Characteristics of SARS-CoV-2 patients dying in Italy
Report based on available data on April 23th , 2020

1. Sample

The present report describes characteristics of 23,188 SARS-CoV-2 patients dying in Italy.* Geographic distribution across the 19 regions and 2 autonomous provinces of Trento and Bozen is presented in the table below. Data are update to April 23th, 2020.

Tabel 1. *Geographic distribution of deceased patients SARS-CoV-2 positive*

REGION	N	%
Lombardia	12,946	55.8
Emilia Romagna	3,190	13.8
Piemonte	1,746	7.5
Veneto	1,207	5.2
Liguria	556	2.4
Marche	541	2.3
Toscana	540	2.3
Trento	381	1.6
Puglia	373	1.6
Lazio	304	1.3
Bolzano	262	1.1
Friuli Venezia Giulia	245	1.1
Campania	196	0.8
Sicilia	187	0.8
Valle d'Aosta	151	0.7
Sardegna	101	0.4
Umbria	98	0.4
Calabria	67	0.3
Abruzzo	54	0.2
Basilicata	23	0.1
Molise	20	0.1
Total	**23,188**	**100.0**

* SARS-CoV-2 related deaths presented in this report are those occurring in patients who test positive for SARS-CoV-2RT by PCR, independently from pre-existing diseases.

2. *Demographics*

Mean age of patients dying for SARS-CoV-2 infection was 79 years (median 81, range 0-100, IQR 73 -86). Women were 8,500 (36.7%). *Figure 1* shows that median age of patients dying for SARS-CoV-2 infection was more than 15 years higher as compared with the national sample diagnosed with SARS-CoV-2 infection (median age 62 years). *Figure 2* shows the absolute number of deaths by age group. Women dying for SARS-CoV-2 infection had an older age than men (median age women 84 - median age men 79).

Figure 1. *Median age of patients with SARS-CoV-2 infection and SARS-CoV-2 positive deceased patients*

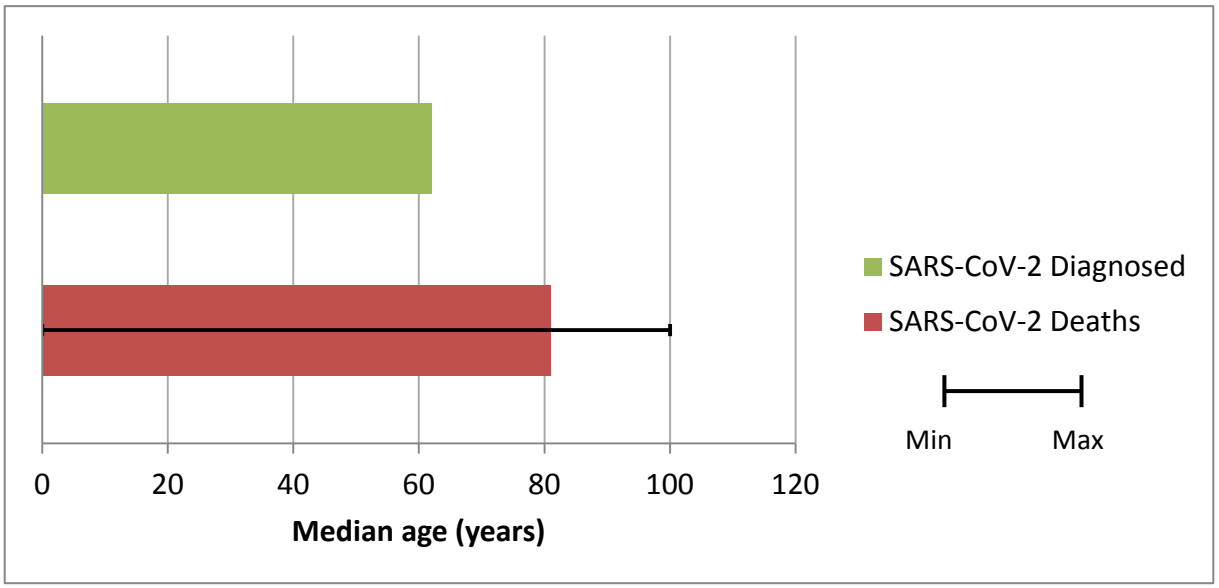
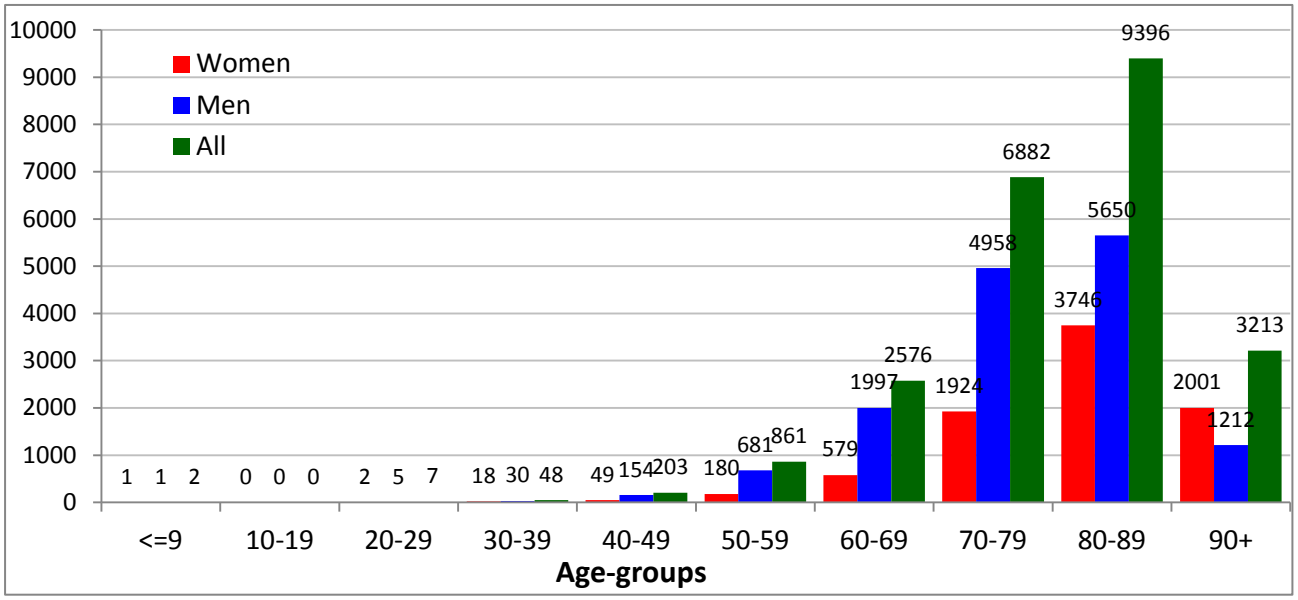


Figure 2. *Absolute number of deaths by age group*



3. Pre-existing conditions

Table 1 presents most common comorbidities diagnosed before SARS-CoV-2 infection. Data on diseases were based on chart review and was available on 2,041 patients dying in-hospital for whom it was possible to analyse clinic charts. Mean number of diseases was 3.3 (median 3, SD 1.9). Overall, 3.6% of the sample presented with a no comorbidities, 14.4% with a single comorbidity, 21.1% with 2, and 60.9% with 3 or more.

Before hospitalization, 24% of SARS-CoV-2 positive deceased patients followed ACE-inhibitor therapy and 16% angiotensin receptor blockers-ARBs therapy. This information can be underestimated because data on drug treatment before admission were not always described in the chart.

Table 1. *Most common comorbidities observed in SARS-CoV-2 positive deceased patients*

Diseases	***N***	***%***
Ischemic heart disease	*562*	*27.5*
Atrial Fibrillation	*450*	*22.0*
Heart failure	*328*	*16.1*
Stroke	*228*	*11.2*
Hypertension	*1410*	*69.1*
Type 2-Diabetes	*647*	*31.7*
Dementia	*307*	*15.0*
COPD (Chronic Obstructive Pulmonary Disease)	*350*	*17.1*
Active cancer in the past 5 years	*328*	*16.1*
Chronic liver disease	*81*	*4.0*
Chronic renal failure	*431*	*21.1*
Dialysis	*43*	*2.1*
Respiratory failure	*110*	*5.4*
HIV Infection	*5*	*0.2*
Autoimmune diseases	*76*	*3.7*
Obesity	*249*	*12.2*
Number of comorbidities		
0 comorbidities	*74*	*3.6*
1 comorbidity	*294*	*14.4*
2 comorbidities	*431*	*21.1*
3 comorbidities and over	*1242*	*60.9*

Table 3 presents the most common pre-existing chronic pathologies in patients who died, separately in men (n = 1,382) and women (n = 659). The average number of pathologies observed in women is 3.4 (median 3, Standard Deviation 1.9). In men the average number of pathologies observed is 3.2 (median 3, Standard Deviation 1.9).

Tabella 3. *Most common comorbidities observed in SARS-CoV-2 positive deceased patients by gender*

	Women		**Men**	
Diseases	***N***	***%***	***N***	***%***
Ischemic heart disease	*137*	*20.8*	*425*	*30.8*
Atrial Fibrillation	*157*	*23.8*	*293*	*21.2*
Heart Failure	*129*	*18.9*	*199*	*14.1*
Stroke	*70*	*10.6*	*158*	*11.4*
Hypertension	*474*	*71.9*	*936*	*67.7*
Type 2-Diabetes	*205*	*31.1*	*442*	*32.0*
Dementia	*137*	*20.8*	*170*	*12.3*
COPD (Chronic Obstructive Pulmonary Disease)	*83*	*12.6*	*267*	*19.3*
Active cancer in the past 5 years	*105*	*15.9*	*223*	*16.1*
Chronic liver disease	*18*	*2.7*	*63*	*4.6*
Chronic renal failure	*122*	*18.5*	*309*	*22.4*
Dialysis	*14*	*2.1*	*29*	*2.1*
Respiratory failure	*33*	*5.0*	*77*	*5.6*
HIV Infection	*0*	*0.0*	*5*	*0.4*
Autoimmune diseases	*40*	*6.1*	*36*	*2.6*
Obesity	*91*	*13.8*	*158*	*11.4*
Number of comorbidities				
0 comorbidities	*13*	*2.0*	*61*	*4.4*
1 comorbidity	*89*	*13.5*	*205*	*14.8*
2 comorbidities	*145*	*22.0*	*286*	*20.7*
3 comorbidities and over	*412*	*62.5*	*830*	*60.1*

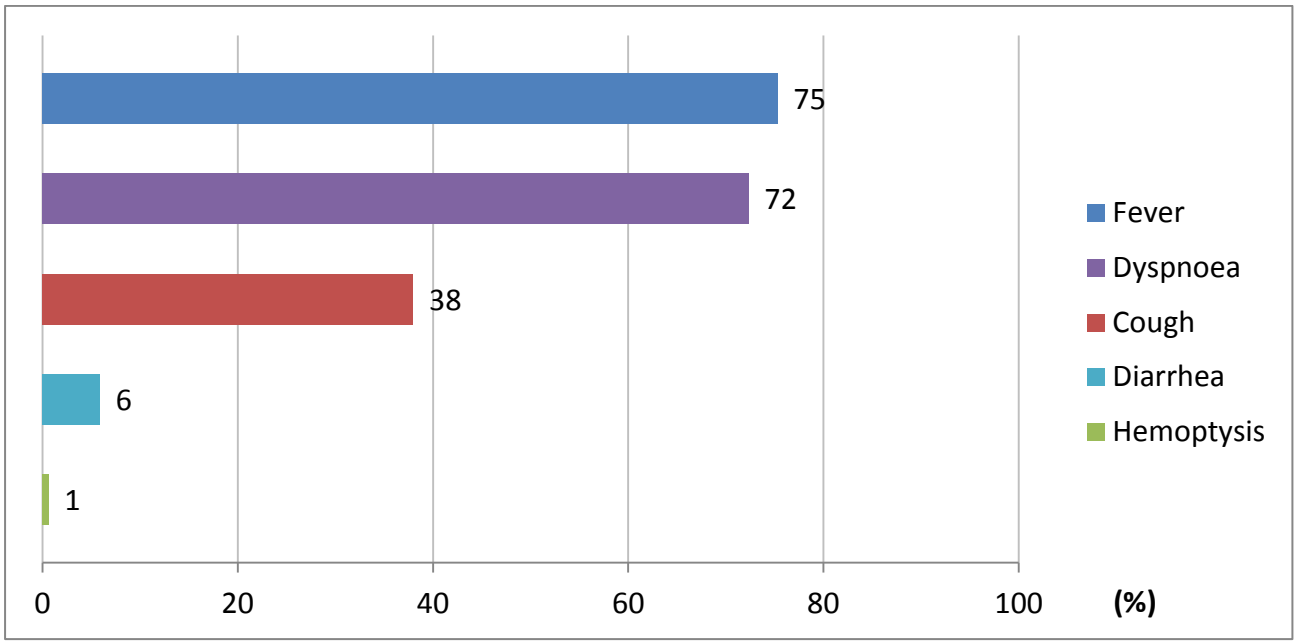
4. Diagnosis of hospitalization

In 92.3% of hospitalizations, conditions (e.g. pneumonia, respiratory failure) or symptoms (e.g. fever, dyspnoea, cough) compatible with SARS-CoV-2 were mentioned. In 149 cases (7.7% of cases) the diagnosis of hospitalization was not related to the infection. In 15 cases the diagnosis of hospitalization concerned exclusively neoplastic pathologies, in 62 cases cardiovascular pathologies (for example Acute Myocardial Infarction-AMI, heart failure, stroke), in 20 cases gastrointestinal pathologies (for example cholecystitis, perforation of the intestine, intestinal obstruction, cirrhosis), in 52 cases other pathologies.

5. Symptoms

Figure 3 shows symptoms most commonly observed at hospital admission. Fever, dyspnoea and cough were the most commonly observed symptoms, while diarrhoea and haemoptysis were less commonly observed. Overall, 6.1% of patients did not present any symptoms at hospital admission.

Figure 3. *Most common symptoms observed in SARS-CoV-2 positive deceased patients*



6. Acute conditions

Acute Respiratory Distress syndrome was observed in the majority of patients (**96.8% of cases**), followed by acute renal failure (22.8%). Superinfection was observed in 12.8% and acute cardiac injury in 9.9% of cases.

7. Treatments

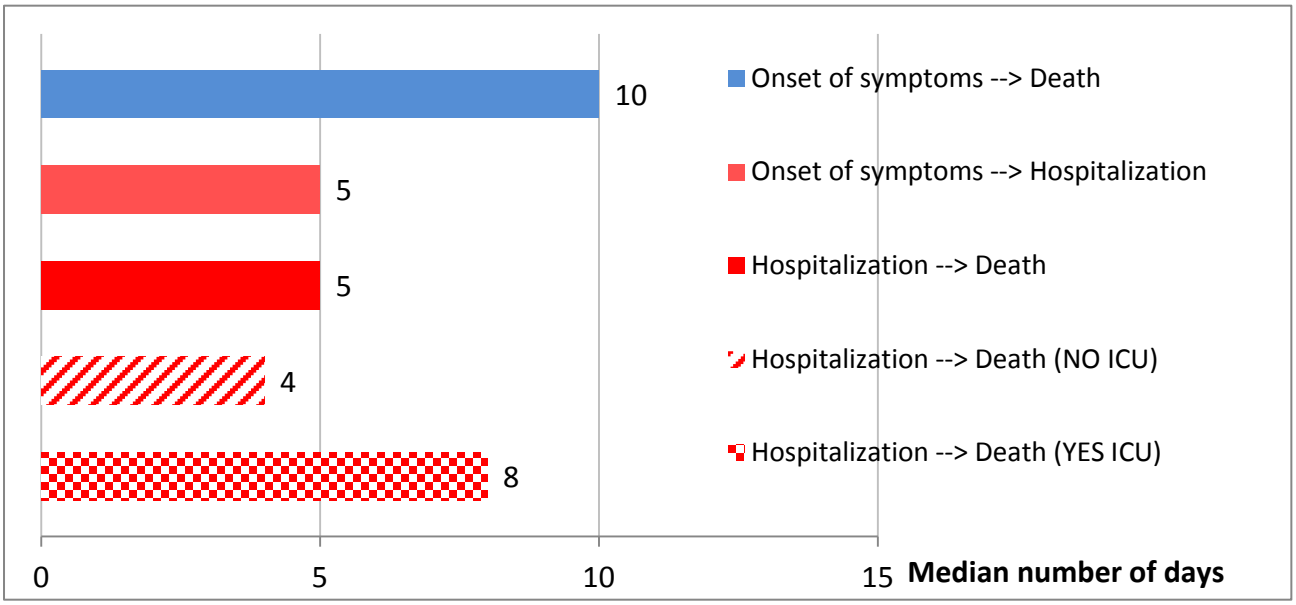
Antibiotics were used by 85% of patients during hospital stay, while less used were antivirals (57%) and corticosteroids (36%). Concomitant use of these 3 treatments was observed in 20.8% of cases.

Out of SARS-CoV-2 positive deceased patients, 4.4% were treated with Tocilizumab during hospitalization.

8. *Time-line*

Figure 4 shows, for SARS-CoV-2 positive deceased patients, the median times, in days, from the onset of symptoms to death (10 days), from the onset of symptoms to hospitalization (5 days) and from hospitalization to death (5 days). The time from hospitalization to death was 4 days longer in those who were transferred to intensive care than those who were not transferred (8 days vs. 4 days).

Figure 4. *Median hospitalization times (in days) in SARS-CoV-2 positive deceased patients*



9. *Deaths under the age of 50 years*

As of April 23th, 260 out of the 23,188 (1.1%) positive SARS-CoV-2 patients under the age of 50 died. In particular, 57 of these were less than 40 years (36 men and 21 women), age range between 0 and 39 years. For 9 patients under the age of 40 years no clinical information is available; the remaining 38 had serious pre-existing pathologies (cardiovascular, renal, psychiatric pathologies, diabetes, obesity) and 10 had no major pathologies.

This report was produced by SARS-CoV-2 Surveillance Group

Members of the SARS-CoV-2 Surveillance Group

Luigi Palmieri, Xanthi Andrianou, Pierfrancesco Barbariol, Antonino Bella, Stefania Bellino, Eva Benelli, Luigi Bertinato, Stefano Boros, Gianfranco Brambilla, Giovanni Calcagnini, Marco Canevelli, Maria Rita Castrucci, Federica Censi, Alessandra Ciervo, Elisa Colaizzo, Fortunato D'Ancona, Martina Del Manso, Chiara Donfrancesco, Massimo Fabiani, Antonietta Filia, Marco Floridia, Marina Giuliano, Tiziana Grisetti, Martin Langer, Ilaria Lega, Cinzia Lo Noce, Pietro Maiozzi, Fiorella Malchiodi Albedi, Valerio Manno, Margherita Martini, Alberto Mateo Urdiales, Eugenio Mattei, Claudia Meduri, Paola Meli, Giada Minelli, Manuela Nebuloni, Lorenza Nisticò, Marino Nonis, Graziano Onder, Lucia Palmisano, Nicola Petrosillo, Patrizio Pezzotti, Flavia Pricci, Ornella Punzo, Vincenzo Puro, Valeria Raparelli, Giovanni Rezza, Flavia Riccardo, Maria Cristina Rota, Paolo Salerno, Debora Serra, Andrea Siddu, Paola Stefanelli, Manuela Tamburo De Bella, Dorina Tiple, Brigid Unim, Luana Vaianella, Nicola Vanacore, Monica Vichi, Emanuele Rocco Villani, Silvio Brusaferro.