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VIEWPOINT

VOICES OF CARDIOLOGY

The Outbreak of COVID-19 in Italy

Fighting the Pandemic



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In Italy, the unexpected pandemic of COVID-19 has caused a never-seen-before disaster in terms of hospitalizations and deaths.

On January 9, 2020, the Chinese Center for Disease Control and Prevention reported that a new coronavirus, severe acute respiratory syndrome coronavirus-2 (SARS-Cov-2), had been identified as the causative agent of coronavirus disease-2019 (COVID-19), and the genomic sequence was made public.

Italy was the first European nation to be affected by COVID-19 with 143,626 confirmed total cases and 18,279 deaths to date (1). The pandemic has mainly been located in northern Italy (Figure 1), partially sparing, for the moment, the southern part of the country. Italy was not prepared for COVID-19, currently a planetary health emergency with 1,436,198 cases and 85,522 deaths worldwide (2). The Italian crisis provoked by COVID-19 is the most serious event in Italian history after World War II; it is a national human, health, and economic tragedy. COVID-19 mortality in Italy has been 9%, higher than that in China. The reasons for this high mortality are unclear. However, the infected fatality rate may actually be lower because the tests have not been widespread compared to other countries such as South Korea. Furthermore, the oldest population in Italy may have increased mortality. In fact, the median age in Italy of those who have died is ~80 years (Figure 2). No patient <20 years of age

has been hospitalized or has died. Only 1% of the deaths have been detected in patients <50 years of age.

THE START OF COVID-19 IN ITALY

On February 21, 2020, the first Italian patient with COVID-19 was diagnosed, a 38-year-old man hospitalized at Codogno Hospital, Lodi, in northern Italy. Also, in northern Italy, on February 21, 2020, another outbreak of viruses was discovered in Vò Euganeo (Padua) and, in the Veneto region, the first death was reported, a 78-year-old man in a hospital in Padua. He was the first of a long series of deaths. The mortality rate in the Lombardy region alone, with a total of 10,022 deaths, is greater than the number of deaths in China (3,342 total deaths).

WHAT HAS HAPPENED IN ITALY?

Social containment, early and rapid throughout a nation, is the most effective measure for controlling the spread of COVID-19; this social containment perhaps was delayed in Italy (Figure 3). Italy was the first nation in Europe affected by COVID-19 and was therefore caught unprepared. The rapid spread of COVID-19 and the dangerousness of the disease, very different from the normal seasonal influenza, were perhaps initially underestimated. Today, the entire nation is on lockdown, and cities and towns have become isolated, as seen in Figure 3, showing a deserted Rome today.

In Italy, the tests for COVID-19 have been performed mainly on symptomatic subjects. Tests were not performed initially in health care professionals (who could, therefore, have contributed to the spread of the disease) as well as in symptomatic patients at home. Finally, Italy, like the majority of nations, was not prepared for the rapid spread of the pandemic, and many protection systems such as masks,

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produced almost exclusively abroad, were not sufficient even for health personnel. In addition, there are simply not enough ventilators for all patients who need them, raising important ethical issues.

Bergamo, a city in Lombardy of 122,000 inhabitants, had a very high number of infections (10,043), perhaps because the importance of social containment to favor economic activities was underestimated. A particularly crowded Atlanta-Valencia football match, with >50,000 Bergamo spectators, is another hypothesis to explain the high number of infections. Noninvasive ventilation is the first form of therapy for many patients hospitalized with severe interstitial cases of pneumonia, who, however, suddenly may require intubation for rapid lung deterioration. Medical therapy in these patients is empirical, although chloroquine, azithromycin, high-dose steroids, tocilizumab, lopinavir/ritonavir, heparin, and other drugs have been empirically tested. It has been recently suggested that other health care systems should prepare for a massive increase in ICU demand during an uncontained outbreak of COVID-19 (3).

CLINICIANS AND NURSES PAID A VERY HIGH PRICE IN ITALY

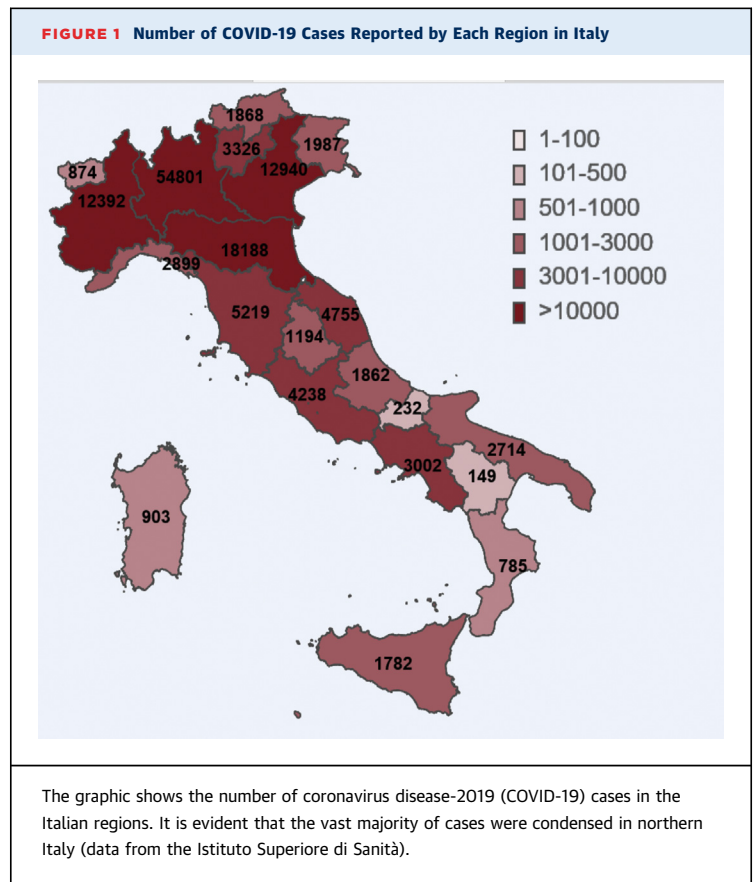
Health care workers in Italy paid a very high price with more than 11,000 confirmed cases, 100 clinicians killed by COVID-19 and many with burnout syndrome.

The epidemic in Italy has also found territorial medicine to be unprepared, which has not been able to handle the problems of individual people and of people positive for tests. Thus, during the days of national quarantine, it is extremely difficult for the population to interact with territorial institutions for all disease-related problems.

Based on the Italian experience, it has become evident that western health care systems have been built around the concept of patient-centered care, but an epidemic requires a change of perspective toward a concept of community-centered care (4). It has been postulated that >2,500 hospital beds for patients in intensive care units will be needed in only 1 week to treat acute respiratory distress syndrome caused by SARS-CoV-2-pneumonia in Italy (5).

PANDEMIC SOLUTIONS ARE REQUIRED FOR THE ENTIRE POPULATION, NOT ONLY FOR HOSPITALS

We are learning that hospitals might be the main COVID-19 carriers, as they are rapidly populated by



infected patients, facilitating transmission to uninfected patients. Patients are transported by our regional system, which also contributes to spreading the disease as the ambulances and personnel rapidly become vectors. Finally, Italy does not produce

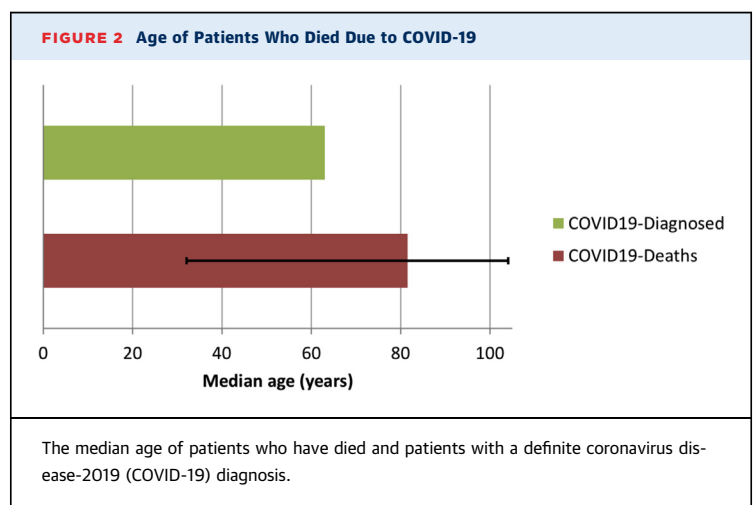


FIGURE 3 Rome Deserted During the Rule of Social Distancing



This photograph shows an unusual, deserted Rome after the lockdown for coronavirus disease-2019.

containment systems; for example, the masks and ventilation systems are not produced in Italy, and this has caused a supply vulnerability when other nations have substantially reduced international relations.

THE UNIVERSAL ITALIAN HEALTH SYSTEM

It has been previously reported that the quality of the universal Italian health system and healthy behaviors have contributed in the past to the country's favorable overall health (6). In a race against time in an unprecedented health national health emergency, with an organizational effort never seen before in Italy, hundreds of doctors and nurses (many then SARS-CoV-2 positive) are fighting this horrible disease. The advantage of the Italian health system is that all citizens may have access to medical therapies. However, in recent years, health policy has profoundly changed in Italy. The number of beds has been reduced, and regional autonomy has

accentuated inequalities in the quality of services on the national territory.

THE CARDIOLOGIST'S PERSPECTIVE IN THE COVID-19 ERA

Cardiologists in Italy are overwhelmed in this unprecedented battle against COVID-19 for reasons related to the disease per se, to the rapid conversion of many hospitals to COVID-19 treatment centers, and to the changes in health management caused by the pandemic (3).

It is now evident that patients with COVID-19 have cardiac involvement, in some cases independent of the lung disease. An increase in troponin levels has been documented in a percentage of COVID-19 patients linked to "noncoronary" myocardial damage frequent in many respiratory diseases. Furthermore, type I or type II myocardial infarction triggered by the inflammatory response of the virus were also reported in COVID-19. Important for all of us on the front lines, as clinicians, we are advised according to the American College of Cardiology statement (7) to measure troponin only if the diagnosis of acute myocardial infarction is being considered on clinical grounds, although the levels of troponin are very important because they correlated to the subsequent prognosis in COVID-19. It is very difficult when we see so many patients each day, to determine the care and necessary tests while balancing the benefit and clinical needs.

The other reason why cardiologists are deeply concerned is directly related to resources; that is, the rapid reorganization of hospitals in Italy and the busy emergency system together with the patients experiencing cardiovascular diseases. In many hospitals, especially in northern Italy, which has a high percentage of patients with COVID-19, cardiac care units were the first to be transformed into COVID-19 units (Figure 4). Appropriate personal protective equipment (PPE) was available late in the pandemic in the Italian cath labs (Figure 5). Hub centers have created dedicated pathways for COVID-19 patients with acute coronary syndromes, and cardiology staff have now been trained to perform procedures on infected patients. Furthermore, telemedicine has been implemented to allow the cardiologists, when possible, to conduct virtual COVID-19 visits and electrocardiography readings. It is difficult when you do not have the patient in front of you but unfortunately a

necessity. The emergency system (118) in some regions is overwhelmed by COVID-19-positive patients. Local doctors are also exhausted from this unprecedented COVID-19 commitment. The Italian *catheterization laboratories* have greatly reduced elective routine nonurgent activities, which have been completely stopped in those regions with a high number of infected patients.

Importantly, a novel finding was documented by a recent ongoing survey by the Italian Society of Cardiology. The survey found a 50% reduction in hospitalizations for acute coronary syndromes in this week of the pandemic, compared with the same period of last year, even in regions not heavily affected by COVID-19 (data on file of the Italian Society of Cardiology). Of note, the survey also showed that some patients with ST-segment elevation myocardial infarction were admitted to the *catheterization laboratory* with a great delay (much longer than 120 min), even in low infection density regions where cardiac care unit beds are available. The reduction is very strong for patients with non-ST-segment elevation myocardial infarction but a reduction of 30% has also been observed for patients with ST-segment elevation myocardial infarction. The reasons for this substantial reduction are still unclear, perhaps related to patients' fear of becoming infected during the hospital stay, the lack of availability of local clinicians, or to the fact that the 118 emergency system is extremely busy dealing with COVID-19 patients (in some regions).

There has been recent concern in the cardiology community about the possible negative effect of angiotensin-converting enzyme inhibitors and angiotensin AT₁ receptor inhibitors in patients with COVID-19. The Italian Cardiology Society, as well as the European Cardiology Society, released a document in which they recommended continuing these drugs in patients with COVID-19, especially in the presence of left ventricular dysfunction. Further studies, however, are needed to show the effect of renin-angiotensin system inhibitors in the general population at risk or affected by COVID-19.

If we were to write a take-home message, it is that we need to be optimistic. We hope that this catastrophe will be very helpful for Italy and other countries in terms of rethinking the health organization of the future and rebuilding an even more efficient health system. The lesson that Italy has

FIGURE 4 COVID-19 Intensive Care Unit in Italy



COVID-19 requires the activation of specific intensive therapy centers with particular attention to the prevention of health personnel. Photo is courtesy of Federico Longhini, MD, Professor of anesthesiology at Magna Graecia University.

learned from this pandemic is that we must be prepared, and we must always plan for the worst and hope for the best scenario. Italian politicians should rethink the linear cuts made in recent years to public health, as well as to the reduction in the number of doctors, residents, beds, and resources to maintain the quality of medical services in all Italian regions. Once again, the importance of research, now little considered in Italy, should be reassessed in the face of catastrophes such as that caused by SARS-CoV-2, to achieve rapid therapeutic strategies.

FIGURE 5 Catheterization Laboratory in the COVID Era



Percutaneous coronary intervention performed with appropriate personal protective equipment in the pandemic.

Italy, as it has done in the past, will improve its health and economic systems after this tragedy. Probably nothing will be like before, and this catastrophe will be a great opportunity to further improve an efficient and effective national universal health system.

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