

Supplementary Table 1. Country origin of cases reported to the registry

Country	Frequency	Percent*
Argentina	n < 5	< 1
Australia	5	1
Austria	n < 5	< 1
Belgium	n < 5	< 1
Bosnia and Herzegovina	n < 5	< 1
Brazil	5	1
Canada	5	1
Chile	8	1
Colombia	n < 5	< 1
Croatia	n < 5	< 1
Cyprus	n < 5	< 1
Czech Republic	n < 5	< 1
Dominican Republic	n < 5	< 1
England	85	14
France	n < 5	< 1
Germany	6	1
Greece	n < 5	< 1
Honduras	n < 5	< 1
India	n < 5	< 1
Iran	7	1
Israel	n < 5	< 1
Italy	6	1
Kuwait	n < 5	< 1
Latvia	n < 5	< 1
Malaysia	5	1
Mexico	n < 5	< 1
Netherlands	8	1
Northern Ireland	n < 5	< 1
Norway	n < 5	< 1
Pakistan	n < 5	< 1
Philippines	n < 5	< 1
Portugal	n < 5	< 1
Republic of Ireland	13	2
Saudi Arabia	n < 5	< 1
Slovenia	n < 5	< 1
South Africa	n < 5	< 1
Spain	59	10

Switzerland	n < 5	< 1
Turkey	15	3
United States of America (USA)	331	55

*Percent may not equal 100 due to rounding

Supplementary Table 2. Demographic and clinical characteristics of rheumatic disease patients with COVID-19 by diagnosis status

	Confirmed Diagnosis† N = 548	Presumptive Diagnosis N = 52
Region		
Region of the Americas: North	321 (59)	19 (37)
Region of the Americas: South	16 (3)	0 (0)
European Region	185 (34)	33 (63)
African Region	n < 5 (<1)	0 (0)
Eastern Mediterranean Region	11 (2)	0 (0)
South-East Asian Region	n < 5 (<1)	0 (0)
Western Pacific Region	13 (2)	0 (0)
Female	386 (70)	37 (71)
Age		
18 - 29 years	30 (5)	n < 5 (<10)
30 - 49 years	146 (27)	23 (44)
50 - 65 years	208 (38)	21 (40)
> 65 years	164 (30)	6 (12)

Median (IQR)	56 (46 – 67.5)	50 (42 – 58.5)
Most Common Rheumatic Disease Diagnoses*		
Rheumatoid arthritis	210 (38)	20 (38)
Systemic lupus erythematosus	80 (15)	5 (10)
Psoriatic arthritis	66 (12)	8 (15)
Axial spondyloarthritis or other spondyloarthritis	41 (7)	7 (13)
Other	156 (28)	12 (23)
Most Common Comorbidities		
Hypertension	187 (34)	12 (23)
Lung disease#	118 (22)	9 (17)
Diabetes	68 (12)	n < 5 (<10)
Cardiovascular disease	59 (11)	4 (8)
Chronic renal insufficiency/End-stage renal disease	40 (7)	n < 5 (<10)
Disease Activity (N=575)		
Remission	160 (31)	13 (25)
Minimal or low disease activity	266 (51)	20 (38)

Moderate disease activity	85 (16)	17 (33)
Severe or high disease activity	12 (2)	n < 5 (<10)
Ever Smoker (N=518)	118 (22)	11 (21)
Medication Prior to COVID-19 Diagnosis [^]		
No DMARD	92 (17)	5 (10)
csDMARD only, including anti-malarial therapy	253 (46)	19 (37)
csDMARD only, excluding anti-malarial therapy	203 (37)	17 (33)
Anti-malarial, with or without other DMARD	123 (22)	7 (13)
Anti-malarial Only	50 (9)	n < 5 (<10)
b/tsDMARDs Only	95 (17)	12 (23)
csDMARD + b/tsDMARD Combination Therapy	108 (20)	16 (31)
NSAIDs (N=531)	101 (21)	10 (22)
Prednisone-Equivalent Glucocorticoids (N=592)		
None	363 (67)	40 (77)
1-9 mg/day	115 (21)	10 (19)

≥ 10 mg/day	62 (11)	n < 5 (<10)
Hospitalized	273 (50)	n < 5 (<10)
Deceased	54 (10)	n < 5 (<10)
Reported Days from Onset to Resolution or Death (N=275), median (IQR)	12 (7 – 16)	16 (10 – 20)

N (column %) for categorical variables unless otherwise noted.

Percentages may not sum to 100 due to rounding.

NSAID = Nonsteroidal anti-inflammatory drugs, DMARD = disease-modifying anti-rheumatic drug;

†Confirmed diagnosis includes evidence of the patient having: a) a confirmatory COVID test; b) documentation of chest imaging showing bilateral infiltrates in keeping with COVID-19 pneumonia; or c) close contact with a known COVID-19 positive patient.

*Cases could have more than one disease diagnosis. “Other” rheumatic disease category included (each n<10): undifferentiated connective tissue disease; ocular inflammation; autoinflammatory syndrome; mixed connective tissue disease; antiphospholipid antibody syndrome; calcium pyrophosphate deposition disease; systemic juvenile idiopathic arthritis; juvenile idiopathic arthritis, not systemic; IgG4-related disease.

#Chronic obstructive pulmonary disease, asthma, interstitial lung disease, or other not specified.

^Conventional synthetic DMARD (csDMARD) medications included: antimalarials (hydroxychloroquine, chloroquine), azathioprine, cyclophosphamide, cyclosporine, leflunomide, methotrexate, mycophenolate mofetil/mycophenolic acid, sulfasalazine, tacrolimus; Biologic or targeted synthetic DMARDs (b/tsDMARD) included: abatacept, belimumab, CD-20 inhibitors, IL-1 inhibitors, IL-6 inhibitors, IL-12/23 inhibitors, IL-17 inhibitors, anti-TNF, and Janus-kinase inhibitors

Supplementary Table 3. Demographic and clinical characteristics of rheumatic disease patients with COVID-19 by sex

	Male N=177	Female N=423
Region		
Region of the Americas: North	85 (48)	255 (60)
Region of the Americas: South	7 (4)	9 (2)
European Region	77 (44)	140 (33)
African Region	n<5 (<1)	n<5 (<1)
Eastern Mediterranean Region	5 (3)	6 (1)
South-East Asian Region	n<5 (<1)	n<5 (<1)
Western Pacific Region	n<5 (<1)	10 (2)
Age		
18 - 29 years	10 (6)	22 (5)
30 - 49 years	38 (21)	131 (31)
50 - 65 years	56 (32)	173 (41)
> 65 years	73 (41)	97 (23)
Median (IQR)	61 (48 - 71)	54 (43 - 64)

Most Common Rheumatic Disease Diagnoses*		
Rheumatoid arthritis	53 (30)	177 (42)
Systemic lupus erythematosus	7 (4)	78 (18)
Psoriatic arthritis	32 (18)	42 (10)
Axial spondyloarthritis or other spondyloarthritis	19 (11)	20 (5)
Vasculitis	16 (9)	28 (7)
Other	51 (29)	78 (18)
Most Common Comorbidities		
Hypertension	66 (37)	133 (31)
Lung disease#	37 (21)	90 (21)
Diabetes	23 (13)	46 (11)
Cardiovascular disease	34 (19)	29 (7)
Chronic renal Insufficiency/End stage renal disease	19 (11)	21 (5)
Smoking Status (N=518)		
Ever	98 (64)	291 (80)
Never	55 (36)	74 (20)
Medication Prior to COVID-19 Diagnosis^		

No DMARD	37 (21)	60 (14)
csDMARD only, including anti-malarial therapy	72 (41)	200 (47)
csDMARD only, excluding anti-malarial therapy	65 (37)	155 (37)
Anti-malarial, with or without other DMARD	23 (13)	107 (25)
b/tsDMARDs only	39 (22)	68 (16)
csDMARD + b/tsDMARD combination therapy	29 (16)	95 (22)
NSAIDs (N=531)	32 (21)	79 (21)
Prednisone-Equivalent Glucocorticoids (N=592)		
None	127 (73)	276 (66)
1-9 mg	29 (17)	96 (23)
≥ 10 mg	19 (11)	45 (11)
Hospitalized	92 (52)	185 (44)
Deceased	15 (8)	40 (9)
Reported Days from Onset to Resolution / Death (N=275), median (IQR)	12 (7 - 15)	14 (8 - 17)

N (column %) for categorical variables unless otherwise noted.

Percentages may not sum to 100 due to rounding.

NSAID = Nonsteroidal anti-inflammatory drugs, DMARD = disease-modifying anti-rheumatic drug;

*Cases could have more than one disease diagnosis. Other rheumatic disease category included (each n<10): undifferentiated connective tissue disease; ocular inflammation; autoinflammatory syndrome; mixed connective tissue disease; anti-phospholipid antibody syndrome; calcium pyrophosphate deposition disease; systemic juvenile idiopathic arthritis; juvenile idiopathic arthritis, not systemic; IgG4-related disease.

#Chronic obstructive pulmonary disease, asthma, interstitial lung disease, or other not specified.

^Conventional synthetic DMARD (csDMARD) medications included: antimalarials (hydroxychloroquine, chloroquine), azathioprine, cyclophosphamide, cyclosporine, leflunomide, methotrexate, mycophenolate mofetil/mycophenolic acid, sulfasalazine, tacrolimus; Biologic or targeted synthetic DMARDs (b/tsDMARD) included: abatacept, belimumab, CD-20 inhibitors, IL-1 inhibitors, IL-6 inhibitors, IL-12/23 inhibitors, IL-17 inhibitors, anti-TNF, and janus-kinase inhibitors

Supplementary Table 4. Individual counts of b/tsDMARDs in the non-TNF inhibitor b/tsDMARD group

	Biologic or small molecule therapy only (n=107)	Any biologic or small molecule therapy (n=231)
	N (%)	N (%)
Anti-TNF	56 (52)	119 (52)
CD-20	10 (9)	27 (12)
IL-1	0 (0)	2 (<1)
IL-12/23	2 (2)	3 (1)
IL-17	15 (14)	16 (7)
IL-6	11 (10)	16 (7)
JAKi	9 (8)	26 (11)
Abatacept	3 (3)	17 (7)
Belimumab	1 (1)	10 (4)

IL – interleukin; JAKi – Janus kinase inhibitor

Supplementary Table 5. Adjusted logistic regression model examining the association between demographic and clinical characteristics and COVID-19 hospitalization status, excluding presumptive cases (N=548)

	OR (95% CI)	P-value
Female	0.80 (0.51, 1.25)	0.32
Age > 65 years	2.60 (1.61, 4.19)	<0.01
Rheumatic Disease Diagnosis		
Rheumatoid arthritis	<i>Ref</i>	--
Systemic lupus erythematosus	1.93 (1.03, 3.59)	0.04
Psoriatic Arthritis	0.97 (0.49, 1.94)	0.93
Axial spondyloarthritis or other spondyloarthritis	1.32 (0.58, 3.02)	0.51
Vasculitis	1.51 (0.64, 3.58)	0.35
Other	1.05 (0.60, 1.84)	0.87
Comorbidities (present vs. not)		
Hypertension or Cardiovascular Disease	1.86 (1.21, 2.86)	0.01
Lung Disease	2.51 (1.53, 4.13)	<0.01
Diabetes	2.39 (1.26, 4.53)	0.01
Chronic renal Insufficiency/End stage renal	2.66 (1.06, 6.66)	0.04

disease		
Smoking status, ever (vs never)	1.21 (0.92, 1.60)	0.18
Rheumatic Disease Medication Prior to COVID-19 Diagnosis		
No DMARD	<i>Ref</i>	--
csDMARD only	1.32 (0.73, 2.37)	0.36
b/tsDMARDs only	0.46 (0.22, 0.97)	0.04
csDMARD + b/tsDMARD combination therapy	0.84 (0.41, 1.70)	0.63
NSAIDs	0.68 (0.41, 1.14)	0.15
Prednisone-Equivalent Glucocorticoids		
None	<i>Ref</i>	--
1-9 mg/day	1.02 (0.62, 1.68)	0.94
≥ 10 mg/day	1.97 (0.99, 3.89)	0.05

Odds ratios adjusted for all variables shown.

NSAID = Nonsteroidal anti-inflammatory drugs, DMARD = disease-modifying anti-rheumatic drug;

*Patients with more than one disease within these five diagnoses were classified as follows: systemic lupus erythematosus > rheumatoid arthritis > psoriatic arthritis > vasculitis > axial/other spondyloarthritis > other. Other rheumatic disease category included (each n<10): undifferentiated connective tissue disease; ocular inflammation; autoinflammatory syndrome; mixed connective tissue disease; antiphospholipid antibody syndrome; calcium pyrophosphate

deposition disease; systemic juvenile idiopathic arthritis; juvenile idiopathic arthritis, not systemic; IgG4-related disease.

#Chronic obstructive pulmonary disease, asthma, interstitial lung disease, or other not specified.

^Conventional synthetic DMARD (csDMARD) medications included: antimalarials (hydroxychloroquine, chloroquine), azathioprine, cyclophosphamide, cyclosporine, leflunomide, methotrexate, mycophenolate mofetil/mycophenolic acid, sulfasalazine, tacrolimus; Biologic or targeted synthetic DMARDs (b/tsDMARD) included: abatacept, belimumab, CD-20 inhibitors, IL-1 inhibitors, IL-6 inhibitors, IL-12/23 inhibitors, IL-17 inhibitors, anti-TNF, and janus-kinase inhibitors

Patients with a “presumptive diagnosis” were excluded, meaning that their physician thought they had symptoms or signs consistent with the disease, but did not have a confirmatory test, chest x-ray, or close contact with a known positive patient.

Supplementary Table 6. Adjusted logistic regression model examining the association between demographic and clinical characteristics and COVID-19 hospitalization status, excluding unresolved cases with reporting < 14 days from symptom onset or diagnosis date, or unknown resolution status (N=386)

	OR (95% CI)	P-value
Female	0.83 (0.47, 1.44)	0.51
Age > 65 years	2.82 (1.54, 5.15)	<0.01
Rheumatic Disease Diagnosis		
Rheumatoid Arthritis	<i>Ref</i>	--
Systemic Lupus Erythematosus	1.61 (0.71, 3.65)	0.25
Psoriatic Arthritis	0.87 (0.38, 1.99)	0.73
Axial spondyloarthritis or other spondyloarthritis	1.07 (0.40, 2.82)	0.89
Vasculitis	0.82 (0.28, 2.38)	0.72
Other	0.75 (0.37, 1.53)	0.43
Comorbidities (present vs. not)		
Hypertension or Cardiovascular Disease	2.02 (1.16, 3.51)	0.01
Lung Disease	2.33 (1.24, 4.36)	0.01
Diabetes	2.06 (0.90, 4.71)	0.09

Chronic Renal Insufficiency/ESRD	5.32 (1.06, 26.78)	0.04
Smoking status, ever (vs never)	1.32 (0.94, 1.85)	0.11
Rheumatic Disease Medication Prior to COVID-19 Diagnosis		
No DMARD	<i>Ref</i>	--
csDMARD only	1.14 (0.56, 2.34)	0.72
b/tsDMARDs only	0.26 (0.10, 0.66)	<0.01
csDMARD + b/tsDMARD combination therapy	0.67 (0.28, 1.61)	0.37
NSAIDs	0.76 (0.41, 1.40)	0.38
Prednisone-Equivalent Glucocorticoids		
None	<i>Ref</i>	--
1-9 mg/day	0.69 (0.36, 1.29)	0.24
≥ 10 mg/day	4.31 (1.61, 11.56)	<0.01

Odds ratios adjusted for all variables shown.

NSAID = Nonsteroidal anti-inflammatory drugs, DMARD = disease-modifying anti-rheumatic drug;

*Patients with more than one disease within these five diagnoses were classified as follows: systemic lupus erythematosus > rheumatoid arthritis > psoriatic arthritis > vasculitis > axial/other spondyloarthritis > other. Other rheumatic disease category included (each n<10): undifferentiated connective tissue disease; ocular inflammation; autoinflammatory syndrome; mixed connective tissue disease; antiphospholipid antibody syndrome; calcium pyrophosphate

deposition disease; systemic juvenile idiopathic arthritis; juvenile idiopathic arthritis, not systemic; IgG4-related disease.

#Chronic obstructive pulmonary disease, asthma, interstitial lung disease, or other not specified.

^Conventional synthetic DMARD (csDMARD) medications included: antimalarials (hydroxychloroquine, chloroquine), azathioprine, cyclophosphamide, cyclosporine, leflunomide, methotrexate, mycophenolate mofetil/mycophenolic acid, sulfasalazine, tacrolimus; Biologic or targeted synthetic DMARDs (b/tsDMARD) included: abatacept, belimumab, CD-20 inhibitors, IL-1 inhibitors, IL-6 inhibitors, IL-12/23 inhibitors, IL-17 inhibitors, anti-TNF, and janus-kinase inhibitors

Analysis included only resolved cases, and unresolved cases entered into the registry \geq 14 days from symptom onset (or diagnosis date if symptom onset was not known), as it is unlikely that a patient would be hospitalized more than 2 weeks after onset.

Supplementary Table 7. Complete case adjusted logistic regression model examining the association between demographic and clinical characteristics and COVID-19 hospitalization status (N=458)

	OR (95% CI)	P-value
Female	0.90 (0.54, 1.48)	0.68
Age > 65 years	2.44 (1.43, 4.16)	<0.01
Rheumatic Disease Diagnosis		
Rheumatoid Arthritis	<i>Ref</i>	--
Systemic Lupus Erythematosus	1.63 (0.83, 3.22)	0.16
Psoriatic Arthritis	0.78 (0.37, 1.65)	0.52
Axial spondyloarthritis or other spondyloarthritis	0.99 (0.42, 2.35)	0.99
Vasculitis	1.38 (0.53, 3.55)	0.51
Other	0.94 (0.50, 1.75)	0.84
Comorbidities (present vs. not)		
Hypertension or Cardiovascular Disease	1.73 (1.08, 2.75)	0.02
Lung Disease	2.28 (1.33, 3.90)	<0.01
Diabetes	3.12 (1.44, 6.79)	<0.01
Chronic Renal Insufficiency/ESRD	3.03 (1.00, 9.13)	0.05

Smoking status, ever (vs never)	1.04 (0.61, 1.74)	0.90
Rheumatic Disease Medication Prior to COVID-19 Diagnosis		
No DMARD	<i>Ref</i>	--
csDMARD only	1.02 (0.54, 1.94)	0.95
b/tsDMARDs only	0.41 (0.19, 0.90)	0.03
csDMARD + b/tsDMARD combination therapy	0.58 (0.27, 1.26)	0.17
NSAIDs	0.66 (0.39, 1.12)	0.12
Prednisone-Equivalent Glucocorticoids		
None	<i>Ref</i>	--
1-9 mg/day	1.15 (0.66, 2.00)	0.62
≥ 10 mg/day	2.03 (0.99, 4.15)	0.05

Odds ratios adjusted for all variables shown.

NSAID = Nonsteroidal anti-inflammatory drugs, DMARD = disease-modifying anti-rheumatic drug;

*Patients with more than one disease within these five diagnoses were classified as follows: systemic lupus erythematosus > rheumatoid arthritis > psoriatic arthritis > vasculitis > axial/other spondyloarthritis > other. Other rheumatic disease category included (each n<10): undifferentiated connective tissue disease; ocular inflammation; autoinflammatory syndrome; mixed connective tissue disease; antiphospholipid antibody syndrome; calcium pyrophosphate

deposition disease; systemic juvenile idiopathic arthritis; juvenile idiopathic arthritis, not systemic; IgG4-related disease.

#Chronic obstructive pulmonary disease, asthma, interstitial lung disease, or other not specified.

^Conventional synthetic DMARD (csDMARD) medications included: antimalarials (hydroxychloroquine, chloroquine), azathioprine, cyclophosphamide, cyclosporine, leflunomide, methotrexate, mycophenolate mofetil/mycophenolic acid, sulfasalazine, tacrolimus; Biologic or targeted synthetic DMARDs (b/tsDMARD) included: abatacept, belimumab, CD-20 inhibitors, IL-1 inhibitors, IL-6 inhibitors, IL-12/23 inhibitors, IL-17 inhibitors, anti-TNF, and janus-kinase inhibitors