

IMPACT OF THE COVID-19 PANDEMIC ON THE OCCURRENCE AND OUTCOME OF CARDIOGENIC SHOCK COMPLICATING ACUTE MYOCARDIAL INFARCTION

¹Zuzana Motovska, ²Ota Hlinomaz, ³Milan Hromadka, ⁴Petr Kala, ⁵Jan Mrozek, ⁶Jan Precek,
¹Tamilla Muzafarova, ⁷Jiri Kettner, ⁸Jan Matejka, ⁹Josef Bis, ¹⁰Pavel Cervinka, ¹¹Ales Kovarik,
¹²Anna Klechova, ^{12,13}Ondrej Sanca, ^{12,13}Jiri Jarkovsky.

¹Cardiocentre, Third Faculty of Medicine, Charles University and University Hospital Kralovske Vinohrady, Prague, Czech Rep., ²First Department of Internal Medicine – Cardioangiology, International Clinical Research Center, Faculty of Medicine, Masaryk University and St. Anne's University Hospital, Brno, Czech Rep., ³ Department of Cardiology, University Hospital and Faculty of Medicine in Pilsen, Charles University, Czech Rep., ⁴ Department of Internal Medicine and Cardiology, Faculty of Medicine of Masaryk University and University Hospital Brno, Brno, Czech Rep., ⁵Cardiovascular Department, University Hospital Ostrava, Ostrava, Czech Rep., ⁶Department of Internal Medicine I - Cardiology, Faculty of Medicine and Dentistry, Palacky University and University Hospital, Olomouc, Czech Rep., ⁷Cardiology Department, Institute of Clinical and Experimental Cardiology, Prague, Czech Rep., ⁸ Department of Cardiology, Pardubice Hospital, Czech Rep., ⁹ Department of Cardiovascular Medicine I, University Hospital Hradec Kralove, Czech Rep., ¹⁰ Department of Cardiology, Krajska zdravotni a.s., Masaryk Hospital and Jan Evangelista Purkyne University, Usti nad Labem, Czech Rep., ¹¹Cardiocenter, Regional Hospital Ceske Budejovice, Czech Rep., ¹² Institute of Health Information and Statistics of the Czech Republic, Prague, Czech Rep., ¹³Institute of Biostatistics and Analyses, Faculty of Medicine Masaryk University, Brno, Czech Rep.

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BACKGROUNDS

- The **COVID-19 pandemic** has influenced **patient's behavior** and impacted **homeostasis to a pro-thrombotic level**.
- The changes caused by the COVID-19 pandemic give the presumption of a higher incidence of cardiogenic shock complicating acute myocardial infarction (CS-AMI); primarily because of **infection and pandemic-related stress** associated **higher thrombotic burden** and **risk of repeated atherothrombotic events, longer time to search-** and **impaired availability of health care**, including reperfusion therapy playing a strategic role in patient prognosis.

STUDY AIM

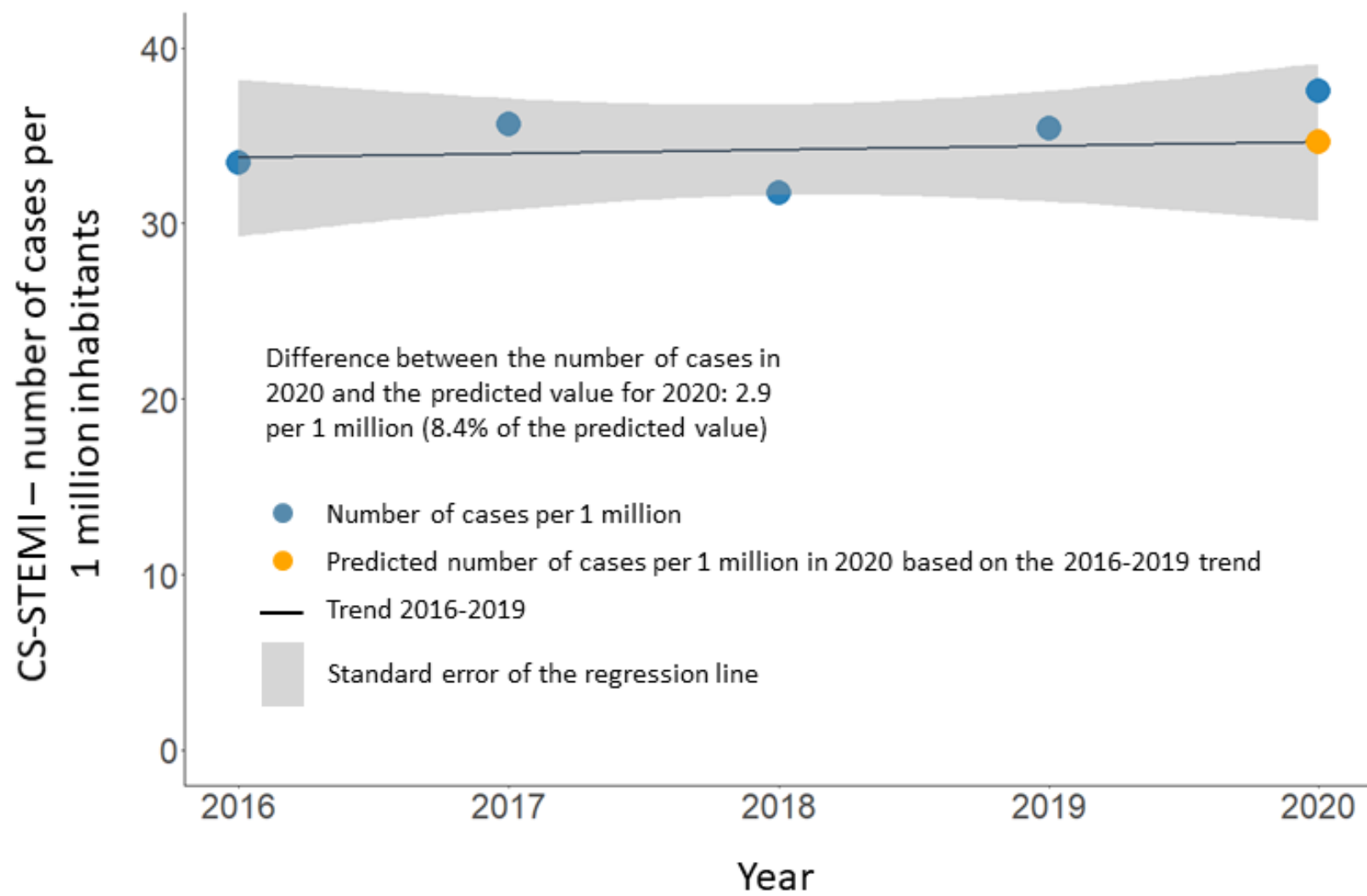
This study aimed to assess the **impact of the COVID-19 pandemic on the incidence and prognosis of acute myocardial infarction complicated initially by cardiogenic shock (CS-AMI).**

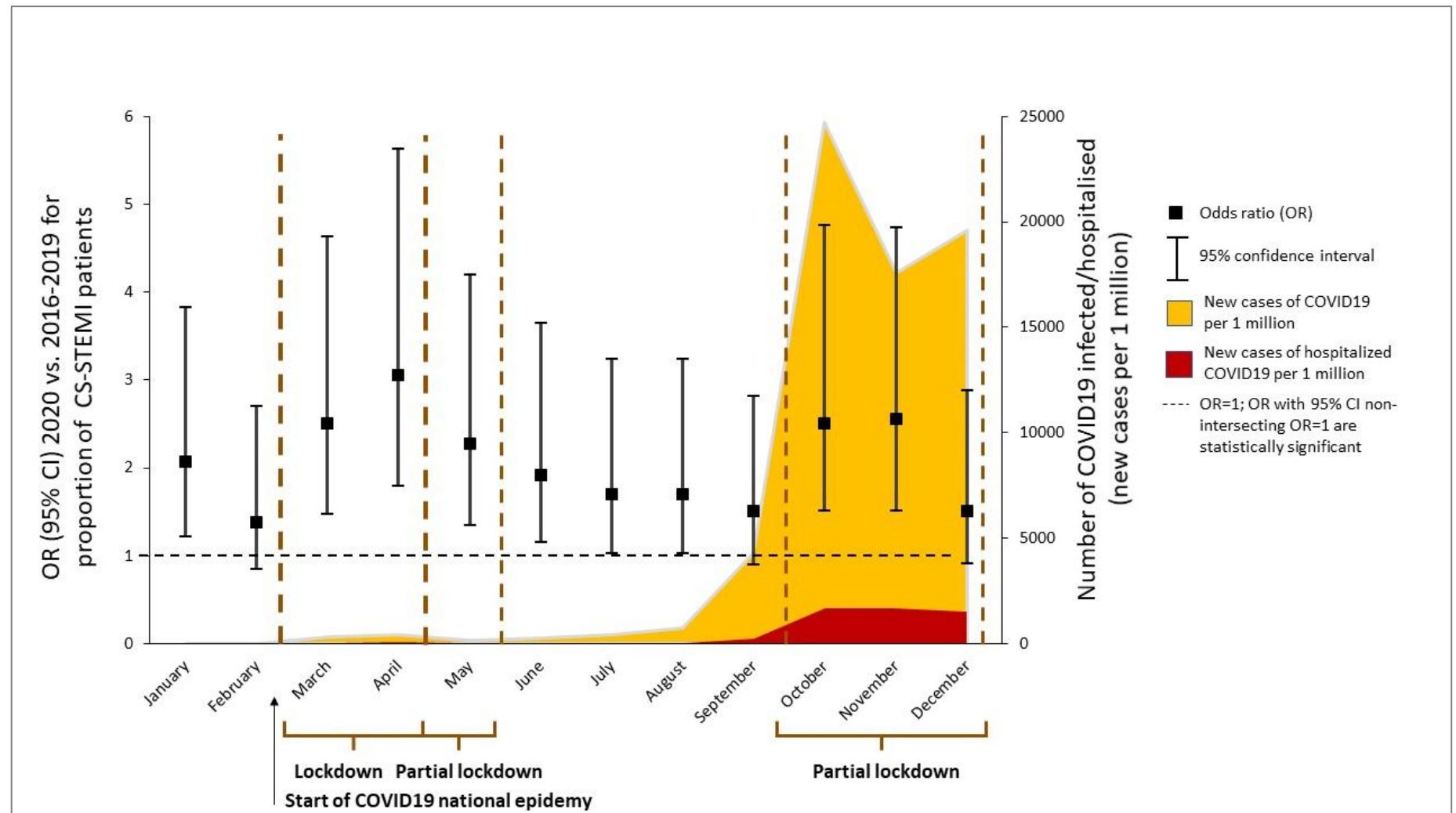
METHODS

- ❑ The analysis is based on data from **the National Registry of Cardiovascular Surgery and Interventions (NRCSI)** in the Czech Republic combined with data from other registries of the **National Health Information System (NHIS)**, namely the **registry of deaths** for mortality analysis and the **Information System of Infectious Diseases (ISID)** for COVID-19 data.
- ❑ NHIS data were collected by the **Institute of Health Information and Statistics in the Czech Republic** and provide information on the population's health status and on healthcare providers' activities.
- ❑ Data in the ISID are collected in compliance with Act No. 258/2000 Coll. on Protection of Public Health, and data in the NHIS are collected under Act No. 372/2011 Coll., on Health Services and Conditions of Their Provision. Due to this legal mandate, **the retrospective analyses did not require either approval by an ethics committee or informed consent from participants.**

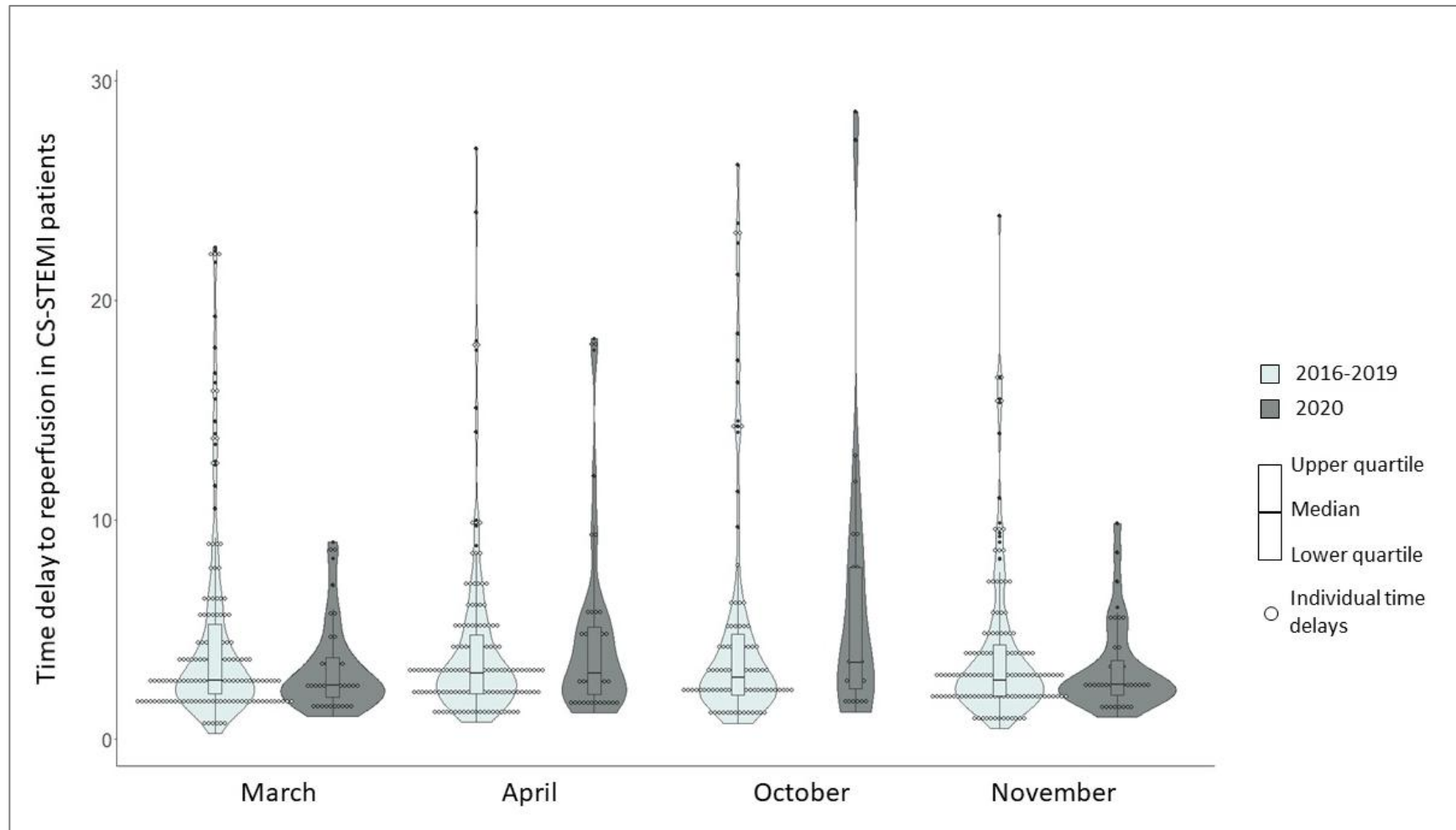
RESULTS

- From 1/2016 to 12/2020, **50,745 AMI** patients were included in the all-comers registry, and **2,822 (5.6%) were complicated by CS**.
- **The mean incidence of CS-AMI was significantly higher during the COVID period (2020) than the incidence from 2016–2019 (6% vs. 5.5%, $p = 0.032$, odds ratio (OR) for CS-AMI in 2020 was 1.118 (95% C.I. 1.019; 1.227)).**
- The difference was caused by **a significant increase in acute STEMI complicated by CS** (8.7% vs. 7.6%, $p=0.011$, OR for CS-STEMI in 2020 was 1.166 (1.039; 1.309)); it was **7.1% in 2016, 7.8% (2017), 7.6% (2018), 7.8% (2019), and 8.7% (2020).**
- NSTEMI complicated by CS was 2.3% (2016), 2.7% (2017), 2.7% (2018), 2.8% (2019), and 2.8% (2020).





→ **The rise in the incidence of CS-STEMI** during each month of the pandemic (compared to the average incidence in non-pandemic years) **correlated with national lockdowns** and the **substantial increase in the number of COVID-infected/hospitalized patients**



→ A significant prolongation in **time delay to reperfusion** (from the onset of symptoms to balloon/reperfusion) was only observed in **October 2020**, compared to non-COVID Octobers in 2016–2019. October 2020: (1) a **peak in the national epidemic** with **the highest growth of infected and hospitalized patients** and (2) a **partial lockdown**.

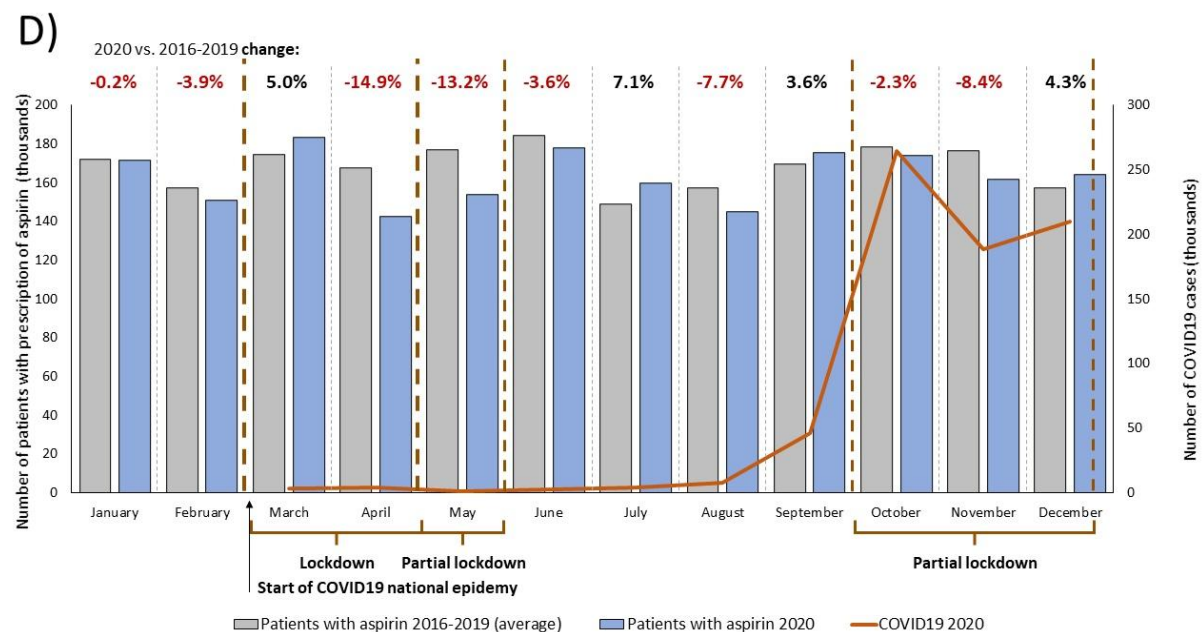
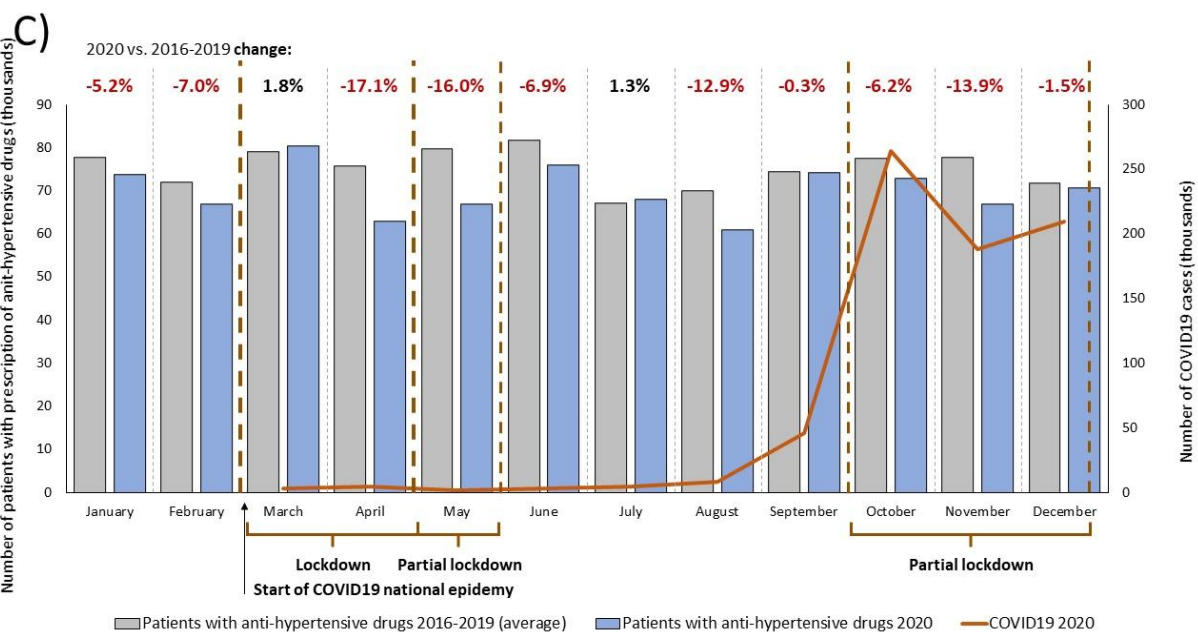
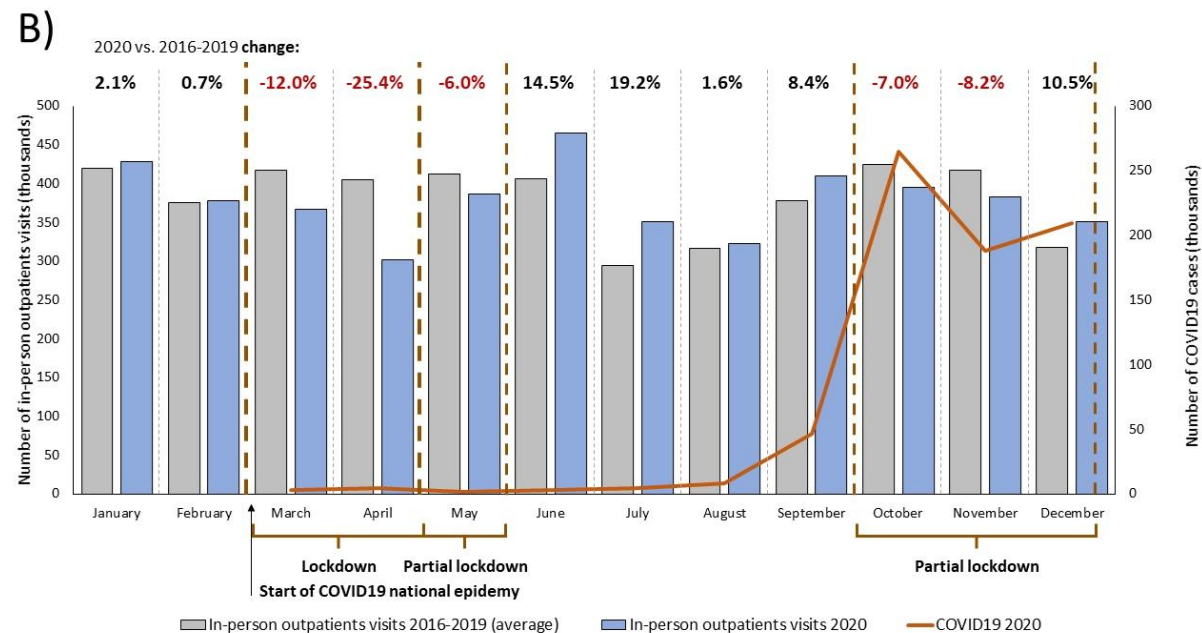
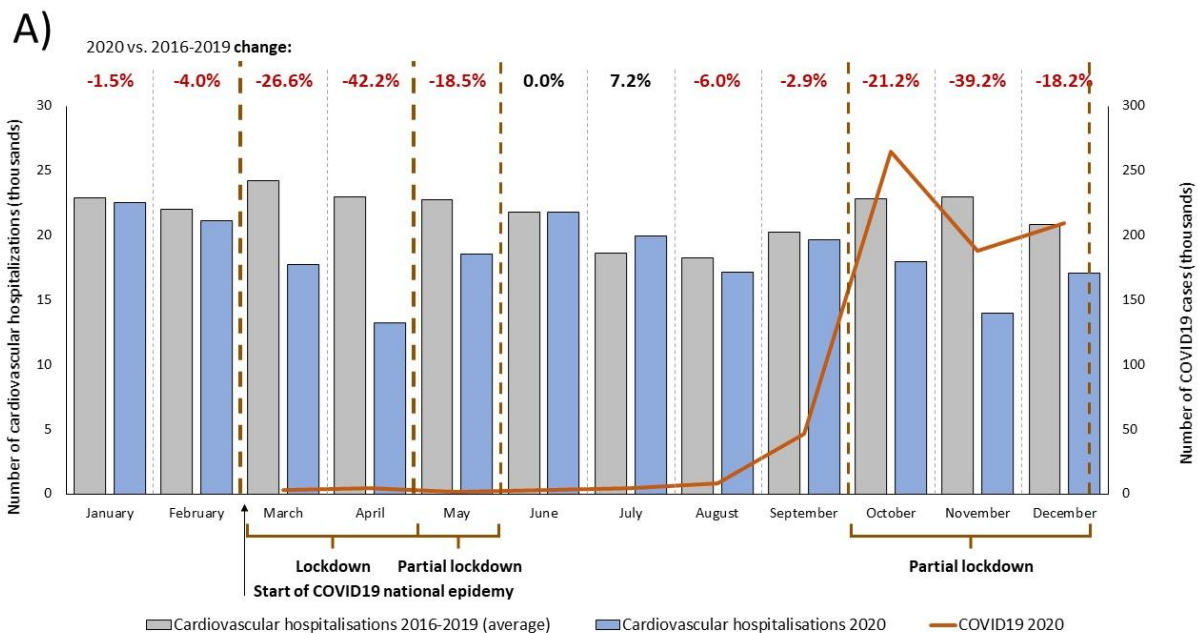
Baseline characteristics

CS-STEMI patient characteristics in 2016–2019 vs. 2020;

- men 72.7% vs. 75.4%,
- mean age (SD) 66.3 (12.3) years vs. 66.3 (12.2) years,
- diabetes 20.9% vs. 19.1%,
- chronic kidney disease 5.4% vs. 5.7%,
- **previous PCI 13.9% vs. 8.2%, $p<0.001$**
- previous CABG 4.5 vs. 4.2%,
- left main disease 14.3% vs. 16%,
- one vessel disease 24.9% vs. 32.1%,
- pre-PCI TIMI flow 0 64.4% vs. 66.2%,
- post-PCI TIMI flow 3 76.7% vs. 76.9%.

→ **PCR positivity for COVID-19 infection within 30 days before hospitalization for CS-AMI** was confirmed in **3.6%** (21) of patients.

→ The COVID pandemic **did not influence the proportions of pre-hospital resuscitated CS-AMI patients** (57.5% vs. 58.7%, $p=0.6$) nor the number of patients on **mechanical ventilation** (67.8% vs. 68.3%, $p=0.8$).



A) Number of cardiovascular hospitalizations; B) Number of in-person outpatients visits (internal medicine, cardiology) from cardiovascular cause (ICD: I00-I99); C) Number of patients with prescription of anti-hypertensive drugs (ATC group C02); D) Number of patients with prescription of aspirin (ATC group B01AC06, N02BA01)

30-day mortality

CS-AMI

53.7% (2016), 51.6% (2017), 49.7% (2018), 49.3% (2019), and 47.9% (2020).

Odds ratios for 30-day mortality in 2020 vs. 2016–2019

0.929 (0.738; 1.170), $p=0.534$ for CS-AMI

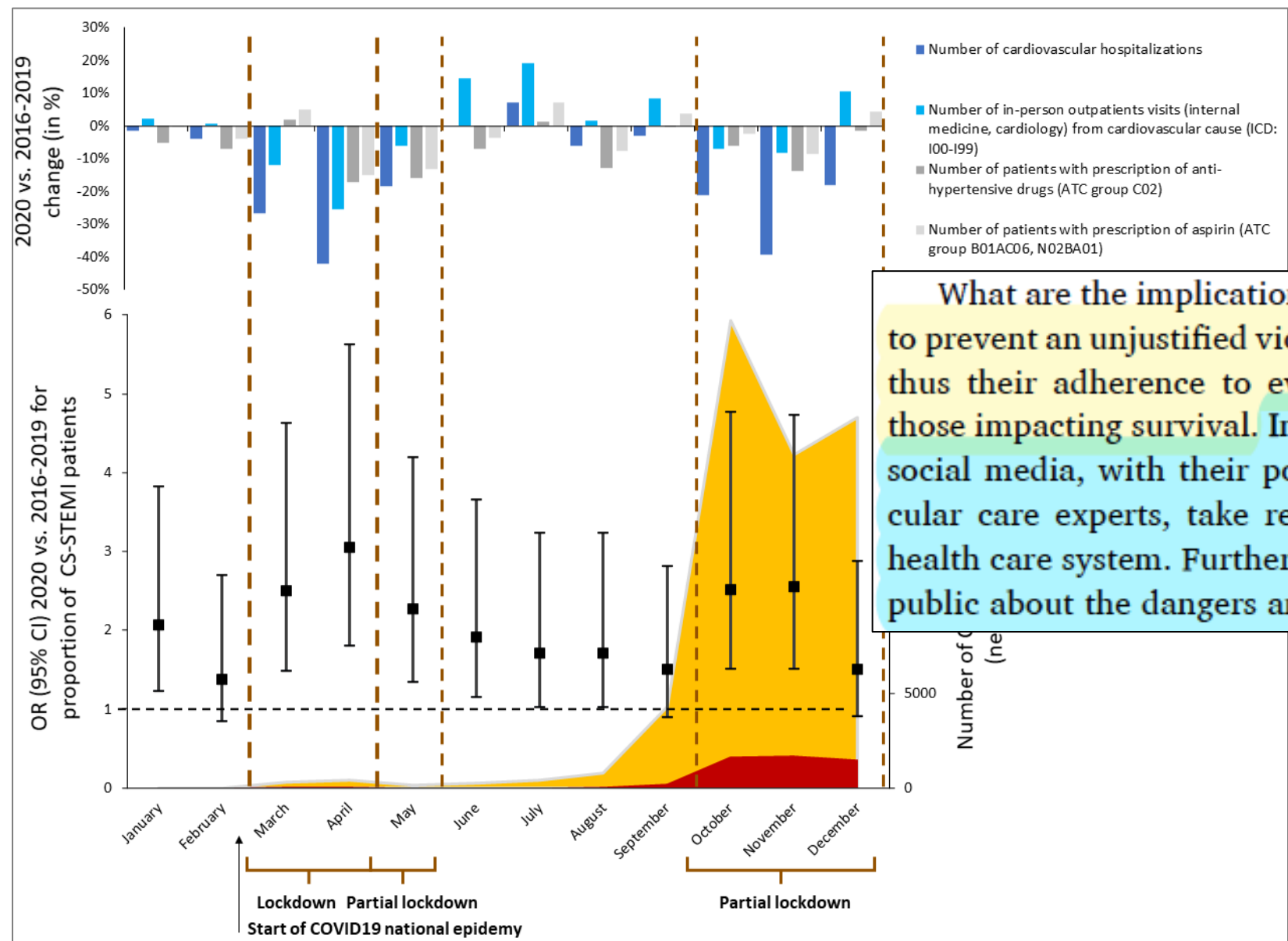
CS-STEMI

50.8%, 47.1%, 46.4%, 44.1%, and 45.3%, respectively (P for 2019 vs. 2020 =0.8).

0.915 (0.541; 1.548), $p=0.740$ for CS-STEMI

CONCLUSIONS

- **↑ in the proportion of patients admitted to hospitals with STEMI complicated by CS.**
- The rise in CS correlated with **lockdown periods and increases in the number of people infected.**
- **The pandemic substantially impacted the availability of health care and patient treatment adherence.**
- We found **no evidence** that **the survival of those admitted to the hospital was affected** by the specific and unusual circumstances created by the COVID-19 pandemic.



Cardiovascular pharmacotherapy was linked to both greater susceptibility to coronavirus infection and higher mortalities after infection.⁹ This appeared to be the case because patients with cardiovascular disease were more vulnerable to both these aspects.^{3,4} Although randomized trials have not confirmed a relationship between drugs that interfere with neurohumoral regulation of the renin-angiotensin-aldosterone system⁹ and antithrombotic agents¹⁰; however, alarming messages in media¹¹ led patients to distrust these medications and ultimately affected adherence.