Letter to the Editor

Differences between the waves in Northern Italy: How the characteristics and the outcome of COVID-19 infected patients admitted to the emergency room have changed

Dear Editor,

Since the beginning of 2020 when the COVID-19 pandemic widely spread from China throughout the World[1-3] epochal changes have been observed in everyday life, leading to dramatic modification of interpersonal relationship and health habit. The morbidity and mortality of SARS-CoV-2 infection permanently put the global health system in crisis, in both the first and the second wave of the pandemic. According to this specific point, we read with particular attention the manuscript by Saito et al.[4] recently published in your Journal that compared the disease severity and the clinical characteristics of the first and the second waves of SARS-CoV-2 infection in Japan. In this study, using data from the National Registry, the authors found that the proportion of cases with severe COVID-19 infection at admission was smaller in the second wave. Further, they observed that the first wave had a more critical effect on the ability of healthcare institutions to receive patients; therefore, the earlier admission of patients in the second wave may reflect the higher number of available beds for COVID-19 infected patients and may explain the results obtained. Finally, patients infected during the second wave were younger and with fewer comorbidities, leading to an overall decreased mortality. Both the waves in Italy (the first between March and May 2020, the second started in October 2020 and still in progress) have been associated with a high morbidity and mortality. Several different studies have evaluated the reasons behind this specific finding;[5-6] in particular, during the first wave of pandemic, the more advanced age and the multiple co-morbidities of Italian patients were postulated as possible explanations, as was the limited number of intensive care unit beds in the Northern Regions of Italy. Furthermore, the number of subjects tested was lower during the first wave of pandemic, as the health authorities suggest not to test but only put in quarantine for 14 days those individuals with mild to moderate symptoms possibly related to COVID-19 infection. After the first wave of pandemic, significant changes have been made in the structure of the health system to try to stem the second wave of pandemic: the total number of ICU beds were increased in some hospitals and the primary care doctors were directly involved in the initial management of patients with COVID-19 infection; furthermore, a larger number of nasopharyngeal swabs was available to test all the subjects with symptoms theoretically related to COVID-19 infection.[7] Aim of the present study was to evaluate the differences in clinical and demographic characteristics and in the outcome of COVID-19 patients admitted to the emergency room during the two waves of SARS-CoV-2 pandemic.

We compared data on patients admitted to the emergency room of ASST Rhodense, diagnosed with COVID-19 infection, in the weeks prior the establishment of the red zone in Italy: the first one between 2 and 8 March (1st wave) 2020 and the second one between 19 and 25 October 2020 (2nd wave). We collected demographic and clinical data of all the patients (symptoms, number of co-morbidities, need for oxygen supply at presentation, number of patients admitted to the ward and time needed to admission to the ward and outcome). Statistical analyses were done using McNemar's test, applying the Yates's correction to reduce the numeric differences between the groups.

Sixty patients diagnosed with COVID-19 infection were evaluated in the emergency room during the 1st wave and 232 during the 2nd wave. Table 1 summarizes clinical and demographic characteristics of the patients considered. No statistical differences were observed according to gender and age (males 63.3% vs 60.8%, age 66.2 vs 59.9 in the 1st and 2nd wave, respectively) and number of co-morbidities at presentation. Patients admitted during the 1st wave have statistically more frequently dyspnea (71.7% vs 37.1%, OR: 4.29, p<0.001) and cough (45% vs 22.8%, OR: 2.76, p=0.001) but not fever (81.7% vs 74.1%, OR: 1.55, p=0.3). Patients in the 1st wave had a higher risk of undergoing to oro-tracheal intubation (16.7% vs 1.3%, OR: 15.27, p<0.0001) or not-invasive ventilation (25% vs 12.1%, OR: 2.43, p=0.02) and of death (31.7% vs 12.9%, OR: 3.12, p=0.001). A higher percentage of subjects was admitted to the ward during the 1st wave (95% vs 60.3%, OR: 12.49, p<0.001) after a shorter period of time (26.2 hours vs 71.4 hours, p=0.003); nevertheless, the overall number of patients hospitalized was higher during the second wave (140 vs 57 patients).

Our study showed that the severity and the mortality of COVID-19 infection was lower during the 2nd wave of pandemic. In particular, we clearly demonstrated that patients admitted to the emergency room during the first wave of COVID-19 infection had significant more severe diseases compared to those admitted in October. In fact, the likelihood of being subjected to not invasive ventilation or to oro-tracheal intubation was higher during the first wave. This finding may be the consequence of the appeal of the health authorities that during the first wave of pandemic suggested patients to go to the emergency room only if they developed severe symptoms, otherwise the advice was to stay at home in quarantine. During the second wave, the population, probably frightened and worried by what happened during the first one, was admitted earlier and with milder symptoms in the emergency room; as a consequence, an overall greater number of patients was evaluated in the emergency room and subsequently hospitalized, albeit with lower levels of respiratory failure. Therefore, the global impact on the healthcare management was higher during the second wave of COVID-19 pandemic leading to a consequent delay of admission to the ward. In conclusion, our study confirms that in the second wave the mortality of COVID-19 pandemic was lower; nevertheless

Table 1

Clinical and demographic characteristics of patients admitted to the emergency room during the 1st wave (March 2-8 2020) and the 2nd wave (October 19-25). *IOT: oro-tracheal intubation; NIV: not invasive ventilation.

	1 wave (N=60)	2 wave (N=232)	p
Males (%)	38 (63.3)	141 (60.8)	NS
Age, years (mean)	66.2	59.9	NS
Fever (%)	49 (81.7)	172 (74.1)	NS
Dyspnea (%)	43 (71.7)	86 (37.1)	<0.001
Cough (%)	27 (45)	53 (22.8)	0.001
IOT* (%)	10 (16.7)	3 (1.3)	<0.0001
NIV* (%)	15 (25)	28 (12.1)	0.02
Number of comorbidities (%)	0=21 (35)	0=104 (44.8)	NS
	1=16 (26.7)	1=66 (28.4)	
	2=14 (23.3)	2=39 (15.5)	
	3=7 (11.7)	3=14 (6.0)	
	4=2 (3.3)	4=7 (3.0)	
	>5=0 (0)	>5=2 (0.1)	
Number of hospitalizations (%)	57 (95)	140 (60.3)	<0.001
Time to admission to the ward, hours (mean, 95% CI)	26.2 (4-94)	71.4 (4-180)	0.003
Number of deaths (%)	19 (31.7)	30 (12.9)	0.001

an overall higher number of subjects was hospitalized compared to the first wave, leading to a significant impact on the health system.

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