

COVID-19: What happened to the healthcare workers of a research and teaching hospital in Milan, Italy?
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The epidemic of Corona Virus 19 disease (COVID-19) was declared as a pandemic at the beginning of the year 2020¹.

In Italy, the Lombardy Region was one the most hit but according to the laws issued which closed all the schools, universities, shops, leisure and sport centres, all the Italian population was protected by the lockdown²⁻⁷. The healthcare workers (HCWs) were the only part of the population together with all the other public services that continued to work. They had to care for patients affected by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), often very serious ones especially from the end of February to the end of May.

To face the flow of patients who needed, very often, intensive care, hospitals turned many beds in intensive ones, stopped the elective activities and provided different pathways for emergency for positive COVID-19 patients and for the negative patients who needed to receive lifesaving treatments.

The health care workers had to face a new way of working, constantly wearing personal protection devices (PPD) and keeping a very high level of attention to avoid to be infected by SARS-CoV-2^{8,9}. But it is indisputable they did a great job all over the world.

In a research and teaching hospital in the centre of Milan, Italy with 716 beds, 101 were devoted to intensive and subintensive care for COVID-19 patients and 5782 patients, from the end of February to the end of May, were admitted and many were SARS-CoV-2 positive (data from the hospital administrative records).

All HCWs at risk for infection, which is defined as a contact with a patient or another HCW with (or later diagnosed with) SARS-CoV-2 infection were tested with nasopharyngeal swab for the detection of SARS-CoV-2¹⁰.

We previously analysed results from February 24 to March 31, 2020 and found 139 workers with a positive test out of 1573 (8.8%)¹¹. In this study we extended the analyses as of July 8 and analysed the relative frequency of positive tests according to gender, age, working area, and occupation.

Materials and Methods

For viral detection two different methods were used. The first one employed Seegene Inc reagents (Seoul, Korea). RNA extraction was performed with STARMag Universal Cartridge kit on Nimbus instrument (Hamilton, Agrate Brianza, Italy) and amplification with Allplex[®] 2019-nCoV assay. The second one employed a GeneFinder[®] COVID-19 Plus RealAmp Kit (OSANG Healthcare, Anyangcheondong-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea) on ELITech InGenius[®] instrument (Torino, Italy). Both assays identify the virus by multiplex rRT-PCR targeting three viral genes (E, RdRP and N).

For each worker, we determined the date of the first positive test (if any) and described the trend of positive tests over time. We compared frequency of workers with a positive nasopharyngeal test according to selected variables using chi-squared test. Then we calculated adjusted odds ratios (OR), and 95% confidence intervals (CI) of positivity with a multivariable logistic regression model including as covariates, gender, age class, working areas, and occupation. Statistical analysis was performed with Stata 16 (StataCorp. 2019)

Results

In the period from February 24 to July 8, 2020, 2554 HCWs out of 4572 employed in the hospital (data from the hospital administrative records) with mean age of 45.9 years, 1787 women and 767 men underwent one or more nasopharyngeal tests according to the National and Lombardy regional guidelines^{12,13,14}. The first positive test was on February 24, with peaks on March 10 (No. 11 workers with a

positive test), March 11 (No. 12), and March 27 (No. 10) (Figure 1). There were 7 workers with a positive test in February, 119 in March, 67 in April, 11 in May, 2 in June, and none in July. The number of positive HCWs decreased in parallel with the slow-down of the epidemic in Lombardy Region¹⁵.

Overall, there were 206 workers with a positive tests out of 2554 (8.1%, 95% CI: 7.0-9.2) (Table 1). Men had a slightly higher frequency of positive tests (10.2%) than women (7.2%) and there was a weak inverse trend of positivity with increasing age. Medicine was the area with the larger frequency of workers with positive tests (9.4%), while intensive care units and the administrative and technical areas showed the lower frequencies (4.4% and 3.6%, respectively). Healthcare assistants were the occupational group with the highest frequency of positive workers (10.4%), while the lowest frequency was observed among clerical workers and technicians (4.0%).

In Figure 1 it is possible to see how the number of positive HCWs decreased according to the slow down of the epidemic in Lombardy Region¹⁵.

Discussion

In a research and teaching hospital in the centre of Milan, the majority (2554, 55.9%) of 4572 HCWs were tested for SARS-CoV-2 and 8.8% were found positive. Most of the tested workers were women, but we found higher relative frequency of positivity for men, even after adjustment for age, working area, and occupation. The higher frequency of positive tests in the medicine area is probably explained by the higher concentration in that area of COVID-19 patients. Conversely, the low frequency of positive HCWs in intensive care units is probably explained by the diffuse and continuous use of PPD.

Our results show that HCWs in a research and teaching hospital in the most hit Region in Italy had a similar pattern of infection as all other HCWs all over the world^{8,9}.

The problem of SARS-CoV-2 infections among the hospital personnel HCWs should remind us the concerns about hospital acquired infections both for patients and HCWs^{16,17,18,19,20,21,22,23,24}.

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Table 1. Association between selected variables and frequency of positive nasopharyngeal tests among healthcare workers in a research and teaching hospital in Milan, Italy, February 24 to July 8, 2020.

Variable	Workers	Positive test				
	N	N	%	p-value*	OR**	95% CI**
All	2554	206	8.1			
Gender						
Women	1787	128	7.2	0.01	1.00	Reference
Men	767	78	10.2		1.56	1.15-2.13
Age (years)						
<30	220	21	9.5	0.65	1.00	Reference
30-39	625	56	9.0		0.93	0.54-1.59
40-49	587	47	8.0		0.83	0.47-1.45
50-59	820	62	7.6		0.79	0.46-1.35
60+	302	20	6.6		0.62	0.31-1.21
Working area						
Medicine	1086	102	9.4	0.06	1.52	0.42-5.50
Surgery	583	41	7.0		1.08	0.29-4.04
Technical and management services	635	53	8.3		1.36	0.38-4.88
Intensive care	113	5	4.4		0.62	0.13-3.00
Administrative, technical	137	5	3.6		1.00	Reference
Occupation						
Physicians, including residents	632	55	8.7	0.07	2.04	0.78-5.29
Nurses, midwives	1054	81	7.7		1.74	0.68-4.43
Healthcare assistants	327	34	10.4		2.56	0.97-6.76
Health technicians***	294	26	8.8		2.01	0.75-5.40
Clerical workers, technicians	247	10	4.0		1.00	Reference

Abbreviations: CI, confidence interval; OR, odds ratio.

*From chi-squared test.

**From a multivariable logistic regression model including gender, age, working area, and occupation.

***Includes biologists, radiology and laboratory technicians, psychologists, other health technicians

Figure 1. Number of positive nasopharyngeal tests per day among healthcare workers in a research and teaching hospital in Milan, Italy, February 24 to July 8, 2020.

