

SUPPLEMENTARY TABLES AND FIGURES

Supplementary table 1. Baseline characteristics of the study population (total, and stratified by medication group)							
Parameter	No DMARDs	csDMARDs only	TNFi	IL-17i/IL-23i/IL12+23i	JAKi	APREMILAST	TOTAL
N	722	867	2298	1017	62	79	5045
General							
Age [years]	49.9 (15.2)	54 (13.4)	48.3 (13.0)	49.9 (12.8)	54.3 (12.5)	56.2 (11.9)	50 (13.5)
≤ 30 years	81 (11.2)	36 (4.2)	226 (9.8)	72 (7.1)	3 (4.8)	3 (3.8)	421 (8.3)
31 – 50 years	281 (38.9)	291 (33.6)	1044 (45.4)	433 (42.6)	19 (30.6)	17 (21.5)	2085 (41.3)
51 – 65 years	252 (34.9)	377 (43.5)	836 (36.4)	402 (39.5)	24 (38.7)	44 (55.7)	1935 (38.4)
66 - 75 years	70 (9.7)	111 (12.8)	152 (6.6)	88 (8.7)	16 (25.8)	11 (13.9)	448 (8.9)
> 75 years	38 (5.3)	52 (6)	40 (1.7)	22 (2.2)	0	4 (5.1)	156 (3.1)
Male sex	357 (49.4)	385 (44.4)	1267 (55.1)	546 (53.7)	20 (32.3)	31 (39.2)	2606 (51.7)
Ever smoker	159 (29.6) (N=538) (NA=184)	196 (31.2) (N=628) (NA=239)	517 (29.1) (N=1777) (NA=521)	308 (35.0) (N=879) (NA=138)	9 (19.6) (N=46) (NA=16)	24 (34.8) (N=69) (NA=10)	1213 (30.8) (N=3937) (NA=1108)
Regions							
African Region	4 (0.6)	6 (0.7)	3 (0.1)	1 (0.1)	0	0	14 (0.3)
Eastern Mediterr. Region	19 (2.6)	17 (2)	27 (1.2)	7 (0.7)	2 (3.2)	0	72 (1.4)
European Region	550 (76.2)	679 (78.3)	1769 (77)	822 (80.8)	35 (56.5)	53 (67.1)	3908 (77.5)
North American Region	102 (14.1)	106 (12.2)	343 (14.9)	128 (12.6)	24 (38.7)	25 (31.6)	728 (14.4)
South American Region	29 (4.0)	38 (4.4)	146 (6.4)	53 (5.2)	1 (1.6)	0	267 (5.3)
South-East Asian Region	5 (0.7)	11 (1.3)	3 (0.1)	1 (0.1)	0	1 (1.3)	21 (0.4)
Western Pacific Region	13 (1.8)	10 (1.2)	7 (0.3)	5 (0.5)	0	0	35 (0.7)
Time period							
Until June 15, 2020	253 (35.0)	304 (35.1)	756 (32.9)	357 (35.1)	20 (32.3)	35 (44.3)	1725 (34.2)
June 16 to Dec 31, 2020	297 (41.1)	367 (42.3)	1073 (46.7)	469 (46.1)	27 (43.5)	30 (38)	2263 (44.9)
January 1, 2021 or later	172 (23.8)	196 (22.6)	469 (20.4)	191 (18.8)	15 (24.2)	14 (17.7)	1057 (21)
Immune-mediated inflammatory diseases							
SpA	309 (42.8)	164 (18.9)	1176 (51.2)	171 (16.8)	11 (17.7)	0	1831 (36.3)
PsA	234 (32.4)	607 (70.0)	895 (38.9)	446 (43.9)	51 (82.3)	60 (75.9)	2293 (45.5)
Psoriasis (no arthritis)	179 (24.8)	96 (11.1)	227 (9.9)	400 (39.3)	0	19 (24.1)	921 (18.3)
Disease activity							
	N=606 (NA=116)	N=762 (NA=105)	N=1821 (NA=477)	N=918 (NA=99)	N=49 (NA=13)	N=77 (NA=2)	N=4233 (NA=812)
Remission, min./low DA	432 (71.3)	625 (82)	1567 (86.1)	782 (85.2)	32 (65.3)	62 (80.5)	3500 (82.7)
Moderate, sev./high DA	174 (28.7)	137 (18)	254 (13.9)	136 (14.8)	17 (34.7)	15 (19.5)	733 (17.3)
Ordinal outcome							
Not hospitalized/dead	573 (79.4)	654 (75.4)	2026 (88.2)	864 (85)	45 (72.6)	58 (73.4)	4220 (83.7)
Hospitalized, no death	128 (17.7)	186 (21.5)	248 (10.8)	146 (14.4)	10 (16.1)	18 (22.8)	736 (14.6)
Death	21 (2.9)	27 (3.1)	24 (1)	7 (0.7)	7 (11.3)	3 (3.8)	89 (1.8)
Comorbidities							
	N=714 (NA=8)	N=854 (NA=13)	N=2281 (NA=17)	N=1008 (NA=9)	N=62 (NA=0)	N=77 (NA=2)	N=4996 (NA=49)

Hypertension	183 (25.6)	263 (30.8)	555 (24.3)	285 (28.3)	13 (21.0)	24 (31.2)	1323 (26.5)
Cardiovascular disease	56 (7.8)	84 (9.8)	109 (4.8)	81 (8.0)	0	8 (10.4)	338 (6.8)
COPD or asthma	52 (7.3)	58 (6.8)	130 (5.7)	102 (10.1)	12 (19.4)	7 (9.1)	361 (7.2)
Other lung disease	15 (2.1)	13 (1.5)	37 (1.6)	27 (2.7)	4 (6.5)	3 (3.9)	99 (2.0)
Chronic kidney disease	14 (2.0)	23 (2.7)	36 (1.6)	23 (2.3)	1 (1.6)	4 (5.2)	101 (2.0)
Obesity (BMI >= 30)	137 (19.2)	171 (20.0)	426 (18.7)	289 (28.7)	12 (19.4)	18 (23.4)	562 (11.2)
Diabetes	81 (11.3)	104 (12.2)	227 (10.0)	133 (13.2)	7 (11.3)	10 (13.0)	115 (2.3)
Cancer	31 (4.3)	24 (2.8)	20 (0.9)	28 (2.8)	1 (1.6)	11 (14.3)	1053 (21.1)
number of comorbidities	0.8 (1.1)	0.9 (1.2)	0.7 (1.0)	1 (1.3)	0.8 (1.0)	1.3 (1.4)	0.8 (1.1)
No comorbidity	371 (52.0)	436 (51.1)	1313 (57.6)	461 (45.7)	33 (53.2)	29 (37.7)	2643 (52.9)
One comorbidity	187 (26.2)	224 (26.2)	524 (23)	271 (26.9)	14 (22.6)	19 (24.7)	1239 (24.8)
Two comorbidities	98 (13.7)	107 (12.5)	281 (12.3)	144 (14.3)	12 (19.4)	16 (20.8)	658 (13.2)
≥ 3 comorbidities	58 (8.1)	87 (10.2)	163 (7.1)	132 (13.1)	3 (4.8)	13 (16.9)	456 (9.1)
csDMARD therapy							
csDMARDs	0	867 (100)	487 (21.2)	138 (13.6)	22 (35.5)	14 (17.7)	1528 (30.3)
Methotrexate	0	649 (74.9)	388 (16.9)	119 (11.7)	18 (29.0)	9 (11.4)	1183 (23.4)
Leflunomide	0	64 (7.4)	30 (1.3)	7 (0.7)	3 (4.8)	3 (3.8)	107 (2.1)
Sulfasalazine	0	181 (20.9)	86 (3.7)	12 (1.2)	3 (4.8)	1 (1.3)	283 (5.6)
Antimalarials	0	27 (3.1)	8 (0.4)	1 (0.1)	0	1 (1.3)	37 (0.7)
Cyclosporine	0	14 (1.6)	2 (0.1)	3 (0.3)	0	0	19 (0.4)
Further therapies							
Glucocorticoids (#)	52 (7.4) (N=698) (NA=24)	112 (13.1) (N=858) (NA=9)	121 (5.4) (N=2229) (NA=69)	57 (5.7) (N=1004) (NA=13)	12 (20.7) (N=58) (NA=4)	3 (3.9) (N=76) (NA=3)	357 (7.3) (N=4923) (NA=122)
0 mg/d < GCs <= 7.5 mg/d	31 (4.5) (N=691) (NA=31)	73 (8.6) (N=847) (NA=20)	75 (3.4) (N=2198) (NA=100)	38 (3.8) (N=991) (NA=26)	5 (9.1) (N=55) (NA=7)	2 (2.6) (N=76) (NA=3)	224 (4.6) (N=4858) (NA=187)
GCs > 7.5 mg/d	14 (2.0) (N=691) (NA=31)	27 (3.2) (N=847) (NA=20)	14 (0.6) (N=2198) (NA=100)	6 (0.6) (N=991) (NA=26)	4 (7.3) (N=55) (NA=7)	1 (1.3) (N=76) (NA=3)	66 (1.4) (N=4858) (NA=187)
NSAIDs	214 (31.9) (N=671) (NA=51)	199 (24.8) (N=802) (NA=65)	480 (23.9) (N=2012) (NA=286)	175 (18.2) (N=961) (NA=56)	14 (25.0) (N=56) (NA=6)	15 (20.8) (N=72) (NA=7)	1097 (24.0) (N=4574) (NA=471)
Acitretin	25 (3.5)	1 (0.1)	2 (0.1)	0	1 (1.6)	0	29 (0.6)

Data are N (column %) for categorical variables or mean (SD) for continuous variables. Table includes patients diagnosed with psoriasis, psoriatic arthritis or axial spondyloarthritis, with a non-missing ordinal outcome and non-missing values for age, sex, and disease-modifying anti-rheumatic drugs (DMARDs). Further, patients receiving DMARDs not typical for the three diagnoses were excluded, as well as patients with some additional rheumatic diseases (529 patients excluded in total). Data refers to patients with non-missing values for the respective variable; total N for patients with non-missing values is given in parentheses for variables with missing values; the total number of missing values is also given in parenthesis, for the applicable variables. (#) Includes patients with a missing glucocorticoid dosage.

bDMARD, biological disease-modifying anti-rheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease-modifying anti-rheumatic drugs; DMARD, disease-modifying anti-rheumatic drugs; IL, interleukin; JAK, Janus kinase; N, number; NSAID, non-steroidal anti-inflammatory drugs; TNF; tumour necrosis factor; tsDMARD, targeted synthetic disease-modifying anti-rheumatic drugs.

Supplementary table 2. Baseline characteristics of the study population (total, and stratified by COVID-19 outcome)				
Parameter	Not hospitalised, no death	Hospitalised, no death	Death	Total
N	4220	736	89	5045
General				
Age [years]	48.4 (12.8)	57.3 (13.5)	67.7 (13.3)	50 (13.5)
≤ 30 years	406 (9.6)	15 (2)	0	421 (8.3)
31 – 50 years	1869 (44.3)	207 (28.1)	9 (10.1)	2085 (41.3)
51 – 65 years	1588 (37.6)	317 (43.1)	30 (33.7)	1935 (38.4)
66 - 75 years	297 (7)	129 (17.5)	22 (24.7)	448 (8.9)
> 75 years	60 (1.4)	68 (9.2)	28 (31.5)	156 (3.1)
Male sex	2130 (50.5)	419 (56.9)	57 (64)	2606 (51.7)
Ever smoker	999 (30.8) (N=3246) (Missing=974)	194 (31.0) (N=626) (Missing=110)	20 (30.8) (N=65) (Missing=24)	1213 (30.8) (N=3937) (Missing=1108)
Regions				
African Region	9 (0.2)	5 (0.7)	0	14 (0.3)
Eastern Mediterranean Region	59 (1.4)	13 (1.8)	0	72 (1.4)
European Region	3300 (78.2)	550 (74.7)	58 (65.2)	3908 (77.5)
North American Region	609 (14.4)	98 (13.3)	21 (23.6)	728 (14.4)
South American Region	221 (5.2)	36 (4.9)	10 (11.2)	267 (5.3)
South-East Asian Region	8 (0.2)	13 (1.8)	0	21 (0.4)
Western Pacific Region	14 (0.3)	21 (2.9)	0	35 (0.7)
Pandemic time period				
Until June 15, 2020	1285 (30.5)	395 (53.7)	45 (50.6)	1725 (34.2)
From June 16 to December 31, 2020	2018 (47.8)	217 (29.5)	28 (31.5)	2263 (44.9)
January 1, 2021, and later	917 (21.7)	124 (16.8)	16 (18)	1057 (21)
Immune-mediated inflammatory disease				
Axial spondyloarthritis	1576 (37.3)	229 (31.1)	26 (29.2)	1831 (36.3)
Psoriatic arthritis	1850 (43.8)	392 (53.3)	51 (57.3)	2293 (45.5)
Psoriasis (without arthritis)	794 (18.8)	115 (15.6)	12 (13.5)	921 (18.3)
Disease activity				
	N=3572 (Missing=648)	N=589 (Missing=147)	N=72 (Missing=17)	N=4233 (Missing=812)
Remission/low disease activity	2986 (83.6)	458 (77.8)	56 (77.8)	3500 (82.7)
Moderate/high disease activity	586 (16.4)	131 (22.2)	16 (22.2)	733 (17.3)
Comorbidities				
	N=4178 (Missing=42)	N=730 (Missing=6)	N=88 (Missing=1)	N=4996 (Missing=49)
Hypertension	973 (23.3)	302 (41.4)	48 (54.5)	1323 (26.5)
Cardiovascular disease	210 (5)	100 (13.7)	28 (31.8)	338 (6.8)
COPD or asthma	254 (6.1)	86 (11.8)	21 (23.9)	361 (7)
Other chronic lung disease	54 (1.3)	34 (4.7)	11 (12.5)	99 (2)
Chronic kidney disease	46 (1.1)	41 (5.6)	14 (15.9)	101 (2)
Diabetes	371 (8.9)	162 (22.2)	29 (33)	562 (11.2)
Cancer	70 (1.7)	36 (4.9)	9 (10.2)	115 (2.3)
Obesity	830 (19.9)	198 (27.1)	25 (28.4)	1053 (21.1)
Number of comorbidities	0.7 (1)	1.4 (1.4)	2.3 (1.8)	0.8 (1.1)
No comorbidity	2397 (57.4)	230 (31.5)	16 (18.2)	2643 (52.9)
One comorbidity	1004 (24)	217 (29.7)	18 (20.5)	1239 (24.8)
Two comorbidities	494 (11.8)	146 (20)	18 (20.5)	658 (13.2)
≥ 3 comorbidities	283 (6.8)	137 (18.8)	36 (40.9)	456 (9.1)
DMARDs				

(monotherapy or combination therapy)				
csDMARDs	1185 (28.1)	309 (42)	34 (38.2)	1528 (30.3)
Antimalarials	30 (0.7)	7 (1)	0	37 (0.7)
Methotrexate	915 (21.7)	246 (33.4)	22 (24.7)	1183 (23.4)
Leflunomide	82 (1.9)	22 (3)	3 (3.4)	107 (2.1)
Sulfasalazine	210 (5)	60 (8.2)	13 (14.6)	283 (5.6)
Cyclosporine	18 (0.4)	1 (0.1)	0	19 (0.4)
bDMARDs	2890 (68.5)	394 (53.5)	31 (34.8)	3315 (65.7)
TNF inhibitors	2026 (48)	248 (33.7)	24 (27)	2298 (45.6)
IL-17 inhibitors	520 (12.3)	88 (12)	2 (2.2)	610 (12.1)
IL-23/IL-12+23 inhibitors	344 (8.2)	58 (7.9)	5 (5.6)	407 (8.1)
tsDMARDs	103 (2.4)	28 (3.8)	10 (11.2)	141 (2.8)
JAK inhibitors	45 (1.1)	10 (1.4)	7 (7.9)	62 (1.2)
Apremilast	58 (1.4)	18 (2.4)	3 (3.4)	79 (1.6)
No DMARD treatment	573 (13.6)	128 (17.4)	21 (23.6)	722 (14.3)
Other therapies				
Glucocorticoids (#)	251 (6.1) (N=4116) (Missing=104)	89 (12.3) (N=722) (Missing=14)	17 (20) (N=85) (Missing=4)	357 (7.3) (N=4923) (Missing=122)
0 mg/d < Glucocorticoids <= 7.5 mg/d	165 (4) (N=4078) (Missing=142)	48 (6.9) (N=697) (Missing=39)	11 (13.3) (N=83) (Missing=6)	224 (4.6) (N=4858) (Missing=187)
Glucocorticoids > 7.5 mg/d	46 (1.1) (N=4078) (Missing=142)	16 (2.3) (N=697) (Missing=39)	4 (4.8) (N=83) (Missing=6)	66 (1.4) (N=4858) (Missing=187)
NSAIDs	948 (24.8) (N=3824) (Missing=396)	137 (20.3) (N=674) (Missing=62)	12 (15.8) (N=76) (Missing=13)	1097 (24) (N=4574) (Missing=471)
Acitretin	22 (0.5)	5 (0.7)	2 (2.2)	29 (0.6)

Data are N (column %) for categorical variables or mean (SD) for continuous variables. Data refers to patients with non-missing values for the respective variable; total N for patients with non-missing values is given in parentheses for variables with missing values; the total number of missing values is also given in parenthesis, for the applicable variables. (#) Includes patients with a missing glucocorticoid dosage.

bDMARD, biological disease-modifying anti-rheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease-modifying anti-rheumatic drugs; DMARD, disease-modifying anti-rheumatic drugs; IL, interleukin; JAK, Janus kinase; N, number; NSAID, non-steroidal anti-inflammatory drugs; TNF; tumour necrosis factor; tsDMARD, targeted synthetic disease-modifying anti-rheumatic drugs.

Supplementary Table 3. Multivariable ordinal logistic regression analysis of factors associated with COVID-19 severity, stratified by IMID (PsA, axSpA and PsO)												
	Psoriatic arthritis				Axial spondyloarthritis				Psoriasis (without arthritis)			
N total	2293				1818				912			
N deaths / hospitalizations without death / other	51 / 392 / 1850				26 / 229 / 1563				12 / 115 / 785			
	N deaths / hospitalizations without death / neither	OR	95% CI		N deaths / hospitalizations without death / neither	OR	95% CI		N deaths / hospitalizations without death / neither	OR	95% CI	
Male sex (vs. female)	26 / 205 / 822	1.50	1.18	1.91	21 / 132 / 837	1.41	1.04	1.93	10 / 82 / 458	2.12	1.32	3.42
Pandemic time period												
Until June 15 th , 2020	24 / 207 / 513	1	[Reference]		13 / 123 / 423	1	[Reference]		8 / 65 / 338	1	[Reference]	
June 16, 2020 – December 31, 2020	16 / 117 / 910	0.41	0.31	0.55	11 / 71 / 792	0.36	0.26	0.52	1 / 29 / 308	0.52	0.31	0.88
January 1, 2021, and later	11 / 68 / 427	0.53	0.37	0.75	2 / 35 / 348	0.35	0.22	0.56	3 / 21 / 139	0.89	0.49	1.63
Comorbidities												
Hypertension alone (vs. no hypertension, no CVD)	18 / 141 / 466	1.06	0.79	1.41	8 / 68 / 255	1.49	1.01	2.19	2 / 34 / 120	1.69	0.97	2.95
CVD alone (vs. no hypertension, no CVD)	2 / 18 / 31	1.46	0.76	2.83	3 / 11 / 22	2.77	1.25	6.13	2 / 9 / 22	1.71	0.67	4.36
CVD and hypertension (vs. no hypertension, no CVD)	11 / 37 / 81	1.07	0.66	1.74	5 / 15 / 33	1.72	0.82	3.62	5 / 11 / 22	2.00	0.83	4.83
COPD or asthma	14 / 49 / 124	1.95	1.34	2.82	5 / 23 / 86	1.40	0.81	2.40	2 / 14 / 46	2.02	0.94	4.35
Other chronic lung disease	3 / 21 / 23	2.41	1.28	4.55	5 / 7 / 18	2.75	1.18	6.40	3 / 6 / 13	2.94	1.11	7.78
Chronic kidney disease	9 / 26 / 26	2.56	1.46	4.48	3 / 11 / 10	3.04	1.22	7.54	2 / 5 / 10	1.10	0.34	3.54
Obesity alone (vs. no obesity, no diabetes)	9 / 75 / 306	1.40	1.02	1.94	1 / 33 / 189	1.37	0.87	2.15	1 / 30 / 175	1.31	0.77	2.26
Diabetes mellitus alone (vs. no obesity, no diabetes)	6 / 60 / 115	1.85	1.25	2.74	5 / 23 / 60	1.54	0.88	2.70	4 / 19 / 36	3.33	1.68	6.61

Obesity and diabetes mellitus (vs. no obesity, no diabetes)	10 / 35 / 93	1.85	1.18	2.92	3 / 9 / 27	1.82	0.79	4.21	1 / 17 / 42	2.00	0.93	4.30
Cancer and known smoking habits (vs. no cancer, never smoked)	2 / 19 / 30	1.20	0.62	2.33	0 / 4 / 11	1.01	0.26	3.89	2 / 6 / 16	1.28	0.45	3.60
Cancer and unknown smoking habits (vs. no cancer, never smoked)	2 / 4 / 8	2.74	0.86	8.74	3 / 3 / 5	2.42	0.59	9.92		n.a.		
No cancer and ever smoked or unknown smoking habits (vs. no cancer, never smoked)	24 / 155 / 934	0.83	0.63	1.09	11 / 83 / 716	0.88	0.59	1.32	3 / 43 / 272	0.98		
Medication												
No DMARD therapy	8 / 49 / 177	1	[Reference]		8 / 47 / 254	1	[Reference]		5 / 32 / 141	1	[Reference]	
Antimalarials	0 / 3 / 12	0.78	0.17	3.45	0 / 1 / 2	1.96	0.13	30.73		n.a.		
Methotrexate	11 / 101 / 342	0.97	0.64	1.47	2 / 14 / 35	1.70	0.80	3.61	0 / 18 / 72	0.77	0.37	1.58
Leflunomide	2 / 16 / 36	1.24	0.60	2.59		n.a.				n.a.		
Sulfasalazine	7 / 15 / 54	1.86	0.98	3.54	5 / 17 / 82	1.25	0.66	2.37				
Cyclosporine	0 / 1 / 10	0.61	0.07	5.13		n.a.						
TNF inhibitors	11 / 104 / 780	0.47	0.32	0.71	10 / 128 / 1038	0.75	0.49	1.13	3 / 16 / 207	0.38	0.19	0.75
IL-17 inhibitors	1 / 49 / 251	0.56	0.34	0.90	1 / 21 / 142	0.71	0.38	1.33	0 / 18 / 127	0.53	0.25	1.12
IL-23/IL-12+23 inhibitors	3 / 31 / 111	0.76	0.43	1.34		n.a.			2 / 27 / 225	0.43	0.23	0.82
JAK inhibitors	7 / 9 / 35	1.65	0.80	3.42	0 / 1 / 10	0.52	0.06	4.72		n.a.		
Apremilast	1 / 14 / 45	0.91	0.43	1.91		n.a.			2 / 4 / 13	1.14	0.34	3.76
Disease activity (DA) and glucocorticoids (GCs)												
Remission/low DA, no GCs	30 / 273 / 1431	1	[Reference]		18 / 159 / 1274	1	[Reference]		9 / 83 / 64	1	[Reference]	
Remission/low DA, GCs	9 / 35 / 121	1.63	1.02	2.59	4 / 21 / 53	2.54	1.41	4.57	0 / 2 / 3	2.18	0.24	20.25
Moderate/high DA, no GCs	8 / 63 / 241	1.44	1.01	2.04	3 / 37 / 213	1.60	0.99	2.59	3 / 30 / 141	1.11	0.65	1.90

Moderate/high DA, GCs	4 / 21 / 57	2.02	1.12	3.64	2 / 11 / 23	2.85	1.25	6.52		n.a.		
NSAIDs	8 / 75 / 479	0.75	0.55	1.02	6 / 69 / 565	0.72	0.48	1.09	2 / 7 / 23	1.69	0.65	4.40

Results for ordinal mixed effects logistic regression analysis in patients with specific disease entities. Shown are fixed effects, random effects for country are not shown. Missing values are imputed via multiple imputation, patient numbers may thus be rounded. The model was additionally adjusted for age employing five-knot restricted cubic splines. Significant associations highlighted in bold.

axSpA, axial spondyloarthritis; bDMARD, biological disease-modifying anti-rheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease-modifying anti-rheumatic drugs; DMARD, disease-modifying anti-rheumatic drugs; IL, interleukin; JAK, Janus kinase; N, number; NSAID, non-steroidal anti-inflammatory drugs; PsA, psoriatic arthritis; PsO, psoriasis without arthritis; TNF; tumour necrosis factor; tsDMARD, targeted synthetic disease-modifying anti-rheumatic drugs.

Supplementary Table 4. Sensitivity analysis – Multivariable ordinal logistic regression analysis of factors associated with COVID-19 severity (confirmed cases)				
N deaths/hospitalisations/neither	75 / 680 / 3421			
	N deaths/hospitalizations/neither	OR	95% CI	
Male sex (vs. female)	47 / 387 / 1733	1.48	1.23	1.78
Pandemic time period				
Until June 15 th , 2020	36 / 361 / 739	1	[Reference]	
June 16, 2020 – December 31, 2020	24 / 203 / 1858	0.28	0.23	0.35
January 1, 2021, and later	15 / 116 / 824	0.36	0.28	0.47
Comorbidities				
Hypertension alone (vs. no hypertension, no CVD)	21 / 228 / 678	1.32	1.05	1.66
CVD alone (vs. no hypertension, no CVD)	6 / 35 / 62	1.84	1.14	2.97
CVD and hypertension (vs. no hypertension, no CVD)	18 / 55 / 117	1.28	0.86	1.90
COPD or asthma	19 / 78 / 202	1.83	1.35	2.47
Other chronic lung disease	10 / 34 / 47	2.35	1.48	3.74
Chronic kidney disease	11 / 38 / 36	2.39	1.48	3.87
Obesity alone (vs. no obesity, no diabetes)	9 / 130 / 554	1.36	1.06	1.74
Diabetes mellitus alone (vs. no obesity, no diabetes)	14 / 97 / 171	1.91	1.40	2.60
Obesity and diabetes mellitus (vs. no obesity, no diabetes)	10 / 53 / 135	1.65	1.13	2.42
Cancer and known smoking habits (vs. no cancer, never smoked)	3 / 28 / 47	1.09	0.63	1.88
Cancer and unknown smoking habits (vs. no cancer, never smoked)	4 / 6 / 11	2.80	1.04	7.51
No cancer and ever smoked or unknown smoking habits (vs. no cancer, never smoked)	32 / 256 / 1662	0.84	0.67	1.04
Rheumatic disease				
Psoriatic arthritis	43 / 354 / 1535	1	[Reference]	
Axial spondyloarthritis	21 / 215 / 1308	1.08	0.86	1.36
Psoriasis (without arthritis)	11 / 111 / 578	0.55	0.41	0.74
Medication				
No DMARD therapy	20 / 124 / 492	1	[Reference]	
Antimalarials	0 / 4 / 13	1.09	0.29	4.05
Methotrexate	12 / 122 / 371	1.00	0.73	1.39
Leflunomide	1 / 13 / 36	0.79	0.37	1.72
Sulfasalazine	10 / 32 / 113	1.54	0.97	2.44
Cyclosporine	0 / 1 / 12	0.41	0.05	3.46
TNF inhibitors	18 / 226 / 1628	0.60	0.46	0.79
IL-17 inhibitors	1 / 80 / 412	0.67	0.47	0.96

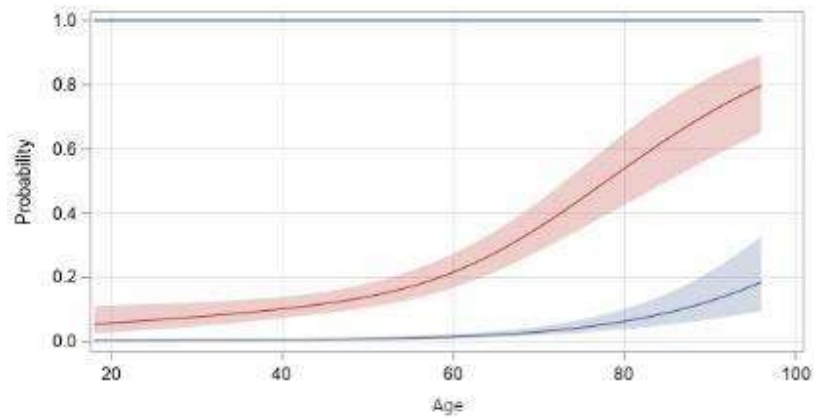
IL-23/IL-12+23 inhibitors	3 / 53 / 264	0.66	0.43	0.9999
JAK inhibitors	7 / 8 / 41	1.43	0.71	2.87
Apremilast	3 / 17 / 42	1.34	0.69	2.59
Disease activity (DA) and glucocorticoids (GCs)				
Remission/low DA, no GCs	49 / 477 / 2748	1	[Reference]	
Remission/low DA, GCs	10 / 57 / 156	1.78	1.22	2.60
Moderate/high DA, no GCs	12 / 119 / 449	1.46	1.12	1.90
Moderate/high DA, GCs	4 / 27 / 68	1.81	1.06	3.08
NSAIDs	13 / 138 / 878	0.76	0.59	0.97
<p>Results for ordinal mixed effects logistic regression analysis in patients with a confirmed COVID-19 diagnosis. Shown are fixed effects, random effects for country are not shown. Missing values are imputed via multiple imputation, patient numbers may thus be rounded. The model was additionally adjusted for age employing four-knot restricted cubic splines. Significant associations highlighted in bold.</p> <p>bDMARD, biological disease-modifying anti-rheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease-modifying anti-rheumatic drugs; DMARD, disease-modifying anti-rheumatic drugs; IL, interleukin; JAK, Janus kinase; N, number; NSAID, non-steroidal anti-inflammatory drugs; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease-modifying anti-rheumatic drugs.</p>				

Supplementary Table 5. Sensitivity analysis – Multivariable binary logistic regression analysis of factors associated with COVID-19 severity (outcome hospitalisation)				
N hospitalizations /other	837 / 4220			
	N hospitalizations/other	OR	95% CI	
Male sex (vs. female)	479 / 2130	1.50	1.26	1.79
Pandemic time period				
Until June 15 th , 2020	442 / 1285	1	[Reference]	
June 16, 2020 – December 31, 2020	250 / 2018	0.40	0.33	0.49
January 1, 2021, and later	145 / 917	0.51	0.40	0.66
Comorbidities				
Hypertension alone (vs. no hypertension, no CVD)	272 / 847	1.31	1.05	1.62
CVD alone (vs. no hypertension, no CVD)	45 / 76	1.92	1.22	3.02
CVD and hypertension (vs. no hypertension, no CVD)	87 / 136	1.36	0.93	1.98
COPD or asthma	111 / 257	1.69	1.27	2.25
Other chronic lung disease	45 / 55	2.39	1.49	3.82
Chronic kidney disease	58 / 46	2.29	1.44	3.66
Obesity alone (vs. no obesity, no diabetes)	153 / 676	1.38	1.09	1.74
Diabetes mellitus alone (vs. no obesity, no diabetes)	117 / 212	1.92	1.43	2.58
Obesity and diabetes mellitus (vs. no obesity, no diabetes)	75 / 162	1.75	1.22	2.51
Cancer and known smoking habits (vs. no cancer, never smoked)	33 / 57	1.19	0.70	2.02
Cancer and unknown smoking habits (vs. no cancer, never smoked)	13 / 13	2.06	0.80	5.33
No cancer and ever smoked or unknown smoking habits (vs. no cancer, never smoked)	330 / 1933	0.87	0.71	1.06
Rheumatic disease				
Psoriatic arthritis	450 / 1850	1	[Reference]	
Axial spondyloarthritis	260 / 1576	1.08	0.87	1.35
Psoriasis (without arthritis)	127 / 794	0.47	0.36	0.63
Medication				
No DMARD therapy	151 / 573	1	[Reference]	
Antimalarials	4 / 14	1.20	0.33	4.39
Methotrexate	49 / 449	1.12	0.82	1.53
Leflunomide	18 / 42	1.13	0.56	2.27
Sulfasalazine	44 / 136	1.25	0.79	1.97
Cyclosporine	1 / 18	0.31	0.04	2.46
TNF inhibitors	278 / 2026	0.59	0.46	0.77
IL-17 inhibitors	91 / 520	0.69	0.49	0.96
IL-23/IL-12+23 inhibitors	63 / 344	0.74	0.50	1.10

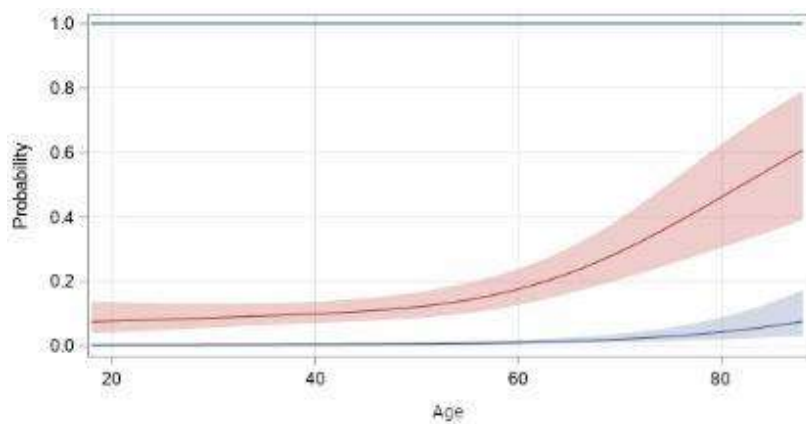
JAK inhibitors	17 / 45	1.34	0.68	2.65
Apremilast	21 / 58	1.07	0.57	2.00
Disease activity (DA) and glucocorticoids (GCs)				
Remission/low DA, no GCs	580 / 3358	1	[Reference]	
Remission/low DA, GCs	74 / 177	1.97	1.38	2.82
Moderate/high DA, no GCs	145 / 504	1.36	1.07	1.74
Moderate/high DA, GCs	38 / 82	2.34	1.43	3.81
NSAIDs	171 / 1072	0.78	0.61	0.99
<p>Results for binary mixed effects logistic regression analysis in all patients, for the outcome of hospitalization. Shown are fixed effects, random effects for country are not shown. Missing values are imputed via multiple imputation, patient numbers may thus be rounded. The model was additionally adjusted for age employing four-knot restricted cubic splines. Significant associations highlighted in bold.</p> <p>bDMARD, biological disease-modifying anti-rheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease-modifying anti-rheumatic drugs; DMARD, disease-modifying anti-rheumatic drugs; IL, interleukin; JAK, Janus kinase; N, number; NSAID, non-steroidal anti-inflammatory drugs; TNF; tumour necrosis factor; tsDMARD, targeted synthetic disease-modifying anti-rheumatic drugs.</p>				

Supplementary Table 6. Sensitivity analysis – Multivariable binary logistic regression analysis of factors associated with COVID-19 severity (outcome death)				
N deaths / survivors	89 / 5070			
	N deaths/ survivors	OR	95% CI	
Male sex (vs. female)	57 / 2605	2.00	1.22	3.26
Pandemic time period				
Until June 15 th , 2020	45 / 1723	1	[Reference]	
June 16, 2020, and later	44 / 3347	0.67	0.41	1.10
Comorbidities				
Three or more comorbidities (vs. 0 – 2 comorbidities)	36 / 435	3.34	1.98	5.63
Smoking habits				
Ever smoked (vs. never smoked)	20/ 1209	0.76	0.41	1.39
Unknown smoking habits (vs. never smoked)	24 / 1141	1.99	0.95	4.16
Medication				
No DMARD therapy	21 / 714	1	[Reference]	
Methotrexate	13 / 596	0.57	0.26	1.24
Leflunomide	2 / 61	0.58	0.11	3.03
Sulfasalazine	12 / 171	2.64	1.13	6.17
TNF inhibitors	24 / 2360	0.50	0.26	0.98
IL-17 inhibitors	2 / 625	0.11	0.02	0.51
IL-23/IL-12+23 inhibitors	5 / 403	0.39	0.13	1.14
JAK inhibitors	7 / 58	7.49	2.61	21.47
Apremilast	3 / 82	1.05	0.25	4.40
Disease activity (DA) and glucocorticoids (GCs)				
Moderate/high DA (vs. remission/low DA)	20 / 857	1.12	0.60	2.06
GC therapy (vs. no GC therapy)	18 / 352	1.91	1.002	3.64
NSAIDs	16 / 1252	0.81	0.42	1.54
<p>Results for binary mixed effects logistic regression analysis in all patients, for the outcome death. Shown are fixed effects, random effects for country are not shown. Missing values are imputed via multiple imputation, patient numbers may thus be rounded. The model was additionally adjusted for age employing three-knot restricted cubic splines. Significant associations highlighted in bold.</p> <p>bDMARD, biological disease-modifying anti-rheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease-modifying anti-rheumatic drugs; DMARD, disease-modifying anti-rheumatic drugs; IL, interleukin; JAK, Janus kinase; N, number; NSAID, non-steroidal anti-inflammatory drugs; TNF; tumour necrosis factor; tsDMARD, targeted synthetic disease-modifying anti-rheumatic drugs.</p>				

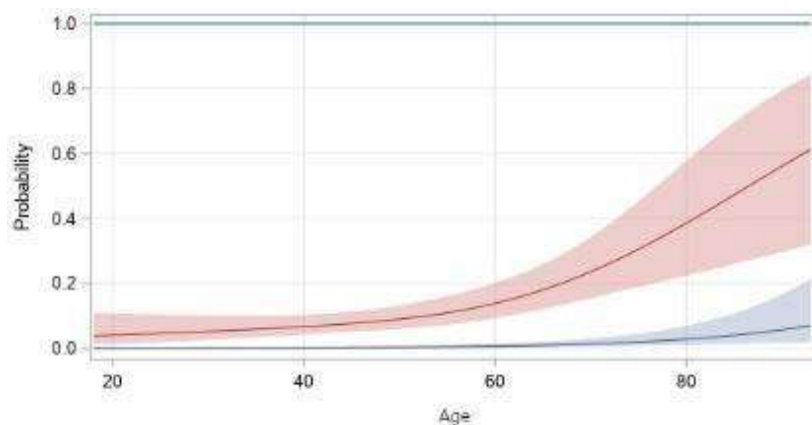
Supplementary figure 1. Relationship between age and probability of hospitalisation (red) and death (blue) in patients with psoriatic arthritis (disease-specific model), estimated by three-knot restricted cubic splines, with 95% confidence intervals.



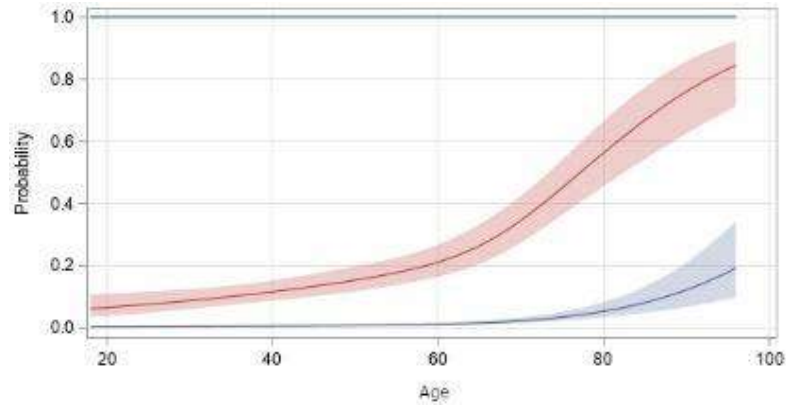
Supplementary figure 2. Relationship between age and probability of hospitalisation (red) and death (blue) in patients with axial spondyloarthritis (disease-specific model), estimated by three-knot restricted cubic splines, with 95% confidence intervals.



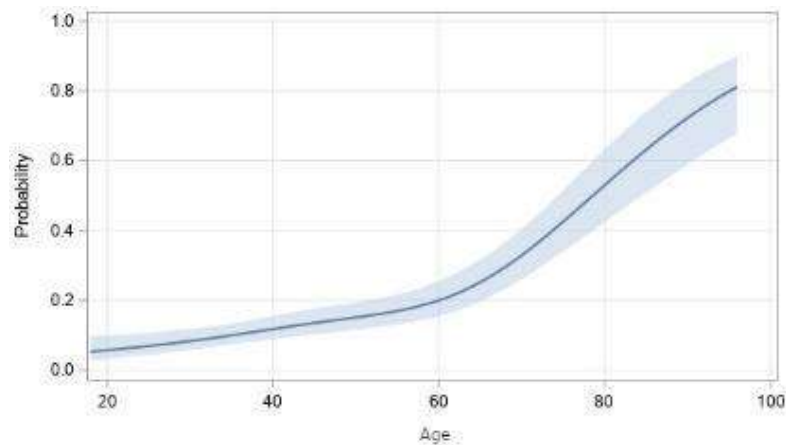
Supplementary figure 3. Relationship between age and probability of hospitalisation (red) and death (blue) in patients with psoriasis without arthritis (disease-specific model), estimated by three-knot restricted cubic splines, with 95% confidence intervals.



Supplementary figure 4. Relationship between age and probability of hospitalisation (red) and death (blue) estimated by four-knot restricted cubic splines, with 95% confidence intervals, for one imputation stratum (model with confirmed cases only).



Supplementary figure 5. Relationship between age and probability of hospitalisation estimated by four-knot restricted cubic splines, with 95% confidence interval (binary outcome model: hospitalisation).



Supplementary figure 6. Relationship between age and probability of death estimated by three-knot restricted cubic splines, with 95% confidence interval, for one imputation stratum (binary outcome model: death).

