

COVID-19 and its impact on acute coronary syndrome in-hospital epidemiology: a multifactorial analysis from a single-center Hospital in the north-east region of Italy

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ABSTRACT

We analyze all possible, multifactorial correlations between coronavirus 2019 (COVID-19) pandemic and epidemiological in-hospital epidemiologic variations in ischemic heart disease burden. We developed a simple retrospective study surveying all acute coronary syndrome cases reporting an epidemiological analysis of a single-center University Italian Hospital located in the north-east area of Italy in the city of Gorizia, comparing data collected in two months (February and March) about the definite diagnosis of myocardial infarction in the years 2019 and 2020 (COVID-19 peak exposure interval) respectively. We retrospectively analyzed data regarding the two months of February and March 2020 about admissions to our Intensive Cardiac Care Unit (ICCU) with a confirmed diagnosis of acute coronary syndrome. Differences among the two study periods were assessed using the χ^2 test. Statistical significances were set at $P < 0.05$. All analyses were conducted using IBM SPSS software version 24.0 (IBM Corp. Armonk, NY, USA). We showed a remarkable decrease of acute coronary syndrome cases diagnosed and admitted to our Intensive Cardiac Care Unit when comparing the interval period between February and March 2019 to the same months of 2020. This rate was significantly lower than either the rate during the earlier period in the same year [95% confidence interval (CI), 0.63 to 0.80; $P < 0.001$]. We showed an overall decrease in diagnosis of acute coronary syndromes during the COVID-19 pandemic; we relate this amount decrease in diagnosis to general underuse of cardiologic public services leading to a reduced number of admissions for acute coronary syndrome cases and possibly undertreatment and death of out-of-hospital, *silenced* critical clinical cardiologic pictures due to a generalized fear of COVID-19 in-hospital contagion.

Introduction

The ongoing pandemic caused by the novel severe acute respiratory syndrome-related coronavirus 2

(SARS-CoV-2) has already been associated with thousands of deaths worldwide, and Italy was one of the first countries affected by this pandemic.¹ On March 2nd 2020 the Italian Government issued a new decree concerning coronavirus 2019 (COVID-19) emergency, which established additional restrictions on the population, actually imposing an almost complete lockdown of the nation.² Some studies suggest, due to these decisions, a consequent underestimation of severe clinical conditions other than COVID-19, which could imply an increase in overall global mortality for all types of death.³⁻⁷

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Materials and Methods

The research was based on the analysis of data derived from one single University Hospital center located in the north-east region of Italy in the city of Gorizia.

We retrospectively analyzed data regarding the two months of February and March 2020 about admissions to our Intensive Cardiac Care Unit (ICCU) with a confirmed diagnosis of acute coronary syndrome (ACS) with and without ECG's ST-interval elevation (NSTEMI/STEMI), and we compared these data to admissions and diagnosis of the same two months related to

the year 2019 (Figure 1). The analysis was made by reviewing all clinical records of patients affected by ACS; it was supported by electronic clinical storage of patients records and data using a software database named 'C@rdio Net' (by Insiel technology company), including only the confirmed diagnosis of ACS cases without clinical complications or overlapping concurring clinical conditions interfering with the main clinical picture. We then excluded all the patients with complex clinical pictures characterized by multiple comorbidities or potentially confounding concurrent diseases or other involved clinical variables (such as sepsis, anemia, *etc.*). The criteria used to diagnose acute coronary syndrome properly stick to the fourth universal definition of myocardial infarction. We then counted the cases that were admitted to our Emergency Department in February and March 2020 and actually resulted positive to polymerase chain reaction swab testing for the diagnosis of COVID-19 and compared these results with the epidemiologic data of ischemic patients. The swab test to determine if patients were or not positive to COVID-19 was routinely administered to all the patients accessing the Emergency Room during February and March 2020. Differences among the two study periods were assessed using the χ^2 test. Statistical significances were set at $P < 0.05$. All analyses were conducted using IBM SPSS software version 24.0 (IBM Corp. Armonk, NY, USA).

Results

The statistical analysis revealed a remarkable decrease in admissions to our ICCU of patients with a definite diagnosis of ACS during the COVID-19 pandemic lockdown declared emergency period. During February and March 2019, the overall number of patients admitted to and discharged from our ICCU with a definite diagnosis of ACS was 73. Among these, 34 patients were labeled with a diagnosis of NSTEMI-ACS, while 39 patients were diagnosed with STEMI.

The overall confirmed diagnosed cases admitted to the Emergency Department of COVID-19 infected patients were 16 in February and March 2020.

On the contrary, in February and March 2020, the overall number of patients admitted and discharged with overall ACS diagnosis amounted to 45 patients. Among these, 22 patients were labeled with a diagnosis of NSTEMI-ACS and 23 with STEMI.

If we consider all the ACS cases managed in our Hospital, we notice a decrease rate of 38% in the overall diagnosis and ICCU admissions as we compare the months of February and March 2020/2019. According to NSTEMI-ACS cases, the decrease rate is 35.3%, while regarding STEMI cases, the decrease rate rockets to 41%, referring to the same two months 2019/2020.

This rate was significantly lower than either the rate

during the earlier period in the same year [95% confidence interval (CI), 0.63 to 0.80; $P < 0.001$] (Figure 1).

Discussion

The declaration from the World Health Organization (WHO) of a pandemic by a novel coronavirus led to several governmental restrictions and then social, economic, and psychological consequences.

Many governments in some countries decided to impose severe and often not properly scientific-based mobility and daily-life restrictions, causing a clearly remarkable impact on the population, on one side increasing a state of concrete general confusion due to lack and heterogeneous, often frightening information provided by media about the actual pandemic situation thus creating a psychological *state of alert* and uncertainty in the population,^{8,9} on the other side the scientific community proved not to be good enough in leading to concrete and homogeneous results and effective communication among scientists and to non-healthcare workers and common people, thus actually increasing the mediatic chaos providing plenty of misleading information and outbreak of fake news and possibly paranoid theories conveyed by the widespread use of social platforms as well.

The mixture of all of these variables led to a state of disorientation, and to a dysfunctional and inappropriate behavior of the common people in relation to the healthcare system.¹⁰ Both governmental restrictions and widespread media-induced fear of in-hospital contagion in the general population probably brought to discourage the users from approaching healthcare emergency facilities in case of real need and the emergency onset of severe clinical pictures in need of immediate assistance.¹¹ Some authors report delayed

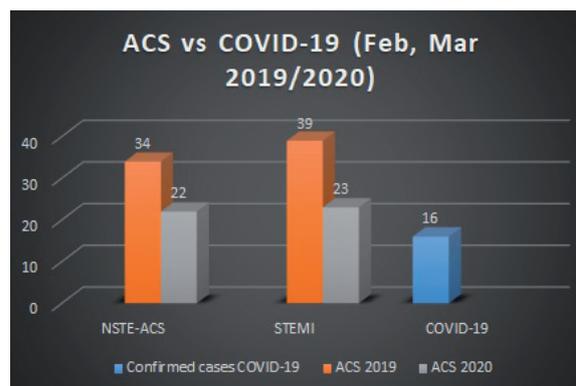


Figure 1. Comparison of Hospital Admissions for acute coronary syndrome (ACS) in Gorizia Hospital between 2019 and 2020 (only February and March). * $P < 0.01$. NSTEMI, non-ST-segment elevation; STEMI, ST-segment elevation myocardial infarction.

access to emergency care of people in real need of assistance due to declared fear of possible COVID-19 near hospital exposure contagion.¹² In our study we underline the remarkable underuse of Cardiology services and consequent admissions to our ICCU in our Hospital from patients affected by actually ongoing myocardial infarction due to the users' evident reluctance to apply to emergency and hospital services.

We could then expect an increase of delayed cases of ischemic heart disease patients or, if worse, an increase in an out-of-hospital fatality rate by untreated acute coronary syndrome cases rather than a rebound of a possible supposed further next infection wave. The COVID-19 scenario should make us properly think about the balance between an excess of overestimation of the popular perception of death caused by SARS-CoV-2 when compared to other well-known and well-assessed common diseases like cardiovascular ones.¹³

All of these considerations should raise a wise re-evaluation about the real, broad meaning of *public health* that should never let its guard down considering all the aspects of the community of patients and commonly prevalent well-known diseases, despite the onset of possible new threats to be faced such as COVID-19 proved to be.

Conclusions

COVID-19 is a virologic pandemic declared by WHO that unbalanced many aspects of healthcare systems and of social, economic, and psychological life of population, leading to governmental restrictions on mobility and daily life, and to a generalized fear of contagion because of inappropriate mediatic information. One of the dramatic consequences of these social derangements led to general underuse of cardiologic public services leading to a reduced number of admissions to ICCU for acute coronary syndrome cases and possibly undertreatment and death of out-of-hospital, *silenced* critical clinical cardiologic pictures.

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