### SUPPLEMENTARY TABLES

#### Supplementary table 1. Patient demographic and clinical characteristics stratified by rheumatic disease diagnostic subgroup

<table>
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<tr>
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<th>Rheumatoid arthritis</th>
<th>Connective tissue diseases and vasculitis</th>
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<td>Deceased</td>
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</tr>
<tr>
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<td>215</td>
<td>2373</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
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</tr>
<tr>
<td>Age [years]</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>≤ 30 years</td>
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<td>31 – 50 years</td>
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<td>51 – 65 years</td>
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<td>66 – 75 years</td>
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<td>&gt; 75 years</td>
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<td>Ever smoker</td>
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### Inflammatory joint diseases

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<th>Deceased</th>
<th>Total</th>
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<tbody>
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<td>Rheumatoid arthritis</td>
<td>1224 (56.7)</td>
<td>170 (79.1)</td>
<td>1394</td>
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<td>Spondyloarthrits</td>
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<td>15 (7)</td>
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<td>Psoriatic arthritis</td>
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<tr>
<td>Condition</td>
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<td>%</td>
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<td>-----------------------------------------------</td>
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<tr>
<td>JIA (poly, oligo, not systemic)</td>
<td>21 (1)</td>
<td>4 (1.9)</td>
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<td>Other inflammatory arthritis</td>
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<td>2373 (100)</td>
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<td>Connective tissue diseases / Vasculitis</td>
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<td>SLE</td>
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<td>11 (6.5)</td>
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<td>Other outcomes</td>
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<td>Hospitalised</td>
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<td>Invasive ventilation</td>
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<td>Count</td>
<td>Percentage</td>
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<td>-------</td>
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<td>Cancer</td>
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<tr>
<td>One comorbidity</td>
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<tr>
<td>Two comorbidities</td>
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<tr>
<td>≥ 3 comorbidities</td>
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<th>DMARD therapies</th>
<th>Count</th>
<th>Percentage</th>
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<td>csDMARDs monotherapy</td>
<td>487 (22.6)</td>
<td>22.6%</td>
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<tr>
<td>csDMARDs combination therapy</td>
<td>611 (28.3)</td>
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<td>Methotrexate monotherapy</td>
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<td>57 (2.6)</td>
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<td>0.4%</td>
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<td>Cyclosporin monotherapy</td>
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<table>
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<td><strong>TNF inhibitors monotherapy</strong></td>
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<td><strong>TNF inhibitors combination therapy</strong></td>
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<td><strong>Further therapies</strong></td>
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<td>510 (23.3)</td>
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<td>(N=1129)</td>
<td>(N=2190)</td>
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<td>74 (46)</td>
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<td>22 (14.8)</td>
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<td>(N=1129)</td>
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<td>260 (21.3)</td>
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<td>373 (37.3)</td>
<td>100 (10)</td>
<td>112 (11.6)</td>
<td>240 (21.3)</td>
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<td>(N=1129)</td>
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<td>35 (24.5)</td>
<td>12 (8.6)</td>
<td>360 (18.2)</td>
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<td>124 (11.2)</td>
<td>124 (11.2)</td>
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<td>(N=1142)</td>
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Data are N (column %) for categorical variables or mean (SD) for continuous variables. Table includes all patients with a non-missing outcome and non-missing values for age, sex, and disease modifying anti-rheumatic drugs (DMARDs) (101 patients excluded). 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. (*) Includes one patient on a study medication (Lenabasum). (#) Includes patients with a missing glucocorticoid dose.

bDMARD, biologic disease modifying antirheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease modifying antirheumatic drugs; CTD, connective tissue diseases; DMARD, disease modifying antirheumatic drugs; IL, interleukin; JAK, Janus kinase; JIA, juvenile idiopathic arthritis; N, number; NSAID, non-steroidal anti-inflammatory drugs; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
## Supplementary Table 2. Patient demographic and clinical characteristics stratified by country (six countries with the highest number of reported cases)

<table>
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<tr>
<th>Parameter</th>
<th>USA</th>
<th>France</th>
<th>UK</th>
<th>Italy</th>
<th>Spain</th>
<th>Germany</th>
<th>Total</th>
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<tbody>
<tr>
<td><strong>N</strong></td>
<td>1005</td>
<td>793</td>
<td>435</td>
<td>315</td>
<td>247</td>
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<td><strong>Age [years]</strong></td>
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<td></td>
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<tr>
<td>&lt; 30 years</td>
<td>66 (6.6)</td>
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<td>16 (3.7)</td>
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<td>10 (4)</td>
<td>6 (3)</td>
<td>143 (4.8)</td>
</tr>
<tr>
<td>30 – 49 years</td>
<td>300 (29.9)</td>
<td>268 (33.8)</td>
<td>97 (22.3)</td>
<td>58 (18.4)</td>
<td>56 (22.7)</td>
<td>48 (24.2)</td>
<td>268 (33.8)</td>
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<tr>
<td>50 – 65 years</td>
<td>390 (38.8)</td>
<td>248 (31.3)</td>
<td>131 (30.1)</td>
<td>92 (27.5)</td>
<td>43 (17.4)</td>
<td>26 (13.1)</td>
<td>248 (31.3)</td>
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<td>&gt; 75 years</td>
<td>103 (10.2)</td>
<td>110 (13.9)</td>
<td>99 (22.8)</td>
<td>51 (16.2)</td>
<td>46 (18.6)</td>
<td>25 (12.6)</td>
<td>434 (14.5)</td>
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<tr>
<td><strong>Male sex</strong></td>
<td>241 (24%)</td>
<td>272 (34.3)</td>
<td>169 (38.9)</td>
<td>107 (34)</td>
<td>95 (37.4)</td>
<td>958 (32)</td>
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<td><strong>Ever smoker</strong></td>
<td>261 (27.3)%</td>
<td>80 (10.1)%</td>
<td>132 (45.2)%</td>
<td>86 (29.5)%</td>
<td>60 (27.5)%</td>
<td>633 (24.6)%</td>
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<tr>
<td>(N=956)</td>
<td>(N=793)</td>
<td>(N=292)</td>
<td>(N=292)</td>
<td>(N=218)</td>
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<td>(N=2569)</td>
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<td>Rheumatoid arthritis</td>
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<td>88 (35.6)</td>
<td>99 (50.0)</td>
<td>1114 (37.2)</td>
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<td>Spondyloarthritis</td>
<td>47 (4.7)</td>
<td>193 (24.3)</td>
<td>29 (6.7)</td>
<td>24 (7.6)</td>
<td>32 (13)</td>
<td>19 (9.6)</td>
<td>344 (11.5)</td>
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<td>Psoriatic arthritis</td>
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<td>32 (16.2)</td>
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<td>Other inflammatory arthritis</td>
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<td><strong>Total IJD</strong></td>
<td>577 (57.4)</td>
<td>531 (67)</td>
<td>305 (70.1)</td>
<td>198 (62.9)</td>
<td>157 (63.6)</td>
<td>150 (75.8)</td>
<td>1918 (64.1)</td>
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<td><strong>Connective tissue diseases / Vasculitis</strong></td>
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<td>9 (4.5)</td>
<td>299 (10)</td>
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<td>CTDs (other than SLE)</td>
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<td>90 (11.3)</td>
<td>38 (8.7)</td>
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<td>44 (17.8)</td>
<td>19 (9.6)</td>
<td>430 (14.4)</td>
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<td>Vasculitis</td>
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<td>71 (9)</td>
<td>51 (11.7)</td>
<td>44 (14)</td>
<td>22 (8.9)</td>
<td>18 (9.1)</td>
<td>273 (9.1)</td>
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<tr>
<td><strong>Total CTD</strong></td>
<td>394 (39.2)</td>
<td>211 (26.6)</td>
<td>111 (25.5)</td>
<td>114 (36.2)</td>
<td>85 (34.4)</td>
<td>43 (21.7)</td>
<td>958 (32)</td>
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<td><strong>Other rheumatic diseases</strong></td>
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<td><strong>Total</strong></td>
<td>132 (13.1)</td>
<td>52 (6.6)</td>
<td>53 (12.2)</td>
<td>8 (2.5)</td>
<td>20 (8.1)</td>
<td>13 (6.6)</td>
<td>278 (9.3)</td>
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<td>N=364</td>
<td>N=315</td>
<td>N=242</td>
<td>N=181</td>
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<td>Remission</td>
<td>211 (22.2)</td>
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<td>109 (29.9)</td>
<td>93 (29.5)</td>
<td>113 (46.7)</td>
<td>102 (56.4)</td>
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<td>Minimal/low DA</td>
<td>521 (54.8)</td>
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<td>172 (47.3)</td>
<td>160 (50.8)</td>
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<td>53 (29.3)</td>
<td>1014 (49.4)</td>
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<td>Moderate DA</td>
<td>185 (19.5)</td>
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<td>53 (16.8)</td>
<td>17 (7)</td>
<td>19 (10.5)</td>
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<td>Severe/high DA</td>
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<td>4 (1.7)</td>
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<td>67 (3.3)</td>
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<td>Death</td>
<td>70 (7.0)</td>
<td>62 (7.8)</td>
<td>91 (20.9)</td>
<td>53 (16.8)</td>
<td>21 (8.5)</td>
<td>15 (7.6)</td>
<td>312 (10.4)</td>
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<tr>
<td>Hospitalised</td>
<td>357 (39.1)%</td>
<td>334 (42.1)%</td>
<td>275 (65.8)%</td>
<td>201 (64.2)%</td>
<td>133 (55.6)%</td>
<td>60 (30.6)%</td>
<td>1360 (47.3)%</td>
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<tr>
<td>(N=914)</td>
<td>(N=793)</td>
<td>(N=418)</td>
<td>(N=313)</td>
<td>(N=239)</td>
<td>(N=196)</td>
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<td>Invasive ventilation</td>
<td>64 (7.9)%</td>
<td>N/A</td>
<td>28 (7.5)%</td>
<td>23 (7.5)%</td>
<td>7 (3)%</td>
<td>15 (7.7)%</td>
<td>137 (5.8)%</td>
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<td>(N=807)</td>
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<td>(N=371)</td>
<td>(N=308)</td>
<td>(N=231)</td>
<td>(N=1913)</td>
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<td>Comorbidities</td>
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<td>N=192</td>
<td>N=2964</td>
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<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
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<td>Hypertension</td>
<td>399 (39.9)</td>
<td>220 (27.8)</td>
<td>140 (32.3)</td>
<td>147 (49)</td>
<td>103 (41.7)</td>
<td>72 (36.4)</td>
<td>1081 (36.4)</td>
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<td>Cardiovascular disease</td>
<td>112 (11.2)</td>
<td>76 (9.6)</td>
<td>72 (16.6)</td>
<td>72 (24)</td>
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<td>27 (13.6)</td>
<td>377 (12.7)</td>
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<tr>
<td>Cerebrovascular disease</td>
<td>27 (2.7)</td>
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<td>17 (3.9)</td>
<td>14 (4.7)</td>
<td>6 (2.4)</td>
<td>0</td>
<td>92 (3.1)</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>231 (23.1)</td>
<td>113 (14.3)</td>
<td>108 (24.9)</td>
<td>75 (25)</td>
<td>54 (21.9)</td>
<td>32 (16.2)</td>
<td>613 (20.6)</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>85 (8.5)</td>
<td>46 (5.8)</td>
<td>28 (6.5)</td>
<td>27 (9)</td>
<td>11 (4.5)</td>
<td>15 (7.6)</td>
<td>212 (7.1)</td>
</tr>
<tr>
<td>Obesity (BMI ≥ 30)</td>
<td>244 (24.4)</td>
<td>138 (17.4)</td>
<td>39 (9)</td>
<td>47 (15.7)</td>
<td>31 (12.6)</td>
<td>30 (15.2)</td>
<td>529 (17.8)</td>
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<td>Morbid obesity (BMI ≥ 40)</td>
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<td>Diabetes</td>
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<td>31 (12.6)</td>
<td>17 (8.6)</td>
<td>408 (13.7)</td>
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<tr>
<td>Cancer</td>
<td>68 (6.8)</td>
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<td>23 (9.3)</td>
<td>7 (3.5)</td>
<td>187 (6.3)</td>
</tr>
<tr>
<td>Other comorbidities</td>
<td>213 (21.3)</td>
<td>159 (20.1)</td>
<td>151 (34.8)</td>
<td>145 (48.3)</td>
<td>67 (27.1)</td>
<td>53 (27.6)</td>
<td>788 (26.2)</td>
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<td>Number of comorbidities</td>
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<td>1.1 (1.1)</td>
<td>1.6 (1.4)</td>
<td>2.3 (1.8)</td>
<td>1.5 (1.4)</td>
<td>1.3 (1.3)</td>
<td>1.5 (1.5)</td>
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<td>277 (35)</td>
<td>105 (24.2)</td>
<td>44 (14.7)</td>
<td>70 (28.3)</td>
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<td>813 (27.4)</td>
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<tr>
<td>One comorbidity</td>
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<td>276 (34.9)</td>
<td>136 (31.3)</td>
<td>79 (26.3)</td>
<td>77 (31.2)</td>
<td>58 (29.3)</td>
<td>901 (30.3)</td>
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<td>98 (22.6)</td>
<td>57 (19)</td>
<td>51 (20.6)</td>
<td>39 (19.7)</td>
<td>599 (20.2)</td>
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<tr>
<td>≥ 3 comorbidities</td>
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<td>95 (21.9)</td>
<td>120 (40)</td>
<td>49 (19.8)</td>
<td>34 (17.2)</td>
<td>657 (22.1)</td>
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### DMARD Theraies

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<tr>
<td>csDMARDs mono</td>
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<td>csDMARDs combi</td>
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<tr>
<td>Methotrexate mono</td>
<td>88 (8.8)</td>
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<tr>
<td>Methotrexate combi</td>
<td>174 (17.3)</td>
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<td>Leflunomide mono</td>
<td>18 (1.8)</td>
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<td>Leflunomide combi</td>
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<td>Sulfasalazine mono</td>
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<td>Sulfasalazine combi</td>
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<tr>
<td>Antimalarial mono</td>
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<tr>
<td>Antimalarial combi</td>
<td>132 (13.1)</td>
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<td>Immunosuppressants mono</td>
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<td>Immunosuppressants combi</td>
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<td>TNF inhibitors combi</td>
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<td>Abatacept mono</td>
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<td>B-cell affecting bDMARDs mono</td>
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<td>Therapy Type</td>
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**Further therapies**

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<th>Glucocorticoids (#)</th>
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<th>0 mg/d &lt; GC &lt;= 10mg/d</th>
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<th>205 (25.9)</th>
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<th>791 (27.1)</th>
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<th>GC &gt; 10 mg/d</th>
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<th>24 (7.8)</th>
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<th>6 (3.1)</th>
<th>167 (5.7)</th>
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<td>(N=985)</td>
<td>(N=791)</td>
<td>(N=425)</td>
<td>(N=309)</td>
<td>(N=212)</td>
<td>(N=196)</td>
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<table>
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<th>NSAID</th>
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<th>36 (19.7)</th>
<th>486 (17.4)</th>
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<td>(N=793)</td>
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<td>(N=285)</td>
<td>(N=21.9)</td>
<td>(N=19.7)</td>
<td>(N=2798)</td>
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**Data** are N (column %) for categorical variables or mean (SD) for continuous variables. Table includes all patients with a non-missing outcome and non-missing values for age, sex and disease modifying anti-rheumatic drugs (DMARDs) (101 patients excluded). 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. (*) Includes one patient on a study medication (Lenabasum). (†) Includes patients with a missing glucocorticoid dose.

bDMARD, biologic disease modifying antirheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease modifying antirheumatic drugs; combi, combination therapy; CTD, connective tissue diseases; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IL, interleukin; JAK, Janus kinase; JIA, juvenile idiopathic arthritis; mono, monotherapy; N, number; NSAID, non-steroidal anti-inflammatory drugs; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
### Supplementary table 3. Patient demographic and clinical characteristics stratified by main medication of interest

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<th>Parameter</th>
<th>MTX</th>
<th>LEF</th>
<th>ANTI-MALARIALS</th>
<th>SSZ</th>
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**Disease activity**

<p>| Remission | 307 (34.3) | 40 (24.7) | 146 (25.4) | 50 (25.5) | 66 (22) | 184 (33.6) | 14 (22.6) | 36 (25.4) | 16 (26.2) | 20 (27.4) | 19 (18.1) | 215 (41.6) | 893 (32.4) |
| Minimal/low | 413 (46.2) | 84 (51.9) | 310 (54) | 100 (51) | 138 (46) | 265 (48.4) | 32 (51.6) | 64 (45.1) | 25 (41) | 33 (45.2) | 56 (53.3) | 211 (40.8) | 1309 (47.5) |
| Moderate DA | 157 (17.6) | 31 (19.1) | 91 (15.9) | 38 (19.4) | 71 (23.7) | 89 (16.3) | 10 (16.1) | 26 (18.3) | 16 (26.2) | 19 (26) | 26 (24.8) | 56 (10.8) | 448 (16.2) |
| Severe/high DA | 17 (1.9) | 7 (4.3) | 27 (4.7) | 8 (4.1) | 25 (8.3) | 9 (1.6) | 6 (9.7) | 16 (11.3) | 4 (6.6) | 1 (1.4) | 4 (3.8) | 35 (6.8) | 108 (3.9) |</p>
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<td>983 (27.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GC &gt; 10 mg/d</td>
<td>38 (3.2)</td>
<td>42 (6.6)</td>
<td>11 (5.2)</td>
<td>20 (2.5)</td>
<td>3 (3.7)</td>
<td>22 (12.2)</td>
<td>70 (7.8)</td>
<td>220 (6.1)</td>
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<td></td>
</tr>
</tbody>
</table>

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Data are N (column %) for categorical variables or mean (SD) for continuous variables. Table includes all patients with a non-missing outcome and non-missing values for age, sex and disease modifying anti-rheumatic drugs (DMARDs) (101 patients excluded). 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. (*) Includes one patient on a study medication (Lenabasum). (#) Includes patients with a missing glucocorticoid dose.

ABA, Abatacept; bDMARD, biologic disease modifying antirheumatic drugs; BMI, body mass index; csDMARD, conventional synthetic disease modifying antirheumatic drugs; combi, combination therapy; CTD, connective tissue diseases; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IL-6i, interleukin-6 inhibitors; IL-17/23/12+23i, interleukin-17/23/12+23 inhibitors; IMMUNOSUPPR, immunosuppressants; JAKi, Janus kinase inhibitors; JIA, juvenile idiopathic arthritis; LEF, leflunomide; MTX, methotrexate; mono, monotherapy; N, number; NSAID, non-steroidal anti-inflammatory drugs; RTX, rituximab; SLE, systemic lupus erythematosus; SSZ, sulfasalazine; TNFi, tumour necrosis factor inhibitors.

<table>
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<th>Variable</th>
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<th>Value 2</th>
<th>Value 3</th>
<th>Value 4</th>
<th>Value 5</th>
<th>Value 6</th>
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</thead>
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<td>80</td>
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<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
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<td>Arthritis</td>
<td>Arthritis</td>
<td>Arthritis</td>
<td>Arthritis</td>
<td>Arthritis</td>
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<tr>
<td>Treatment</td>
<td>ABA</td>
<td>bDMARD</td>
<td>csDMARD</td>
<td>DMARD</td>
<td>combi</td>
<td>IMMUNOSUPPR</td>
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<td>Present</td>
<td>Absent</td>
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<td>Absent</td>
</tr>
<tr>
<td>NSAIDs</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>TNFis</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
<td>Absent</td>
</tr>
</tbody>
</table>
### Supplementary table 4. Multivariable logistic regression analysis of factors associated with COVID-19-related death in patients with rheumatic diseases (excluding patients reported from France)

<table>
<thead>
<tr>
<th>N deaths/patients (%)</th>
<th>All</th>
<th>Patients with inflammatory joint diseases (IJDs)</th>
<th>Only patients with rheumatoid arthritis</th>
<th>Patients with connective tissue diseases (CTDs) or vasculitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>N deaths/patients</td>
<td>324 / 2921 (11.1%)</td>
<td>186 / 1818 (10.2%)</td>
<td>146 / 1124 (13.0%)</td>
<td>113 / 932 (12.1%)</td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 years &lt; Age ≤ 75</td>
<td>97 / 516 3.18 2.26 4.47</td>
<td>67 / 351 3.58 2.41 5.33</td>
<td>53 / 259 3.33 1.80 6.18</td>
<td>24 / 139 2.43 1.43 4.13</td>
</tr>
<tr>
<td>Age &gt; 75</td>
<td>119 / 387 5.77 4.03 8.28</td>
<td>67 / 208 7.22 4.89 10.66</td>
<td>55 / 173 6.31 3.77 10.54</td>
<td>40 / 136 4.34 2.11 8.91</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td>131 / 919 1.39 1.00 1.95</td>
<td>74 / 603 1.39 1.01 1.91</td>
<td>50 / 279 1.27 0.85 1.89</td>
<td>44 / 232 1.38 0.91 2.08</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>135 / 873 1.12 0.85 1.49</td>
<td>85 / 576 1.15 0.79 1.67</td>
<td>71 / 373 1.27 0.87 1.86</td>
<td>39 / 234 1.13 0.70 1.82</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension alone or CVD alone</td>
<td>125 / 954 1.08 0.85 1.38</td>
<td>67 / 568 1.03 0.69 1.54</td>
<td>54 / 375 1.05 0.70 1.59</td>
<td>53 / 337 1.40 0.95 2.08</td>
</tr>
<tr>
<td>Hypertension and CVD</td>
<td>72 / 253 1.77 1.20 2.62</td>
<td>48 / 146 2.45 1.22 4.92</td>
<td>34 / 102 2.09 0.99 4.42</td>
<td>18 / 82 1.15 0.61 2.18</td>
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<tr>
<td>Chronic lung disease</td>
<td>122 / 610 1.74 1.26 2.40</td>
<td>73 / 342 1.67 1.15 2.41</td>
<td>61 / 258 1.62 1.13 2.32</td>
<td>44 / 241 2.17 1.41 3.35</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>58 / 214 1.40 0.81 2.43</td>
<td>21 / 97 0.83 0.45 1.56</td>
<td>16 / 75 0.76 0.36 1.59</td>
<td>30 / 97 2.34 1.16 4.73</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>79 / 433 1.26 0.76 2.08</td>
<td>47 / 267 1.23 0.86 1.77</td>
<td>32 / 182 1.00 0.63 1.58</td>
<td>21 / 126 1.01 0.52 1.96</td>
</tr>
<tr>
<td>Rheumatic disease</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>34 / 341 1.28 0.71 2.29</td>
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<td>n.a.</td>
<td>30 / 328 1 [Reference]</td>
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<tr>
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<td>n.a.</td>
<td>43 / 233 0.65 0.40 1.08</td>
</tr>
<tr>
<td>Other connective tissue diseases</td>
<td>42 / 384 0.73 0.54 0.98</td>
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<td>n.a.</td>
<td>40 / 371 0.77 0.36 1.64</td>
</tr>
<tr>
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<td>n/a, n/a, n/a</td>
<td>n/a, n/a, n/a</td>
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<tr>
<td>-----------------------------------------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Psoriasis arthritis</td>
<td>16 / 355</td>
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<td>0.49</td>
<td>1.05</td>
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<td>16 / 363</td>
<td>0.75</td>
<td>0.50</td>
<td>1.13</td>
</tr>
<tr>
<td>Spondyloarthritis</td>
<td>14 / 231</td>
<td>0.96</td>
<td>0.50</td>
<td>1.87</td>
</tr>
<tr>
<td></td>
<td>14 / 232</td>
<td>1.02</td>
<td>0.52</td>
<td>2.00</td>
</tr>
<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>9 / 92</td>
<td>0.75</td>
<td>0.45</td>
<td>1.26</td>
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<td>10 / 97</td>
<td>0.71</td>
<td>0.41</td>
<td>1.23</td>
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<tr>
<td>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</td>
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<td>0.53</td>
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<td>0.80</td>
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<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
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<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
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<td>1.91</td>
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<td>50 / 365</td>
<td>1.65</td>
<td>1.11</td>
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</tr>
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<td>40 / 233</td>
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<td>1.00</td>
<td>2.81</td>
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<td>43 / 189</td>
<td>2.59</td>
<td>1.46</td>
<td>4.58</td>
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<tr>
<td>Medication</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No DMARD therapy</td>
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<td>1.91</td>
<td>1.29</td>
<td>2.84</td>
</tr>
<tr>
<td></td>
<td>30 / 188</td>
<td>1.99</td>
<td>1.18</td>
<td>3.36</td>
</tr>
<tr>
<td>Leflunomide</td>
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<td>0.83</td>
<td>2.81</td>
</tr>
<tr>
<td></td>
<td>10 / 75</td>
<td>1.40</td>
<td>0.65</td>
<td>3.01</td>
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<td>0.58</td>
<td>1.46</td>
</tr>
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<td></td>
<td>17 / 158</td>
<td>1.15</td>
<td>0.61</td>
<td>2.14</td>
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<td>3.19</td>
<td>1.39</td>
<td>7.32</td>
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<td></td>
<td>31 / 132</td>
<td>3.10</td>
<td>1.25</td>
<td>7.70</td>
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<td>Immunosuppressants</td>
<td>36 / 252</td>
<td>1.98</td>
<td>1.20</td>
<td>3.24</td>
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<tr>
<td>TNF inhibitors</td>
<td>26 / 574</td>
<td>0.76</td>
<td>0.45</td>
<td>1.28</td>
</tr>
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<td></td>
<td>23 / 544</td>
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<td>1.46</td>
</tr>
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<td>0.55</td>
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</tr>
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<td>8 / 57</td>
<td>1.43</td>
<td>0.60</td>
<td>3.45</td>
</tr>
<tr>
<td>Rituximab</td>
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<td>3.56</td>
<td>1.94</td>
<td>6.53</td>
</tr>
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<td></td>
<td>19 / 73</td>
<td>4.75</td>
<td>2.21</td>
<td>10.20</td>
</tr>
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<td>Belimumab</td>
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<td>0.62</td>
<td>0.15</td>
<td>2.53</td>
</tr>
<tr>
<td>IL-6 inhibitors</td>
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<td>0.94</td>
<td>0.36</td>
<td>2.43</td>
</tr>
<tr>
<td>IL-17/IL-23/IL-12+23 inhibitors</td>
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<td>0.29</td>
<td>0.03</td>
<td>2.41</td>
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<td>tsDMARDs</td>
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<td>1.50</td>
<td>0.81</td>
<td>2.77</td>
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<td>Glucocorticoids (GCs)</td>
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<td></td>
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### Table 1: Glucocorticoid (GC) Dose and Outcomes

<table>
<thead>
<tr>
<th>GCs</th>
<th>No GCs</th>
<th>GCs 1-10mg/d</th>
<th>GCs &gt; 10 mg/d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>148 / 1885</td>
<td>137 / 856</td>
<td>40 / 180</td>
</tr>
<tr>
<td></td>
<td>103 / 1301</td>
<td>75 / 467</td>
<td>9 / 50</td>
</tr>
<tr>
<td></td>
<td>76 / 700</td>
<td>63 / 390</td>
<td>7 / 34</td>
</tr>
<tr>
<td></td>
<td>31 / 465</td>
<td>57 / 372</td>
<td>28 / 111</td>
</tr>
</tbody>
</table>

|     | 1 | 1.33 | 0.85 | 2.07 | 1.18 | 0.61 | 2.28 | 1.10 | 0.51 | 2.38 | 1.92 | 1.21 | 3.03 |
|     | [Reference] | 0.85 | 2.07 | 75 / 467 | 1.18 | 0.61 | 2.28 | 63 / 390 | 1.10 | 0.51 | 2.38 | 57 / 372 | 1.92 | 1.21 | 3.03 |
|     | 0.85 | 2.07 | 75 / 467 | 0.85 | 2.07 | 75 / 467 | 0.85 | 2.07 | 75 / 467 | 0.85 | 2.07 | 75 / 467 | 0.85 | 2.07 | 75 / 467 |

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level α=0.05 are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
**Supplementary table 5. Multivariable logistic regression analysis of factors associated with COVID-19-related death in patients with rheumatic diseases in patients with no missing values (complete case analysis)**

<table>
<thead>
<tr>
<th>Age, years</th>
<th>All</th>
<th>Patients with inflammatory joint diseases (IJDs)</th>
<th>Only patients with rheumatoid arthritis</th>
<th>Patients with connective tissue diseases (CTDs) or vasculitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 years &lt; Age ≤ 75</td>
<td>58 / 357</td>
<td>3.03 1.99 4.62</td>
<td>37 / 236 2.81 1.78 4.44</td>
<td>28 / 172 2.52 1.31 4.85</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td>81 / 614</td>
<td>1.30 0.96 1.76</td>
<td>45 / 385 1.57 1.05 2.35</td>
<td>29 / 175 1.35 0.79 2.32</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>85 / 597</td>
<td>1.16 0.84 1.60</td>
<td>50 / 377 1.20 0.80 1.80</td>
<td>42 / 247 1.44 1.02 2.03</td>
</tr>
<tr>
<td>Comorbidities:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension alone or CVD alone</td>
<td>82 / 687</td>
<td>1.14 0.93 1.41</td>
<td>41 / 387 1.11 0.74 1.66</td>
<td>33 / 258 1.17 0.76 1.82</td>
</tr>
<tr>
<td>Hypertension and CVD</td>
<td>48 / 168</td>
<td>2.04 1.58 2.63</td>
<td>34 / 97 3.24 1.73 6.08</td>
<td>24 / 67 3.05 1.33 6.96</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>83 / 453</td>
<td>1.76 1.37 2.27</td>
<td>42 / 232 1.39 1.02 1.90</td>
<td>34 / 175 1.32 0.95 1.83</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>38 / 135</td>
<td>1.59 0.94 2.69</td>
<td>17 / 55 1.49 0.97 2.31</td>
<td>13 / 42 1.53 1.03 2.29</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>48 / 302</td>
<td>1.13 0.73 1.73</td>
<td>32 / 185 1.24 0.91 1.69</td>
<td>21 / 125 0.88 0.59 1.30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rheumatic disease</th>
<th>All</th>
<th>Patients with inflammatory joint diseases (IJDs)</th>
<th>Only patients with rheumatoid arthritis</th>
<th>Patients with connective tissue diseases (CTDs) or vasculitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systemic lupus erythematosus</td>
<td>19 / 265</td>
<td>0.99 0.409 2.37</td>
<td>n.a.</td>
<td>16 / 256 1 [Reference]</td>
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<tr>
<td>Diagnosis</td>
<td>N1</td>
<td>N2</td>
<td>N1/N2</td>
<td>N1</td>
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<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>31/163</td>
<td>1.02</td>
<td>0.59</td>
<td>1.77</td>
</tr>
<tr>
<td>Other connective tissue diseases</td>
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<td>0.88</td>
<td>0.55</td>
<td>1.43</td>
</tr>
<tr>
<td>Psoriasis arthritis</td>
<td>11/230</td>
<td>0.80</td>
<td>0.53</td>
<td>1.20</td>
</tr>
<tr>
<td>Spondyloarthritis</td>
<td>9/157</td>
<td>1.11</td>
<td>0.56</td>
<td>2.18</td>
</tr>
<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>5/68</td>
<td>0.87</td>
<td>0.42</td>
<td>1.81</td>
</tr>
<tr>
<td>Other rheumatic diseases (not IIDs / CTDs / vasculitis)</td>
<td>15/119</td>
<td>0.70</td>
<td>0.39</td>
<td>1.26</td>
</tr>
<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>65/422</td>
<td>2.03</td>
<td>1.33</td>
<td>3.10</td>
</tr>
<tr>
<td>Medication</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methotrexate</td>
<td>24/302</td>
<td>1</td>
<td>[Reference]</td>
<td>22/252</td>
</tr>
<tr>
<td>No DMARD therapy</td>
<td>58/385</td>
<td>1.56</td>
<td>1.09</td>
<td>2.23</td>
</tr>
<tr>
<td>Leflunomide</td>
<td>7/51</td>
<td>1.35</td>
<td>0.76</td>
<td>2.41</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>19/296</td>
<td>1.02</td>
<td>0.67</td>
<td>1.54</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>16/90</td>
<td>2.77</td>
<td>0.88</td>
<td>8.69</td>
</tr>
<tr>
<td>Immunosuppressants</td>
<td>26/193</td>
<td>1.99</td>
<td>1.08</td>
<td>3.68</td>
</tr>
<tr>
<td>TNF inhibitors</td>
<td>19/447</td>
<td>0.75</td>
<td>0.43</td>
<td>1.31</td>
</tr>
<tr>
<td>Abatacept</td>
<td>6/49</td>
<td>1.17</td>
<td>0.43</td>
<td>3.19</td>
</tr>
<tr>
<td>Rituximab</td>
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<td>2.43</td>
<td>1.64</td>
<td>3.58</td>
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<tr>
<td>Belimumab</td>
<td>1/21</td>
<td>0.95</td>
<td>0.26</td>
<td>3.52</td>
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<td>IL-6 inhibitors</td>
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</tr>
<tr>
<td>tsDMARDs</td>
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<td>1.58</td>
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<td>2.90</td>
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</table>
### Glucocorticoids (GCs)

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<th>GCs 1-10mg/d</th>
<th>GCs &gt; 10 mg/d</th>
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<td>90 / 561</td>
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<td>0.91</td>
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<td>7 / 33</td>
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<td>5 / 22</td>
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<td>2.32</td>
<td>1.35</td>
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</table>

Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF; tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
### Supplementary table 6. Multivariable logistic regression analysis of factors associated with COVID-19-related death in patients with rheumatic diseases with a confirmed or highly likely COVID-19 diagnosis

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Patients with inflammatory joint diseases (IJDs)</th>
<th>Only patients with rheumatoid arthritis</th>
<th>Patients with connective tissue diseases (CTDs) or vasculitis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N deaths/patients (%)</strong></td>
<td>345 / 2968 (11.6%)</td>
<td>184 / 1619 (10.2%)</td>
<td>143 / 946 (13.1%)</td>
<td>139 / 999 (13.9%)</td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 years &lt; Age ≤ 75</td>
<td>98 / 545</td>
<td>2.87 [1.92, 4.29]</td>
<td>62 / 358</td>
<td>3.43 [2.43, 4.84]</td>
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<tr>
<td>Male sex (vs. female)</td>
<td>146 / 962</td>
<td>1.47 [1.12, 1.94]</td>
<td>71 / 607</td>
<td>1.27 [0.90, 1.81]</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>119 / 740</td>
<td>1.13 [0.85, 1.50]</td>
<td>69 / 468</td>
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<td>Comorbidities</td>
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<td></td>
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<td>Hypertension alone or CVD alone</td>
<td>138 / 962</td>
<td>1.16 [0.87, 1.54]</td>
<td>67 / 553</td>
<td>1.00 [0.72, 1.37]</td>
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<tr>
<td>Hypertension and CVD</td>
<td>80 / 271</td>
<td>1.83 [1.34, 2.51]</td>
<td>47 / 151</td>
<td>2.16 [1.17, 3.98]</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>122 / 602</td>
<td>1.68 [1.23, 2.29]</td>
<td>66 / 334</td>
<td>1.47 [0.95, 2.27]</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>69 / 233</td>
<td>1.57 [0.97, 2.57]</td>
<td>24 / 95</td>
<td>1.18 [0.61, 2.29]</td>
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<tr>
<td>Diabetes mellitus</td>
<td>90 / 461</td>
<td>1.36 [0.89, 2.08]</td>
<td>50 / 274</td>
<td>1.29 [0.92, 1.81]</td>
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<tr>
<td>Rheumatic disease</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Rheumatoid arthritis</td>
<td>137 / 1055</td>
<td>1 [Reference]</td>
<td>143 / 1091</td>
<td>1 [Reference]</td>
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<tr>
<td>Systemic lupus erythematosus</td>
<td>35 / 336</td>
<td>1.31 [0.77, 2.23]</td>
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<td>n.a.</td>
</tr>
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<td>Condition</td>
<td>Cases</td>
<td>Controls</td>
<td>OR 95% CI</td>
<td>Cases</td>
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<td>---------------------------------------------------</td>
<td>-------</td>
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<tr>
<td>Vasculitis</td>
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<td>0.92</td>
<td>0.67</td>
<td>1.26</td>
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<tr>
<td>Other connective tissue diseases</td>
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<td>0.83</td>
<td>0.62</td>
<td>1.12</td>
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<tr>
<td>Psoriasis arthritis</td>
<td>17 / 324</td>
<td>0.76</td>
<td>0.60</td>
<td>0.97</td>
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<tr>
<td>Spondyloarthritis</td>
<td>14 / 291</td>
<td>0.77</td>
<td>0.38</td>
<td>1.58</td>
</tr>
<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>9 / 84</td>
<td>0.86</td>
<td>0.57</td>
<td>1.31</td>
</tr>
<tr>
<td>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</td>
<td>20 / 187</td>
<td>0.49</td>
<td>0.35</td>
<td>0.70</td>
</tr>
<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>97 / 575</td>
<td>1.77</td>
<td>1.15</td>
<td>2.73</td>
</tr>
<tr>
<td>Medication</td>
<td></td>
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<tr>
<td>No DMARD therapy</td>
<td>109 / 620</td>
<td>1.88</td>
<td>1.31</td>
<td>2.68</td>
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<tr>
<td>Leflunomide</td>
<td>10 / 75</td>
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<td>Antimalarials</td>
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<td>0.52</td>
<td>1.43</td>
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<td>Sulfasalazine</td>
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<td>3.16</td>
<td>1.36</td>
<td>7.37</td>
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<td>Immunosuppressants</td>
<td>36 / 238</td>
<td>1.99</td>
<td>1.27</td>
<td>3.13</td>
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<tr>
<td>TNF inhibitors</td>
<td>29 / 575</td>
<td>0.92</td>
<td>0.57</td>
<td>1.49</td>
</tr>
<tr>
<td>Abatacept</td>
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<td>0.57</td>
<td>1.96</td>
</tr>
<tr>
<td>Rituximab</td>
<td>35 / 160</td>
<td>3.28</td>
<td>1.89</td>
<td>5.69</td>
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<td>Belimumab</td>
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<td>0.66</td>
<td>0.19</td>
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<tr>
<td>IL-6 inhibitors</td>
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### IL-17/IL-23/IL-12+23 inhibitors

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<th>1 / 87</th>
<th>0.31</th>
<th>0.04</th>
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<th>n.a.</th>
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### tsDMARDs

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<th>1.66</th>
<th>0.85</th>
<th>3.21</th>
<th>14 / 111</th>
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<th>0.96</th>
<th>3.34</th>
<th>12 / 91</th>
<th>1.54</th>
<th>0.66</th>
<th>3.60</th>
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### Glucocorticoids (GCs)

#### No GCs

|---------------|------------|----------------|----------|---------------|----------|---------------|----------|---------------|

#### GCs 1-10mg/d

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<th>76 / 454</th>
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<th>67 / 371</th>
<th>1.38</th>
<th>0.64</th>
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#### GCs > 10 mg/d

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<th>11 / 51</th>
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<th>0.68</th>
<th>2.90</th>
<th>9 / 38</th>
<th>1.38</th>
<th>0.59</th>
<th>3.22</th>
<th>33 / 126</th>
<th>2.16</th>
<th>1.21</th>
<th>3.88</th>
</tr>
</thead>
</table>

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
Supplementary table 7. Multivariable logistic regression analysis of factors associated with COVID-19-related death or invasive ventilation in patients with rheumatic diseases

<table>
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<tr>
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<th>N deaths or invasive ventilations (IV) /patients (%)</th>
<th>OR</th>
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<th>N deaths or IVs / patients</th>
<th>OR</th>
<th>95% CI</th>
<th>OR</th>
<th>95% CI</th>
<th>OR</th>
<th>95% CI</th>
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<td>OR</td>
<td>95% CI</td>
<td>N deaths or IVs / patients</td>
<td>OR</td>
<td>95% CI</td>
<td>N deaths or IVs / patients</td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>N deaths or invasive ventilations (IV) / patients (%)</td>
<td>451 / 3075 (14.7%)</td>
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<td>[Reference]</td>
<td>248 / 1970 (12.6%)</td>
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<td>[Reference]</td>
<td>188 / 1148 (16.4%)</td>
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<td>[Reference]</td>
<td>170 / 925 (18.4%)</td>
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<tr>
<td>65 years &lt; Age ≤ 75</td>
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<td>3.09</td>
<td>1.96</td>
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<td>8.03</td>
<td>89 / 206</td>
<td>7.22</td>
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<td>0.91</td>
<td>1.83</td>
<td>61 / 287</td>
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<td>96 / 541</td>
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<td></td>
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</tr>
<tr>
<td>Hypertension alone or CVD alone</td>
<td>184 / 927</td>
<td>1.33</td>
<td>1.02</td>
<td>1.74</td>
<td>94 / 560</td>
<td>1.22</td>
<td>0.86</td>
<td>1.72</td>
<td>74 / 371</td>
<td>1.15</td>
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<td>2.88</td>
<td>57 / 144</td>
<td>2.33</td>
<td>1.20</td>
<td>4.53</td>
<td>41 / 101</td>
<td>1.96</td>
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<tr>
<td>Chronic lung disease</td>
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<td>1.38</td>
<td>2.35</td>
<td>91 / 328</td>
<td>1.87</td>
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<td>74 / 234</td>
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<td>23 / 69</td>
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<td>62 / 246</td>
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<td>OR</td>
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<td>OR</td>
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<td>65 / 246</td>
<td>0.74</td>
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<td>1.09</td>
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<tr>
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<td>0.37</td>
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<tr>
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<td>n.a.</td>
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<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
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<td>1.57</td>
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<td>2.19</td>
<td>60 / 380</td>
<td>1.35</td>
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**Medication**

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<tbody>
<tr>
<td>No DMARD therapy</td>
<td>139 / 622</td>
<td>1.96</td>
<td>1.26</td>
<td>3.06</td>
<td>41 / 208</td>
<td>1.93</td>
<td>1.15</td>
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<tr>
<td>Leflunomide</td>
<td>15 / 71</td>
<td>1.83</td>
<td>0.96</td>
<td>3.48</td>
<td>13 / 66</td>
<td>1.72</td>
<td>0.81</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>35 / 357</td>
<td>1.02</td>
<td>0.67</td>
<td>1.56</td>
<td>20 / 142</td>
<td>1.13</td>
<td>0.61</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>37 / 120</td>
<td>3.67</td>
<td>1.85</td>
<td>7.26</td>
<td>35 / 113</td>
<td>3.67</td>
<td>1.75</td>
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<td>Immunosuppressants</td>
<td>45 / 231</td>
<td>1.80</td>
<td>1.19</td>
<td>2.72</td>
<td>n.a.</td>
<td>n.a.</td>
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<tr>
<td>TNF inhibitors</td>
<td>39 / 692</td>
<td>0.86</td>
<td>0.53</td>
<td>1.37</td>
<td>34 / 657</td>
<td>0.83</td>
<td>0.48</td>
</tr>
<tr>
<td>Abatacept</td>
<td>11 / 65</td>
<td>1.28</td>
<td>0.61</td>
<td>2.71</td>
<td>11 / 62</td>
<td>1.40</td>
<td>0.63</td>
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<td>Rituximab</td>
<td>46 / 144</td>
<td>4.31</td>
<td>2.48</td>
<td>7.49</td>
<td>25 / 72</td>
<td>5.99</td>
<td>3.00</td>
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<td>Belimumab</td>
<td>3 / 22</td>
<td>1.84</td>
<td>0.58</td>
<td>5.87</td>
<td>n.a.</td>
<td>n.a.</td>
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</tr>
<tr>
<td>Group</td>
<td>N</td>
<td>OR</td>
<td>95% CI</td>
<td>P</td>
<td>OR</td>
<td>95% CI</td>
<td>P</td>
</tr>
<tr>
<td>------------------------------</td>
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<td>--------</td>
<td>------------</td>
<td>-----</td>
<td>--------</td>
<td>------------</td>
</tr>
<tr>
<td>IL-6 inhibitors</td>
<td>5 / 77</td>
<td>0.75</td>
<td>0.34</td>
<td>1.63</td>
<td>1 / 60</td>
<td>0.22</td>
<td>0.02</td>
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<tr>
<td>IL-17/IL-23/IL-12+23 inhibitors</td>
<td>6 / 92</td>
<td>1.42</td>
<td>0.59</td>
<td>3.43</td>
<td>6 / 89</td>
<td>1.58</td>
<td>0.63</td>
</tr>
<tr>
<td>tsDMARDs</td>
<td>17 / 125</td>
<td>1.45</td>
<td>0.81</td>
<td>2.59</td>
<td>17 / 122</td>
<td>1.67</td>
<td>0.94</td>
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<td>Glucocorticoids (GCs)</td>
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<td></td>
</tr>
<tr>
<td>GCs 1-10mg/d</td>
<td>191 / 860</td>
<td>1.45</td>
<td>1.03</td>
<td>2.04</td>
<td>99 / 468</td>
<td>1.31</td>
<td>0.72</td>
</tr>
<tr>
<td>GCs &gt; 10 mg/d</td>
<td>58 / 183</td>
<td>2.11</td>
<td>1.44</td>
<td>3.11</td>
<td>13 / 53</td>
<td>1.47</td>
<td>0.58</td>
</tr>
</tbody>
</table>

Living patients with missing values for invasive ventilation excluded from the model (dependent variable unknown). Missing values in other variables imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level α=0.05 are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
Supplementary table 8. Multivariable logistic regression analysis of factors associated with COVID-19-related death in all patients with a reduced number of regressor variables

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Patients with inflammatory joint diseases (IJDs)</th>
<th>Only patients with rheumatoid arthritis</th>
<th>Patients with connective tissue diseases (CTDs) or vasculitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>N deaths/patients (%)</td>
<td>384/3705 (10.4%)</td>
<td>211/2348 (9.0%)</td>
<td>166/1371 (12.1%)</td>
<td>147/1157 (12.7%)</td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age ≤ 65</td>
<td>118 / 2565</td>
<td>55 / 1657</td>
<td>40 / 840</td>
<td>56 / 779</td>
</tr>
<tr>
<td>Age &gt; 65</td>
<td>266 / 1140</td>
<td>156 / 691</td>
<td>126 / 531</td>
<td>91 / 378</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td>161 / 1188</td>
<td>82 / 788</td>
<td>55 / 345</td>
<td>63 / 296</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>140 / 922</td>
<td>84 / 607</td>
<td>71 / 385</td>
<td>42 / 248</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension alone or CVD alone</td>
<td>155 / 1150</td>
<td>79 / 690</td>
<td>66 / 454</td>
<td>69 / 406</td>
</tr>
<tr>
<td>Hypertension and CVD</td>
<td>89 / 301</td>
<td>53 / 168</td>
<td>38 / 118</td>
<td>28 / 106</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>136 / 721</td>
<td>76 / 406</td>
<td>63 / 293</td>
<td>54 / 285</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>76 / 259</td>
<td>27 / 111</td>
<td>21 / 83</td>
<td>41 / 124</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>96 / 508</td>
<td>55 / 313</td>
<td>39 / 213</td>
<td>32 / 154</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>160 / 1326</td>
<td>166 / 1373</td>
<td></td>
<td></td>
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<tr>
<td>Systemic lupus erythematosus</td>
<td>36 / 391</td>
<td>1.10</td>
<td>n.a.</td>
<td>32 / 378</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>67 / 325</td>
<td>0.85</td>
<td>n.a.</td>
<td>n.a.</td>
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<tr>
<td>Other connective tissue diseases</td>
<td>53 / 473</td>
<td>0.75</td>
<td>n.a.</td>
<td>n.a.</td>
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<td>Psoriasis arthritis</td>
<td>19 / 429</td>
<td>0.66</td>
<td>n.a.</td>
<td>n.a.</td>
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</table>

<table>
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<th>Condition</th>
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<th>OR 95% CI</th>
<th>N1 / N2</th>
<th>OR 95% CI</th>
<th>N1 / N2</th>
<th>OR 95% CI</th>
<th>N1 / N2</th>
<th>OR 95% CI</th>
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</thead>
<tbody>
<tr>
<td>Spondyloarthritis</td>
<td>15 / 423</td>
<td>0.66</td>
<td>0.32</td>
<td>1.35</td>
<td>15 / 424</td>
<td>0.76</td>
<td>0.39</td>
<td>1.48</td>
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<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>10 / 109</td>
<td>0.73</td>
<td>0.44</td>
<td>1.22</td>
<td>11 / 114</td>
<td>0.70</td>
<td>0.40</td>
<td>1.23</td>
</tr>
<tr>
<td>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</td>
<td>24 / 229</td>
<td>0.52</td>
<td>0.36</td>
<td>0.74</td>
<td>n.a.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>109 / 722</td>
<td>1.84</td>
<td>1.31</td>
<td>2.59</td>
<td>54 / 453</td>
<td>1.49</td>
<td>1.09</td>
<td>2.02</td>
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<tr>
<td>Medication</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>No DMARD therapy</td>
<td>124 / 739</td>
<td>2.20</td>
<td>1.55</td>
<td>3.12</td>
<td>38 / 239</td>
<td>2.14</td>
<td>1.44</td>
<td>3.17</td>
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<tr>
<td>Leflunomide</td>
<td>12 / 90</td>
<td>1.47</td>
<td>0.81</td>
<td>2.66</td>
<td>10 / 83</td>
<td>1.27</td>
<td>0.62</td>
<td>2.61</td>
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<tr>
<td>Antimalarials</td>
<td>27 / 426</td>
<td>0.96</td>
<td>0.64</td>
<td>1.43</td>
<td>17 / 167</td>
<td>1.07</td>
<td>0.59</td>
<td>1.93</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>33 / 144</td>
<td>3.49</td>
<td>1.64</td>
<td>7.45</td>
<td>31 / 137</td>
<td>3.22</td>
<td>1.44</td>
<td>7.23</td>
</tr>
<tr>
<td>Immunosuppressants</td>
<td>38 / 276</td>
<td>2.18</td>
<td>1.44</td>
<td>3.32</td>
<td>n.a.</td>
<td></td>
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<tr>
<td>Rituximab</td>
<td>42 / 192</td>
<td>3.77</td>
<td>2.23</td>
<td>6.36</td>
<td>22 / 90</td>
<td>4.91</td>
<td>2.60</td>
<td>9.25</td>
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<tr>
<td>TNF inhibitors</td>
<td>30 / 803</td>
<td>0.82</td>
<td>0.52</td>
<td>1.29</td>
<td>26 / 764</td>
<td>0.73</td>
<td>0.41</td>
<td>1.29</td>
</tr>
<tr>
<td>Belimumab</td>
<td>16 / 313</td>
<td>0.82</td>
<td>0.47</td>
<td>1.42</td>
<td>n.a.</td>
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<tr>
<td>IL-6 inhibitors</td>
<td>11 / 255</td>
<td>0.69</td>
<td>0.35</td>
<td>1.36</td>
<td>10 / 131</td>
<td>0.89</td>
<td>0.40</td>
<td>1.98</td>
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<tr>
<td>IL-17/IL-23/IL-12+23 inhibitors</td>
<td>n.a.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>tsDMARDs</td>
<td>15 / 145</td>
<td>1.38</td>
<td>0.80</td>
<td>2.36</td>
<td>15 / 142</td>
<td>1.45</td>
<td>0.85</td>
<td>2.47</td>
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<tr>
<td>Glucocorticoids (GCs)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>No GCs</td>
<td>165 / 2417</td>
<td>1 [Reference]</td>
<td>109 / 1721</td>
<td>1 [Reference]</td>
<td>78 / 863</td>
<td>1 [Reference]</td>
<td>38 / 551</td>
<td>1 [Reference]</td>
</tr>
</tbody>
</table>
Glucocorticoids | 219 / 1288 | 1.50 | 1.07 | 2.10 | 102 / 627 | 1.46 | 0.86 | 2.47 | 88 / 508 | 1.44 | 0.74 | 2.80 | 109 / 606 | 1.77 | 1.28 | 2.46

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
Supplementary table 9. Multivariable logistic regression analysis of factors associated with COVID-19 death in patients from the six countries providing the largest number of patients, considering country effects, with an otherwise reduced number of regressor variables

<table>
<thead>
<tr>
<th>Age, years</th>
<th>OR</th>
<th>95% CI</th>
<th>Age, years</th>
<th>OR</th>
<th>95% CI</th>
<th>Age, years</th>
<th>OR</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td>Age ≤ 65</td>
<td>76 / 2015</td>
<td>1 [Reference]</td>
<td>130 / 941</td>
<td>1.41</td>
<td>1.01 1.96</td>
<td>68 / 572</td>
<td>1.25</td>
<td>0.79 1.98</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td>141 / 951</td>
<td>1.68 1.26 2.24</td>
<td>71 / 640</td>
<td>1.41</td>
<td>0.95 2.08</td>
<td>47 / 283</td>
<td>1.24</td>
<td>0.77 1.98</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>118 / 745</td>
<td>1.15 0.82 1.60</td>
<td>73 / 500</td>
<td>1.10</td>
<td>0.71 1.70</td>
<td>61 / 323</td>
<td>1.22</td>
<td>0.73 2.03</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension alone or CVD alone</td>
<td>130 / 941</td>
<td>1.41</td>
<td>1.01 1.96</td>
<td>68 / 572</td>
<td>1.25</td>
<td>0.79 1.98</td>
<td>56 / 369</td>
<td>1.41</td>
</tr>
<tr>
<td>Hypertension and CVD</td>
<td>73 / 259</td>
<td>2.16</td>
<td>1.41 3.31</td>
<td>43 / 141</td>
<td>2.58</td>
<td>1.43 4.68</td>
<td>32 / 100</td>
<td>2.60</td>
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<tr>
<td>Lung disease</td>
<td>115 / 614</td>
<td>1.58</td>
<td>1.16 2.16</td>
<td>63 / 344</td>
<td>1.46</td>
<td>0.94 2.25</td>
<td>53 / 245</td>
<td>1.43</td>
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<td>Chronic kidney disease</td>
<td>59 / 212</td>
<td>1.73</td>
<td>1.12 2.67</td>
<td>24 / 97</td>
<td>1.32</td>
<td>0.68 2.57</td>
<td>19 / 72</td>
<td>1.28</td>
</tr>
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<td>Diabetes mellitus</td>
<td>78 / 410</td>
<td>1.26</td>
<td>0.89 1.79</td>
<td>46 / 258</td>
<td>1.31</td>
<td>0.84 2.06</td>
<td>35 / 181</td>
<td>1.23</td>
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<td>Rheumatic disease</td>
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<tr>
<td>Systemic lupus erythematosus</td>
<td>18 / 299</td>
<td>0.78</td>
<td>0.39 1.55</td>
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<tr>
<td>Vasculitis</td>
<td>60 / 272</td>
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<td>0.50 1.30</td>
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<tr>
<td>Other connective tissue diseases</td>
<td>47 / 384</td>
<td>0.93</td>
<td>0.58 1.47</td>
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<td>Psoriasis arthritis</td>
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<td>0.38 1.30</td>
<td>17 / 360</td>
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<td>0.43 1.54</td>
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<td>Odds Ratio (95% CI)</td>
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<td></td>
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<tr>
<td>Spondyloarthritis</td>
<td>10 / 340</td>
<td>0.57 (0.27, 1.20)</td>
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<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
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<td>0.68 (0.30, 1.58)</td>
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<tr>
<td>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</td>
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<td>0.60 (0.30, 1.17)</td>
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<td></td>
</tr>
<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>87 / 569</td>
<td>1.84 (1.26, 2.69)</td>
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<td></td>
<td></td>
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<tr>
<td>Medication</td>
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<td>Methotrexate</td>
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<td>1.00 (Reference)</td>
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<tr>
<td>No DMARD therapy</td>
<td>101 / 602</td>
<td>2.61 (1.61, 4.26)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leflunomide</td>
<td>10 / 64</td>
<td>2.32 (0.98, 5.50)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Antimalarials</td>
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<td>1.15 (0.59, 2.22)</td>
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<td></td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>27 / 93</td>
<td>5.07 (2.64, 9.74)</td>
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<tr>
<td>Immunosuppressants</td>
<td>28 / 212</td>
<td>2.94 (1.53, 5.63)</td>
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<td>Rituximab</td>
<td>35 / 159</td>
<td>4.38 (2.37, 8.10)</td>
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<td>TNF inhibitors</td>
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<td>1.10 (0.61, 2.00)</td>
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<td>Belimumab</td>
<td>14 / 268</td>
<td>1.25 (0.62, 2.51)</td>
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<tr>
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<td>Abatacept</td>
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<td>IL-17/IL-23/IL-12+23 inhibitors</td>
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<td>n.a.</td>
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<tr>
<td>tsDMARDs</td>
<td>15 / 136</td>
<td>2.32 (1.08, 4.99)</td>
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<td>Glucocorticoids (GCs)</td>
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<td>No GCs</td>
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<td>1.40</td>
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<td>90 / 497</td>
<td>1.99</td>
<td>1.33</td>
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<tr>
<td>France</td>
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<td>1.24</td>
<td>0.82</td>
<td>1.89</td>
<td>25 / 530</td>
<td>0.95</td>
<td>0.52</td>
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<td>90 / 433</td>
<td>2.71</td>
<td>1.79</td>
<td>4.10</td>
<td>57 / 303</td>
<td>2.38</td>
<td>1.39</td>
<td>4.07</td>
</tr>
<tr>
<td>Italy</td>
<td>52 / 312</td>
<td>1.87</td>
<td>1.15</td>
<td>3.02</td>
<td>29 / 196</td>
<td>1.65</td>
<td>0.84</td>
<td>3.24</td>
</tr>
<tr>
<td>Spain</td>
<td>21 / 246</td>
<td>1.02</td>
<td>0.55</td>
<td>1.86</td>
<td>10 / 156</td>
<td>0.68</td>
<td>0.29</td>
<td>1.62</td>
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<tr>
<td>Germany</td>
<td>15 / 198</td>
<td>1.02</td>
<td>0.54</td>
<td>1.94</td>
<td>13 / 150</td>
<td>1.30</td>
<td>0.60</td>
<td>2.79</td>
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</table>

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided $\leq 20$ patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
### Supplementary table 10. Multivariable logistic regression analysis of factors associated with COVID-19-related death stratified by age (> 65 years vs. ≤ 65 years)

<table>
<thead>
<tr>
<th>Comorbidities</th>
<th>&gt; 65 years N deaths/patients (%)</th>
<th>≤ 65 years N deaths/patients (%)</th>
<th>OR (95% CI)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex (vs. female)</td>
<td>121 / 437</td>
<td>40 / 751</td>
<td>1.43 (1.09, 1.87)</td>
<td>1.32 (0.74, 2.33)</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>105 / 388</td>
<td>35 / 534</td>
<td>1.04 (0.75, 1.44)</td>
<td>1.63 (1.02, 2.60)</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension alone or CVD alone</td>
<td>103 / 544</td>
<td>52 / 627</td>
<td>0.85 (0.53, 1.36)</td>
<td>2.04 (1.38, 3.01)</td>
</tr>
<tr>
<td>Hypertension and CVD</td>
<td>77 / 210</td>
<td>12 / 91</td>
<td>1.81 (0.99, 3.31)</td>
<td>2.16 (1.09, 4.31)</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>102 / 320</td>
<td>35 / 401</td>
<td>1.62 (1.09, 2.40)</td>
<td>1.79 (1.31, 2.45)</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>53 / 158</td>
<td>23 / 100</td>
<td>1.43 (0.75, 2.75)</td>
<td>3.78 (2.24, 6.37)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>75 / 251</td>
<td>21 / 257</td>
<td>1.39 (0.91, 2.12)</td>
<td>1.21 (0.66, 2.21)</td>
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<tr>
<td>Rheumatic disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Rheumatoid arthritis</td>
<td>129 / 537</td>
<td>40 / 850</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
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<tr>
<td>Systemic lupus erythematosus</td>
<td>8 / 47</td>
<td>28 / 344</td>
<td>0.54 (0.26, 1.11)</td>
<td>1.24 (0.66, 2.34)</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>55 / 192</td>
<td>12 / 133</td>
<td>0.77 (0.55, 1.09)</td>
<td>0.91 (0.46, 1.78)</td>
</tr>
<tr>
<td>Other connective tissue diseases</td>
<td>32 / 147</td>
<td>21 / 326</td>
<td>0.66 (0.51, 0.85)</td>
<td>0.75 (0.37, 1.54)</td>
</tr>
<tr>
<td>Psoriasis arthritis</td>
<td>12 / 85</td>
<td>7 / 344</td>
<td>0.73 (0.52, 1.03)</td>
<td>0.58 (0.24, 1.37)</td>
</tr>
<tr>
<td>Spondyloarthritis</td>
<td>9 / 38</td>
<td>6 / 385</td>
<td>0.81 (0.37, 1.76)</td>
<td>0.59 (0.21, 1.71)</td>
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<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>8 / 33</td>
<td>2 / 76</td>
<td>0.71 (0.36, 1.39)</td>
<td>0.67 (0.31, 1.44)</td>
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<tr>
<td>Other rheumatic diseases (not IJDs/CTDs/vasculitis)</td>
<td>17 / 83</td>
<td>7 / 146</td>
<td>0.45 (0.29, 0.69)</td>
<td>0.58 (0.25, 1.33)</td>
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<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>59 / 191</td>
<td>50 / 531</td>
<td>1.53 (0.98, 2.41)</td>
<td>2.20 (1.38, 3.50)</td>
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<td>Medication</td>
<td>N</td>
<td>OR</td>
<td>95% CI</td>
<td>N</td>
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<td>----------------------</td>
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<td>-----------------</td>
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<tr>
<td>Methotrexate</td>
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<td>1</td>
<td>[Reference]</td>
<td>6</td>
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<tr>
<td>No DMARD therapy</td>
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<td>2.07</td>
<td>1.45</td>
<td>28</td>
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<tr>
<td>Leflunomide</td>
<td>7</td>
<td>0.98</td>
<td>0.38</td>
<td>5</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>13</td>
<td>0.68</td>
<td>0.38</td>
<td>14</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>28</td>
<td>3.89</td>
<td>1.60</td>
<td>5</td>
</tr>
<tr>
<td>Immunosuppressants</td>
<td>18</td>
<td>2.74</td>
<td>1.51</td>
<td>20</td>
</tr>
<tr>
<td>Rituximab</td>
<td>24</td>
<td>3.84</td>
<td>1.93</td>
<td>18</td>
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<tr>
<td>Other b/tsDMARDs</td>
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<td>0.92</td>
<td>0.61</td>
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<tr>
<td>Glucocorticoids (GCs)</td>
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<tr>
<td>GCs 1-10mg/d</td>
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<td>0.84</td>
<td>54</td>
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<tr>
<td>GCs &gt; 10 mg/d</td>
<td>32</td>
<td>1.35</td>
<td>0.79</td>
<td>17</td>
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</tbody>
</table>

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level α=0.05 are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

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<table>
<thead>
<tr>
<th>Comorbidities</th>
<th>Male sex</th>
<th>Female sex</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N deaths/patients</td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>161 / 1188 (13.6%)</td>
<td>223 / 2517 (8.9%)</td>
</tr>
<tr>
<td>Age, years</td>
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<tr>
<td>Age ≤ 65</td>
<td>40 / 751</td>
<td>1</td>
</tr>
<tr>
<td>65 years &lt; Age ≤ 75</td>
<td>55 / 252</td>
<td>3.81</td>
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<tr>
<td>Age &gt; 75</td>
<td>66 / 185</td>
<td>6.80</td>
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<td>Ever smoked (vs. never)</td>
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<td>1.08</td>
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<td>Comorbidities</td>
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<tr>
<td>Hypertension alone or CVD alone</td>
<td>66 / 385</td>
<td>1.16</td>
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<td>Hypertension and CVD</td>
<td>43 / 145</td>
<td>1.87</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>53 / 232</td>
<td>1.41</td>
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<td>Chronic kidney disease</td>
<td>30 / 104</td>
<td>1.26</td>
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<td>Diabetes mellitus</td>
<td>46 / 193</td>
<td>1.80</td>
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<tr>
<td>Rheumatic disease</td>
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<tr>
<td>Rheumatoid arthritis</td>
<td>55 / 347</td>
<td>1</td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>10 / 47</td>
<td>1.91</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>35 / 138</td>
<td>0.95</td>
</tr>
<tr>
<td>Other connective tissue diseases</td>
<td>21 / 121</td>
<td>0.96</td>
</tr>
<tr>
<td>Psoriasis arthritis</td>
<td>13 / 200</td>
<td>0.95</td>
</tr>
<tr>
<td>Spondyloarthritis</td>
<td>10 / 202</td>
<td>0.82</td>
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<tr>
<td>Other inflammatory arthritis</td>
<td>3 / 35</td>
<td>0.41</td>
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<td>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</td>
<td>16 / 112</td>
<td>0.49</td>
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<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>34 / 204</td>
<td>1.69</td>
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### Medication

<table>
<thead>
<tr>
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<th>23 / 206</th>
<th>1</th>
<th>[Reference]</th>
<th>24 / 389</th>
<th>1</th>
<th>[Reference]</th>
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</thead>
<tbody>
<tr>
<td>Methotrexate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No DMARD therapy</td>
<td>61 / 280</td>
<td>2.25</td>
<td>1.16</td>
<td>4.37</td>
<td>63 / 459</td>
<td>2.19</td>
</tr>
<tr>
<td>Leflunomide</td>
<td>5 / 28</td>
<td>1.57</td>
<td>0.82</td>
<td>3.02</td>
<td>7 / 62</td>
<td>1.79</td>
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<tr>
<td>Antimalarials</td>
<td>61 / 280</td>
<td>0.86</td>
<td>0.36</td>
<td>2.04</td>
<td>63 / 459</td>
<td>1.19</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>16 / 52</td>
<td>4.71</td>
<td>1.92</td>
<td>11.54</td>
<td>17 / 92</td>
<td>3.26</td>
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<tr>
<td>Immunosuppressants</td>
<td>14 / 79</td>
<td>2.02</td>
<td>1.15</td>
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<td>24 / 197</td>
<td>2.41</td>
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<td>16 / 60</td>
<td>3.09</td>
<td>1.03</td>
<td>9.30</td>
<td>26 / 132</td>
<td>5.40</td>
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<tr>
<td>Other b/tsDMARDs</td>
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<td>0.64</td>
<td>0.37</td>
<td>1.10</td>
<td>42 / 835</td>
<td>1.34</td>
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</table>

### Glucocorticoids (GCs)

<table>
<thead>
<tr>
<th>Glucocorticoids (GCs)</th>
<th>76 / 781</th>
<th>1</th>
<th>[Reference]</th>
<th>89 / 1636</th>
<th>1</th>
<th>[Reference]</th>
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<tr>
<td>GCs 1-10mg/d</td>
<td>65 / 319</td>
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<td>0.61</td>
<td>1.87</td>
<td>105 / 744</td>
<td>1.71</td>
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<td>GCs &gt; 10 mg/d</td>
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<td>1.20</td>
<td>0.67</td>
<td>2.17</td>
<td>29 / 138</td>
<td>2.23</td>
</tr>
</tbody>
</table>

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---

| Other rheumatic diseases (not IJDs / CTDs / vasculitis) | 16 / 112 | 0.49 | 0.30 | 0.79 | 8 / 117 | 0.50 | 0.29 | 0.89 |
| High/moderate/severe disease activity (DA) vs. remission/low DA | 34 / 204 | 1.69 | 1.18 | 2.42 | 75 / 518 | 1.99 | 1.16 | 3.41 |

### Medication

<table>
<thead>
<tr>
<th>Medication</th>
<th>23 / 206</th>
<th>1</th>
<th>[Reference]</th>
<th>24 / 389</th>
<th>1</th>
<th>[Reference]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methotrexate</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No DMARD therapy</td>
<td>61 / 280</td>
<td>2.25</td>
<td>1.16</td>
<td>4.37</td>
<td>63 / 459</td>
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</tr>
<tr>
<td>Leflunomide</td>
<td>5 / 28</td>
<td>1.57</td>
<td>0.82</td>
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<td>61 / 280</td>
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<td>63 / 459</td>
<td>1.19</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>16 / 52</td>
<td>4.71</td>
<td>1.92</td>
<td>11.54</td>
<td>17 / 92</td>
<td>3.26</td>
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<tr>
<td>Immunosuppressants</td>
<td>14 / 79</td>
<td>2.02</td>
<td>1.15</td>
<td>3.54</td>
<td>24 / 197</td>
<td>2.41</td>
</tr>
<tr>
<td>Rituximab</td>
<td>16 / 60</td>
<td>3.09</td>
<td>1.03</td>
<td>9.30</td>
<td>26 / 132</td>
<td>5.40</td>
</tr>
<tr>
<td>Other b/tsDMARDs</td>
<td>19 / 425</td>
<td>0.64</td>
<td>0.37</td>
<td>1.10</td>
<td>42 / 835</td>
<td>1.34</td>
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</table>

### Glucocorticoids (GCs)

<table>
<thead>
<tr>
<th>Glucocorticoids (GCs)</th>
<th>76 / 781</th>
<th>1</th>
<th>[Reference]</th>
<th>89 / 1636</th>
<th>1</th>
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</tr>
<tr>
<td>GCs 1-10mg/d</td>
<td>65 / 319</td>
<td>1.07</td>
<td>0.61</td>
<td>1.87</td>
<td>105 / 744</td>
<td>1.71</td>
</tr>
<tr>
<td>GCs &gt; 10 mg/d</td>
<td>20 / 88</td>
<td>1.20</td>
<td>0.67</td>
<td>2.17</td>
<td>29 / 138</td>
<td>2.23</td>
</tr>
</tbody>
</table>

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
### Supplementary table 12. Multivariable logistic regression analysis of factors associated with COVID-19-related death stratified by smoking habits

<table>
<thead>
<tr>
<th></th>
<th>Ever smoked</th>
<th>Never smoked</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N deaths/patients</td>
<td>OR</td>
</tr>
<tr>
<td><strong>N deaths/patients (%)</strong></td>
<td>140 / 922 (15.2%)</td>
<td></td>
</tr>
<tr>
<td><strong>Age, years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age ≤ 65</td>
<td>35 / 534</td>
<td>1</td>
</tr>
<tr>
<td>Age &lt; 75</td>
<td>47 / 226</td>
<td><strong>2.79</strong></td>
</tr>
<tr>
<td>Age &gt; 75</td>
<td>58 / 162</td>
<td><strong>6.43</strong></td>
</tr>
<tr>
<td><strong>Male sex (vs. female)</strong></td>
<td>72 / 399</td>
<td>1.30</td>
</tr>
<tr>
<td><strong>Comorbidities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension alone or CVD</td>
<td>57 / 338</td>
<td>1.01</td>
</tr>
<tr>
<td>Hypertension and CVD</td>
<td>36 / 124</td>
<td>1.53</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>62 / 271</td>
<td>1.49</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>21 / 87</td>
<td>0.74</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>39 / 158</td>
<td>1.48</td>
</tr>
<tr>
<td><strong>Rheumatic disease</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>71 / 388</td>
<td>1</td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>11 / 62</td>
<td>1.30</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>18 / 90</td>
<td><strong>0.42</strong></td>
</tr>
<tr>
<td>Other connective tissue diseases</td>
<td>16 / 103</td>
<td>0.71</td>
</tr>
<tr>
<td>Psoriatic arthritis</td>
<td>6 / 111</td>
<td>0.60</td>
</tr>
<tr>
<td>Spondyloarthritis</td>
<td>3 / 80</td>
<td>0.32</td>
</tr>
<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>5 / 27</td>
<td>0.65</td>
</tr>
<tr>
<td>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</td>
<td>12 / 73</td>
<td>0.59</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>32 / 171</td>
<td>1.45</td>
</tr>
<tr>
<td>Medication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methotrexate</td>
<td>15 / 145</td>
<td>1</td>
</tr>
<tr>
<td>No DMARD therapy</td>
<td>43 / 221</td>
<td>2.35</td>
</tr>
<tr>
<td>Leflunomide</td>
<td>5 / 21</td>
<td>1.41</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>13 / 93</td>
<td>1.52</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>21 / 56</td>
<td>6.15</td>
</tr>
<tr>
<td>Immunosuppressants</td>
<td>12 / 55</td>
<td>3.89</td>
</tr>
<tr>
<td>Rituximab</td>
<td>12 / 46</td>
<td>3.95</td>
</tr>
<tr>
<td>Other b/tsDMARDs</td>
<td>20 / 289</td>
<td>1.04</td>
</tr>
<tr>
<td>Glucocorticoids (GCs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No GCs</td>
<td>67 / 604</td>
<td>1</td>
</tr>
<tr>
<td>GCs 1-10mg/d</td>
<td>57 / 260</td>
<td>1.52</td>
</tr>
<tr>
<td>GCs &gt; 10 mg/d</td>
<td>16 / 57</td>
<td>2.53</td>
</tr>
</tbody>
</table>

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
<table>
<thead>
<tr>
<th></th>
<th>Heart disease</th>
<th></th>
<th>No heart disease</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N deaths/patients (%)</td>
<td>242 / 1439 (16.8%)</td>
<td>384 / 3705 (10.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age ≤ 65</td>
<td>63 / 711</td>
<td>1</td>
<td>[Reference]</td>
<td>53 / 1833</td>
</tr>
<tr>
<td>65 years &lt; Age ≤ 75</td>
<td>58 / 367</td>
<td>1.68</td>
<td>1.12</td>
<td>2.52</td>
</tr>
<tr>
<td>Age &gt; 75</td>
<td>121 / 361</td>
<td>4.77</td>
<td>3.08</td>
<td>7.40</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td>108 / 525</td>
<td>1.59</td>
<td>1.23</td>
<td>2.06</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>93 / 458</td>
<td>1.13</td>
<td>0.82</td>
<td>1.56</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>84 / 352</td>
<td>1.56</td>
<td>1.15</td>
<td>2.12</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>58 / 190</td>
<td>1.58</td>
<td>0.94</td>
<td>2.67</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>75 / 358</td>
<td>1.33</td>
<td>0.84</td>
<td>2.12</td>
</tr>
<tr>
<td>Rheumatic disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>105 / 572</td>
<td>1</td>
<td>[Reference]</td>
<td>63 / 805</td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>24 / 154</td>
<td>1.16</td>
<td>0.55</td>
<td>2.46</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>39 / 168</td>
<td>0.61</td>
<td>0.36</td>
<td>1.01</td>
</tr>
<tr>
<td>Other connective tissue diseases</td>
<td>36 / 201</td>
<td>0.79</td>
<td>0.60</td>
<td>1.02</td>
</tr>
<tr>
<td>Psoriasis arthritis</td>
<td>13 / 152</td>
<td>0.70</td>
<td>0.45</td>
<td>1.10</td>
</tr>
<tr>
<td>Spondyloarthritis</td>
<td>6 / 87</td>
<td>0.51</td>
<td>0.17</td>
<td>1.51</td>
</tr>
<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>8 / 34</td>
<td>1.30</td>
<td>0.66</td>
<td>2.55</td>
</tr>
<tr>
<td>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</td>
<td>16 / 100</td>
<td>0.45</td>
<td>0.30</td>
<td>0.68</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>66 / 283</td>
<td>1.92</td>
<td>1.01</td>
<td>3.63</td>
</tr>
</tbody>
</table>

### Medication

<table>
<thead>
<tr>
<th>Methotrexate</th>
<th>14 / 352</th>
<th>1</th>
<th>[Reference]</th>
<th>33 / 238</th>
<th>1</th>
<th>[Reference]</th>
</tr>
</thead>
<tbody>
<tr>
<td>No DMARD therapy</td>
<td>91 / 372</td>
<td>2.14</td>
<td>1.37</td>
<td>3.35</td>
<td>32 / 361</td>
<td>2.09</td>
</tr>
<tr>
<td>Leflunomide</td>
<td>5 / 40</td>
<td>0.79</td>
<td>0.24</td>
<td>2.61</td>
<td>7 / 49</td>
<td>3.49</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>20 / 168</td>
<td>1.10</td>
<td>0.62</td>
<td>1.96</td>
<td>6 / 254</td>
<td>0.64</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>18 / 64</td>
<td>2.78</td>
<td>1.08</td>
<td>7.15</td>
<td>14 / 77</td>
<td>4.82</td>
</tr>
<tr>
<td>Immunosuppressants</td>
<td>21 / 117</td>
<td>1.82</td>
<td>1.02</td>
<td>3.23</td>
<td>17 / 158</td>
<td>2.25</td>
</tr>
<tr>
<td>Rituximab</td>
<td>19 / 68</td>
<td>2.49</td>
<td>1.25</td>
<td>4.96</td>
<td>22 / 121</td>
<td>5.86</td>
</tr>
<tr>
<td>Other b/tsDMARDs</td>
<td>35 / 377</td>
<td>0.96</td>
<td>0.59</td>
<td>1.54</td>
<td>26 / 877</td>
<td>1.08</td>
</tr>
</tbody>
</table>

### Glucocorticoids (GCs)

<table>
<thead>
<tr>
<th>No GCs</th>
<th>96 / 816</th>
<th>1</th>
<th>[Reference]</th>
<th>69 / 1584</th>
<th>1</th>
<th>[Reference]</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCs 1-10mg/d</td>
<td>114 / 510</td>
<td>1.62</td>
<td>1.02</td>
<td>2.56</td>
<td>53 / 541</td>
<td>1.16</td>
</tr>
<tr>
<td>GCs &gt; 10 mg/d</td>
<td>32 / 112</td>
<td>1.84</td>
<td>1.20</td>
<td>2.82</td>
<td>17 / 112</td>
<td>1.62</td>
</tr>
</tbody>
</table>

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level α=0.05 are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, Glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, Systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
**Supplementary table 14. Multivariable logistic regression analysis of factors associated with COVID-19-related death stratified by chronic lung disease**

<table>
<thead>
<tr>
<th>Chronic lung disease</th>
<th>No chronic lung disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>N deaths/patients (%)</td>
<td>136 / 721 (18.9%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N deaths/patients</th>
<th>OR</th>
<th>95% CI</th>
<th>N deaths/patients</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age ≤ 65</td>
<td>35 / 401</td>
<td>1</td>
<td>[Reference]</td>
<td>84 / 2164</td>
<td>1</td>
</tr>
<tr>
<td>65 years &lt; Age ≤ 75</td>
<td>48 / 189</td>
<td>3.58</td>
<td>2.40</td>
<td>5.33</td>
<td>61 / 456</td>
</tr>
<tr>
<td>Age &gt; 75</td>
<td>54 / 131</td>
<td>8.34</td>
<td>6.29</td>
<td>11.05</td>
<td>103 / 365</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td>53 / 232</td>
<td>1.02</td>
<td>0.47</td>
<td>2.22</td>
<td>108 / 956</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>62 / 271</td>
<td>1.23</td>
<td>0.68</td>
<td>2.24</td>
<td>77 / 651</td>
</tr>
</tbody>
</table>

**Comorbidities**

| Hypertension alone or CVD alone | 51 / 260 | 0.92 | 0.67 | 1.27 | 104 / 890 | 1.43 | 1.05 | 1.94 |
| Hypertension and CVD | 34 / 97 | 1.51 | 0.84 | 2.73 | 55 / 204 | 2.21 | 1.50 | 3.27 |
| Chronic kidney disease | 21 / 64 | 0.96 | 0.32 | 2.82 | 55 / 194 | 2.04 | 1.22 | 3.43 |
| Diabetes mellitus | 38 / 140 | 1.40 | 0.61 | 3.21 | 58 / 368 | 1.44 | 1.05 | 1.96 |

**Rheumatic disease**

| Rheumatoid arthritis | 65 / 298 | 1 | [Reference] | 104 / 1089 | 1 | [Reference] |
| Systemic lupus erythematosus | 5 / 58 | 0.55 | 0.18 | 1.66 | 31 / 333 | 1.42 | 0.81 | 2.50 |
| Vasculitis | 18 / 66 | 0.87 | 0.44 | 1.72 | 49 / 259 | 0.75 | 0.57 | 1.00 |
| Other connective tissue diseases | 35 / 169 | 1.21 | 0.66 | 2.19 | 19 / 304 | 0.46 | 0.30 | 0.71 |
| Psoriasis arthritis | 4 / 44 | 1.19 | 0.45 | 3.14 | 15 / 385 | 0.54 | 0.40 | 0.75 |
| Spondyloarthritis | 4 / 49 | 0.81 | 0.43 | 1.55 | 11 / 374 | 0.60 | 0.26 | 1.35 |
| Other inflammatory arthritis or non-systemic JIA | 4 / 16 | 1.61 | 0.53 | 4.85 | 6 / 94 | 0.55 | 0.26 | 1.19 |
| Other rheumatic diseases (not IJDs / CTDs / vasculitis) | 6 / 40 | 0.73 | 0.24 | 2.21 | 18 / 189 | 0.40 | 0.24 | 0.69 |
| High/moderate/severe disease activity (DA) vs. remission/low DA | 43 / 173 | 1.70 | 1.01 | 2.87 | 66 / 549 | 1.97 | 1.27 | 3.04 |

**Medication**

| Methotrexate | 16 / 110 | 1 | [Reference] | 31 / 485 | 1 | [Reference] |
| No DMARD therapy | 35 / 138 | 2.28 | 1.31 | 3.95 | 89 / 601 | 2.17 | 1.39 | 3.39 |
| Leflunomide | 5 / 23 | 2.21 | 1.21 | 4.03 | 7 / 67 | 1.44 | 0.68 | 3.07 |
| Antimalarials | 12 / 78 | 2.03 | 0.68 | 6.06 | 15 / 348 | 0.73 | 0.38 | 1.41 |
| Sulfasalazine | 10 / 33 | 2.97 | 1.19 | 7.39 | 23 / 111 | 4.20 | 1.83 | 9.65 |
| Immunosuppressants | 17 / 93 | 2.74 | 1.99 | 3.78 | 21 / 183 | 1.68 | 0.86 | 3.28 |
| Rituximab | 20 / 65 | 4.95 | 1.59 | 15.39 | 23 / 127 | 4.08 | 1.99 | 8.39 |
| Other b/tsDMARDs | 21 / 183 | 1.22 | 0.69 | 2.16 | 40 / 1077 | 0.90 | 0.52 | 1.54 |

**Glucocorticoids (GCs)**

| No GCs | 52 / 406 | 1 | [Reference] | 113 / 2012 | 1 | [Reference] |
| GCs 1-10mg/d | 68 / 258 | 1.95 | 1.30 | 2.91 | 103 / 804 | 1.23 | 0.77 | 1.95 |
| GCs > 10 mg/d | 17 / 58 | 1.70 | 0.96 | 3.00 | 32 / 168 | 1.65 | 0.93 | 2.92 |

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided $\leq 20$ patients for that analysis or if there were no deaths reported for that specific medication.

CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
**Supplementary table 15. Multivariable logistic regression analysis of factors associated with COVID-19-related death stratified by disease activity**

<table>
<thead>
<tr>
<th>Comorbidities</th>
<th>N deaths/patients (%)</th>
<th>Moderate / severe disease activity</th>
<th>Low disease activity / remission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N deaths/patients (%)</td>
<td>OR 95% CI</td>
<td>N deaths/patients (%)</td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age ≤ 65</td>
<td>50 / 531</td>
<td>1 [Reference]</td>
<td>69 / 2035</td>
</tr>
<tr>
<td>65 years &lt; Age ≤ 75</td>
<td>30 / 120</td>
<td>2.52 1.22 5.23</td>
<td>80 / 524</td>
</tr>
<tr>
<td>Age &gt; 75</td>
<td>30 / 72</td>
<td>3.92 1.99 7.74</td>
<td>127 / 424</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td>34 / 204</td>
<td>1.18 0.62 2.22</td>
<td>127 / 984</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>32 / 171</td>
<td>1.09 0.64 1.86</td>
<td>108 / 751</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension alone or CVD alone</td>
<td>43 / 227</td>
<td>1.32 0.70 2.49</td>
<td>112 / 923</td>
</tr>
<tr>
<td>Hypertension and CVD</td>
<td>24 / 59</td>
<td>3.26 1.33 8.03</td>
<td>65 / 242</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>43 / 173</td>
<td>1.78 1.20 2.64</td>
<td>93 / 548</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>30 / 61</td>
<td>3.62 1.81 7.25</td>
<td>47 / 197</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>25 / 115</td>
<td>0.85 0.39 1.84</td>
<td>71 / 393</td>
</tr>
<tr>
<td>Rheumatic disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>46 / 283</td>
<td>1 [Reference]</td>
<td>123 / 1104</td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>17 / 77</td>
<td>1.42 0.59 3.41</td>
<td>19 / 315</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>18 / 52</td>
<td>1.32 0.59 2.92</td>
<td>49 / 273</td>
</tr>
<tr>
<td>Other connective tissue diseases</td>
<td>21 / 108</td>
<td>1.17 0.59 2.29</td>
<td>32 / 365</td>
</tr>
<tr>
<td>Psoriasis arthritis</td>
<td>5 / 79</td>
<td>0.53 0.16 1.77</td>
<td>15 / 350</td>
</tr>
<tr>
<td>Spondyloarthitis</td>
<td>3 / 79</td>
<td>0.45 0.15 1.34</td>
<td>12 / 344</td>
</tr>
<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>1 / 19</td>
<td>0.68 0.10 4.50</td>
<td>9 / 90</td>
</tr>
<tr>
<td>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</td>
<td>1 / 45</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
</tbody>
</table>

**Medication**

<table>
<thead>
<tr>
<th>Medication</th>
<th>5 / 92</th>
<th>1</th>
<th>[Reference]</th>
<th>42 / 503</th>
<th>1</th>
<th>[Reference]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methotrexate</td>
<td>4.64</td>
<td>1.64</td>
<td>13.15</td>
<td>97 / 605</td>
<td>1.93</td>
<td>1.33</td>
</tr>
<tr>
<td>No DMARD therapy</td>
<td>6 / 19</td>
<td>6.96</td>
<td>2.64</td>
<td>18.39</td>
<td>6 / 71</td>
<td>0.96</td>
</tr>
<tr>
<td>Leflunomide</td>
<td>8 / 60</td>
<td>2.28</td>
<td>0.88</td>
<td>5.92</td>
<td>19 / 366</td>
<td>0.96</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>6 / 25</td>
<td>7.44</td>
<td>1.35</td>
<td>40.89</td>
<td>27 / 119</td>
<td>3.27</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>19 / 83</td>
<td>3.95</td>
<td>1.24</td>
<td>12.59</td>
<td>19 / 193</td>
<td>1.98</td>
</tr>
<tr>
<td>Immunosuppressants</td>
<td>12 / 52</td>
<td>3.50</td>
<td>1.11</td>
<td>11.07</td>
<td>30 / 140</td>
<td>5.16</td>
</tr>
<tr>
<td>Rituximab</td>
<td>25 / 261</td>
<td>2.76</td>
<td>1.14</td>
<td>6.70</td>
<td>36 / 999</td>
<td>0.76</td>
</tr>
</tbody>
</table>

**Glucocorticoids (GCs)**

<table>
<thead>
<tr>
<th>Glucocorticoids (GCs)</th>
<th>28 / 336</th>
<th>1</th>
<th>[Reference]</th>
<th>136 / 2081</th>
<th>1</th>
<th>[Reference]</th>
</tr>
</thead>
<tbody>
<tr>
<td>No GCs</td>
<td>51 / 266</td>
<td>1.61</td>
<td>0.86</td>
<td>3.02</td>
<td>119 / 797</td>
<td>1.44</td>
</tr>
<tr>
<td>GCs 1-10 mg/d</td>
<td>30 / 120</td>
<td>1.71</td>
<td>0.94</td>
<td>3.10</td>
<td>19 / 105</td>
<td>1.69</td>
</tr>
<tr>
<td>GCs &gt; 10 mg/d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication. CI, confidence interval; CTD, connective tissue diseases; CVD, cardiovascular disease; DA, disease activity; DMARD, disease modifying antirheumatic drugs; GC, Glucocorticoids; IJD, inflammatory joint diseases; IL, interleukin; JIA, juvenile idiopathic arthritis; N, number; OR, odds ratio; SLE, Systemic lupus erythematosus; TNF, tumour necrosis factor; tsDMARD, targeted synthetic disease modifying antirheumatic drugs.
## Supplementary table 16. Multivariable logistic regression analysis of factors associated with COVID-19-related death stratified by glucocorticoid use

<table>
<thead>
<tr>
<th>Comorbidities</th>
<th>Glucocorticoids</th>
<th>No glucocorticoids</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N deaths/patients (%)</td>
<td>OR</td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age ≤ 65</td>
<td>71 / 754</td>
<td>1</td>
</tr>
<tr>
<td>65 years &lt; Age ≤ 75</td>
<td>52 / 265</td>
<td>1.80</td>
</tr>
<tr>
<td>Age &gt; 75</td>
<td>97 / 269</td>
<td>4.67</td>
</tr>
<tr>
<td>Male sex (vs. female)</td>
<td>85 / 407</td>
<td>1.16</td>
</tr>
<tr>
<td>Ever smoked (vs. never)</td>
<td>73 / 318</td>
<td>1.25</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension alone or CVD alone</td>
<td>94 / 474</td>
<td>1.43</td>
</tr>
<tr>
<td>Hypertension and CVD</td>
<td>54 / 154</td>
<td>1.87</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>84 / 316</td>
<td>2.03</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>51 / 151</td>
<td>1.79</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>55 / 215</td>
<td>1.32</td>
</tr>
<tr>
<td>Rheumatic disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>91 / 516</td>
<td>1</td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>26 / 198</td>
<td>1.20</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>58 / 240</td>
<td>0.95</td>
</tr>
<tr>
<td>Other connective tissue diseases</td>
<td>31 / 181</td>
<td>0.84</td>
</tr>
<tr>
<td>Psoriasis arthritis</td>
<td>4 / 53</td>
<td>0.52</td>
</tr>
<tr>
<td>Spondyloarthitis</td>
<td>3 / 38</td>
<td>0.69</td>
</tr>
<tr>
<td>Other inflammatory arthritis or non-systemic JIA</td>
<td>5 / 24</td>
<td>1.04</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Other rheumatic diseases (not IJDs / CTDs / vasculitis)</th>
<th>7 / 69</th>
<th>0.48</th>
<th>0.17</th>
<th>1.33</th>
<th>17 / 160</th>
<th>0.51</th>
<th>0.28</th>
<th>0.91</th>
</tr>
</thead>
<tbody>
<tr>
<td>High/moderate/severe disease activity (DA) vs. remission/low DA</td>
<td>80 / 386</td>
<td>1.95</td>
<td>1.30</td>
<td>2.92</td>
<td>28 / 336</td>
<td>1.74</td>
<td>0.98</td>
<td>3.08</td>
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</tbody>
</table>

### Medication

<table>
<thead>
<tr>
<th>Medication</th>
<th>18 / 212</th>
<th>1</th>
<th>[Reference]</th>
<th>29 / 383</th>
<th>1</th>
<th>[Reference]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methotrexate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No DMARD therapy</td>
<td>74 / 296</td>
<td>3.11</td>
<td>2.12</td>
<td>4.57</td>
<td>50 / 444</td>
<td>1.72</td>
</tr>
<tr>
<td>Leflunomide</td>
<td>9 / 43</td>
<td>3.40</td>
<td>1.83</td>
<td>6.34</td>
<td>3 / 47</td>
<td>0.52</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>18 / 137</td>
<td>1.81</td>
<td>1.19</td>
<td>2.77</td>
<td>9 / 289</td>
<td>0.59</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>11 / 48</td>
<td>3.17</td>
<td>1.22</td>
<td>8.27</td>
<td>22 / 96</td>
<td>4.00</td>
</tr>
<tr>
<td>Immunosuppressants</td>
<td>24 / 176</td>
<td>2.27</td>
<td>1.61</td>
<td>3.19</td>
<td>14 / 100</td>
<td>3.26</td>
</tr>
<tr>
<td>Rituximab</td>
<td>30 / 99</td>
<td>5.52</td>
<td>2.13</td>
<td>14.33</td>
<td>12 / 94</td>
<td>3.41</td>
</tr>
<tr>
<td>Other b/tsDMARDs</td>
<td>35 / 289</td>
<td>1.78</td>
<td>1.13</td>
<td>2.81</td>
<td>26 / 971</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Missing values imputed via multiple imputation, patient numbers may thus be rounded. Effects significant at level $\alpha=0.05$ are marked in bold. Patients were excluded from a particular analysis if the medication they received provided ≤ 20 patients for that analysis or if there were no deaths reported for that specific medication.

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