**Clinical portrait of the SARS-CoV-2 epidemic in European cancer patients**

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**Supplementary Results**

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**Supplementary Table 1.** Patient disposition across participating centres.

|  |  |  |
| --- | --- | --- |
| **Institution** | **Patients** | |
| **N** | **%** |
| Imperial College London (UK) | 26 | 2.9 |
| University College London (UK) | 83 | 9.3 |
| Chelsea and Westminster Hospital (UK) | 109 | 12.2 |
| Hospital Clinic Barcelona (Spain) | 46 | 5.2 |
| Vall dHebron University Hospital, Barcelona (Spain) | 126 | 14.2 |
| ICO, Girona (Spain) | 40 | 4.5 |
| ICO Badalona (Spain) | 31 | 3.5 |
| ICO L’Hospitalet, L’Hospitalet de Llobregat, Barcelona (Spain) | 80 | 9.0 |
| University of Munich (Germany) | 6 | 0.7 |
| Ospedale Maggiore della Carità, Novara (Italy) | 68 | 7.6 |
| Policlinico San Matteo, Pavia (Italy) | 20 | 2.2 |
| Humanitas Cancer Centre, Milan (Italy) | 64 | 7.2 |
| Ospedale Antonio e Biagio e Cesare Arrigo, Alessandria (Italy) | 16 | 1.8 |
| Università Campus Bio-Medico, Rome (Italy) | 3 | 0.3 |
| Ospedale Papa Giovanni XXIII, Bergamo (Italy) | 107 | 12.0 |
| Fondazione Poliambulanza Istituto Ospedaliero, Brescia (Italy) | 10 | 1.1 |
| Istituto Tumori, Milan (Italy) | 3 | 0.3 |
| Azienda Istituti Ospitalieri di Cremona, Cremona (Italy) | 26 | 2.9 |
| Azienda Ospedaliera Spedali Civili and Univerisity of Brescia, Brescia (Italy) | 26 | 2.9 |
| **Total** | 890 | 100.0 |

**Supplementary Table 2.** Patient characteristics.

|  |  |
| --- | --- |
| **Characteristic** | Total (n=890) |
| *Age (years), Mean±SD* | 68.0±12.8 |
| *Age > 65 years no.(%)* | 571 (64.2) |
| *Sex no.(%)*  Male  Female | 503 (56.5)  387 (43.5) |
| *Smoking history* *no.(%)*  Never smoker  Current/former smoker  Unknown | 343 (38.5)  380 (42.7)  167 (18.8) |
| *Cancer type* *no.(%)*  Genito-Urinary  Lung  Gastrointestinal  Breast  Gynaecological  Gastro-esophageal  Hepatobiliary  Head and Neck  Skin  Other  Haematological malignancies | 132 (14.8)  119 (13.4)  105 (11.8)  162 (18.2)  41 (4.6)  40 (4.5)  45 (5.1)  29 (3.3)  28 (3.1)  52 (5.8)  137 (15.4) |
| *Tumor stage no.(%)*  Non-advanced  Advanced | 539 (60.6)  351 (39.4) |
| *Prior radical therapies no.(%)*  Surgery  Adjuvant/Neoadjuvant chemotherapy | 417 (46.8)  210 (23.6) |
| *Prior palliative systemic therapy no.(%)\**  Chemotherapy  Immunotherapy  Endocrine Therapy  Target Therapy | 235 (31.2)  164 (69.8)  38 (16.2)  48 (20.4)  41 (17.4) |
| *Prior curative systemic therapy\*\** *no.(%)* | 93 (67.9) |
| Prior Radiotherapy *no.(%)* | 263 (29.6) |
| *Prior lines of palliative therapy\* no.(%)*  1  2  > 3 | 115 (48.9)  51 (21.7)  52 (22.1) |
| *Co-morbidities no.(%)*  Hypertension  Diabetes  Cardiovascular disease  Chronic pulmonary disease  Chronic kidney disease  Cerebrovascular disease  Congestive cardiac failure  Dementia  Peripheral vascular disease  Liver impairment  Immunosuppression  Other | 386 (43.4)  181 (20.3)  128 (14.4)  119 (13.4)  77 (8.7)  54 (6.1)  21 (2.3)  33 (3.7)  38 (4.3)  15 (1.7)  23 (2.6)  263 (29.5) |
| *Number of comorbidities no.(%)*  0  1  2  > 3 | 220 (24.7)  259 (29.1)  202 (22.7)  209 (23.5) |
| *Ongoing anticancer therapy at Covid-19 diagnosis no.(%)* | 479 (53.8) |
| *Covid-19 Symptoms no.(%)*  Fever  Cough  Dyspnea  Fatigue  Myalgia  Diarrhea  Coryzal symptoms  Nausea or vomiting  Sore throat  Headache  Dysgeusia  Anosmia  Other (confusion, delirium) | 569 (63.9)  448 (50.3)  340 (38.2)  208 (23.4)  92 (10.3)  101 (11.3)  38 (4.3)  61 (6.8)  28 (3.1)  39 (4.4)  36 (4.0)  39 (4.4)  95 (10.7) |
| *Hospitalization rate no.(%)* | 760 (85.4) |
| *Admission to intensive or sub-intensive care unit no.(%)* | 110/760 (14.5) |
| *Covid-19 Specific Treatments no.(%)*  Antibiotics  Hydroxychloroquine  Lopinavir/ritonavir  Systemic Corticosteroids  Remdesivir  Tocilizumab  Chloroquine  Darunavir/Cobicistat  Others  *Oxygen therapy no.(%)*  *Mechanical ventilation no.(%)* | 630 (70.8)  516 (82.0)  411 (65.3)  186 (29.6)  80 (12.7)  19 (3.0)  51 (8.1)  13 (2.1)  53 (8.4)  37 (5.8)  *527 (59.2)*  *97 (10.9)* |
| *Covid-19 Complications no.(%)*  Acute respiratory failure  ARDS  Acute kidney injury  Secondary infection  Sepsis  Septic Shock  Acute cardiac injury  Acute liver injury  Others | 565 (63.5)  527 (59.2)  127 (22.5)  61 (10.8)  63 (11.1)  37 (4.2)  23 (2.6)  17 (3.0)  9 (1.6)  51 (9.0) |

**Supplementary Table 3.** Distribution of baseline clinic-pathologic features in relationship to anti-cancer therapy status.

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **Anti-cancer therapy**  **N (%)** | **No Anti-cancer therapy**  **N (%)** | **p value** |
| *Sex*  *M vs F* | 232 / 245 (48.6/51.4) | 265/138 (65.8/34.2) | <0.0001 |
| *Age, years*  > 65 vs *<65* | 282/197 (58.9/41.1) | 283/120 (70.2/29.8) | <0.0001 |
| *Comorbidities*  >2 vs 0-1 | 188/291 (39.2/60.8) | 220/183 (54.6/45.4) | <0.0001 |
| *Tumor Stage*  Advanced vs Non advanced | 263/216 (54.9/45.1) | 87/316 (21.6/78.4) | <0.0001 |
| *Tumour Status*  Active Malignancy  vs Remission/No measurable disease | 381/92 (80.6/19.5) | 173/214 (44.7/55.3) | <0.0001 |

**Supplementary Table 4.** Mean and median OS of Covid-19-infected cancer patients evaluated by tumour site.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Tumour Site** | **Mean** | | | | **Median** | | | |
| Estimate | Std. Error | 95% Confidence Interval | | Estimate | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound | Lower Bound | Upper Bound |
| Head & Neck | 27.357 | 3.784 | 19.941 | 34.774 | 44.000 | .000 | . | . |
| Lung & Thoracic | 34.419 | 2.505 | 29.510 | 39.328 | . | . | . | . |
| Gastro-intestinal | 77.996 | 7.696 | 62.911 | 93.081 | 40.000 | 7.485 | 25.330 | 54.670 |
| Breast | 56.232 | 2.173 | 51.973 | 60.490 | . | . | . | . |
| Gynae | 42.134 | 4.914 | 32.502 | 51.766 | . | . | . | . |
| Genito-urinary | 30.340 | 2.663 | 25.121 | 35.560 | 21.000 | 7.968 | 5.383 | 36.617 |
| Lymphoma/Leukemia | 47.573 | 6.852 | 34.143 | 61.004 | 24.000 | 7.753 | 8.804 | 39.196 |
| Others | 45.850 | 3.755 | 38.490 | 53.210 | . | . | . | . |
| **Overall** | 85.950 | 3.682 | 78.733 | 93.167 | . | . | . | . |

**Supplementary Table 5.** Restricted mean survival time analysis illustrating the relationship between baseline clinico-pathologic features and survival of patients with Covid-19 and cancer.

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **RMST difference (days)** | **95% CI** | **p value** |
| *Sex*  *M vs F* | -3.1 | (-5.0,-1,3) | 0.001 |
| *Age, years*  > 65 vs *<65* | -10.5 | (-13.1,-8.0) | <0.0001 |
| *Comorbidities*  >2 vs 0-1 | -8.2 | (-10,8,-5.5) | <0.0001 |
| *Tumor Stage*  Advanced vs Non advanced | -2.0 | (-4.8,0.7) | 0.15 |
| *Tumour Status*  Active Malignancy  vs Remission/No measurable disease | -3.7 | (-6.2,-1.2) | 0.003 |
| *Anti-cancer therapy*  Yes vs No | 4.5 | (2.0-6.9) | <0.0001 |

**Supplementary Table 6.** Distribution of exposure to Covid-19-specific therapies including antivirals\*, antimalarials\*\* and tocilizumab.

|  |  |  |
| --- | --- | --- |
| **Therapy** | **Patients** | |
| **N** | **%** |
| No Antivirals / Antimalarials / Tocilizumab | 446 | 50.1 |
| Antimalarials | 182 | 20.4 |
| Antivirals + Antimalarials | 195 | 21.9 |
| Antivirals | 16 | 1.8 |
| Antivirals + Tocilizumab | 12 | 1.3 |
| Antimalarials + Tocilizumab | 3 | 0.3 |
| Antivirals + Antimalarials + Tocilizumab | 35 | 3.9 |
| Tocilizumab | 1 | 0.1 |
| **Total** | **890** | **100.0** |

\*Antivirals include: lopinavir/ritonavir (n=186), darunavir/cobicistat (n=53) and remdesivir (n=19).

\*\*Antimalarials include: chloroquine (n=13) and hydroxychloroquine (n=411)

**Supplementary Table 7.** Clinical characteristics of patients categorised according to exposure to anti-Covid-19 therapies.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Characteristic** | No Antivirals, no antimalarials, no tocilizumab (n=446) | Tocilizumab  (n=51) | Antivirals and antimalarials (n=195) | Antimalarials only (n=182) |
| *Sex no. (%)*  *F*  *M* | 191 (42.9)  254 (57.1) | 23 (45.1)  28 (54.9) | 74 (38.0)  121 (62.0) | 91 (50.3)  90 (49.7) |
| *Age, years no. (%)*  *<65*  > 65 | 148 (33.2)  298 (66.8) | 19 (37.3)  32 (62.7) | 79 (40.5)  116 (59.5) | 71 (39.0)  111 (61.0) |
| *Smoking history* *no.(%)*  Never smoker  Current/former smoker  Unknown | 158 (35.4)  173 (38.8)  115 (25.8) | 28 (54.9)  20 (39.2)  3 (5.9) | 75 (38.5)  95 (48.7)  25 (12.8) | 74 (46.3)  86 (47.3)  22 (12.1) |
| *Comorbidities no. (%)*  0-1  >2 | 223 (50.0)  223 (50.0) | 25 (49.0)  26 (51.0) | 110 (56.4)  85 (43.6) | 115 (63.2)  67 (36.8) |
| *Tumor Stage no. (%)*  Non advanced  Advanced | 277 (62.1)  169 (37.9) | 36 (70.6)  15 (29.4) | 117 (60.0)  78 (40.0) | 100 (54.9)  82 (45.1) |
| *Tumour Status no. (%)*  Remission/ No measurable disease  Active Malignancy | 158 (36.7)  273 (63.3) | 24 (48.0)  26 (52.0) | 71 (37.2)  120 (62.8) | 52 (29.4)  125 (70.6) |
| *Anti-cancer therapy no. (%)*  Yes  No | 200 (45.5)  240 (54.5) | 31 (60.8)  20 (39.2) | 112 (57.7)  82 (42.3) | 128 (70.7)  53 (29.3) |
| *Admission to intensive or sub-intensive care unit no.(%)* | 58 (16.9) | 13 (26.5) | 22 (11.5) | 16 (11.3) |

**Supplementary Table 8.** Treatment by covariate interactions in a Cox proportional hazards regression model adjusted for sex, age and tumor stage.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Therapy** | **Cox Proportional Model**  HR (95% CI)  p value | **Co-variates** | | |
| **Sex**  (M/F) | **Age**  (<65/>65 years) | **Tumour Stage**  (Advanced/non-advanced) |
| **Antimalarials**  (Yes/No) | 0.44 (0.29-0.67)  p<0.0001 | 1.35  (1.05-1.74)  p=0.02 | 2.78  (2.03-3.80)  p<0.0001 | 1.42  (1.10-1.85)  p=0.01 |
| **Antivirals**  (Yes/No) | 0.96 (0.45-2.05)  p=0.92 |
| **Antimalarials + Antivirals**  (Yes/No) | 1.41 (0.61-3.28)  p=0.42 |

**Supplementary Figure 1.** Patient exposure to systemic anti-cancer agents at Covid-19 diagnosis including cytotoxic chemotherapy (**Panel A**, n=206), molecularly targeted therapies (**Panel B**, n=93) and immune-based therapies (**Panel C**, n=56).

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**A.**

**A picture containing device, drawing

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**C.**

**B.**

**Supplementary Figure 2.** The overall survival of Covid-19-infected cancer patients stratified by number of Covid-19-related complications.

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**Supplementary Figure 3.** The overall survival of Covid-19-infected cancer patients evaluated by tumour site.

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**Supplementary Figure 4.** Routine laboratory investigations at Covid-19 diagnosis#.

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#Obtained at the time of hospital assessment for Covid-19. For each variable data were available for (n=): Albumin (n=434), C-Reactive protein (CRP, n=708), Lactate Dehydrogenase (LDH, n=480), D-dimer (n=384), Troponin (n=273), Ferritin (n=308), Haemoglobin (Hb, n=793), Leukocytes (n=706), Neutrophils (n=781), Lymphocytes (n=778), Platelets (n=792).

\*\*\*\* = p<0.0001, \*\*\* = p<0.001, \*\* = p<0.01, \* = p<0.05