Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Response to Letter to the Editor

We would like to thank Dr Nzwalo and Dr Logallo for their interest in our paper about the impact of the lockdown measures, enforced in March 2020 to control the spread of Covid-19 outbreak, on stroke admissions and treatments in Campania, the third most-populous and the most-densely populated region in Italy.

During the first wave of Covid-19 pandemic in Italy, Campania was less affected than Northern Italy, with only 3604 confirmed cases at the end of our study period, on April 12th 2020.

However, a significant reduction in the number of acute percutaneous coronary interventions for myocardial infarction was reported in our region.[1]

Similarly, in our study we showed a significant reduction in the number of acute revascularization treatments for acute stroke but not in the global number of ischemic strokes admitted to five Campania stroke hubs.

The significant increase in overall time from symptom onset to hospital presentation (155 versus 230 minutes, *P* 0.016) was likely to play a causative role in the reduction of acute treatments, above all if we consider that transfers from peripheral hospitals to stroke hubs decreased by 60% and significantly slowed down (+160 min, *P* 0.03). Furthermore, in acutely treated patients, we noticed more severe symptoms at presentation compared to 2019 and no significant increase in pre-hospital delays; on the other hand, untreated patients had milder symptoms and presented significantly later.

Similarly, in several cohorts of patients,[2,3] a significant reduction in the number of acute reperfusion treatments was showed during the pandemic. Interestingly, similarly to our study, patients with milder symptoms or TIAs less commonly presented to hospitals during the peak of Covid-19. Moreover, in a study from Northwick Park Hospital, London, UK[4] stroke mimics showed the greatest proportional reduction, and for stroke admissions, there was a significant increase in the time between symptom onset and hospital arrival.

The factors that potentially influenced the changes in stroke care during the first peak of Covid-19 are probably several. In their letter, Dr Nzwalo and Dr Logallo suggested a possible increase in unwitnessed strokes. Compared to 2019, in Lombardia, the incidence of unwitnessed cardiac arrest was 11.3 percentage points higher during the first wave of Covid-19 pandemic.[5] In our cohort, we found no significant increase in the rate of unwitnessed strokes during the period of strict home confinement (20% prepandemic versus 25% pandemic; *P* 0.70). In a French national prospective study,[6] the proportion of patients with unwitnessed stroke receiving mechanical thrombectomy significantly decreased, during the lockdown period (37.5% in 2019 versus 30.6% during the epidemic containment measures).

Furthermore, although evidence exist from epidemiological studies linking air pollution and cardiovascular disease including stroke, the increase in relative risk is small at an individual level in high-income countries, above all for short-term variations.[7] So, although the lockdown measures reduced air pollution, it seems to be unlikely that in such a short time period a major impact on stroke risk could have been induced.

Finally, the overwhelming of ambulances, the repeated sanitization of vehicles, and the adoption of personal protection measures played an important role in both increasing pre-hospital delays and decreasing and slowing inter-hospital transfers, even in less affected regions, as in our cohort.

However, as shown by Esenwa et al,[8] in three Montefiore Health System Hospitals in the Bronx, NY, the decline in weekly admissions occurred about two weeks before the first Covid-19 admission.

These observations may therefore suggest that fear of contagions may have greatly affected stroke care during the first wave of pandemic. Whether the second wave of pandemic induced similar changes in health systems should be determined.

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