IMPACT of COVID-19 on the Elderly: Summary of Published Early Studies

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COVID-19 has a disproportionate impact on elderly and those with chronic disease. The CDC has provided data showing older adults are at higher risk of morbidity and mortality, reporting that 8 out of 10 COVID-19 related deaths in the U.S. have been in adults 65 years old and older. The rates of hospitalization, ICU admission and deaths increase as the person gets older (Table 1).

Table 1. CDC outcomes for U.S. adults with confirmed COVID-19:

	Adults 65 – 84	Adults 85+
Hospitalizations	31-59%	31-70%
Admission to intensive care	11-31%	6-29%
Deaths	4-11%	10-27%

Early in the course of the U.S. outbreak we performed a literature search to identify parameters of transmission to model the impact COVID-19 could have in the nursing home population. In literature published prior to April 2020, we identified observed rates of infection, symptomatic presentation, hospitalization, ICU/Ventilator use, and death from published reports by CDC, WHO, health departments in Italy, China, reports on outbreaks in cruise ships and Johns Hopkins University's tracking website for different age cohorts in the elderly. Some of these reports were for the general population of elderly and others for those residing in long term care settings. Observational death rates in more recent publications have shown to be similar mortality rates internationally and in the U.S. population.

Rates were estimated for elderly in four age cohorts: ages 80+, ages 70-79, ages 60-69, and ages under 60. The highest published rates for an age group were used as the worst-case scenario rates, the lowest published rates were used as the best-case scenario, and a most-likely rate was estimated by looking across publications and coming up with a roughly compiled average. For these average rates, we gave additional weight to sources that were more relevant to nursing home populations than others. Summarized results for the highest, lowest, and most likely rates for each outcome in each age cohort may be found in Table 2. Early reports from Italy and China show data similar to the U.S. experience in Washington State. Figure 1 shows the case fatality rate by age cohort in Italy.
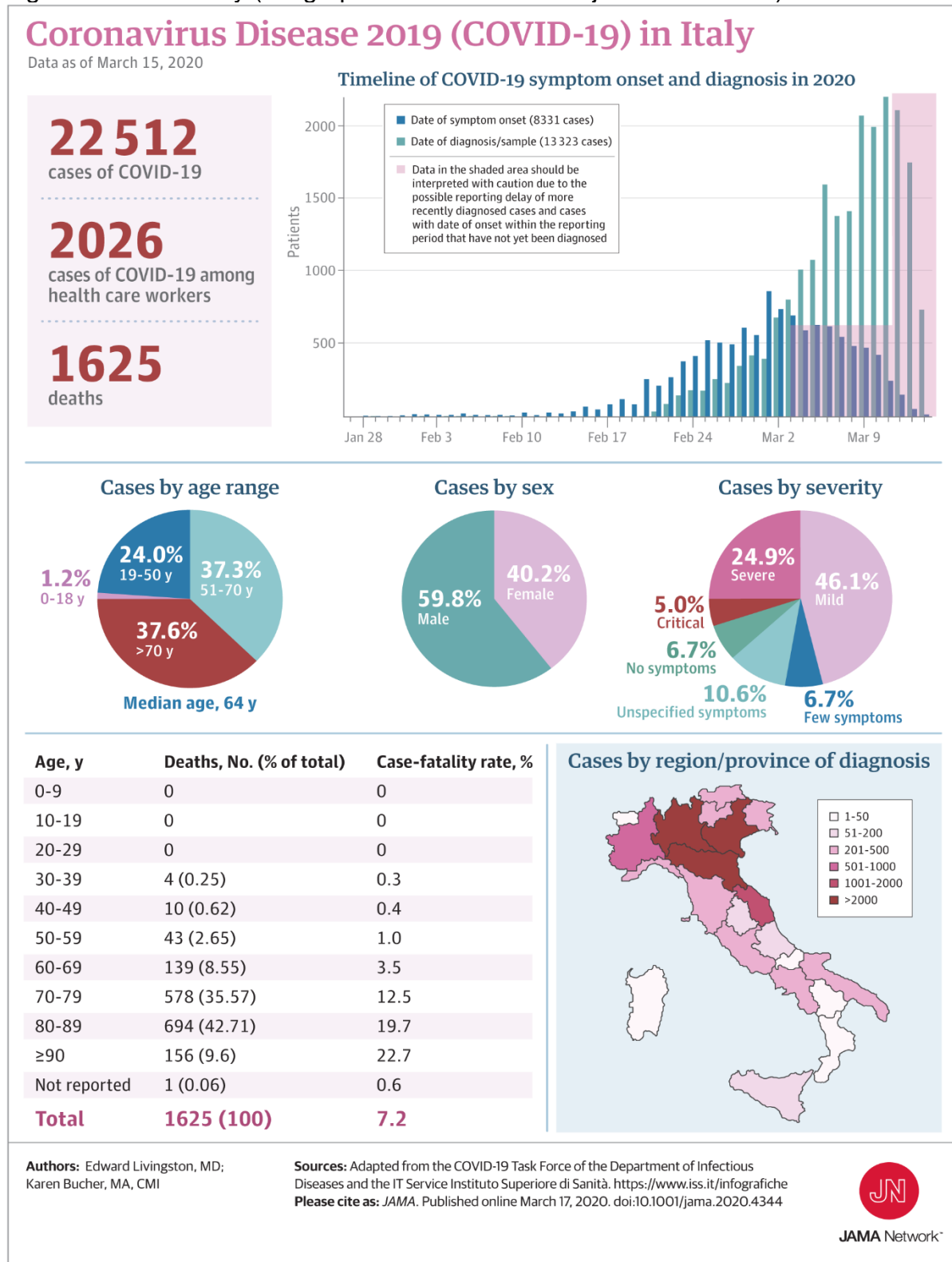
Case fatality rates differed across reports, but generally ran from 10-27% in those aged 80+, 10-13% in those aged 70-79, and 2-7% in those aged 60-69. (Note: the most extreme published values were outside these ranges, but infrequently reported.) With the exception of cruise ship data, rates published in these reports primarily look at people who presented with symptoms, sought care, were tested, and then shown to be positive. As more wide-spread testing and serological data become available, case fatality rates will be corrected downward, particularly when taking into account asymptomatic infections, which are estimated to be as high as 50% in some studies.

Table 2. Summary of published observational COVID-19 parameters by age cohort.

Group	Scenario	Infection Rate: % of People in Group Infected	Symptomatic Rate*: % of Infected Who Show Symptoms	Hospitalization Rate: % of Symptomatic Infected Hospitalized	ICU/Vent Rate: % of Symptomatic Infected Needing ICU/Vent Care	Death Rate: % of Symptomatic Infected Who Die
Ages 80+	Worst Case	63	75	70	30	27
	Most Likely	40	67	50	20	20
	Best Case	25	50	30	6	10
Ages 70-79	Worst Case	63	75	60	31	20
	Most Likely	40	67	45	20	10
	Best Case	23	50	30	10	3
Ages 60-69	Worst Case	40	75	40	20	8
	Most Likely	30	67	35	10	4
	Best Case	19	50	25	6	2
Ages <60	Worst Case	20	75	30	10	2
	Most Likely	15	67	25	7	1
	Best Case	10	50	20	5	0
Health Care Workers	Worst Case	20	75	25	10	0.8
	Most Likely	15	67	15	5	0.3
	Best Case	10	50	6	2	0

* Note: best- and worst-case scenarios for symptomatic infections were created with the goal of estimating the number of people who would likely have negative outcomes requiring nursing home and hospital resources, these rates are inverted for scenarios of infection control efforts.

Figure 1. CFR in Italy (infographic from doi:10.1001/jama.2020.4344)

Coronavirus Disease 2019 (COVID-19) in Italy

Data as of March 15, 2020

22 512
cases of COVID-19

2026
cases of COVID-19 among health care workers

1625
deaths

Timeline of COVID-19 symptom onset and diagnosis in 2020

- Date of symptom onset (8331 cases)
- Date of diagnosis/sample (13 323 cases)
- Data in the shaded area should be interpreted with caution due to the possible reporting delay of more recently diagnosed cases and cases with date of onset within the reporting period that have not yet been diagnosed

Cases by age range
- 1.2% 0-18 y
- 24.0% 19-50 y
- 37.3% 51-70 y
- 37.6% >70 y

Median age, 64 y

Cases by sex
- 59.8% Male
- 40.2% Female

Cases by severity
- 24.9% Severe
- 46.1% Mild
- 5.0% Critical
- 6.7% No symptoms
- 10.6% Unspecified symptoms
- 6.7% Few symptoms

Age, y	Deaths, No. (% of total)	Case-fatality rate, %
0-9	0	0
10-19	0	0
20-29	0	0
30-39	4 (0.25)	0.3
40-49	10 (0.62)	0.4
50-59	43 (2.65)	1.0
60-69	139 (8.55)	3.5
70-79	578 (35.57)	12.5
80-89	694 (42.71)	19.7
≥90	156 (9.6)	22.7
Not reported	1 (0.06)	0.6
Total	**1625 (100)**	**7.2**

Cases by region/province of diagnosis
- 1-50
- 51-200
- 201-500
- 501-1000
- 1001-2000
- >2000

Authors: Edward Livingston, MD; Karen Bucher, MA, CMI

Sources: Adapted from the COVID-19 Task Force of the Department of Infectious Diseases and the IT Service Instituto Superiore di Sanità. https://www.iss.it/infografiche
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