref]	16 (0.5%)	1.00 [Ref]	1.00 [Ref]
>6	51 (9.8%)	5.18 (3.46, 7.76)*	3.12 (1.88, 5.16)*	54 (9.0%)	20.44 (11.40, 36.66)*	10.39 (5.15, 20.97)*
		<i>p</i> <0.001	<i>p</i> <0.001		<i>p</i> <0.001	<i>p</i> <0.001
MS disease duration						
0-10 years	49 (3.1%)	1.00 [Ref]	1.00 [Ref]	15 (0.9%)	1.00 [Ref]	1.00 [Ref]
>10 years	70 (4.4%)	1.57 (1.07, 2.32)*	0.82 (0.53, 1.27)	42 (2.5%)	2.76 (1.52, 5.01)*	0.67 (0.34, 1.33)
		<i>p</i> =0.023	<i>p</i> =0.37		<i>p</i> =0.001	<i>p</i> =0.26
Receiving glucocorticoid treatment?						
No	74 (3.0%)	1.00 [Ref]	1.00 [Ref]	41 (1.5%)	1.00 [Ref]	1.00 [Ref]
Yes	11 (12.1%)	2.98 (1.41, 6.31)*	2.92 (1.35, 6.31)*	6 (6.3%)	4.39 (1.81, 10.66)*	4.78 (1.77, 12.94)*
		<i>p</i> =0.004	<i>p</i> =0.006		<i>p</i> =0.001	<i>p</i> =0.002

Has comorbidities						
No	39 (2.3%)	1.00 [Ref]	1.00 [Ref]	11 (0.6%)	1.00 [Ref]	1.00 [Ref]
Yes	80 (6.4%)	3.48 (2.27, 5.34)*	2.72 (1.74, 4.25)*	57 (4.2%)	7.41 (3.87, 14.19)*	4.14 (2.09, 8.20)*
		<i>p<0.001</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
BMI						
<30	55 (3.9%)	1.00 [Ref]	1.00 [Ref]	27 (1.8%)	1.00 [Ref]	1.00 [Ref]
≥30	43 (5.2%)	2.09 (1.32, 3.31)*	2.26 (1.41, 3.61)*	22 (2.5%)	1.31 (0.73, 2.36)	1.54 (0.83, 2.85)
		<i>p=0.002</i>	<i>p=0.001</i>		<i>p=0.38</i>	<i>p=0.17</i>
Current smoker						
No	103 (3.8%)	1.00 [Ref]	1.00 [Ref]	43 (1.5%)	1.00 [Ref]	1.00 [Ref]
Yes	40 (4.9%)	1.40 (0.94, 2.09)	1.28 (0.85, 1.94)	27 (3.1%)	1.88 (1.13, 3.15)*	1.51 (0.89, 2.57)
		<i>p=0.099</i>	<i>p=0.24</i>		<i>p=0.016</i>	<i>p=0.13</i>

Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for age, sex, MS phenotype, and EDSS.

Abbreviations: EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio; RRMS = relapsing-remitting multiple sclerosis.

Results in boldface denote statistical significance ($p < 0.05$).

* Significant after family-wise Holm's step down multiple comparisons adjustment.

eTable 6. Characteristics of COVID-19 severity outcomes, DMTs vs dimethyl fumarate, anti-CD20 DMTs vs all other DMTs, and anti-CD20 DMTs vs natalizumab, suspected+confirmed COVID-19.

	Hospitalisation			ICU admission		
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	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
DMT						
Untreated	111 (26.4%)	2.43 (1.59, 3.72)*	1.79 (1.15, 2.79)	24 (6.1%)	3.17 (1.19, 8.46)	2.05 (0.75, 5.57)
Alemtuzumab	5 (9.8%)	0.68 (0.25, 1.85)	0.89 (0.32, 2.46)	1 (2.0%)	1.00 (0.11, 8.81)	1.42 (0.16, 12.77)
Cladribine	8 (11.3%)	0.80 (0.35, 1.84)	1.05 (0.45, 2.42)	0 (0%)	-	-
Dimethyl fumarate	53 (9.6%)	0.71 (0.47, 1.12)	0.82 (0.51, 1.32)	10 (1.9%)	0.94 (0.32, 2.79)	1.10 (0.37, 3.29)
Fingolimod	35 (7.3%)	0.54 (0.33, 0.90)	0.68 (0.40, 1.13)	6 (1.3%)	0.67 (0.20, 2.22)	0.88 (0.26, 2.95)
Glatiramer acetate	34 (13.3%)	1.00 [Ref]	1.00 [Ref]	5 (2.1%)	1.00 [Ref]	1.00 [Ref]
Interferon	33 (12.2%)	0.91 (0.54, 1.53)	0.90 (0.53, 1.53)	4 (1.5%)	0.72 (0.19, 2.74)	0.70 (0.18, 2.68)
Natalizumab	39 (8.1%)	0.60 (0.37, 0.98)	0.69 (0.41, 1.14)	9 (1.9%)	1.00 (0.33, 3.02)	1.16 (0.38, 3.56)
Ocrelizumab	211 (21.2%)	1.74 (1.17, 2.59)	1.61 (1.07, 2.44)	66 (7.0%)	3.48 (1.38, 8.78)	3.13 (1.22, 8.01)
Rituximab	132 (24.5%)	2.41 (1.55, 3.73)*	2.43 (1.54, 3.82)*	37 (7.1%)	4.76 (1.78, 12.72)*	4.47 (1.65, 12.12)*
Siponimod	9 (33.3%)	3.10 (1.28, 7.48)	2.13 (0.84, 5.43)	2 (7.7%)	3.63 (0.66, 19.88)	2.11 (0.37, 11.95)
Teriflunomide	33 (12.5%)	0.95 (0.56, 1.58)	0.90 (0.53, 1.53)	7 (2.7%)	1.36 (0.42, 4.36)	1.23 (0.38, 4.00)
Other DMT	22 (15.2%)	1.31 (0.73, 2.36)	1.02 (0.55, 1.87)	6 (4.3%)	2.32 (0.68, 7.85)	1.65 (0.48, 5.68)

Pooled Other DMT	271 (10.5%)	1.00 [Ref]	1.00 [Ref]	50 (2.0%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	211 (21.2%)	2.23 (1.82, 2.73)*	1.91 (1.54, 2.37)*	66 (7.0%)	3.46 (2.35, 5.10)*	2.87 (1.92, 4.29)*
Rituximab	132 (24.5%)	3.11 (2.37, 4.07)*	2.90 (2.19, 3.83)*	37 (7.1%)	4.78 (2.89, 7.88)*	4.14 (2.49, 6.89)*
No DMT	111 (26.4%)	3.12 (2.42, 4.02)*	2.10 (1.59, 2.76)*	24 (6.1%)	3.18 (1.92, 5.26)*	1.88 (1.10, 3.20)*
Natalizumab	39 (8.1%)	1.00 [Ref]	1.00 [Ref]	9 (1.9%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	211 (21.2%)	2.87 (1.99, 4.14)*	2.34 (1.60, 3.42)*	66 (7.0%)	3.43 (1.67, 7.01)*	2.67 (1.29, 5.55)*
Rituximab	132 (24.5%)	4.21 (2.78, 6.38)*	3.72 (2.45, 5.65)*	37 (7.1%)	5.34 (2.40, 11.87)*	4.12 (1.82, 9.34)*
	Ventilation			Death		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
DMT						
Untreated	23 (6.3%)	2.83 (1.13, 7.07)	1.98 (0.77, 5.07)	21 (5.1%)	5.48 (1.60, 18.76)	2.82 (0.79, 10.14)
Alemtuzumab	4 (8.2%)	1.95 (0.48, 8.02)	2.41 (0.55, 10.51)	1 (2.0%)	1.73 (0.17, 17.29)	2.86 (0.26, 31.78)
Cladribine	4 (6.2%)	1.17 (0.29, 4.67)	1.38 (0.34, 5.68)	1 (1.4%)	1.42 (0.14, 13.98)	3.40 (0.32, 35.63)
Dimethyl fumarate	13 (2.6%)	0.98 (0.37, 2.64)	1.14 (0.42, 3.08)	5 (1.0%)	0.90 (0.21, 3.79)	1.40 (0.32, 6.17)

Fingolimod	7 (1.6%)	0.50 (0.17, 1.52)	0.62 (0.20, 1.90)	0 (0%)	-	-
Glatiramer acetate	7 (3.0%)	1.00 [Ref]	1.00 [Ref]	3 (1.2%)	1.00 [Ref]	1.00 [Ref]
Interferon	8 (3.1%)	0.75 (0.25, 2.24)	0.74 (0.25, 2.21)	2 (0.8%)	0.67 (0.11, 4.09)	0.66 (0.10, 4.25)
Natalizumab	8 (1.8%)	0.88 (0.30, 2.59)	1.02 (0.34, 3.01)	3 (0.6%)	0.63 (0.13, 3.19)	0.89 (0.17, 4.67)
Ocrelizumab	38 (4.2%)	2.17 (0.90, 5.23)	1.87 (0.77, 4.58)	22 (2.2%)	1.93 (0.57, 6.56)	1.57 (0.44, 5.55)
Rituximab	30 (6.6%)	4.13 (1.64, 10.40)*	3.57 (1.39, 9.20)	10 (2.0%)	2.74 (0.72, 10.41)	2.75 (0.68, 11.12)
Siponimod	0 (0%)	-	-	2 (7.4%)	6.42 (1.01, 40.73)	4.15 (0.59, 29.01)
Teriflunomide	9 (3.6%)	0.96 (0.32, 2.86)	0.84 (0.28, 2.54)	4 (1.5%)	1.37 (0.30, 6.21)	1.43 (0.30, 6.81)
Other DMT	3 (2.2%)	0.59 (0.13, 2.68)	0.48 (0.11, 2.17)	3 (2.1%)	2.35 (0.46, 12.00)	1.38 (0.26, 7.41)
Pooled Other DMT	63 (2.6%)	1.00 [Ref]	1.00 [Ref]	24 (0.9%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	38 (4.2%)	2.58 (1.62, 4.10)*	2.11 (1.31, 3.42)*	22 (2.2%)	2.15 (1.18, 3.90)*	1.37 (0.73, 2.56)
Rituximab	30 (6.6%)	4.84 (2.80, 8.37)*	3.99 (2.26, 7.04)*	10 (2.0%)	3.03 (1.37, 6.73)*	2.42 (1.04, 5.62)
No DMT	23 (6.3%)	3.38 (1.98, 5.76)*	2.25 (1.28, 3.97)*	21 (5.1%)	6.13 (3.33, 11.29)*	2.43 (1.24, 4.75)*
Natalizumab	8 (1.8%)	1.00 [Ref]	1.00 [Ref]	3 (0.6%)	1.00 [Ref]	1.00 [Ref]

Ocrelizumab	38 (4.2%)	2.52 (1.12, 5.64)*	1.82 (0.79, 4.17)	22 (2.2%)	3.23 (0.95, 10.96)	2.01 (0.57, 7.10)
Rituximab	30 (6.6%)	5.82 (2.37, 14.33)*	4.10 (1.62, 10.35)*	10 (2.0%)	4.11 (1.05, 16.15)	2.78 (0.64, 12.01)

Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for age, sex, MS phenotype, and EDSS.

Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio.

Results in boldface denote statistical significance (p<0.05).

* Significant after family-wise Holm's step down multiple comparisons adjustment.

Note: Other DMT was queried as "On another drug not listed".

e Table 7. Clinician-reported DMT characteristics of COVID-19 severity outcomes, confirmed COVID-19 only.

	Hospitalisation			ICU admission		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
DMT						
Untreated	108 (28.8%)	2.31 (1.49, 3.58)*	1.73 (1.09, 2.75)	22 (6.3%)	2.74 (1.02, 7.38)	1.80 (0.65, 4.94)
Alemtuzumab	5 (11.1%)	0.64 (0.23, 1.76)	0.83 (0.30, 2.34)	1 (2.2%)	0.92 (0.10, 8.11)	1.27 (0.14, 11.44)
Cladribine	8 (12.7%)	0.77 (0.33, 1.78)	1.01 (0.43, 2.36)	0 (0%)	-	-
Dimethyl fumarate	50 (10.8%)	0.68 (0.42, 1.09)	0.78 (0.48, 1.28)	10 (2.2%)	0.93 (0.31, 2.76)	1.07 (0.36, 3.20)
Fingolimod	30 (7.5%)	0.48 (0.28, 0.82)	0.59 (0.34, 1.01)	5 (1.3%)	0.56 (0.16, 1.98)	0.72 (0.20, 2.56)
Glatiramer acetate	33 (15.3%)	1.00 [Ref]	1.00 [Ref]	5 (2.5%)	1.00 [Ref]	1.00 [Ref]
Interferon	29 (13.0%)	0.82 (0.48, 1.42)	0.80 (0.46, 1.41)	4 (1.8%)	0.75 (0.20, 2.84)	0.72 (0.19, 2.76)
Natalizumab	38 (9.2%)	0.59 (0.36, 0.98)	0.66 (0.40, 1.12)	9 (2.2%)	0.97 (0.32, 2.94)	1.10 (0.36, 3.38)
Ocrelizumab	200 (23.2%)	1.71 (1.14, 2.57)	1.57 (1.03, 2.41)	64 (7.7%)	3.28 (1.30, 8.29)	2.91 (1.14, 7.47)
Rituximab	123 (29.2%)	2.40 (1.51, 3.80)*	2.45 (1.52, 3.96)*	37 (9.0%)	4.95 (1.84, 13.29)*	4.69 (1.72, 12.80)*
Siponimod	8 (33.3%)	2.71 (1.07, 6.86)	2.00 (0.74, 5.37)	2 (8.7%)	3.55 (0.65, 19.53)	2.20 (0.38, 12.63)

Teriflunomide	30 (13.7%)	0.90 (0.52, 1.54)	0.85 (0.49, 1.49)	7 (3.3%)	1.39 (0.43, 4.47)	1.26 (0.39, 4.10)
Other DMT	21 (18.4%)	1.44 (0.78, 2.66)	1.05 (0.55, 1.99)	6 (5.4%)	2.45 (0.72, 8.33)	1.65 (0.47, 5.71)
Pooled Other DMT	252 (11.5%)	1.00 [Ref]	1.00 [Ref]	49 (2.3%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	200 (23.2%)	2.29 (1.85, 2.84)*	1.96 (1.57, 2.47)*	64 (7.7%)	3.34 (2.26, 4.94)*	2.77 (1.85, 4.16)*
Rituximab	123 (29.2%)	3.26 (2.43, 4.36)*	3.11 (2.29, 4.21)*	37 (9.0%)	5.09 (3.06, 8.44)*	4.52 (2.70, 7.59)*
No DMT	108 (28.8%)	3.11 (2.39, 4.05)*	2.15 (1.62, 2.87)*	22 (6.3%)	2.81 (1.67, 4.73)*	1.70 (0.98, 2.95)
Natalizumab	38 (9.2%)	1.00 [Ref]	1.00 [Ref]	9 (2.2%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	200 (23.2%)	2.82 (1.94, 4.10)*	2.29 (1.55, 3.37)*	64 (7.7%)	3.30 (1.61, 6.76)*	2.61 (1.26, 5.41)*
Rituximab	123 (29.2%)	4.57 (2.97, 7.01)*	4.23 (2.75, 6.52)*	37 (9.0%)	5.71 (2.56, 12.72)*	4.62 (2.03, 10.50)*
	Ventilation			Death		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
DMT						
Untreated	22 (6.7%)	2.72 (1.03, 7.18)	1.92 (0.71, 5.19)	19 (5.1%)	7.09 (1.62, 31.07)	3.73 (0.81, 17.15)
Alemtuzumab	4 (8.9%)	1.85 (0.44, 7.78)	2.19 (0.49, 9.75)	1 (2.3%)	2.36 (0.20, 27.50)	4.06 (0.31, 52.59)

Cladribine	3 (5.0%)	0.96 (0.21, 4.39)	1.09 (0.23, 5.21)	1 (1.6%)	2.06 (0.18, 23.44)	5.09 (0.42, 61.93)
Dimethyl fumarate	12 (2.8%)	1.01 (0.36, 2.87)	1.18 (0.41, 3.36)	5 (1.1%)	1.35 (0.26, 7.04)	2.10 (0.39, 11.47)
Fingolimod	5 (1.3%)	0.41 (0.12, 1.42)	0.48 (0.14, 1.70)	0 (0%)	-	-
Glatiramer acetate	6 (3.0%)	1.00 [Ref]	1.00 [Ref]	2 (0.9%)	1.00 [Ref]	1.00 [Ref]
Interferon	6 (2.8%)	0.70 (0.21, 2.33)	0.66 (0.20, 2.22)	1 (0.5%)	0.52 (0.05, 5.80)	0.50 (0.04, 5.91)
Natalizumab	8 (2.1%)	0.98 (0.32, 2.98)	1.08 (0.35, 3.32)	3 (0.7%)	0.94 (0.16, 5.74)	1.38 (0.22, 8.80)
Ocrelizumab	37 (4.6%)	2.28 (0.90, 5.78)	1.94 (0.76, 4.96)	21 (2.4%)	2.84 (0.66, 12.30)	2.30 (0.51, 10.40)
Rituximab	29 (8.2%)	4.10 (1.54, 10.90)	3.48 (1.28, 9.48)	8 (2.1%)	3.36 (0.68, 16.64)	3.52 (0.66, 18.59)
Siponimod	0 (0%)	-	-	2 (8.0%)	9.38 (1.25, 70.54)	6.34 (0.76, 53.03)
Teriflunomide	8 (3.8%)	0.99 (0.31, 3.17)	0.86 (0.27, 2.80)	4 (1.9%)	2.15 (0.39, 11.91)	2.39 (0.41, 13.96)
Other DMT	3 (2.8%)	0.77 (0.17, 3.55)	0.56 (0.12, 2.58)	3 (2.7%)	3.82 (0.62, 23.61)	2.17 (0.33, 14.13)
Pooled Other DMT	55 (2.7%)	1.00 [Ref]	1.00 [Ref]	22 (1.0%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	37 (4.6%)	2.69 (1.67, 4.33)*	2.21 (1.36, 3.61)*	21 (2.4%)	2.26 (1.22, 4.20)*	1.41 (0.74, 2.70)
Rituximab	29 (8.2%)	4.76 (2.71, 8.38)*	3.92 (2.17, 7.07)*	8 (2.1%)	2.67 (1.11, 6.44)*	2.16 (0.85, 5.53)
No DMT	22 (6.7%)	3.24 (1.87, 5.63)*	2.22 (1.24, 3.99)*	19 (5.1%)	5.70 (3.01, 10.79)*	2.24 (1.11, 4.54)

Natalizumab	8 (2.1%)	1.00 [Ref]	1.00 [Ref]	3 (0.7%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	37 (4.6%)	2.44 (1.09, 5.47)*	1.79 (0.78, 4.12)	21 (2.4%)	3.25 (0.95, 11.11)	1.89 (0.53, 6.74)
Rituximab	29 (8.2%)	5.31 (2.16, 13.07)*	3.95 (1.56, 10.03)*	8 (2.1%)	3.08 (0.74, 12.88)	1.87 (0.39, 8.94)

Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for age, sex, MS phenotype, and EDSS.

Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio.

Results in boldface denote statistical significance (p<0.05).

* Significant after family-wise Holm's step down multiple comparisons adjustment.

Note: Other DMT was queried as "On another drug not listed".

e Table 8. BMI and anti-CD20 DMT associations with COVID-19 severity outcomes, alone and mutually adjusted

	Hospitalisation			ICU admission		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
BMI						
<30	247 (15.2%)	1.00 [Ref]	1.00 [Ref]	49 (3.1%)	1.00 [Ref]	1.00 [Ref]
≥30	197 (21.1%)	1.42 (1.14, 1.76)*	1.55 (1.24, 1.95)*	67 (7.3%)	2.46 (1.69, 3.60)*	2.51 (1.70, 3.72)*
		p=0.002	p<0.001		p<0.001	p<0.001
Adjusted for DMT type						

		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
		1.42 (1.14, 1.76)	1.56 (1.24, 1.95)		2.47 (1.69, 3.60)	2.51 (1.69, 3.71)
		<i>p=0.002</i>	<i>p<0.001</i>		<i>p<0.001</i>	<i>p<0.001</i>
DMT						
Glatiramer acetate	34 (13.3%)	1.00 [Ref]	1.00 [Ref]	5 (2.1%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	211 (21.2%)	1.74 (1.17, 2.59)	1.61 (1.07, 2.44)	66 (7.0%)	3.48 (1.38, 8.78)	3.13 (1.22, 8.01)
Rituximab	132 (24.5%)	2.41 (1.55, 3.73)*	2.43 (1.54, 3.82)*	37 (7.1%)	4.76 (1.78, 12.72)*	4.47 (1.65, 12.12)*
Restricted to those with BMI data						
Glatiramer acetate		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		1.98 (1.21, 3.23)	1.76 (1.07, 2.91)		3.97 (1.22, 12.90)	3.23 (0.98, 10.64)
Rituximab		3.50 (1.94, 6.33)	3.53 (1.92, 6.50)		11.79 (3.44, 40.42)	10.34 (2.95, 10.64)
Adjust for BMI						
Glatiramer acetate		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		2.01 (1.24, 3.29)	1.88 (1.13, 3.14)		3.84 (1.18, 12.55)	3.28 (0.99, 10.87)
Rituximab		3.61 (1.99, 6.55)	3.49 (1.88, 6.50)		12.98 (3.76, 44.81)	11.90 (3.36, 42.20)
Pooled Other DMT	271 (10.5%)	1.00 [Ref]	1.00 [Ref]	50 (2.0%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	211 (21.2%)	2.23 (1.82, 2.73)*	1.91 (1.54, 2.37)*	66 (7.0%)	3.46 (2.35, 5.10)*	2.87 (1.92, 4.29)*
Rituximab	132 (24.5%)	3.11 (2.37, 4.07)*	2.90 (2.19, 3.83)*	37 (7.1%)	4.78 (2.89, 7.88)*	4.14 (2.49, 6.89)*

Restricted to those with BMI data						
Pooled Other DMT		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		2.24 (1.75, 2.85)	1.98 (1.53, 2.56)		3.48 (2.20, 5.51)	2.73 (1.70, 4.38)
Rituximab		3.88 (2.56, 5.89)	3.53 (2.27, 5.49)		10.35 (5.79, 18.50)	8.72 (4.74, 16.07)
Adjust for BMI						
Pooled Other DMT		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		2.25 (1.76, 2.87)	2.00 (1.55, 2.58)		3.30 (2.08, 5.24)	2.66 (1.65, 4.29)
Rituximab		3.95 (2.60, 6.01)	3.58 (2.30, 5.56)		11.18 (6.20, 20.15)	9.67 (5.19, 18.04)
Natalizumab	39 (8.1%)	1.00 [Ref]	1.00 [Ref]	9 (1.9%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	211 (21.2%)	2.87 (1.99, 4.14)*	2.34 (1.60, 3.42)*	66 (7.0%)	3.43 (1.67, 7.01)*	2.67 (1.29, 5.55)*
Rituximab	132 (24.5%)	4.21 (2.78, 6.38)*	3.72 (2.45, 5.65)*	37 (7.1%)	5.34 (2.40, 11.87)*	4.12 (1.82, 9.34)*
Restricted to those with BMI data						
Natalizumab		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		2.83 (1.81, 4.44)	2.37 (1.49, 3.76)		4.69 (1.67, 13.16)	3.78 (1.33, 10.78)
Rituximab		5.33 (3.06, 9.29)	4.75 (2.65, 8.51)		13.95 (4.69, 41.53)	11.50 (3.69, 35.85)
Adjust for BMI						
Natalizumab		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		2.86 (1.82, 2.49)	2.38 (1.49, 3.79)		4.74 (1.69, 13.30)	3.86 (1.35, 11.02)
Rituximab		5.75 (3.28, 10.08)	5.10 (2.83, 9.21)		15.41 (5.14, 46.16)	12.23 (3.90, 38.35)

	Ventilation			Death		
	n (%)	OR (95% CI)	aOR (95% CI) ^a	n (%)	OR (95% CI)	aOR (95% CI) ^a
BMI						
<30	62 (3.9%)	1.00 [Ref]	1.00 [Ref]	30 (1.8%)	1.00 [Ref]	1.00 [Ref]
≥30	44 (4.8%)	1.87 (1.21, 2.91)*	2.00 (1.28, 3.14)*	22 (2.3%)	1.19 (0.67, 2.12)	1.37 (0.75, 2.49)
		p=0.005	p=0.003		<i>p=0.56</i>	<i>p=0.31</i>
Adjust for DMT						
		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
<30		1.88 (1.21, 2.93)	2.02 (1.29, 3.17)		1.19 (0.66, 2.11)	1.37 (0.75, 2.50)
≥30		p=0.005	p=0.002		<i>p=0.56</i>	<i>p=0.30</i>
DMT						
Glatiramer acetate	7 (3.0%)	1.00 [Ref]	1.00 [Ref]	3 (1.2%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	38 (4.2%)	2.17 (0.90, 5.23)	1.87 (0.77, 4.58)	22 (2.2%)	1.93 (0.57, 6.56)	1.57 (0.44, 5.55)
Rituximab	30 (6.6%)	4.13 (1.64, 10.40)*	3.57 (1.39, 9.20)	10 (2.0%)	2.74 (0.72, 10.41)	2.75 (0.68, 11.12)
Restricted to those with BMI data						
Glatiramer acetate		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		1.72 (0.65, 4.56)	1.56 (0.58, 4.21)			
Rituximab		5.63 (2.03, 15.57)	5.63 (1.97, 16.11)			
Adjust for BMI						
Glatiramer acetate		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		1.70 (0.65, 4.49)	1.55 (0.58, 4.19)			

Rituximab		5.57 (2.02, 15.39)	1.55 (0.58, 4.19)			
Pooled Other DMT	63 (2.6%)	1.00 [Ref]	1.00 [Ref]	24 (0.9%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	38 (4.2%)	2.58 (1.62, 4.10)*	2.11 (1.31, 3.42)*	22 (2.2%)	2.15 (1.18, 3.90)*	1.37 (0.73, 2.56)
Rituximab	30 (6.6%)	4.84 (2.80, 8.37)*	3.99 (2.26, 7.04)*	10 (2.0%)	3.03 (1.37, 6.73)*	2.42 (1.04, 5.62)
Restricted to those with BMI data						
Glatiramer acetate		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		2.13 (1.22, 3.71)	1.87 (1.05, 3.32)		2.49 (1.21, 5.12)	1.57 (0.75, 3.26)
Rituximab		6.84 (3.62, 12.92)	6.66 (3.40, 13.03)		5.17 (1.94, 13.82)	5.18 (1.96, 13.71)
Adjust for BMI						
Pooled Other DMT		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		2.17 (1.24, 3.79)	1.90 (1.07, 3.39)		2.49 (1.21, 5.11)	1.55 (0.75, 3.23)
Rituximab		6.96 (3.65, 13.24)	6.88 (3.48, 13.62)		5.23 (1.95, 14.03)	5.35 (2.01, 14.20)
Natalizumab	8 (1.8%)	1.00 [Ref]	1.00 [Ref]	3 (0.6%)	1.00 [Ref]	1.00 [Ref]
Ocrelizumab	38 (4.2%)	2.52 (1.12, 5.64)*	1.82 (0.79, 4.17)	22 (2.2%)	3.23 (0.95, 10.96)	2.01 (0.57, 7.10)
Rituximab	30 (6.6%)	5.82 (2.37, 14.33)*	4.10 (1.62, 10.35)*	10 (2.0%)	4.11 (1.05, 16.15)	2.78 (0.64, 12.01)
Restricted to those with BMI data						
Glatiramer acetate		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]

Ocrelizumab		5.73 (1.30, 25.32)	4.52 (1.01, 20.19)		6.55 (0.87, 49.48)	4.77 (0.61, 37.12)
Rituximab		26.68 (5.62, 126.71)	20.39 (4.22, 98.51)		16.07 (1.95, 132.11)	11.08 (1.16, 105.93)
Adjust for BMI						
Natalizumab		1.00 [Ref]	1.00 [Ref]		1.00 [Ref]	1.00 [Ref]
Ocrelizumab		5.96 (1.35, 26.41)	4.72 (1.05, 21.25)		6.55 (0.87, 49.43)	4.93 (0.63, 38.44)
Rituximab		29.68 (6.19, 142.33)	23.06 (4.68, 113.55)		16.56 (2.01, 136.55)	11.29 (1.17, 108.82)

e Table 9. DMT associations with COVID-19 severity by age, MS type, and disability, suspected+confirmed COVID-19.

	All persons	Age<70	Age≥70	Test for difference
	aβ (95% CI)			
Pooled Other DMT	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.34 (0.22, 0.45)*	0.33 (0.21, 0.44)	-0.21 (-0.89, 0.47)	<i>p=0.13</i>
Rituximab	0.59 (0.44, 0.74)*	0.58 (0.42, 0.73)	0.38 (-1.26, 2.02)	<i>p=0.81</i>
No DMT	0.41 (0.27, 0.56)*	0.47 (0.31, 0.63)	-0.16 (-0.70, 0.39)	<i>p=0.030</i>
Natalizumab	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	

Ocrelizumab	0.44 (0.25, 0.64)*	0.44 (0.24, 0.63)	0.50 (-1.08, 2.09)	<i>p=0.94</i>
Rituximab	0.72 (0.50, 0.94)*	0.70 (0.48, 0.93)	1.07 (-1.10, 3.24)	<i>p=0.74</i>
	All persons	RRMS	Progressive	Test for difference
	aβ (95% CI)			
Pooled Other DMT	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.34 (0.22, 0.45)*	0.35 (0.22, 0.48)	0.25 (-0.01, 0.50)	<i>p=0.46</i>
Rituximab	0.59 (0.44, 0.74)*	0.68 (0.51, 0.85)	0.35 (0.04, 0.67)	<i>p=0.061</i>
No DMT	0.41 (0.27, 0.56)*	0.38 (0.19, 0.56)	0.43 (0.14, 0.71)	<i>p=0.77</i>
Natalizumab	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.44 (0.25, 0.64)*	0.48 (0.27, 0.70)	0.02 (-0.52, 0.56)	<i>p=0.12</i>
Rituximab	0.72 (0.50, 0.94)*	0.82 (0.57, 1.07)	0.16 (-0.42, 0.73)	<i>p=0.035</i>
	All persons	EDSS≤6	EDSS>6	Test for difference

	a β (95% CI)			
Pooled Other DMT	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.34 (0.22, 0.45)*	0.33 (0.19, 0.47)	0.35 (0.13, 0.57)	<i>p=0.88</i>
Rituximab	0.59 (0.44, 0.74)*	0.62 (0.45, 0.79)	0.55 (0.23, 0.88)	<i>p=0.72</i>
No DMT	0.41 (0.27, 0.56)*	0.37 (0.19, 0.56)	0.49 (0.22, 0.76)	<i>p=0.49</i>
Natalizumab	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.44 (0.25, 0.64)*	0.36 (0.14, 0.57)	0.83 (0.35, 1.30)	<i>p=0.075</i>
Rituximab	0.72 (0.50, 0.94)*	0.66 (0.42, 0.91)	1.08 (0.55, 1.61)	<i>p=0.16</i>
<p>Analysis by multilevel mixed-effects ordered probit regression, estimating β (95% CI). All models adjusted for age, sex, MS phenotype, and EDSS, as appropriate. Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale.</p> <p>Results in boldface denote statistical significance ($p < 0.05$).</p>				

e Table 10. DMT associations with COVID-19 severity by age, MS type, and disability, confirmed-only COVID-19.

	All persons	Age<70	Age≥70	Test for difference
	aβ (95% CI)			
Pooled Other DMT	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.37 (0.25, 0.49)*	0.36 (0.23, 0.48)	-0.13 (-0.84, 0.57)	<i>p=0.18</i>
Rituximab	0.61 (0.44, 0.78)*	0.59 (0.42, 0.76)	0.21 (-1.43, 1.85)	<i>p=0.65</i>
No DMT	0.42 (0.27, 0.58)*	0.49 (0.33, 0.65)	-0.17 (-0.73, 0.40)	<i>p=0.030</i>
Natalizumab	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.45 (0.25, 0.65)*	0.44 (0.24, 0.64)	0.70 (-0.89, 2.29)	<i>p=0.75</i>
Rituximab	0.75 (0.51, 0.99)*	0.73 (0.49, 0.97)	1.03 (-1.13, 3.20)	<i>p=0.78</i>
	All persons	RRMS	Progressive	Test for difference
	aβ (95% CI)			
Pooled Other DMT	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	

Ocrelizumab	0.37 (0.25, 0.49)*	0.39 (0.25, 0.53)	0.28 (0.01, 0.55)	<i>p=0.47</i>
Rituximab	0.61 (0.44, 0.78)*	0.70 (0.51, 0.88)	0.38 (0.04, 0.72)	<i>p=0.098</i>
No DMT	0.42 (0.27, 0.58)*	0.39 (0.20, 0.58)	0.47 (0.17, 0.77)	<i>p=0.65</i>
Natalizumab	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.45 (0.25, 0.65)*	0.50 (0.28, 0.72)	0.05 (-0.51, 0.61)	<i>p=0.14</i>
Rituximab	0.75 (0.51, 0.99)*	0.85 (0.59, 1.11)	0.21 (-0.39, 0.81)	<i>p=0.050</i>
	All persons	EDSS≤6	EDSS>6	Test for difference
	aβ (95% CI)			
Pooled Other DMT	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	
Ocrelizumab	0.37 (0.25, 0.49)*	0.38 (0.24, 0.52)	0.34 (0.11, 0.57)	<i>p=0.77</i>
Rituximab	0.61 (0.44, 0.78)*	0.65 (0.47, 0.84)	0.49 (0.14, 0.84)	<i>p=0.40</i>
No DMT	0.42 (0.27, 0.58)*	0.40 (0.21, 0.59)	0.47 (0.19, 0.76)	<i>p=0.67</i>
Natalizumab	0.00 [Ref]	0.00 [Ref]	0.00 [Ref]	

Ocrelizumab	0.45 (0.25, 0.65)*	0.36 (0.13, 0.58)	0.85 (0.37, 1.33)	<i>p=0.068</i>
Rituximab	0.75 (0.51, 0.99)*	0.70 (0.44, 0.96)	1.08 (0.53, 1.63)	<i>p=0.21</i>

Analysis by multilevel mixed-effects ordered probit regression, estimating β (95% CI). All models adjusted for age, sex, MS phenotype, and EDSS, as appropriate. Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale.

Results in boldface denote statistical significance ($p < 0.05$).

eTable 11. DMT associations with COVID-19 severity, suspected+confirmed, by age.

	Hospitalisation			
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	aOR (95% CI) ^a	Age<70	Age≥70	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.91 (1.54, 2.37)	4.98 (1.38, 17.90)	0.27 (0.02, 3.08)	<i>p</i> =0.12
Rituximab	2.90 (2.19, 3.83)	2.46 (0.14, 44.72)	3.41 (0.01, 1051.05)	<i>p</i> =0.94
No DMT	2.10 (1.59, 2.76)	8.93 (2.93, 27.17)	0.17 (0.02, 1.20)	<i>p</i>=0.002
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.34 (1.60, 3.42)	4.80 (0.29, 80.94)	0.58 (0.00, 136.82)	<i>p</i> =0.62
Rituximab	3.72 (2.45, 5.65)	2.65 (0.06, 124.03)	7.03 (0.00, 13177.15)	<i>p</i> =0.87
	ICU admission			
	aOR (95% CI) ^a	Age<70	Age≥70	Test for difference
DMT				

Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.87 (1.92, 4.29)	6.77 (1.76, 26.03)	1.33 (0.41, 4.28)	<i>p=0.18</i>
Rituximab	4.14 (2.49, 6.89)	5.40 (1.15, 25.28)	3.29 (0.80, 13.49)	<i>p=0.73</i>
No DMT	1.88 (1.10, 3.20)	17.92 (3.16, 101.81)	0.30 (0.06, 1.42)	<i>p=0.010</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.67 (1.29, 5.55)	31.16 (1.52, 637.00)	0.33 (0.03, 3.12)	<i>p=0.077</i>
Rituximab	4.12 (1.82, 9.34)	35.78 (1.58, 811.03)	0.66 (0.06, 7.23)	<i>p=0.14</i>
	Ventilation			
	aOR (95% CI) ^a	Age<70	Age≥70	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.11 (1.31, 3.42)	2.39 (0.60, 9.60)	1.84 (0.44, 7.69)	<i>p=0.85</i>
Rituximab	3.99 (2.26, 7.04)	1.61 (0.34, 7.73)	9.60 (2.03, 45.36)	<i>p=0.23</i>

No DMT	2.25 (1.28, 3.97)	2.37 (0.40, 14.23)	2.29 (0.44, 11.98)	$p=0.98$
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.82 (0.79, 4.17)	14.24 (0.86, 237.05)	0.25 (0.02, 2.97)	$p=0.11$
Rituximab	4.10 (1.62, 10.35)	14.51 (0.76, 277.47)	1.34 (0.10, 17.17)	$p=0.37$
	Death			
	aOR (95% CI) ^a	Age<70	Age≥70	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.37 (0.73, 2.56)	5.66 (0.39, 81.89)	0.48 (0.07, 3.14)	$p=0.27$
Rituximab	2.42 (1.04, 5.62)	6.45 (0.31, 133.11)	1.06 (0.09, 12.23)	$p=0.50$
No DMT	2.43 (1.24, 4.75)	17.34 (0.92, 328.51)	0.76 (0.10, 5.59)	$p=0.20$
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	

Ocrelizumab	2.01 (0.57, 7.10)	4.37 (0.05, 405.24)	1.04 (0.02, 43.91)	<i>p</i> =0.72
Rituximab	2.78 (0.64, 12.01)	4.56 (0.04, 554.26)	1.73 (0.03, 107.01)	<i>p</i> =0.82
<p>Analysis by multilevel mixed-effects logistic regression, estimating β (95% CI). All models adjusted for sex, MS phenotype, and EDSS. Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale. Results in boldface denote statistical significance (<i>p</i><0.05).</p>				

eTable 12. DMT associations with COVID-19 severity, confirmed-only, by age.

	Hospitalisation			
	aOR (95% CI) ^a	Age<70	Age≥70	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	

Ocrelizumab	1.96 (1.57, 2.47)	4.25 (1.10, 16.48)	0.40 (0.03, 5.23)	<i>p=0.24</i>
Rituximab	3.11 (2.29, 4.21)	3.44 (0.19, 63.50)	2.10 (0.01, 664.47)	<i>p=0.91</i>
No DMT	2.15 (1.62, 2.87)	9.04 (2.82, 29.01)	0.18 (0.02, 1.35)	<i>p=0.014</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.29 (1.55, 3.37)	3.36 (0.19, 58.85)	1.08 (0.00, 272.85)	<i>p=0.79</i>
Rituximab	4.23 (2.75, 6.52)	3.34 (0.07, 158.74)	6.19 (0.00, 11,814.23)	<i>p=0.92</i>
	ICU admission			
	aOR (95% CI) ^a	Age<70	Age≥70	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.77 (1.85, 4.16)	7.36 (1.87, 29.00)	1.14 (0.35, 3.76)	<i>p=0.13</i>
Rituximab	4.52 (2.70, 7.59)	5.17 (1.07, 24.84)	4.16 (0.98, 17.56)	<i>p=0.88</i>
No DMT	1.70 (0.98, 2.95)	20.89 (3.55, 122.79)	0.22 (0.04, 1.11)	<i>p=0.005</i>

Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.61 (1.26, 5.41)	29.75 (1.45, 608.59)	0.33 (0.03, 3.14)	<i>p=0.080</i>
Rituximab	4.62 (2.03, 10.50)	30.49 (1.34, 693.10)	0.97 (0.09, 10.70)	<i>p=0.20</i>
	Ventilation			
	aOR (95% CI) ^a	Age<70	Age≥70	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.21 (1.36, 3.61)	2.83 (0.68, 11.74)	1.69 (0.39, 7.27)	<i>p=0.71</i>
Rituximab	3.92 (2.17, 7.07)	1.59 (0.32, 8.02)	9.47 (1.88, 47.64)	<i>p=0.25</i>
No DMT	2.22 (1.24, 3.99)	2.59 (0.42, 16.07)	2.07 (0.38, 11.42)	<i>p=0.90</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.79 (0.78, 4.12)	13.64 (0.79, 234.23)	0.26 (0.02, 3.12)	<i>p=0.12</i>
Rituximab	3.95 (1.56, 10.03)	12.74 (0.64, 251.70)	1.45 (0.11, 19.13)	<i>p=0.42</i>

	Death			
	aOR (95% CI) ^a	Age<70	Age≥70	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.41 (0.74, 2.70)	10.47 (0.57, 193.69)	0.33 (0.04, 2.42)	<i>p</i> =0.15
Rituximab	2.16 (0.85, 5.53)	6.22 (0.19, 201.90)	0.95 (0.06, 14.25)	<i>p</i> =0.53
No DMT	2.24 (1.11, 4.54)	31.57 (1.33, 751.54)	0.48 (0.06, 4.02)	<i>p</i> =0.11
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.89 (0.53, 6.74)	5.27 (0.06, 491.58)	0.78 (0.02, 32.89)	<i>p</i> =0.64
Rituximab	1.87 (0.39, 8.94)	2.45 (0.02, 366.96)	1.38 (0.02, 95.27)	<i>p</i> =0.90
<p>Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for sex, MS phenotype, and EDSS. Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio.</p> <p>Results in boldface denote statistical significance (<i>p</i><0.05).</p>				

eTable 13. DMT associations with COVID-19 severity, suspected+confirmed, by MS phenotype.

	Hospitalisation			
	aOR (95% CI) ^a	RRMS	Progressive	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.91 (1.54, 2.37)	1.99 (1.56, 2.54)	1.60 (1.02, 2.51)	<i>p=0.40</i>
Rituximab	2.90 (2.19, 3.83)	3.33 (2.44, 4.53)	1.80 (1.03, 3.15)	<i>p=0.051</i>
No DMT	2.10 (1.59, 2.76)	2.06 (1.47, 2.89)	1.98 (1.20, 3.25)	<i>p=0.89</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.34 (1.60, 3.42)	2.53 (1.67, 3.84)	1.13 (0.43, 3.01)	<i>p=0.14</i>
Rituximab	3.72 (2.45, 5.65)	4.36 (2.76, 6.90)	1.44 (0.51, 4.05)	<i>p=0.052</i>
	ICU admission			

	aOR (95% CI) ^a	RRMS	Progressive	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.87 (1.92, 4.29)	3.23 (2.01, 5.19)	2.09 (1.02, 4.27)	<i>p=0.32</i>
Rituximab	4.14 (2.49, 6.89)	4.44 (2.43, 8.10)	3.24 (1.39, 7.53)	<i>p=0.53</i>
No DMT	1.88 (1.10, 3.20)	2.43 (1.24, 4.78)	1.22 (0.53, 2.81)	<i>p=0.21</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.67 (1.29, 5.55)	3.54 (1.47, 8.53)	0.98 (0.26, 3.73)	<i>p=0.11</i>
Rituximab	4.12 (1.82, 9.34)	5.52 (2.08, 14.63)	1.50 (0.36, 6.27)	<i>p=0.13</i>
	Ventilation			
	aOR (95% CI) ^a	RRMS	Progressive	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.11 (1.31, 3.42)	1.97 (1.13, 3.44)	2.74 (1.06, 7.19)	<i>p=0.55</i>

Rituximab	3.99 (2.26, 7.04)	4.00 (2.07, 7.71)	4.50 (1.56, 12.97)	<i>p=0.85</i>
No DMT	2.25 (1.28, 3.97)	1.96 (0.95, 4.05)	3.08 (1.11, 8.53)	<i>p=0.48</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.82 (0.79, 4.17)	2.73 (0.98, 7.62)	0.43 (0.10, 1.79)	<i>p=0.038</i>
Rituximab	4.10 (1.62, 10.35)	6.85 (2.21, 21.25)	0.85 (0.19, 3.87)	<i>p=0.026</i>
	Death			
	aOR (95% CI) ^a	RRMS	Progressive	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.37 (0.73, 2.56)	2.21 (0.92, 5.31)	0.79 (0.33, 1.90)	<i>p=0.10</i>
Rituximab	2.42 (1.04, 5.62)	5.10 (1.72, 15.15)	0.96 (0.27, 3.40)	<i>p=0.046</i>
No DMT	2.43 (1.24, 4.75)	4.14 (1.51, 11.38)	1.50 (0.64, 3.52)	<i>p=0.13</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	

Ocrelizumab	2.01 (0.57, 7.10)	2.46 (0.52, 11.53)	0.83 (0.09, 7.31)	<i>p=0.43</i>
Rituximab	2.78 (0.64, 12.01)	4.74 (0.84, 26.67)	0.69 (0.06, 8.31)	<i>p=0.20</i>
<p>Analysis by multilevel mixed-effects logistic regression, estimating β (95% CI). All models adjusted for age, sex, and EDSS. Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale.</p> <p>Results in boldface denote statistical significance ($p<0.05$).</p>				

eTable 14. DMT associations with COVID-19 severity, confirmed-only, by MS phenotype.

	Hospitalisation			
	aOR (95% CI) ^a	RRMS	Progressive	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.96 (1.57, 2.47)	2.04 (1.58, 2.63)	1.72 (1.07, 2.76)	<i>p=0.059</i>
Rituximab	3.11 (2.29, 4.21)	3.56 (2.55, 4.97)	1.95 (1.06, 3.56)	<i>p=0.54</i>

No DMT	2.15 (1.62, 2.87)	2.04 (1.44, 2.89)	2.23 (1.32, 3.78)	<i>p=0.074</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.29 (1.55, 3.37)	2.48 (1.62, 3.79)	1.18 (0.43, 3.22)	<i>p=0.18</i>
Rituximab	4.23 (2.75, 6.52)	4.94 (3.07, 7.93)	1.73 (0.59, 5.05)	<i>p=0.076</i>
	ICU admission			
	aOR (95% CI) ^a	RRMS	Progressive	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.77 (1.85, 4.16)	3.08 (1.90, 4.99)	2.09 (1.02, 4.30)	<i>p=0.38</i>
Rituximab	4.52 (2.70, 7.59)	4.94 (2.69, 9.09)	3.46 (1.47, 8.15)	<i>p=0.49</i>
No DMT	1.70 (0.98, 2.95)	2.19 (1.09, 4.41)	1.13 (0.48, 2.66)	<i>p=0.24</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.61 (1.26, 5.41)	3.39 (1.41, 8.17)	1.04 (0.27, 3.99)	<i>p=0.15</i>
Rituximab	4.62 (2.03, 10.50)	6.18 (2.33, 16.39)	1.77 (0.42, 7.46)	<i>p=0.15</i>

	Ventilation			
	aOR (95% CI) ^a	RRMS	Progressive	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.21 (1.36, 3.61)	2.13 (1.21, 3.78)	2.62 (1.00, 6.87)	<i>p=0.72</i>
Rituximab	3.92 (2.17, 7.07)	4.02 (2.03, 7.96)	4.10 (1.40, 11.96)	<i>p=0.98</i>
No DMT	2.22 (1.24, 3.99)	1.82 (0.84, 3.90)	3.15 (1.13, 8.77)	<i>p=0.40</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.79 (0.78, 4.12)	2.69 (0.95, 7.56)	0.45 (0.11, 1.90)	<i>p=0.047</i>
Rituximab	3.95 (1.56, 10.03)	6.45 (2.06, 20.18)	0.92 (0.20, 4.23)	<i>p=0.039</i>
	Death			
	aOR (95% CI) ^a	RRMS	Progressive	Test for difference
DMT				

Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.41 (0.74, 2.70)	2.21 (0.88, 5.54)	0.87 (0.36, 2.12)	<i>p=0.15</i>
Rituximab	2.16 (0.85, 5.53)	3.92 (1.11, 13.80)	1.10 (0.29, 4.11)	<i>p=0.16</i>
No DMT	2.24 (1.11, 4.54)	3.81 (1.30, 11.20)	1.45 (0.60, 3.50)	<i>p=0.17</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.89 (0.53, 6.74)	2.32 (0.49, 10.95)	0.93 (0.10, 8.29)	<i>p=0.50</i>
Rituximab	1.87 (0.39, 8.94)	2.87 (0.44, 18.49)	0.72(0.06, 8.93)	<i>p=0.37</i>
<p>Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for age, sex, MS phenotype, and EDSS. Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio.</p> <p>Results in boldface denote statistical significance ($p<0.05$).</p> <p>Note: Other DMT was queried as “On another drug not listed”.</p>				

e Table 15. DMT associations with COVID-19 severity, suspected+confirmed, by disability.

	Hospitalisation			
	aOR (95% CI) ^a	EDSS≤6	EDSS>6	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.91 (1.54, 2.37)	1.84 (1.42, 2.38)	2.01 (1.36, 2.98)	<i>p=0.71</i>
Rituximab	2.90 (2.19, 3.83)	3.09 (2.28, 4.20)	2.27 (1.28, 4.03)	<i>p=0.33</i>
No DMT	2.10 (1.59, 2.76)	2.13 (1.52, 2.98)	2.06 (1.28, 3.29)	<i>p=0.91</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.34 (1.60, 3.42)	1.96 (1.29, 3.00)	4.04 (1.72, 9.49)	<i>p=0.14</i>
Rituximab	3.72 (2.45, 5.65)	3.50 (2.23, 5.50)	5.00 (1.92, 13.01)	<i>p=0.50</i>
	ICU admission			

	aOR (95% CI) ^a	EDSS≤6	EDSS>6	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.87 (1.92, 4.29)	3.78 (2.25, 6.34)	1.93 (1.05, 3.53)	<i>p=0.094</i>
Rituximab	4.14 (2.49, 6.89)	5.04 (2.73, 9.33)	2.78 (1.23, 6.28)	<i>p=0.23</i>
No DMT	1.88 (1.10, 3.20)	1.90 (0.86, 4.23)	1.58 (0.77, 3.28)	<i>p=0.74</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.67 (1.29, 5.55)	3.64 (1.09, 5.88)	3.09 (0.70, 13.60)	<i>p=0.82</i>
Rituximab	4.12 (1.82, 9.34)	4.01 (1.58, 10.13)	4.60 (0.93, 22.75)	<i>p=0.88</i>
	Ventilation			
	aOR (95% CI) ^a	EDSS≤6	EDSS>6	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.11 (1.31, 3.42)	2.36 (1.32, 4.23)	1.95 (0.86, 4.41)	<i>p=0.70</i>
Rituximab	3.99 (2.26, 7.04)	4.23 (2.21, 8.10)	3.41 (1.25, 9.36)	<i>p=0.71</i>

No DMT	2.25 (1.28, 3.97)	1.45 (0.62, 3.37)	3.36 (1.40, 8.05)	<i>p=0.17</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.82 (0.79, 4.17)	2.01 (0.76, 5.31)	1.31 (0.28, 6.11)	<i>p=0.64</i>
Rituximab	4.10 (1.62, 10.35)	4.62 (1.59, 13.41.)	2.80 (0.53, 14.81)	<i>p=0.61</i>
	Death			
	aOR (95% CI) ^a	EDSS≤6	EDSS>6	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.37 (0.73, 2.56)	1.81 (0.52, 6.31)	1.22 (0.60, 2.48)	<i>p=0.59</i>
Rituximab	2.42 (1.04, 5.62)	2.83 (0.69, 11.62)	2.20 (0.80, 6.07)	<i>p=0.77</i>
No DMT	2.43 (1.24, 4.75)	4.52 (1.28, 15.93)	1.98 (0.93, 4.23)	<i>p=0.26</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.01 (0.57, 7.10)	1.02 (0.18, 5.71)	3.94 (0.49, 31.50)	<i>p=0.33</i>

Rituximab	2.78 (0.64, 12.01)	1.57 (0.24, 10.37)	5.50 (0.57, 53.38)	$p=0.39$
<p>Analysis by multilevel mixed-effects logistic regression, estimating β (95% CI). All models adjusted for age, sex, and MS phenotype. Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale.</p> <p>Results in boldface denote statistical significance ($p<0.05$).</p>				

e Table 16. DMT associations with COVID-19 severity, confirmed-only, by disability.

	Hospitalisation			
	aOR (95% CI) ^a	EDSS≤6	EDSS>6	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.96 (1.57, 2.47)	1.92 (1.46, 2.52)	2.05 (1.36, 3.08)	$p=0.79$
Rituximab	3.11 (2.29, 4.21)	3.27 (2.35, 4.55)	2.50 (1.34, 4.65)	$p=0.43$
No DMT	2.15 (1.62, 2.87)	2.15 (1.52, 3.05)	2.15 (1.31, 3.54)	$p=0.99$

Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.29 (1.55, 3.37)	1.88 (1.22, 2.89)	4.29 (1.81, 10.14)	<i>p=0.092</i>
Rituximab	4.23 (2.75, 6.52)	3.83 (2.40, 6.10)	6.43 (2.40, 17.24)	<i>p=0.34</i>
	ICU admission			
	aOR (95% CI) ^a	EDSS≤6	EDSS>6	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.77 (1.85, 4.16)	3.67 (2.17, 6.21)	1.83 (0.99, 3.37)	<i>p=0.086</i>
Rituximab	4.52 (2.70, 7.59)	5.54 (2.99, 10.26)	2.97 (1.28, 6.86)	<i>p=0.21</i>
No DMT	1.70 (0.98, 2.95)	1.85 (0.83, 4.12)	1.36 (0.64, 2.91)	<i>p=0.59</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.61 (1.26, 5.41)	2.43 (1.05, 5.64)	3.18 (0.72, 14.07)	<i>p=0.76</i>
Rituximab	4.62 (2.03, 10.50)	4.39 (1.74, 11.05)	5.50 (1.10, 27.59)	<i>p=0.81</i>

	Ventilation			
	aOR (95% CI) ^a	EDSS≤6	EDSS>6	Test for difference
DMT				
Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	2.21 (1.36, 3.61)	2.67 (1.47, 4.83)	1.72 (0.76, 3.88)	<i>p=0.38</i>
Rituximab	3.92 (2.17, 7.07)	4.50 (2.31, 8.77)	2.58 (0.90, 7.38)	<i>p=0.35</i>
No DMT	2.22 (1.24, 3.99)	1.50 (0.64, 3.53)	3.00 (1.23, 7.30)	<i>p=0.27</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.79 (0.78, 4.12)	1.97 (0.74, 5.22)	1.28 (0.27, 5.98)	<i>p=0.64</i>
Rituximab	3.95 (1.56, 10.03)	4.59 (1.59, 13.29)	2.47 (0.45, 13.48)	<i>p=0.53</i>
	Death			
	aOR (95% CI) ^a	EDSS≤6	EDSS>6	Test for difference
DMT				

Pooled Other DMT	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.41 (0.74, 2.70)	2.58 (0.68, 9.86)	1.13 (0.54, 2.33)	<i>p=0.28</i>
Rituximab	2.16 (0.85, 5.53)	3.87 (0.87, 17.20)	1.58 (0.49, 5.06)	<i>p=0.34</i>
No DMT	2.24 (1.11, 4.54)	5.87 (1.53, 22.58)	1.63 (0.74, 3.59)	<i>p=0.10</i>
Natalizumab	1.00 [Ref]	1.00 [Ref]	1.00 [Ref]	
Ocrelizumab	1.89 (0.53, 6.74)	1.09 (0.19, 6.15)	3.31 (0.42, 26.34)	<i>p=0.42</i>
Rituximab	1.87 (0.39, 8.94)	1.35 (0.20, 9.31)	3.10 (0.28, 33.89)	<i>p=0.58</i>
<p>Analysis by multilevel mixed-effects logistic regression, estimating OR (95% CI). ^aMultivariable models adjusted for age, sex, MS phenotype, and EDSS. Abbreviations: DMT = disease-modifying therapy; EDSS = Expanded Disability Status Scale; ICU = Intensive Care Unit; MS = multiple sclerosis; OR = odds ratio.</p> <p>Results in boldface denote statistical significance ($p<0.05$).</p>				