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Temporal trends in hospitalizations due to diabetes complications during COVID-19 pandemic in Andalusia, Spain

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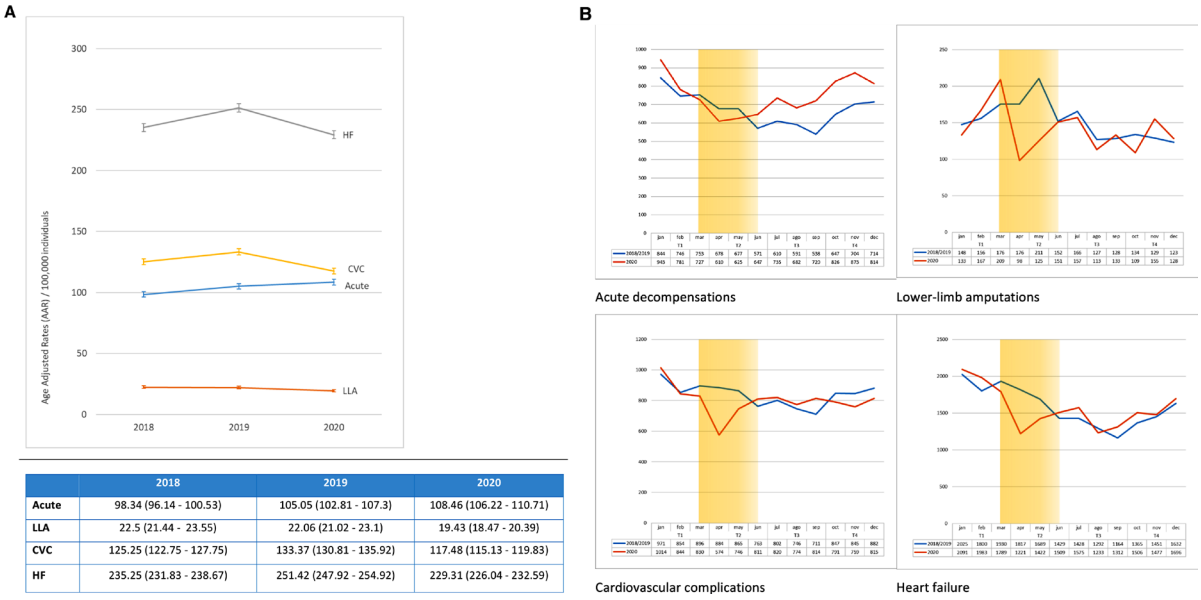
From March 14 to June 21, 2020, a global lockdown due to COVID-19 pandemic was implemented in Spain as a whole, including the Andalusian region. Andalusia encompasses a very populated area in Southern Spain (8.4 million), with a significantly higher diabetes mellitus (DM) prevalence rate compared with the rest of the country (15.3% vs 12.5%).[1]

The aim of the present study was to analyze whether the hospital admission pattern related to main DM complications in Andalusia has changed during the COVID-19 pandemic (year 2020). A population-based study of all monthly hospital discharges as well as the annual age-adjusted-admission rates (AARs) of patients with DM due to acute decompensations (AD) (ketoacidosis, diabetic hyperosmolarity syndrome, hyperglycemia), lower-limb amputations including forefoot amputations for diabetic foot ulcers (LLA), cardiovascular complications (stroke, acute myocardial infarction) (CVC) and heart failure (HF) in all individuals with a diagnosis of DM in Andalusia was conducted. Total number of discharges was obtained from the minimum basic data set (CMBD) at hospital discharge and the population from the user database of the Andalusian Public Health System. Discharges summaries include main diagnosis (cause of hospitalization) and secondary diagnosis (diabetes and/or other comorbidities). Outcomes were identified through specific codes for patients with diabetes from the International Statistical Classification of Diseases, 10th revision (ICD-10) applied to any diagnostic field of the CMBD. The E08-E13 codes from the ICD-10 were used at any diagnostic field of the CMBD to identify all patients with DM. A total of 92,720 (year 2020), 101,622 (year 2019) and 97,207 (year 2018) discharges of patients with DM were identified. This study was approved by the Ethics Committee of the University Hospital Virgen Macarena (IC 1409-N-20). AARs were calculated by the direct method of rate standardization, using the 2013 European standard population as the reference population. Data were then compared with the previous 2 years.

Our study shows that during 2020, there was an increase in AAR due to AD and a decline in the remaining DM complications (figure 1A). Likewise, different temporal patterns in admission rates were identified, based on the time period and the type of complications analyzed (figure 1B). During the lockdown period, a decrease in hospital admissions due to DM complications was observed, although less evident for the AD. This decrease was followed by a clear rise, particularly for AD, throughout the second half of the year, with a higher net balance. The same pattern was observed in both sexes (data not shown).

It can be concluded that during the COVID-19 pandemic, a specific pattern in hospital admissions due to DM complications was observed in Andalusia. Significant reductions in LLA rates in patients with DM were observed, in agreement with data reported in other countries during the first wave of the COVID-19 pandemic.[2] Interestingly, a novel increase in AD was noted once strict lockdown ended, representing an early indicator of the direct and indirect effects of the pandemic on DM complications, which included delays in presentation due to either healthcare or patient factors, changes in individual behaviors that worsened the metabolic control[3] as well as consequences of the SARS-CoV-2 infection itself, which caused acute



	2018	2019	2020
Acute	98.34 (96.14 - 100.53)	105.05 (102.81 - 107.3)	108.46 (106.22 - 110.71)
LLA	22.5 (21.44 - 23.55)	22.06 (21.02 - 23.1)	19.43 (18.47 - 20.39)
CVC	125.25 (122.75 - 127.75)	133.37 (130.81 - 135.92)	117.48 (115.13 - 119.83)
HF	235.25 (231.83 - 238.67)	251.42 (247.92 - 254.92)	229.31 (226.04 - 232.59)

Figure 1 Annual age-adjusted rates (AARs) related to acute and chronic diabetes complications, 2018–2020 (A) and monthly hospital admissions rate related to acute and chronic diabetes complications, 2020 vs 2018/2019 average rate (B). (A) Annual age-adjusted rates (AARs) related to acute and chronic diabetes complications, 2018–2020. Note: The bars in the figure and the parentheses in the table correspond to the 95% confidence intervals. Acute, acute decompensations; CVC, cardiovascular complications; HF, heart failure; LLA, lower limb amputations. (B) Monthly hospital admissions rate related to acute and chronic diabetes complications, 2020 vs 2018/2019 average rate. Note: The yellow shading shows the duration of the lockdown period established by the Spanish Health Authorities between March 15, 2020 and June 21, 2020.

DM illness or causing pancreatic alterations. AD is a preventable condition when early medical and adequate patient training is provided, highlighting the importance of access to healthcare and prompt recognition of new cases, especially among vulnerable patients.

We can hypothesize that the decrease in hospital admissions during lockdown may be due, on one hand, to the *fear* of the population to set foot in emergency rooms or doctors' offices, and, on the other hand, to an *attention diversion* to COVID-19 pathology throughout the health system. The silver lining of the COVID-19 pandemic should focus on establishing innovative management strategies to treat glycemic decompensations promptly; better control of the risk factors that predispose to the appearance of chronic DM complications; proactive recruitment models for patients undergoing poor disease control and/or follow-up losses; and finally, continuous access to recommended comprehensive diabetes care.[4 5]

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Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Ethics Committee: Hospital Universitario Virgen Macarena (Approval ID number: ID 1409-N-20).

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