ORIGINAL ARTICLE

Older adults and major cardiovascular events requiring emergency department consultation during the 1st wave of the COVID-19 pandemic: results from the EDEN-4 Study

Pascual Piñera Salmerón[1], Javier Jacob[2], Òscar Miró[3], Guillermo Burillo-Putze[4], Eric Jorge García-Lamberechts[5], Francisco Javier Montero Pérez[6], Sira Aguiló[3], Cesáreo Fernández[5], Aitor Alquézar-Arbé[7], Ana Murcia Olagüenaga[8], Francisco Javier Díaz Miguez[9], Mar Sousa[10], Pedro Ruiz Asensio[11], Beatriz Paderne Díaz[12], Teresa Pablos Pizarro[13], María Ángeles de Juan Gómez[14], Núria Perelló Viola[15], Lourdes Hernández-Castells[16], Alejandro Cortés Soler[17], Violeta Delgado Sardina[18], Jesús Ángel Sánchez Serrano[19], Patxi Ezponda[20], Andrea Martínez Lorenzo[21], Juan Vicente Ortega Liarte[22], Raquel Hernando Fernández[23], Asumpta Ruiz Aranda[24], Juan González del Castillo[4], on behalf of the SIESTA Network.

Objective. To determine the rate, patient profile, and outcomes of emergency department (ED) visits by older adults for major acute cardiovascular events (MACE) during the 1st wave of the COVID-19 pandemic in Spain vs the prepandemic period.

Methods. We analyzed all patients aged ≥ 65 years who attended 52 Spanish EDs within 1 week of the 1st COVID-19 wave (April 1–7, 2020; COVID period) and within the same week of the previous year (March 30–April 5, 2019; pre-COVID period). Cardiac events (angina pectoris and myocardial infarction with and without ST-segment elevation) and cerebrovascular events (stroke) were recorded for each period, jointly and individually. We estimated changes in MACE incidence rate per 100,000 persons per year and compared patient characteristics and outcomes (30-day all-cause mortality rate, intensive care unit [ICU] admission, and ED revisits, adjusted for patient characteristics) across periods.

Results. ED visits dropped by 61.8% during the COVID period (from 25,557 to 9,770). During this period, 297 patients attended the ED for MACE (incidence rate, 131.2), vs 488 during the pre-COVID period (incidence rate, 215.6; incidence reduction, 39.1%, 95% CI, 29.7–47.3). The reduction in ED visits was significantly greater ($P < .001$) for cardiac events (43.3 vs 99.9; reduction 56.6%, 95% CI, 45.0–65.8) than for cerebrovascular events (88.8 vs 116.7; reduction 23.9%, 95% CI, 8.5–36.6). Patients with MACE presenting during the COVID period had lower comorbidity. These patients had fewer ICU admissions (OR, 0.338; 95% CI, 0.149–0.764) and more ED revisits (OR, 1.764; 95% CI, 1.116–2.790), with no differences in 30-day mortality (HR, 1.474; 95% CI, 0.971–2.239).

Conclusions. During the 1st wave of the COVID-19 pandemic, the rate of ED visits for MACE decreased among older adults. Patients who presented had fewer comorbidities, fewer ICU admissions, and more ED revisits, with no significant changes in mortality.

Keywords: Older adults. COVID-19. Stroke. Acute coronary syndrome.

Personas mayores y eventos cardiovasculares graves que precisaron consultar en el servicio de urgencias durante la primera ola de la pandemia de COVID-19: resultados del estudio EDEN-4

Objetivos. Determinar la incidencia, el perfil de los pacientes y los resultados de las consultas de personas mayores por eventos cardiovasculares agudos mayores (ECVAM) en los servicios de urgencias (SU) españoles durante la primera ola de la pandemia de COVID-19, en comparación con el periodo prepandémico.

Métodos. Se analizaron todos los pacientes de 65 años o más que acudieron a 52 SU españoles durante una semana (del 30 de marzo al 5 de abril de 2020; periodo pre-COVID) de la primera ola de la pandemia de COVID-19 (periodo COVID) y durante la misma semana del año anterior (del 1 al 7 de abril de 2019). Se contabilizaron los eventos car-

Author Affiliations:
[1]Servicio de Urgencias, Hospital General Universitario Reina Sofía, Murcia, Spain.
[2]Servicio de Urgencias, Hospital Universitari de Bellvitge, l'Hospitalet de Llobregat, Barcelona, Spain.
[3]Servicio de Urgencias, Hospital Clínic, IDIBAPS, Universitat de Barcelona, Barcelona, Spain.
[4]Servicio de Urgencias, Hospital Clínico San Carlos, IDISSC, Universidad Complutense, Madrid, Spain.
(Continued at the bottom of the page)

Author Contributions:
All authors have confirmed their authorship in the author's responsibilities document, publication agreement, and assignment of rights to EMERGENCIAS.

Corresponding Author:
Pascual Piñera Salmerón.
Servicio de Urgencias.
Hospital General Universitario Reina Sofía.
Av. Intendente Jorge Palacios, 1.
30003 Murcia, Spain.

Email:
pascual.pinera@gmail.com

Article Information:
Received: 3-11-2025
Accepted: 27-12-2025
Online: 30-1-2026

Editor in Charge:
Agustín Julián-Jiménez

[5]Servicio de Urgencias, Hospital Universitario de Canarias, Tenerife, Spain. [6]Servicio de Urgencias, Hospital Reina Sofía, Córdoba, Spain. [7]Servicio de Urgencias, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain. [8]Servicio de Urgencias, Hospital del Nalón, Langreo, Asturias, Spain. [9]Servicio de Urgencias, Hospital Altagracia, Manzanares, Ciudad Real, Spain. [10]Servicio de Urgencias, Hospital Nuestra Señora del Prado de Talavera de la Reina, Toledo, Spain. [11]Servicio de Urgencias, Hospital Universitario Vinalopó, Elche, Alicante, Spain. [12]Servicio de Urgencias, Hospital de Móstoles, Madrid, Spain. [13]Servicio de Urgencias, Hospital Virgen del Rocío, Sevilla, Spain. [14]Servicio de Urgencias, Hospital General Universitario Dr. Peset, Valencia, Spain. [15]Servicio de Urgencias, Hospital Universitario Son Espases, Palma de Mallorca, Spain. [16]Servicio de Urgencias, Clínica Universitaria Navarra, Madrid, Spain. [17]Servicio de Urgencias, Clínico Universitario, Valencia, Spain. [18]Servicio de Urgencias, Hospital Álvaro Cunqueiro, Vigo, Spain. [19]Servicio de Urgencias, Hospital Universitario, Salamanca, Spain. [20]Servicio de Urgencias, Hospital De Zumárraga, Guipúzcoa, Spain. [21]Servicio de Urgencias, Hospital Virxe da Xunqueira, A Coruña, Spain. [22]Servicio de Urgencias, Hospital Universitario Los Arcos del Mar Menor, San Javier, Murcia, Spain. [23]Servicio de Urgencias, Hospital Universitario Río Ortega, Valladolid, Spain. [24]Servicio de Urgencias, Hospital Juan Ramón Jiménez, Huelva, Spain.

diacos (angina de pecho e infarto de miocardio, con y sin elevación del segmento ST) y cerebrovasculares (ictus) de cada periodo, tanto de forma conjunta como individual. Se estimó el cambio en la incidencia de ECVAM por cada 100.000 personas al año y comparamos las características de los pacientes con ECVAM y sus desenlaces (mortalidad por cualquier causa a los 30 días, ingreso en la unidad de cuidados intensivos –UCI– y reconsulta en urgencias, ajustados por las características del paciente) según el periodo.

Resultados. El número de visitas a urgencias disminuyó un 61,8% durante el periodo de la COVID-19 (de 25.557 a 6.770). Durante este periodo, 297 pacientes acudieron al SU por ECVAM (incidencia = 131,2) y 488 durante el periodo previo a la COVID-19 (incidencia: 215,6; reducción de la incidencia: 39,1%, IC 95%: 29,7 a 47,3). La disminución en la incidencia de consultas en urgencias fue significativamente mayor (p < 0,001) para los eventos cardiacos (43,3 frente a 99,9; reducción: 56,6%, IC 95%: 45,0 a 65,8) que para los eventos cerebrovasculares (88,8 frente a 116,7; reducción: 23,9%, IC 95%: 8,5 a 36,6). Los pacientes con ECVAM que consultaron en urgencias durante el periodo de la COVID-19 presentaron menor comorbilidad. Estos pacientes tuvieron menos ingresos en la UCI (OR = 0,338; IC 95%: 0,149-0,764) y más reconsultas en urgencias (OR = 1,764; IC 95%: 1,116-2,790), sin diferencias en la mortalidad a 30 días (HR = 1,474; IC 95%: 0,971-2,239).

Conclusiones. Durante la primera ola de la pandemia de COVID-19, la incidencia de visitas a SU por ECVAM disminuyó en la población anciana. Los pacientes que consultaron presentaban más comorbilidades, menos ingresos en la UCI y mayor número de reconsultas en urgencias. No se observaron cambios significativos en la mortalidad.

Palabras clave: Ancianos. COVID-19. Accidente cerebrovascular. Síndrome cardiaco agudo.

Introduction

During the first wave of the SARS-CoV-2 pandemic, in March and April 2020, it is estimated that approximately 5% of the global population became infected within just a few weeks, placing national health care systems in the most critical situation of recent years and significantly impacting the quality of care provided in emergency departments (EDs).[1-3] In April 2020, British Medical Journal warned of a substantial decrease in ED visits in the United Kingdom. According to data from the Emergency Syndromic Surveillance System, there was a 49% reduction in ED visits during the first week of lockdown (March 23–29, 2020) compared with the last week of February (February 24–March 1, 2020).[4] This phenomenon was progressively reported across the rest of Europe[5-7] Similarly, in the United States, it is estimated that 40.9% of adults avoided medical care during the pandemic, and 12% avoided ED care, resulting in a 42% reduction in ED visits.[8]

Regarding cardiovascular diseases, according to data from a network of 75 Spanish hospitals, Rodríguez-Leor *et al.*[9] reported a 27.6% decrease in suspected ST-segment elevation acute coronary syndrome (STEACS) cases compared with the same period in the previous year. In this context, a twofold increase in in-hospital mortality was also observed. This reduction in events was detected in 87% of participating centers. The decrease in diagnoses of cardiovascular diseases, such as acute coronary syndrome (ACS), stroke, and others, among hospitalized patients is consistent with the reductions reported in ED admissions. For example, several studies showed that during the first peak of the pandemic, the number of stroke and myocardial infarction code activations decreased.[9,10]

However, most studies have focused on individual conditions without distinguishing populations by age. In this regard, older patients represent a subgroup that deserves special attention, as they were among the most affected during the first weeks of the COVID-19 pandemic.[11] Therefore, we aimed to investigate whether the incidence rate of ED visits for major adverse cardiovascular events (MACE) in older patients decreased during this period and whether there were differences in the profiles and outcomes of patients with MACE who presented to the ED during the first wave of the COVID-19 pandemic.

Method

SIESTA group and EDEN project

The SIESTA Network *(Equipo de Investigadores Españoles en Situaciones de Emergencia)* was established in 2020 with the participation of 62 Spanish EDs, which collaborated to generate knowledge about COVID-19 during the first weeks of the pandemic.[12] After completing this initiative, the SIESTA network launched the EDEN project *(Servicios de Urgencias y Necesidades de las Personas Mayores)* in 2022, with the general objective of expanding knowledge regarding the sociodemographic, organizational, clinical, care-related, and outcome characteristics of individuals aged ≥ 65 years attending Spanish EDs. A total of 52 EDs participated in the EDEN project, representing 18% of EDs in the Spanish public health system and covering 11.8 million inhabitants (25% of the Spanish population). Two specific multipurpose registries, EDEN and EDEN-COVID, were created, including all patients aged ≥ 65 years who attended the ED during 2 7-day periods: April 1–7, 2019 (EDEN cohort) and March 30–April 5, 2020 (EDEN-COVID cohort). Detailed descriptions of both cohorts have been published elsewhere.[13,14]

Study design of EDEN-4

The EDEN-4 study was designed to determine the incidence rate, patient profile, and outcomes of those presenting to EDs with MACE during the COVID-19 period (data obtained from the EDEN-COVID cohort) compared with the pre–COVID-19 period (data obtained from the EDEN cohort). The MACE evaluated were of two main types: cardiac (subdivided into unstable angina, STEACS, and non–ST-segment elevation ACS [NSTEACS]) and cerebral (ischemic stroke and hemorrhagic stroke). Patients were selected according to the following inclusion criteria: age ≥ 65 years with a diagnosis of MACE according to ICD-10 coding (I20–I25 for coronary events; I60–I68 for cerebrovascular events) during the study periods. Patients with incomplete data were excluded.

The incidence of MACE was expressed as the number of episodes per 100,000 inhabitants per year. The exposed population was calculated based on the reference population assigned by the Spanish National Health System to each participating ED. Patient-related characteristics analyzed in the EDEN-4 study included 2 sociodemographic variables (age and sex), 9 comorbidities (hypertension, diabetes mellitus, dyslipidemia, ischemic heart disease, chronic kidney disease, cerebrovascular disease, peripheral arterial disease, chronic obstructive pulmonary disease, and heart failure), 5 baseline variables [Barthel Index, cognitive impairment, comorbidity assessed using the Charlson Comorbidity Index (CCI), falls in the 6 months prior to the index episode, and need for assistance with ambulation], prior medical evaluation before ED presentation, 8 baseline treatments (diuretics, beta-blockers, renin–angiotensin system inhibitors, statins, antiplatelet agents, anticoagulants, antidepressants, and benzodiazepines), 5 variables related to vital signs at ED admission (systolic blood pressure, temperature, respiratory rate, heart rate, and oxygen saturation), and 6 ED treatment variables (oxygen therapy, use of diuretics, analgesics, inotropes/vasopressors, opioids, and antihypertensives). Finally, three outcomes were considered: all-cause 30-day mortality, need for admission to the intensive care unit (ICU), and ED revisit related to the index episode.

Statistical analysis

Qualitative variables were expressed as absolute values and percentages, and quantitative variables as mean and SD, for normally distributed data (assessed using the Kolmogorov–Smirnov test), or as median and IQR, (Q1–Q3) for non-normal distributions. Incidence rate was expressed as cases per 100,000 inhabitants per year, and the 95% CI for incidence rate was calculated using the exact binomial method proposed by Clopper and Pearson. For group comparisons, the chi-square test was used for qualitative variables. For quantitative variables, Student's t test or the Mann–Whitney U test was used (when normal distribution was not met).

The size of the association between the COVID-19 period and outcomes was expressed by calculating crude and adjusted odds ratios (OR) with 95% CI, using logistic regression. Adjustment was performed using the enter method, including as covariates those patient characteristics that showed significant differences between periods in the bivariate analysis. Thirty-day mortality was analyzed using Cox regression models, and unadjusted and adjusted hazard ratios (HR) with 95% CI, were calculated (using the same covariates described above). For group comparisons, the pre–COVID-19 period was used as the reference group.

Differences between groups were considered statistically significant if the *P* value was < .05 or if the 95% CI, of the OR or HR did not include the value 1. Statistical analysis was performed using SPSS Statistics version 25 (IBM, Armonk, New York, USA).

Ethical aspects

The EDEN project was approved by the Clinical Research Ethics Committee of *Hospital Clínico San Carlos de Madrid* (protocol No.: HCSC/22/005-E). Due to the nature of the study, a waiver of informed consent was granted. The ethical principles of the Declaration of Helsinki were respected at all times. The database was used anonymously, with patients coded to preserve anonymity, and only the principal investigator at each center had access to patient identification data.

Results

During the pre–COVID-19 period, a total of 96,104 patients were treated in the 52 EDs participating in the EDEN-4 study. Of these, 25,856 (26.9%) were aged ≥ 65 years, whereas during the COVID-19 period, 33,578 cases were treated, of which 9,853 (29.3%) were aged ≥ 65 years. These values represented a 61.8% decrease during the COVID-19 period (95% CI, 60.9 to 62.7). Finally, a total of 25,557 and 9,770 patients, respectively, provided valid data for inclusion in the present analysis (approximately 99% of all patients aged ≥ 65 years) (Figure 1).

During the COVID period, 297 patients presented to the ED with MACE (incidence rate, 131.2 cases per 100,000 persons per year) vs 488 during the pre–COVID-19 period (incidence rate, 215.6 cases per 100,000 persons per year; incidence reduction of 39.1%, 95% CI, 29.7 to 47.3) (Figure 1).

The decrease in ED visit incidence rate during the COVID period was significantly greater (*P* < .001) for cardiac events (43.3 vs 99.9 cases per 100,000 persons per year; reduction: 56.6%, 95% CI, 45.0 to 65.8) than for cerebrovascular events (88.8 vs 116.7 cases per 100,000 persons per year; reduction: 23.9%, 95% CI, 8.5 to 36.6). Subgroup analysis showed a significant decrease in incidence across all disease groups (Figure 2).

Patients with MACE had a mean age of 79 years (SD, 7.7), with no differences between periods. In contrast, during the COVID-19 period, patients generally

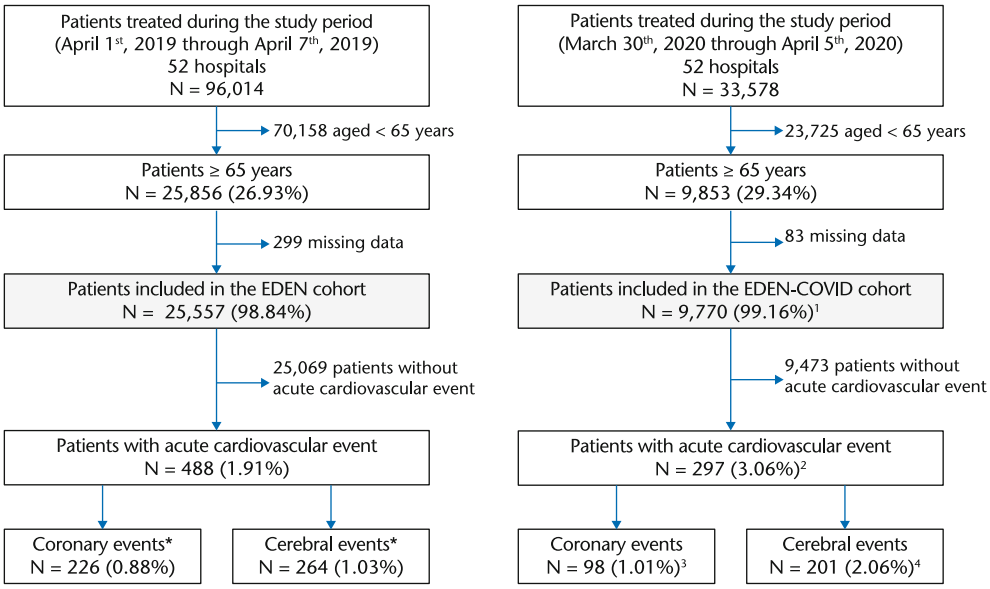

Figure 1. Flow diagram of the EDEN and EDEN-COVID cohorts.
Percentage reductions based on the n value of the EDEN-COVID cohort vs the EDEN cohort: 1 (61.8% reduction); 2 (39.1% reduction); 3 (56.6% reduction); 4 (24.9% reduction).
*Two patients presented both events simultaneously.

presented with more comorbidities (severe comorbidity—CCI ≥ 3 points—was observed in 40.2% of cases compared with 29.6% in the pre–COVID-19 period), and ischemic heart disease, chronic kidney disease, chronic obstructive pulmonary disease, and heart failure were the most frequent individual comorbidities during this period. No differences were observed in baseline treatment, except for antiplatelet use (more frequent in the pre–COVID-19 period). Vital signs and ED-administered treatments did not differ between groups. Other clinical characteristics of patients with MACE are shown in Table 1.

The 30-day all-cause mortality and ED revisits related to the index episode increased in patients with MACE treated during the COVID-19 period, whereas ICU admission decreased significantly (Table 2). After adjusting for differences in patient characteristics between periods, no statistically significant differences were observed in 30-day mortality (adjusted HR, 1.474; 95% CI, 0.971–2.239). Similarly, no significant differences were observed in 30-day mortality when cardiac and cerebral subgroups were analyzed separately (Figure 3). In contrast, adjusted analysis maintained statistical significance for lower ICU admission rates (OR, 0.338; 95% CI, 0.149–0.764) and higher ED revisit rates (OR, 1.764; 95% CI, 1.116–2.790) during the COVID-19 period (Table 2).

Discussion

During the first wave of the SARS-CoV-2 pandemic, a significant reduction in ED visits was observed in Spain and worldwide. The CONCOVUR study[15] demonstrated that the reduction in visits to Spanish EDs during the first wave of the COVID-19 pandemic in 2020 was not related to hospital size but to the local impact of the pandemic: in areas with higher COVID-19 seroprevalence, there was a greater decrease in visits for other conditions, although the overall reduction in ED visits was smaller due to the higher number of COVID-19–related consultations. Neither the CONCOVUR study in Spain nor any other study differentiated patients by age groups. In this study, which analyzed patients aged ≥ 65 years, ED utilization also decreased, both in total visits and in visits for MACE. There is no pathophysiological or epidemiological reason to suggest that fewer MACE occurred during the COVID-19 period. On the contrary, the prothrombotic state associated with SARS-CoV-2 infection, characterized by elevated D-dimer, fibrinogen, and IL-6,[16] would be expected to increase MACE rather than reduce them.

Several explanations may account for this decrease. Strict stay-at-home orders and fear of contagion in medical facilities may have led patients with mild cardiovascular symptoms to remain at home.[17] In addition, these measures increased social isolation, particularly among older patients, which may have hindered family members from recognizing mild symptoms. In a study conducted in Catalonia (Spain),[18] the median baseline NIH Stroke Scale score was lower (although not significantly) in March 2020 compared with March 2019, suggesting that a relative decrease in mild stroke cases may not fully explain the reduction in ED visits.

Regarding cerebrovascular events, and consistent with EDEN-4 findings, several studies showed a reduction in patients with acute cerebrovascular disease treated in hospitals during the first pandemic peak.[19,20] A lower activation of stroke codes was observed, with a

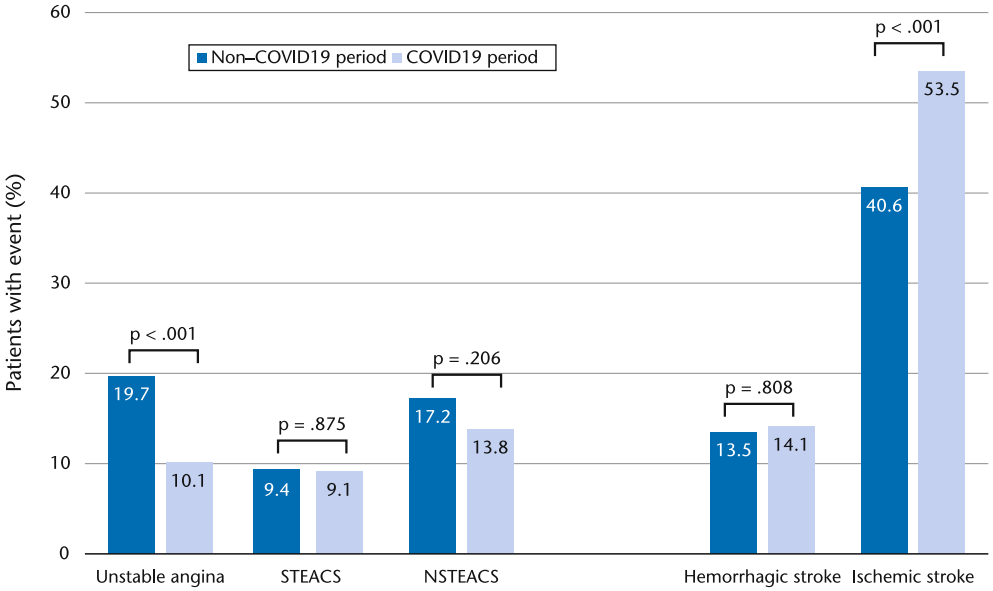

Figure 2. Comparative analysis of different cardiovascular events according to period (EDEN cohort vs the EDEN-COVID cohort).
NSTEACS: non-ST-segment elevation acute coronary syndrome; STEACS: ST-segment elevation acute coronary syndrome.
Percentage reductions based on the n value of the EDEN-COVID cohort compared with the EDEN cohort: 1 (68.8% reduction); 2 (41.3% reduction); 3 (51.2% reduction); 4 (36.4% reduction); 5 (19.7% reduction).

similar percentage reduction across all stroke types.[21] Significant decreases were reported in both ischemic and hemorrhagic stroke. Another possible explanation is the simultaneous presentation of SARS-CoV-2 infection and stroke, in which case patients may have been admitted to isolation units and not recorded as stroke cases in administrative registries, as they were outside standard care pathways. This would render such cases undetectable using the EDEN registry methodology. Additionally, exclusion of non-COVID patients with transient or mild stroke who were discharged for home observation after ED diagnosis may have limited inclusion in hospital stroke registries.[22]

Regarding heart disease, several studies have reported a reduction in hospital admissions for ACS.[23,24] In Austria, a 39% decrease in NSTEACS cases was observed during the last week of March 2020 compared with the first.[23] In Italy, a study comparing one week in 2020 with the same period in 2019 showed a 48% reduction in acute myocardial infarction admissions (26% for STEACS and 65% for NSTEACS).[24] Similarly, the present study demonstrates a decrease in all 3 major ACS types: unstable angina, NSTEACS, and STEACS, with the largest reduction observed in unstable angina.

This marked reduction in unstable angina diagnoses may be explained by population confinement and fear of hospital attendance; if chest pain resolved without myocardial injury, patients may have avoided seeking care. None of the abovementioned studies specifically addressed older populations, which were the focus of the EDEN-4 study.

On the other hand, underdiagnosis of cardiovascular conditions in EDs cannot be excluded, as attention was focused on patients with COVID-19 infection.[25] A study in the United States reported a reduction in hospitalizations for primary diagnoses of heart failure, chest pain syndromes, ACS, and stroke, with a 43% decrease in hospitalizations for acute cardiovascular causes in March 2020 vs March 2019.

Although patients admitted during the COVID-19 pandemic had similar demographic characteristics, in-hospital mortality was higher, suggesting greater disease severity.[26] Similarly, in the EDEN-4 study, crude mortality was higher during the COVID-19 period; however, after 30-day adjustment, the difference was no longer statistically significant. Nevertheless, there appears to be a trend toward higher prevalence despite lower comorbidity, and a type II error may exist given the limited statistical power of the present analysis.

Overall, older patients with MACE exhibited a high burden of comorbidities. Several comorbidity indices are used to assess prognosis, among which the CCI is the most widely used.[27] In this study, the CCI was lower among patients presenting during the COVID-19 period. The study by Miró *et al.*[28] previously showed that, during this period, ICU admission decisions followed routine clinical practice criteria, in which overall comorbidity burden was the independent factor associated with ICU non-admission. This may explain why ICU admission rates for patients with MACE were lower during the COVID-19 period (as they had fewer comorbidities than in the pre–COVID-19 period). Additionally, considering that during the first wave ICUs were almost entirely occupied by patients with SARS-CoV-2 infection and access was limited, some patients who required ICU care may have been admitted to general wards.

Table 1. Characteristics of patients with acute cardiovascular events in the non–COVID-19 period vs the COVID-19 period

Variable	Total N = 785 n (%)	Non–COVID period N = 488 n (%)	COVID period N = 297 n (%)	*P*
Epidemiological variables				
Age (years), [mean (SD)]	79.0 (7.7)	79.0 (7.9)	78.9 (7.3)	.859
Female sex	311 (40.5)	191 (40.0)	120 (41.2)	.743
Medical history				
Hypertension	615 (78.3)	375 (76.8)	240 (80.8)	.191
Diabetes mellitus	268 (34.1)	163 (33.4)	105 (35.4)	.576
Dyslipidemia	470 (59.9)	293 (60.0)	177 (59.6)	.902
Ischemic heart disease	232 (29.6)	167 (34.2)	65 (21.9)	**< .001**
Chronic kidney disease	84 (10.7)	62 (12.7)	22 (7.4)	**.020**
Cerebrovascular disease	180 (22.9)	119 (24.4)	61 (20.5)	.214
Peripheral arterial disease	98 (12.5)	68 (13.9)	30 (10.1)	.115
COPD	129 (16.4)	95 (19.5)	34 (11.4)	**.003**
Prior heart failure	133 (16.9)	95 (19.5)	38 (12.8)	**.016**
Baseline status				
Barthel index < 60 points	55 (7.0)	36 (7.4)	19 (6.4)	.602
Cognitive impairment	67 (8.5)	48 (9.8)	19 (6.4)	.094
Charlson Comorbidity Index ≥ 3	283 (36.1)	196 (40.2)	87 (29.3)	**.002**
Falls in previous 6 months	35 (4.5)	28 (5.7)	7 (2.4)	**.026**
Ambulation capacity				.482
Does not ambulate	31 (3.9)	21 (4.3)	10 (3.4)	
Ambulates with assistance	178 (22.7)	116 (23.8)	62 (20.9)	
Ambulates independently	576 (73.4)	351 (71.9)	225 (75.8)	
Prior medical evaluation	396 (50.4)	243 (49.8)	153 (51.5)	.640
Baseline treatment				
Diuretics	356 (45.4)	223 (45.7)	133 (44.8)	.803
Beta-blockers	278 (35.4)	183 (37.5)	95 (32.0)	.117
RAS inhibitors	473 (60.3)	288 (59.0)	185 (62.3)	.363
Statins	431 (54.9)	280 (57.4)	151 (50.8)	.074
Antiplatelets	321 (40.9)	219 (44.9)	102 (34.3)	**.004**
Anticoagulants	187 (23.8)	117 (24.0)	70 (23.6)	.897
Antidepressants	116 (14.8)	73 (15.0)	43 (14.5)	.854
Benzodiazepines	187 (23.8)	127 (26.0)	60 (20.0)	.063
Acute episode data [mean (SD)]				
Systolic blood pressure (mmHg)	148.6 (28.1)	147.1 (28.7)	151.0 (27.0)	.075
Temperature (°C)	36.0 (0.4)	36.0 (0.4)	36.0 (0.5)	.360
Respiratory rate (breaths/min)	16.5 (4.0)	16.2 (3.6)	17.0 (4.6)	.096
Heart rate (beats/min)	79.7 (20.3)	79.2 (20.0)	80.6 (20.6)	.389
Oxygen saturation (%)	95.8 (5.0)	95.7 (4.9)	95.9 (4.9)	.579
Emergency department management				
Oxygen therapy use	171 (21.8)	105 (21.5)	66 (22.2)	.816
Diuretic use	96 (12.3)	68 (14.0)	28 (9.6)	.068
Analgesic use	150 (19.4)	92 (18.9)	58 (20.1)	.698
Inotrope or vasopressor use	22 (2.9)	13 (2.7)	9 (3.1)	.756
Opioid use	46 (5.9)	27 (3.4)	19 (2.4)	.617
Antihypertensive use	143 (18.3)	85 (17.5)	58 (19.7)	.434

SD: standard deviation; COPD: chronic obstructive pulmonary disease; RAS inhibitors: renin-angiotensin system inhibitors; breaths/min: respirations per minute; beats/min: beats per minute.
Bold values indicate statistical significance ($P < .05$).

Thus, patients aged ≥ 65 years received similar management to the general population.

Of note, the higher ED revisit rate observed during the COVID-19 period. This finding may be partially explained by the fact that patients with mild MACE were discharged for home observation to avoid in-hospital COVID-19 exposure.

The EDEN-4 study has several limitations. First, the reliability of coding used to identify MACE cases is uncertain. Given that codes are often generic, some event details may have been missed. Second, the 52 EDs in the SIESTA network were not randomly selected but volunteered to participate. However, they were geographically representative across Spain and included a wide range of hospital types, minimizing potential bias. Third, this is a secondary analysis of a multipurpose cohort; therefore, associations may be influenced by unmeasured factors such as frailty and social conditions, which may affect ED management and prognosis.[29,30] These factors were not measured, and findings should therefore be considered hypothesis-generating. Fourth, results may have been influenced by seasonal variation in disease prevalence, as the recruitment period covered only one week. Fifth, patient inclusion was episo-

Table 2. Analysis of unadjusted and adjusted odds ratios for the COVID-19 period compared with the non–COVID-19 period

Variable	Total N = 785 n (%)	Non–COVID period N = 488 n (%)	COVID period N = 297 n (%)	Unadjusted OR (95% CI); *P* value	Adjusted OR* (95% CI); *P* value
30-day mortality	114 (14.5)	61 (12.5)	53 (17.8)	**1.520 (1.019-2.269); .039**	1.474 (0.971-2.239); .069
ICU admission	87 (60.0)	66 (67.3)	21 (44.7)	**0.392 (0.192-0.799); .010**	**0.338 (0.149-0.764); .009**
ED revisit related to the index episode	124 (29.7)	72 (26.3)	52 (36.4)	**1.603 (1.039-2.475); .032**	**1.764 (1.116-2.790); .015**

OR: odds ratio; CI: confidence interval; ED: emergency department.
*Adjusted for: age, female sex, ischemic heart disease, chronic kidney disease, chronic obstructive pulmonary disease, prior heart failure, Charlson Comorbidity Index ≥ 3, falls in the previous 6 months, antiplatelet therapy.
Bold values indicate statistical significance ($P < .05$).

de-based rather than patient-based; thus, some episodes may correspond to the same patient. However, given the short inclusion period (7 days), the likelihood of repeat visits is low. Sixth, the number of patients with MACE was relatively small, which may have led to type II error in some estimates (particularly the lack of demonstrated increase in mortality) due to limited statistical power. Finally, characteristics of the Spanish public health system and ED organization may have influenced results, warranting studies in other countries.

In conclusion, during the first wave of COVID-19, the incidence rate of ED visits for MACE decreased among older patients. Patients who presented had more comorbidities, lower ICU admission rates, and higher ED revisit rates. No significant changes in mortality were observed.

Conflict of Interest Disclosures: None reported.

Funding: The authors declare the non-existence of funding related to this article.

Ethical responsibilities: All authors have confirmed the maintenance of confidentiality and respect for patients' rights in the author's responsibilities document, publication agreement and assignment of rights to EMERGENCIAS.The EDEN project was approved by the Clinical Research Ethics Committee of *Hospital Clínico San Carlos de Madrid* (protocol number: HCSC/22/005-E).

Article not commissioned by the Editorial Board and with external peer review.

Addendum

Members of the SIESTA network: González del Castillo, Cesáreo Fernández, Jorge García Lamberechts, Sara Vargas Lobé, Laura Fernández García, Beatriz Escudero Blázquez, Estrella Serrano Molina, Julia Barrado Cuchillo, Leire Paramas López. *Hospital Universitario Infanta Cristina:* Ángel Iván Díaz Salado, Alicia Fuente Gaforio, Diana Rosendo Mesino. *Hospital Santa Tecla.* Tarragona: Sílvia Flores Quesada, Lidia Cuevas Jiménez. *Hospital Universitario de Canarias.* Tenerife: Guillermo Burillo Putze, Aarati Vaswani-Bulchand, Patricia Eiroa-Hernández. *Hospital Norte Tenerife:* Montserrat Rodríguez-Cabrera. *Hospital General Universitario Reina Sofía.* Murcia: Pascual Piñera Salmerón, Elena Sánchez García, Eduardo Alarcón Capel, Ana María Albaladejo Rubio, Juan Javier García Fernández. *Hospital Universitario del Henares.* Madrid: Raquel Barrós González, Gema Domínguez Gioya, María Adalid Moll. *Hospital Clinic.* Barcelona: Sonia Jiménez Hernández, Sira Aguiló Mir, Francesc Xavier Alemany González, María Florencia Poblete Palacios, Claudia Lorena Amarilla Molinas, Ivet Gina Osorio Quispe, Sandra Cuerpo Cardeñosa. *Hospital General Universitario de Elche:* Matilde González Tejera, Ana Puche Alcaraz, Cristina Chacón García. *Hospital Universitario y Politécnico La Fe.* Valencia: Leticia Serrano Lázaro, Javier Millán Soria, Jésica Mansilla Collado, María Bóveda García. *Hospital General Universitario Dr. Balmis.* Alicante: Pere Llorens Soriano, Adriana Gil Rodrigo, Begoña Espinosa Fernández, Mónica Veguillas Benito, Sergio Guzmán Martínez, Gema Jara Torres, María Caballero Martínez. *Hospital Universitario de Bellvitge.* L'Hospitalet de Llobregat. Barcelona: Javier Jacob Rodríguez, Ferran Llopis, Elena Fuentes, Lidia Fuentes, Francisco Chamorro, Lara Guillen, Nieves López. *Hospital de la Axiarquia de Vélez-Málaga:* Coral Suero Méndez, Lucía Zambrano Serrano, Rocío Lorenzo Álvarez. *Hospital Regional de Málaga:* Manuel Salido Mota, Valle Toro Gallardo, Antonio Real López, Lucía Ocaña Martínez, Esther Muñoz Soler, Mario Lozano Sánchez, Eva Fraguero Blesa. *Hospital Santa Barbara.* Soria: Fahd Beddar Chaib, Rodrigo Javier Gil Hernández. *Hospital Valle Pedroches.* Pozoblanco. Córdoba: Jorge Pedraza García, Paula Pedraza Ramírez. *Hospital Reina Sofía.* Córdoba: F. Javier Montero-Pérez, Carmen Lucena Aguilera, F. de Borja Quero

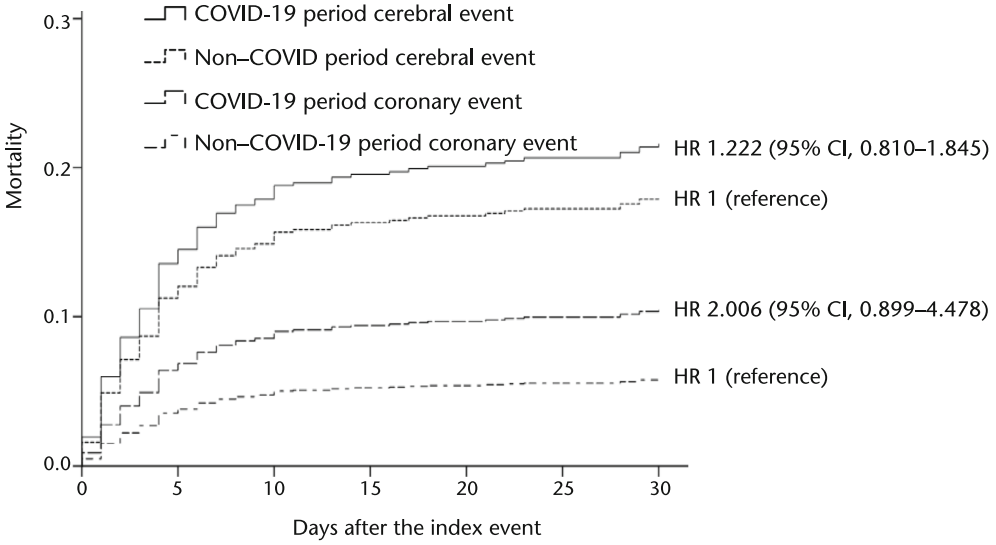

Figure 3. Curves representing proportional hazards of all-cause mortality in patients with cardiac and cerebral events, comparing hazard ratios for patients presenting to the emergency department during the COVID-19 period with those from the pre–COVID-19 period.

Espinosa, Ángela Cobos Requena, Esperanza Muñoz Triano, Inmaculada Bajo Fernández, María Calderón Caro, Sierra Bretones Baena. *Hospital Universitario Gregorio Marañon.* Madrid: Esther Gargallo García, Juan Antonio Andueza Lillo, Melisa San Julián Romero, Montserrat Jiménez Lucena, María Dolores Pulfer, Juan Fernández Herranz, Marta Rincón Francés, Irene Arnaiz Fernández. *Hospital Universitario de Burgos:* Leopoldo Sánchez Santos, Monika D'Oliveira Millán, Amanda Ibisate Cubillas, Mónica de Diego Arnaiz, Verónica Castro Jiménez. *Complejo Asistencial Universitario de León:* Mónica Santos Orús, Rudiger Carlos Chávez Flores, Alberto Álvarez Madrigal, Albert Carbó Jordá, Enrique González Revuelta, Héctor Lago Gancedo, Miguel Moreno Martín. *Hospital Universitario Morales Meseguer.* Murcia: Rafael Antonio Pérez-Costa, María Rodríguez Romero, Esperanza Marín Arranz, Ana Barnes Parra. *Hospital Francecs de Borja de Gandía:* Miriam Gamir Roselló, Sonia Cascant Pérez, Alessandro Evangelista, Anna Ferrús Ferrús. *Hospital Universitario Severo Ochoa.* Leganés: Esther Álvarez-Rodríguez, Guillermo Villoria Almeida, María José Hernández Martínez, Ana Benito Blanco, Vanesa Abad Cuñado. *Hospital Universitario Virgen Arrixaca.* Murcia: Laura Bernal Martínez, Marina Carrión Fernández, Lilia Amer Al Arud, Miguel Parra Morata. *Hospital Universitario Lorenzo Guirao.* Cieza: Carmen Escudero Sánchez, José Joaquín Giménez Belló. *Hospital Josep Trueta.* Girona: María Adroher Muñoz, Ester Soy Ferrer, Eduard Anton Poch Ferrer. *Hospital de Mendaro.* Gipuzkoa: Jeong-Uh Hong Cho. *Hospital Miguel Servet.* Zaragoza: Cristina Martín Durán, María Teresa Escolar Martínez-Berganza, Iciar González Salvatierra, Alberto Guillén Bobé, Violeta González Guillén, María Diamanti, Beatriz Casado Ramón. *Hospital Comarcal El Escorial.* Madrid: Sara Gayoso Martín. *Hospital Do Salnes.* Villagarcía de Arosa: Goretti Sánchez Sindín. *Hospital de Barbanza.* Ribeira. A Coruña: Azucena Prieto Zapico, Jésica Pazos González. *Hospital del Mar.* Barcelona: Isabel Cirera Lorenzo, Patricia Gallardo Vizcaíno, M Carmen Petrus Rivas, Bárbara Gómez y Gómez. *Hospital Santa Creu y Sant Pau.* Barcelona: Aitor Alquézar Arbé, Paola Ponte Márquez, Carlos Romero Carrete, Sergio Pérez Baena, Laura Lozano Polo, Roser Arenos Sambro, José María Guardiola Tey. *Hospital de Vic:* Lluís Llauger. *Hospital del Nalón,* Langreo. Asturias: Ana Murcia Olagüenaga, Sayoa Francesena González, César Roza Alonso. *Hospital Altagracia.* Manzanares: Francisco Javier Díaz Miguez, Antonio Rodríguez Mejía. *Hospital Nuestra Señora del Prado de Talavera de la Reina.* Toledo: Ricardo Juárez González, Mar Sousa, Laura Molina, Mónica Cañete. *Hospital Universitario Vinalopó.* Elche: Esther Ruescas, María Martínez Juan, María José Blanco Hoffman, Pedro Ruiz Asensio. *Hospital de Móstoles:* Fátima Fernández Salgado, Eva de las Nieves Rodríguez, Gema Gómez García, Beatriz Paderne Díaz. *Hospital Virgen del Rocio:* Amparo Fernández-Simón Almela, Esther Pérez García, Pedro Rivas Del Valle, María Sánchez Moreno, Rafaela Rios Gallardo, Teresa Pablos Pizarro, Mariano Herranz García, Laura Redondo Lora, Ana Gómez Caminero. *Hospital General Universitario Dr. Peset.* Valencia: María Amparo Berenguer Díez, María Ángeles De Juan Gómez, María Luisa López Grima, Rigoberto Jesús Del Rio Navarro. *Hospital Universitario Son Espases:* Bernardino Comas Díaz, Sandra Guiu Martí, Juan Domínguez Casasola, Pere Rull Bertrán, Núria Perelló Viola. *Clínica Universitaria Navarra,* Madrid: Nieves López-Laguna, Lourdes Hernández-Castells. *Clínico Universitario de Valencia:* José J. Noceda Bermejo, María Teresa Sánchez Moreno, Raquel Benavent Campos, Jacinto García Acosta, Alejandro Cortés Soler. *Hospital Alvaro Cunqueiro:* María Teresa Maza Vera, Raquel Rodríguez Calveiro, Paz Balado Dacosta, Violeta Delgado Sardina, Emma González Nespereira, Carmen Fernández Domato, Elena Sánchez Fernández-Linares. *Hospital Universitario de Salamanca:* Ángel García García, Francisco Javier Diego Robledo, Manuel Ángel Palomero Martín, Jesús Ángel Sánchez Serrano. *Hospital De Zumárraga.* Guipúzcoa: Patxi Ezponda. *Hospital Virxe Da Xunqueira,* Coruña: Andrea Martínez Lorenzo. *Hospital Universitario Los Arcos del Mar Menor,* San Javier, Murcia: Juan Vicente Ortega Liarte. *Hospital Universitario Río Ortega Valladolid:* Susana Sánchez Ramón, Inmaculada García Rupérez, Pablo González Garcinuño, Raquel Hernando Fernández, José Ramón Oliva Ramos, Virginia Carabajosa Rodríguez. *Hospital Juan Ramón Jiménez.* Huelva: José María Santos Martín, Setefilla Borne Jerez, Asumpta Ruiz Aranda, María José Marchena. *Hospital Central de Asturias:* Claudia Corugedo Ovies, Claudia Marinero Noval, Eugenia Prieto Piquero, Hugo Mendes Moreira, Isabel Lobo Cortizo, Jennifer Turcios Torres, and Lucía Hinojosa Díaz.

References

1 Pollán M, Pérez-Gómez B, Pastor-Barriuso R, Oteo J, Hernán MA, Pérez-Olmeda M, et al; ENE-COVID Study Group. Prevalence of SARS-CoV-2 in Spain (ENE-COVID): a nationwide, population-based seroepidemiological study. Lancet. 2020;396:535-44.

2 Julián-Jiménez A, Eduardo García D, González Del Castillo J, Penna Guimarães H, García-Lamberechts EJ, Menéndez E, et al; Grupo de Trabajo Latinoamericano para la mejora de la atención del paciente con Infección en Urgencias (GT-LATINFURG). Key issues in emergency department management of COVID-19: proposals for improving care for patients in Latin America. Emergencias 2021;33:42-58.

3 Jiménez S, Miró Ò, Alquézar-Arbé A, Piñera P, Jacob J, Llorens P, et al; Red de investigación SIESTA. Quality of hospital emergency department care for patients with COVID-19 during the first wave in 2020: the CALUR-COVID-19 study. Emergencias. 2022;34:369-76.

4 Thornton J. Covid-19: A&E visits in England fall by 25% in week after lockdown. BMJ. 2020;369:m1401.

5 Santana R, Sousa JS, Soares P, Lopes S, Boto P, Rocha JV. The demand for hospital emergency services: trends during the first month of COVID-19 response. Port J Public Health. 2020;38:30-6.

6 Metzler B, Siostrzonek P, Binder RK, Bauer A, Reinstadler SJ. Decline of acute coronary syndrome. admissions in Austria since the outbreakof COVID-19: the pandemic response causes cardiac collateral damage. Eur Heart J. 2020;41:1852-3.

7 Lazzerini M, Barbi E, Apicella A, Marchetti F, Cardinale F, Trobia G. Delayed access or provision of care in Italy resulting from fear of COVID-19. Lancet Child Adolesc Health. 2020;4:e10-e11.

8 Hartnett KP, Kite-Powell A, DeVies J, Coletta MA, Boehmer TK, Adjemian J, et al; National Syndromic Surveillance Program Community of Practice. Impact of the COVID-19 pandemic on emergency department visits – United States, January 1, 2019-May 30, 2020. MMWR Morb Mortal Wkly Rep. 2020;69:699-704.

9 Rodríguez-Leor O, Cid-Álvarez B, Pérez de Prado A, Rossello X, Ojeda S, Serrador A, et al. Impacto de la COVID-19 en el tratamiento del infarto agudo de miocardio con elevación del segmento ST. La experiencia española. Rev Esp Cardiol. 2020;73:994-1002.

10 Riera-López N, Fuentes B, de Donlebún JR. Effect of the COVID-19 pandemic in stroke code activations in the region of Madrid: A retrospective study. Medicine (Baltimore). 2021;100:e27634.

11 Rodríguez-Leor O, Cid-Álvarez B, Pérez de Prado A, Rossello X, Ojeda S, Serrador A, et al. Impact of COVID-19 on ST-segment elevation myocardial infarction care. The Spanish experience. Rev Esp Cardiol. 2020;73:994-1002.

12 Gil-Rodrigo A, Miró Ò, Piñera P, Burillo-Putze G, Jiménez S, Martín A, et al; en representación de la red de investigación SIESTA. Evaluación de las características clínicas y evolución de pacientes con COVID-19 a partir de una serie de 1000 pacientes atendidos en servicios de urgencias españoles. Emergencias. 2020;32:233-41.

13 Miró Ò, González Del Castillo J. SIESTA - the Spanish Investigators in Emergency Situations TeAm - during the COVID-19 pandemic: a summary of results of the network's first challenge. Emergencias. 2022;34:225-7.

14 González Del Castillo J, Jacob J, García-Lamberechts EJ, Piñera Salmerón P, Alquézar-Arbé A, Llorens P, et al; Red de investigación SIESTA. Sociodemographic characteristics, comorbidity, and baseline functional status of older patients treated in emergency departments during the COVID-19 pandemic and associations with mortality: an analysis based on the EDENCOVID cohort. Emergencias. 2022;34:428-36.

15 Miró Ò, Jacob J, García-Lamberechts EJ, Piñera Salmerón P, Llorens P, Jiménez S, et al; Red de investigación SIESTA. Sociodemographic characteristics, functional status, and health resource use of older patients treated in Spanish emergency departments: a description of the EDEN cohort. Emergencias. 2022;34:418-27.

16 López-Reyes R, Oscullo G, Jiménez D, Cano I, García-Ortega A. Riesgo trombótico y COVID-19: revisión de la evidencia actual para una mejor aproximación diagnóstica y terapéutica. Arch Bronconeumol. 2021;57:55-64.

17 Alquézar-Arbé A, Miró Ò, Piñera P, Jacob J, Martín A, Agra Montava I, et al, Siesta RI. Analysis of the evolution of patients attended in Spanish emergency departments during the first wave of the pandemic. An Sist Sanit Navar. 2021;44:243-52.

18 Aguiar de Sousa D, Sandset EC, Elkind MSV. The Curious Case of the Missing Strokes During the COVID-19 Pandemic. Stroke. 2020;51:1921-3.

19 Rudilosso S, Laredo C, Vera V, Vargas M, Renú A, Llull L, et al. Acute stroke care is at risk in the era of COVID-19: experience at a comprehensive stroke center in Barcelona. Stroke. 2020;51:1991-5.

20 Tejada Meza H, Lambea Gil Á, Saldaña AS, Martínez-Zabaleta M, Juez PR, Martínez EL, et al, On Behalf Of The Nordictus Investigators. Impact of COVID-19 outbreak on ischemic stroke admissions and in-hospital mortality in North-West Spain. Int J Stroke. 2020;15:755-62.

21 Alonso de Leciñana M, Castellanos M, Ayo-Martín Ó, Morales A. Stroke care during the COVID-19 outbreak in Spain: the experience of Spanish stroke units. Stroke Vasc Neurol. 2021;6:267-73.

22 Fuentes B, Alonso de Leciñana M, Calleja-Castaño P, Carneado-Ruiz J, Egido-Herrero J, Gil-Núñez A, et al; en representación de los hospitales del Plan Ictus Madrid. Impact of the COVID-19 pandemic on the organization of stroke care. Madrid Stroke Care Plan. Neurologia. 2020;35:363-71.

23 Metzler B, Siostrzonek P, Binder RK, Bauer A, Reinstadler SJ. Decline of acute coronary syndrome. admissions in Austria since the outbreakof COVID-19: the pandemic response causes cardiac collateral damage. Eur Heart. J 2020;41:1852-3.
24 De Rosa S, Spaccarotella C, Basso C, Calabro' MP, Curcio A, Perrone Filardi P, et al, on behalf of SIC, Società Italiana di Cardiologia. Reduction of hospitalizations for myocardial infarction in Italy in the COVID-19 era. Eur Heart J. 2020;41:2083-8.
25 Aguiar de Sousa D, Sandset EC, Elkind MSV. The Curious Case of the Missing Strokes During the COVID-19 Pandemic. Stroke. 2020;51:1921-3.
26 Bhatt AS, Moscone A, McElrath EE, Varshney AS, Claggett BL, Bhatt DL, et al. Fewer Hospitalizations for Acute Cardiovascular Conditions During the COVID-19 Pandemic. J Am Coll Cardiol. 2020;76:280-8.
27 Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987;40:373-83.
28 Miró Ò, Alquézar-Arbé A, Llorens P, Martín-Sánchez FJ, Jiménez S, Martín A, et al; en representación de la red de investigación SIESTA. Comparison of the demographic characteristics and comorbidities of patients with COVID-19 who died in Spanish hospitals based on whether they were or were not admitted to an intensive care unit. Med Intensiva. 2021;45:14-26.
29 Puig-Campmany M, Ris Romeu J. Frail older patients in the emergency department: main challenges. Emergencias. 2022;34:415-7.
30 Afonso-Argilés FJ, Comas Serrano M, Blázquez-Andión M, Castells Oliveres X, Cirera Lorenzo I, García Pérez D, et al. Factors associated with short-term mortality after emergency department care of residents living in aged care homes: findings from the multicenter Caregency study. Emergencias. 2022;34:437-43.