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ORGINAL ARTICLE

Impact of extreme temperatures on emergency department visits: A multicenter study in Catalonia (2020–2025)

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Objective. To analyze the relationship between extreme temperatures and hospital emergency department (ED) visits in Catalonia (Spain), assessing their impact on workload and case severity.

Methods. We conducted a retrospective, multicenter, ecological time-series study with 8 public hospitals serving a population of 4.7 million people. ED visits from January 2020 through August 2025 were analyzed according to triage level. Daily mean, minimum, and maximum temperatures were obtained from 198 weather stations of the Catalan Meteorological Service and assigned to each hospital by proximity. The association between temperature and hospital admissions was evaluated using distributed lag nonlinear models (DLNM) with quasi-Poisson regression.

Results. More than 4.55 million visits were recorded during the study period, with a mean of 275 daily visits per hospital; 47.2% of patients were triaged as levels I, II, or III. Two peaks in workload were observed: winter (October–December) and summer (May–August). Maximum temperature showed the strongest association with admissions, with increases of 42.8% in total visits and 37.7% in level 1 patients at the most extreme percentiles vs reference values.

Conclusions. Extreme temperatures increase ED activity, particularly among the most severe cases. These findings support the need to strengthen summer-specific care plans and integrate emergency indicators into surveillance systems to address the health effects of climate change.

Keywords: Hospital emergency services. Extreme heat. Temperature. Triage. Climate change.

Impacto de las temperaturas extremas en las consultas a los servicios hospitalarios de urgencias: estudio multicéntrico en Cataluña (2020-2025)

Objetivo. Analizar la relación entre las temperaturas extremas y las consultas a los servicios de urgencias hospitalarios (SUH) de Cataluña, y evaluar su impacto en la presión asistencial y en la gravedad de los casos atendidos.

Métodos. Estudio observacional, multicéntrico, ecológico y de series temporales retrospectivo. Se incluyeron 8 hospitales públicos, que atienden a una población de 4,7 millones de personas. Se analizaron las consultas a urgencias entre enero de 2020 y agosto de 2025, clasificadas según su triaje. Las temperaturas diarias (media, mínima y máxima) se obtuvieron de 198 estaciones meteorológicas del Servei Meteorològic de Catalunya, asignadas a cada hospital por proximidad. La asociación entre temperatura y hospitalizaciones se evaluó mediante modelos no lineales de retraso distribuido (DLNM) con regresión cuasi-Poisson.

Resultados. Durante el periodo de estudio se registraron más de 4,55 millones de consultas, con una media de 275 consultas diarias por hospital; el 47,2% correspondieron a pacientes con niveles de triaje I, II y III. Se identificaron dos picos de presión asistencial: en invierno (octubre–diciembre) y en verano (mayo–agosto). La temperatura máxima mostró la asociación más significativa con las hospitalizaciones: un incremento del 42,8% en el total de consultas y del 37,7% en pacientes de nivel 1 en los percentiles más extremos respecto a valores de referencia.

Conclusiones. Las temperaturas extremas generan un aumento de la actividad en los SUH, especialmente de los casos más graves. Estos hallazgos confirman la necesidad de consolidar planes asistenciales específicos de verano e integrar indicadores de urgencias en los sistemas de vigilancia para afrontar los efectos del cambio climático.

Palabras clave: Urgencias hospitalarias. Calor extremo. Temperatura. Triaje. Cambio climático.

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Introduction

The care burden on emergency departments (EDs) has progressively increased in recent years.[1] Generally, EDs prepare to face winter campaigns due to the onset of influenza epidemics and the exacerbation of respiratory diseases. In fact, in Catalonia, the Comprehensive Emergency Plan of Catalonia (Pla Integral d'Urgències de Catalunya, PIUC)[2] was implemented in 1999 with the aim of coordinating all actions organized across different levels of care, services, and healthcare resources to effectively address changes in urgent care needs and thus prevent ED overcrowding.[3] However, in recent years it has been observed that ED activity does not decrease after winter, and that during the summer months there are high levels of demand and clinical severity.

According to data from the Spanish State Meteorological Agency (AEMET), the summer of 2025 (from June 1st through August 31st, 2025)[4] was characterized as extremely warm, with a mean temperature of 24.2 °C in mainland Spain. It was the warmest summer since the beginning of records in 1961, surpassing by 0.1 °C the summer of 2022, which until then had been the warmest on record. In Spain, studies have evaluated the impact of rising temperatures on exacerbations of chronic diseases[5] and mortality.[6]

In Catalonia, there are no multicenter studies evaluating the direct impact of temperature on EDs and on the severity of cases treated. Understanding this relationship is essential to anticipate resources, adapt seasonal planning, and consolidate summer plans that complement traditional winter plans. Therefore, the main objective of this study is to analyze the relationship between extreme temperatures and visits to EDs in Catalonia, and to evaluate their impact on care pressure and on the severity of the cases treated.

Methods

We designed an observational, multicenter, ecological, and retrospective time-series study to analyze the association between daily temperatures and the number of ED visits according to triage level in 8 hospitals of *Institut Català de la Salut* (ICS) in Catalonia from 2020 through 2025.

Catalonia is an autonomous community in Spain with a population of 8.11 million inhabitants, 73% of whom are concentrated in the province of Barcelona. According to the Köppen climate classification for Catalonia,[7] the coastal area has a temperate climate with dry, hot summers (Csa), the south has a cold semi-arid climate (BSk), and the north has a temperate climate without a dry season and with warm or hot summers (Cfa–b), except for the higher Pyrenean areas, where a cold climate without a dry season and with cold or cool summers (Dfb–c) is observed.

The ICS has 8 public hospitals distributed throughout Catalonia, serving a reference population of approximately 4.7 million people, with different levels of care complexity.[8]

The collected data included the daily number of total ED admissions and admissions by triage level in these 8 public hospitals, as well as daily temperatures recorded in Catalonia from January 1st, 2020 through August 31st, 2025. The daily number of ED admissions by triage level and for each of the 8 ICS hospitals was obtained from patient care records provided by the ICS technical secretariat. Therefore, these are aggregated data of all daily ED visits by hospital and triage level, without individual patient information such as age, sex, diagnosis, or comorbidities.

Currently, triage in Catalonia is based on the Structured Triage System (SET), which establishes five care priorities according to urgency: level 1 (resuscitation), level 2 (emergency), level 3 (urgent), level 4 (less urgent), and level 5 (non-urgent).[9]

Daily temperature measurements included the 24-hour mean, minimum, and maximum temperatures recorded by each of the 198 automatic meteorological stations of the Meteorological Service of Catalonia (*Servei Meteorològic de Catalunya,* SMC).

For the statistical analysis, summary measures included mean and standard deviation (SD), median (or 50th percentile, P50) and interquartile range (IQR), as well as the standardized mean (mean/SD), coefficient of variation (SD/mean), and quartile dispersion coefficient [IQR/(P25+P75)].

To define the local temperature associated with each hospital, meteorological stations were grouped around the geographically closest hospital. Grouping was based on position, defined by longitude and latitude. The Haversine method[10] was used to calculate distance (minimum great-circle distance) from each hospital. This method estimates the minimum great-circle distance between 2 points on the Earth's surface, taking into consideration the Earth's curvature. It is widely used in environmental and public health studies to group geographic observations by proximity, as it provides an accurate estimate of real surface distance even for relatively small areas. Figure 1 illustrates the location of the 8 hospitals included in the study and the meteorological stations assigned to each, distributed according to this method. This representation allows visualization of the territorial coverage of the analysis and the climatic variability across regions. Once stations were grouped by their nearest hospital, the local daily mean temperature was defined as the median of the mean temperatures provided by the stations in each of the 8 groups. Local daily maximum and minimum temperatures were defined as the median of the maximum and minimum temperatures, respectively, provided by the meteorological stations in each group. The minimum and maximum temperatures recorded by group were identified as well.

To estimate the association between ED admissions—both overall and by urgency level—distributed lag non-linear models (DLNM) were used to account for possible delayed effects. Quasi-Poisson time-series regression models were fitted, in which the exposure–response association was modeled using a quadratic B-spline with three internal knots located at the 10th, 50th, and 90th percentiles of the location-specific exposure distribution. Each model accounted for seasonality by including a natural cubic spline of the day of the year with 4 degrees of freedom and an interaction between this spline function and the year indicator to relax the assumption of a constant seasonal trend. Long-term trends were controlled by including a linear term for the day of the study period.

Additionally, indicator variables for day of the week and for national and regional public holidays were included. The lag–response association was modeled using a natural cubic spline with an intercept and three internal knots placed at equally spaced values on the logarithmic scale.

To account for potentially prolonged delays in temperature effects, the lag period was extended up to 21 days. Results were aggregated across all lags to obtain overall exposure–response association curves and were expressed as percentage changes. Each curve was used to define the temperature percentile with the minimum number of ED admissions (minimum admission value, MAV) for the triage level considered. Relative risk (RR) was estimated for extreme temperature percentiles (1st, 2.5th, 97.5th, and 99th), considered extreme exposure values, using the MAV percentile as the reference. To avoid using percentiles too close to the extremes as reference, if no percentile with a minimum number of admissions was observed between the 20th and 80th percentiles, the median was used as the reference percentile for estimation. Results were expressed as percentage differences, that is, 100 × (RR – 1). Sensitivity analyses were performed to assess the association between temperature and hospital admissions considering shorter lag periods of up to 3 or 7 days.

All analyses were performed using R software.[11] The geosphere[12] and DLNM[13] packages were also used.

This study did not require evaluation by a Research Ethics Committee for medicinal products (REC), as it was based exclusively on aggregated health care activity data and meteorological records, without including individual patient information or identifiable clinical variables.

Results

During the 2,070-day period from January 1st, 2020 through August 31st, 2025, a total of more than 4.5 million visits were recorded in the EDs of the 8 Catalan hospitals included in the study, with the following distribution by triage level: 0.6%, level 1; 7.4%, level 2; 39.2%, level 3; and 52.8%, visits without potential life-threatening risk (43.9%, triage level 4; 6.8%, triage level 5; and 2.1%, without triage assessment—not attended).

The overall mean daily number of ED visits per hospital was 275 (SD, 141), with an observed range from 19 to 774 (Table 1). When stratified by triage level, the mean daily number per hospital was 1.7 (SD, 2.9) for level 1, 20.4 (SD, 16.6) for level 2, 107.7 (SD, 47.6) for level 3, 120.7 (SD, 78.4) for level 4, 18.8 (SD, 18.3) for level 5, and 5.7 (SD, 6.6) without triage (not attended). The local mean daily temperature was 15.1 °C, with an observed range from –3.5 °C to 31.5 °C. The absolute maximum temperature was 23.9 °C, with an observed range from 3.2 °C to 45.1 °C, and the absolute minimum temperature was 4.6 °C, with an observed range from –19.6 °C to 25.4 °C.

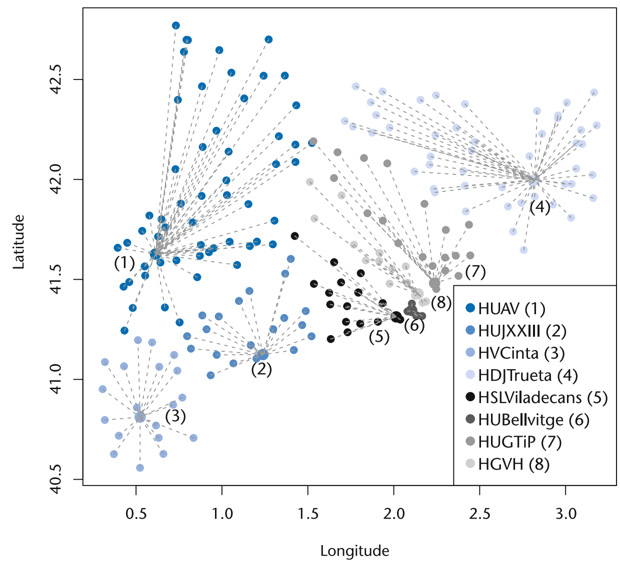

Figure 1. Meteorological stations in Catalonia and nearest hospital.
Geographic coordinates (longitude and latitude) of all meteorological stations grouped according to the nearest hospital among the eight hospitals analyzed, represented by larger circles of the same color.
HUAV: Hospital Universitari Arnau de Vilanova de Lleida; HUJXXIII: Hospital Universitari Joan XXIII de Tarragona; HVCinta: Hospital Universitari Verge de la Cinta de Tortosa; HDJTrueta: Hospital Universitari Josep Trueta de Girona; HSLViladecans: Hospital Universitari de Viladecans; HUBellvitge: Hospital Universitari de Bellvitge; HUCTiP: Hospital Universitari Germans Trias i Pujol de Badalona; HGVH: Hospital Universitari Vall d'Hebron de Barcelona.

Figure 2 illustrates the monthly distribution of maximum, mean, and minimum temperatures recorded at the hospitals included in the study. July, August, and June were the warmest months, with maximum temperatures occasionally exceeding 40 °C. Similarly, the months of May, September, and October showed maximum temperatures above the global median, reflecting a seasonal pattern of sustained thermal increase from spring to early autumn.

The months with the highest median number of ED visits were December, with 270 (IQR, 180–370), and October, with 260 (IQR, 170–350), followed by the warmest months from May through August, also with 260 (IQR, 170–360). Over the course of the year, a bimodal seasonal pattern was observed, with increased care activity both during the winter months and during the warm period (Figure 3).

When analyzing data by triage level, a higher number of level 1 visits was observed from May through August, coinciding with the period of highest temperatures. Level 2 visits were more frequent in December and November, followed by the warm months from May through July, whereas level 3 visits predominated between October and December, with a secondary increase during the summer. Levels 4 and 5 showed a similar seasonal pattern, with a higher number of visits in December, October, and May, and an additional increase during the hottest months. Finally, visits without an assigned triage level were more frequent in December, July, and August.

Table 1. Descriptive summary of the study variables

Triage level	Mean	SD	Standardized mean*	CV*	Median	IQR	QDC*	Min.	Max.
Triage level									
Resuscitation (level 1)	1.73	2.91	0.60	1.68	1	2	1.00	0	23
Emergency (level 2)	20.38	16.58	1.23	0.81	16	14	0.41	0	132
Urgent (level 3)	107.70	47.62	2.26	0.44	105	67	0.32	12	286
Less urgent (level 4)	120.70	78.38	1.54	0.65	98	86	0.39	1	409
Non-urgent (level 5)	18.82	18.30	1.03	0.97	13	18	0.60	0	137
No triage level	5.65	6.56	0.86	1.16	3	7	0.78	0	71
Total	274.98	140.54	1.96	0.51	261	190	0.38	19	774
Temperature									
Local median temperature, P50 (24-h mean)	15.73	6.74	42.86	0.023	15.10	11.25	0.020	–3.50	31.50
Local maximum temperature	21.86	7.26	40.64	0.025	21.20	12.00	0.020	0.30	41.50
Maximum temperature	24.62	7.35	40.50	0.025	23.90	12.20	0.021	3.20	45.10
Local minimum temperature	10.40	6.48	43.74	0.023	10.10	10.55	0.019	–7.10	27.70
Minimum temperature	4.70	7.57	36.68	0.027	4.60	11.30	0.020	–19.60	25.40

Daily value summary.
Local mean, minimum, and maximum temperatures defined for each hospital correspond to the median of the mean, minimum, and maximum temperatures recorded at nearby meteorological stations (Figure 1), whereas the minimum and maximum temperatures per hospital correspond to the observed minimum and maximum within each station group.
SD: standard deviation; Standardized mean: mean/SD; CV: coefficient of variation (SD/mean); IQR, interquartile range (P75–P25, *P* = percentile); QDC: quartile dispersion coefficient [IQR/(P25 + P75)].
*Standardized mean, CV, and QDC values for temperature variables were calculated in degrees Kelvin.

Exposure–response curve analysis was used to estimate the relationship between daily temperature and daily ED admissions for each hospital, both overall and for the most severe triage levels. Specifically, associations were analyzed for ED admissions with triage level 3 or higher, level 2 or higher, and maximum triage level (level 1). As daily temperature measures by hospital, local mean, minimum, and maximum temperatures estimated through the median of meteorological stations closest to each hospital (Figure 1) were used, as well as the minimum and maximum temperatures observed within the same groups of meteorological stations. Among all these measures, maximum temperature showed the best fit (lowest AIC) with ED visits, both overall and when considering severity levels from triage levels 2 and 3 onward. The estimated curves for exposure to maximum temperatures are shown in Figure 4, demonstrating an increasing association between maximum temperatures and ED admissions, particularly pronounced for the most urgent admissions, that is, those requiring patient resuscitation.

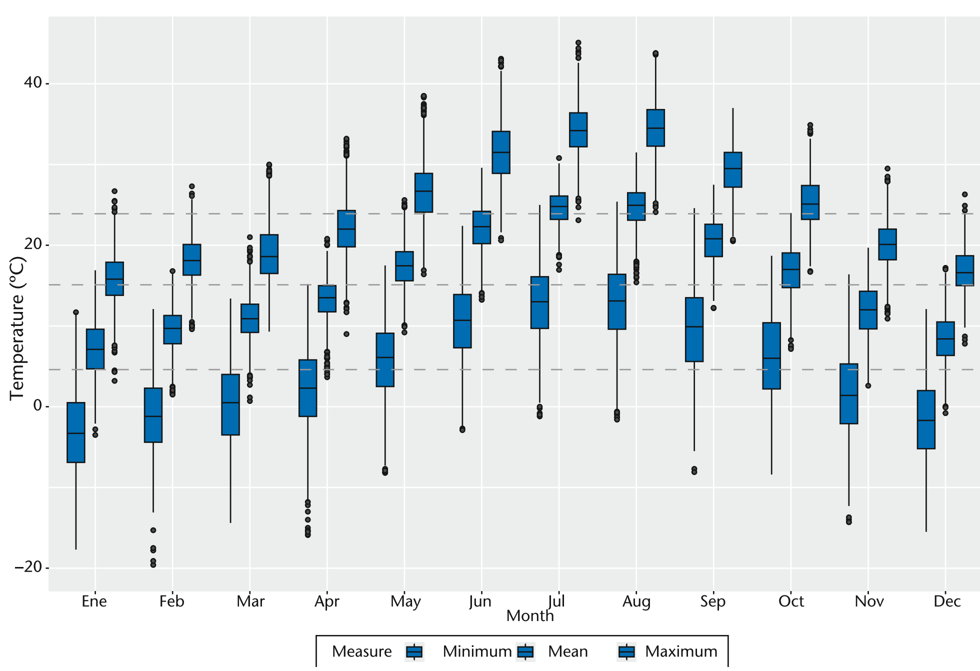

Figure 2. Monthly minimum, mean, and maximum daily temperatures.
Local mean daily temperatures, together with the minimum and maximum temperatures recorded during the study period, grouped by month. The horizontal dashed lines show the medians of the 3 temperature measures.

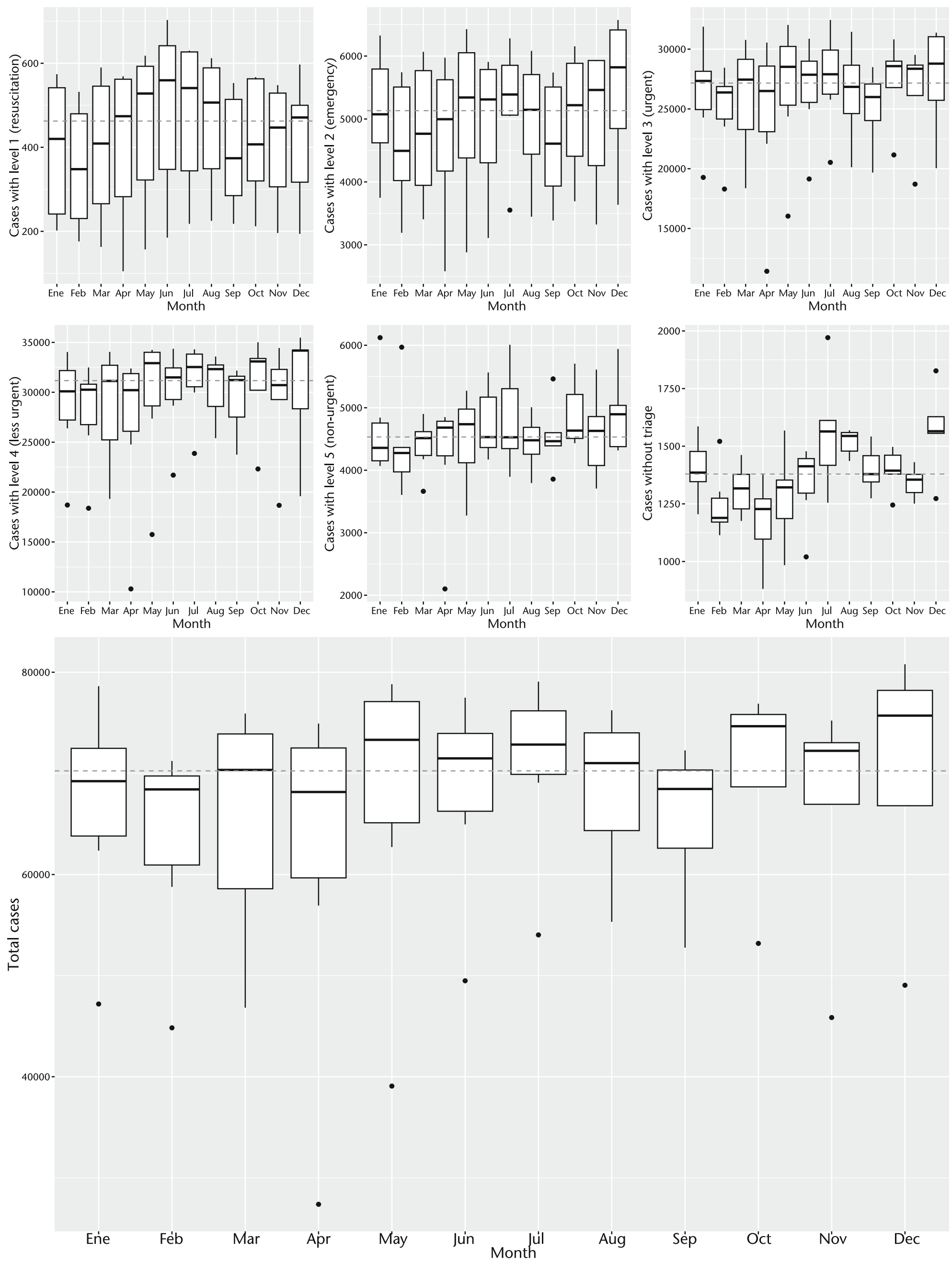

Figure 3. Monthly admissions by triage level and total admissions from January 1st, 2020 through August 31st, 2025.
Box plots of monthly admissions by month of the year during the study period. The 6 graphs at the top show admissions by triage level and admissions without triage, and the graph at the bottom shows the distribution of total admissions. The horizontal dashed line indicates the global median.

Table 2 illustrates the estimated percentage of relative effect associated with extreme maximum temperatures (percentiles 1 and 2.5 for the lowest values and 97.5 and 99 for the highest values) on total visits and by triage level. The greatest effect of maximum temperature was observed in level 1 visits, with a 37.7% increase vs days with median maximum temperatures (95% CI, 17.0–62.1). In level 2 visits, the increase was smaller but still significant, at 13.7% (95% CI, 7.3–20.5), whereas for level 3 visits the estimated increase reached 33.6% (95% CI, 28.4–39.1) when using as reference the 21st percentile of maximum temperature, at which the minimum number of level 3 or higher visits was recorded. Considering total ED visits, regardless of triage level, the increase was 42.8% (95% CI, 38.0–47.8) vs the same reference point. The association with other temperature variables and the exposure–response curve for local mean temperature showed a similar pattern.

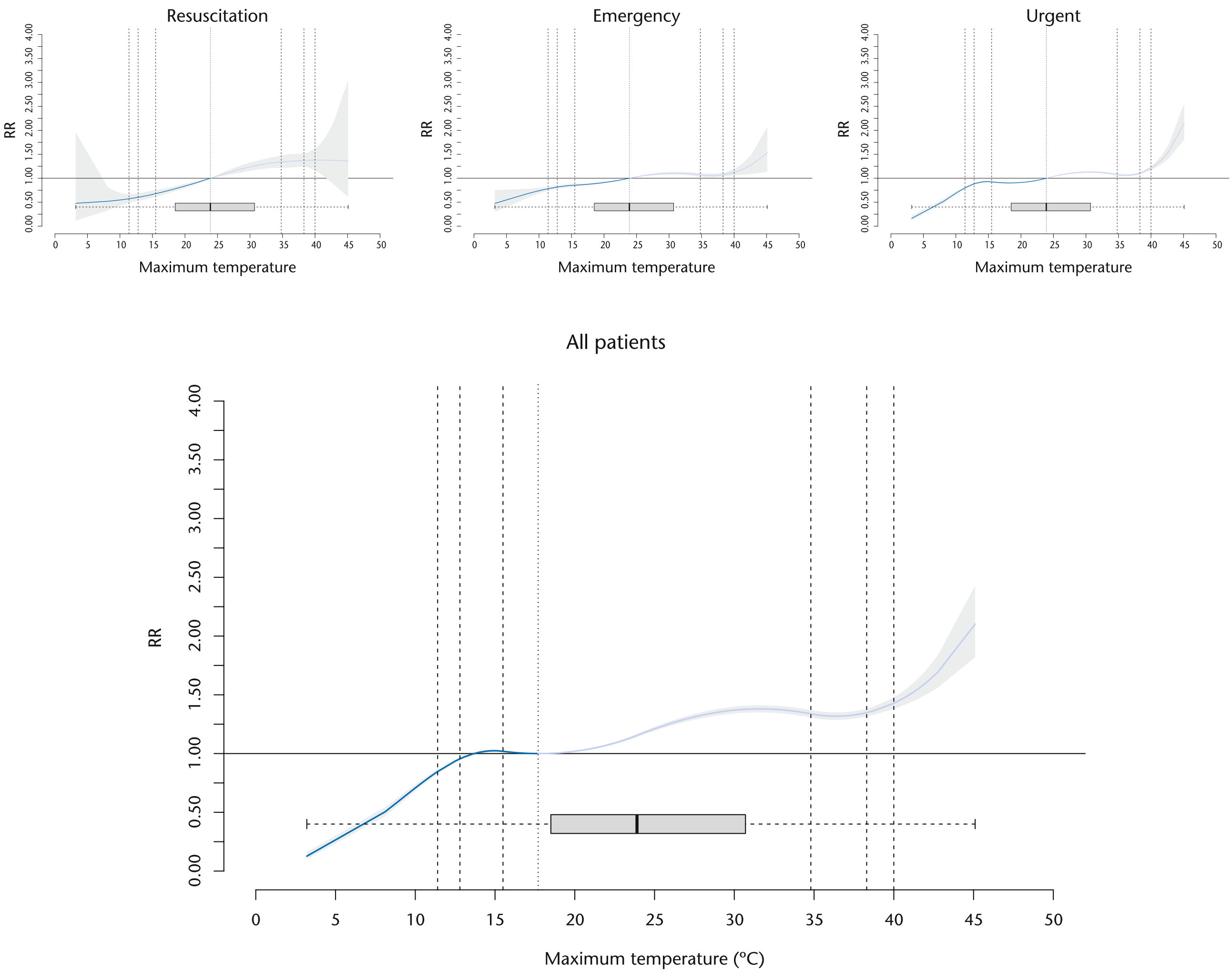

Figure 4. Association between maximum temperature and the number of emergency department admissions by highest triage severity levels and total admissions.

The upper panel shows the relative risk of emergency department visits for the most severe triage levels (resuscitation, emergency+, and urgent+, where "+" indicates "or higher," with urgent+ equal to urgent or emergency or resuscitation), and the lower panel shows total admissions, for values of local maximum temperature relative to the reference maximum temperature (which may be the MAV or the median temperature, where MAV is the temperature with the minimum number of admissions between the 20th and 80th percentiles). The six vertical dashed lines—excluding the central dotted line—represent temperature percentiles P1, P2.5, P10, P90, P97.5, and P99. The central vertical dotted line indicates the reference maximum temperature value.

Discussion

This is the first study to systematically analyze the impact of temperature on ED activity in Catalonia. The high care burden observed confirms the growing pressure faced by these services, particularly in a context of sustained increases in demand and a predominance of cases without immediate life-threatening risk, as previously described in other studies conducted in Catalonia. The study of the impact of climate on emergency care activity represents an expanding field of research and is highly relevant for health care planning.[15]

Results demonstrate a clearly bimodal seasonal pattern in ED activity, with increases in demand both during the winter months and throughout the warm period. In our study, winter is characterized by a predominance of patients with intermediate triage levels (2–3), whereas in summer there is an increase in the most severe cases (level 1), together with a rise in visits without potential life-threatening risk. This behavior suggests that extreme temperatures—particularly high temperatures—act as a triggering factor that increases care burden and modifies the severity profile of patients treated.

Extreme temperatures, and especially heat waves, have a direct impact on demand and the severity of patients treated in EDs.[16] Several studies have shown a significant increase in ED visits during hotter periods, particularly due to cardiovascular, respiratory, and metabolic causes, as well as a higher proportion of high-priority triage cases.[17] This pattern may be explained by the combination of greater environmental exposure (due to longer daylight hours and outdoor activities) and the vulnerability of certain population groups, such

Table 2. Percentage of relative effect associated with maximum temperature

Triage level	Lowest 2.5% (P2.5) [95% CI]	Highest 2.5% (P97.5) [95% CI]	Lowest 1% (P1) [95% CI]	Highest 1% (P99) [95% CI]	MinY
Resuscitation	–39.7 [–46.9. –31.6]*	37.1 [24.0. 51.6]*	–42.8 [–51.1. –33.1]*	37.7 [17.0. 62.1]*	P50r
Emergency+	–20.3 [–2–3.7. –16.8]*	9.2 [5.4. 13.1]*	–23.6 [–27.4. –19.6]*	13.7 [7.3. 20.5]*	P50r
Urgent+	–3.6 [–5.3. –1.8]*	23.2 [19.7. 26.8]*	–11.7 [–14.0. –9.4]*	33.6 [28.4. 39.1]*	P21
Total	–4.5 [–5.9. –3.0]*	34.8 [31.6. 38.1]*	–15.3 [–17.2. –13.4]*	42.8 [38.0. 47.8]*	P21

Maximum local temperature was estimated as the median of the maximum temperatures recorded at meteorological stations grouped by proximity to the nearest hospital (Figure 1). Maximum temperature refers to the highest temperature observed among those stations.
The "+" symbol following the triage level indicates inclusion of that level and all higher levels (eg, Emergency+ = Emergency + Resuscitation). The symbol * denotes a statistically significant effect based on the 95% confidence interval (95% CI). MinY indicates the temperature percentile associated with the minimum risk of ED admission for that triage level; P50rdenotes the reference median percentile used when no clear minimum was observed.

as older adults or individuals with chronic diseases.[18] In contrast, during winter, exposure to extreme temperatures is lower and occurs mainly at night or in areas with low population density, which could mitigate its impact on emergency demand.[19]

These results are consistent with those obtained in other countries, such as the United States, where heat waves are associated with increased ED visits.[20] However, most former studies have focused on specific episodes of extreme heat, whereas the present study analyzes temperature over a prolonged period and across an entire region such as Catalonia.[21,22] The findings suggest that extreme temperatures may indirectly contribute to an increase in more severe cases treated in EDs, thus reflecting a potential impact of climate change on health.[23] This pattern is consistent with recent observations showing that exposure to higher temperatures is associated with an increased risk of clinical decompensation, particularly in patients with cardiovascular disease[24] or chronic conditions.[25]

In Catalonia, the effects of extreme heat on health are addressed in the *Pla operatiu per prevenir els efectes de la calor sobre la salut* (POCS),[26] coordinated by the *Agència de Salut Pública de Catalunya* in collaboration with multiple healthcare and social system stakeholders. The POCS establishes a meteorological alert system, identifies vulnerable populations, and defines preventive and care measures in progressive phases according to risk level, including activation of healthcare and social services, opening of climate shelters, and intensification of epidemiological surveillance. The present results show that extreme temperatures not only increase mortality or scheduled hospital admissions, as already captured by surveillance systems,[27] but also generate a significant increase in pressure on EDs, particularly for the most severe cases. Incorporating ED activity indicators into POCS monitoring systems could improve their anticipatory and response capacity, positioning emergency departments as a true "advanced sensor" of the health impacts of heat on the population.

The main limitation of this study is its descriptive and retrospective design, which does not allow causal relationships to be established or individual patient characteristics to be analyzed. Detailed clinical data (age, diagnoses, comorbidities, treatments) were not available, limiting the ability to identify high-risk groups within the cohort. In addition, the analysis includes only ICS hospitals and therefore does not encompass the entire Catalan hospital network, although it represents a very substantial proportion of the population served (more than half of the population of Catalonia). Finally, the lack of individualized data including the location and time of the triggering event leading to the ED visit for each patient is also a limitation, as this information is not collected and would require a prospective study design. Only under such conditions could each patient be matched with the temperature recorded at the nearest meteorological station at the corresponding time, allowing for the most precise assessment of the association.

The results of the present study show that extreme temperatures and heat waves have a direct and significant impact on ED activity, particularly for the most severe cases requiring resuscitation. The increase in ED visits during periods of extreme heat highlights the vulnerability of EDs to the effects of climate change. These findings reinforce the need to consolidate specific summer care plans, analogous to existing winter plans, and to integrate EDs as true sentinel systems. Climate change poses a scenario in which thermal extremes will become increasingly frequent and intense; therefore, it will be necessary to adapt the organization and resources of EDs to ensure an adequate and sustainable health care response throughout the year.

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References

1 Subdirección General de Información Sanitaria. Secretaría General de Salud Digital, Información e Innovación del SNS. Estadística de centros sanitarios de atención especializada: hospitales y centros sin internamiento. Año 2023. Madrid: Ministerio de Sanidad; 2024. (Accessed 8 October 2025). Available at: https://www.sanidad.gob.es/estadEstudios/estadisticas/docs/TablasSIAE2022/2022_INFORME_ANUAL_SIAE.pdf
2 Torné Vilagrasa E, Guarga Rojas A, Torras Boatella MG, Pozuelo García A, Pasarin Rua M, Borrell Thió C. Análisis de la demanda en los servicios de urgencias de Barcelona. Aten Primaria. 2003;32:423-4.
3 Escarrabill J, Corbella X, Salazar A, Sánchez JL. Los colapsos en los servicios de urgencias hospitalarios durante el invierno. Aten Primaria. 2001;27:137-40.
4 Agencia Estatal de Meteorología (AEMET). Avance climático nacional

del verano de 2025. (Accessed 19 September 2025). Available at: https://www.aemet.es/documentos/es/noticias/2025/09/avance_climatico_nacional_verano_2025.pdf
5 Bujosa Mateu A, Alegre Latorre L, Comas MV, Salom J, García Gasalla M, Planas Bibiloni L, et al. Impact of heat waves on human morbidity and hospital admissions in a city of the western Mediterranean area. Int Arch Occup Environ Health. 2024;97:757-65.
6 Cuerdo-Vilches T, Díaz J, López-Bueno JA, Luna MY, Navas MA, Mirón IJ, et al. Impact of urban heat islands on morbidity and mortality in heat waves: observational time series analysis of Spain's five cities. Sci Total Environ. 2023;890:164412.
7 Essenwanger OM. General climatology. Vol. 1C: classification of climates. Amsterdam: Elsevier Science; 2001.
8 Institut Català de la Salut. Memoria de actividad 2023. (Accessed 19 September 2025). Available at: https://ics.gencat.cat/web/.content/memories-2023/Memoria-ICS-2023.pdf
9 Montero Pérez J, Lucena Aguilera C, González Jurado MC, Gracia Sádaba MJ, Calderón de la Barca Gázquez JM, Jiménez Murillo LM. Implantación del Sistema Español de Triaje (SET) en los servicios de urgencias generales de los hospitales públicos de Andalucía (España). Emergencias. 2020;32:314-9.
10 van Brummelen GR. Heavenly mathematics: the forgotten art of spherical trigonometry. Princeton (NJ): Princeton University Press; 2013.
11 R Core Team (2024). R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. (Accessed 19 September 2025). Available at: https://www.R-project.org/
12 Hijmans R (2024). geosphere: Spherical Trigonometry. R package version 1.5-20. (Accessed 19 September 2025). Available at: https://CRAN.R-project.org/package=geosphere
13 Gasparrini A. Distributed lag linear and non-linear models in R: the package dlnm. J Stat Softw. 2011;43:1-20.
14 Leey-Echavarría C, Zorrilla-Riveiro J, Arnau A, Fernàndez-Puigbó M, Sala-Barcons E, Gené E. Validación prospectiva de un modelo predictivo de ingreso y orientar la seguridad de la derivación inversa desde el triaje de los servicios de urgencias hospitalarios. Emergencias. 2022;34:165-73.
15 Del Campo F, Álvaro de Castro TM, López-Izquierdo R, Moreno Torrero F, Álvarez D, Gutiérrez-Tobal GC, et al. Material particulado y exacerbaciones de la enfermedad pulmonar obstructiva crónica: análisis de las visitas a urgencias en un área de baja contaminación. Emergencias. 2025;37:267-73.
16 Nori-Sarma A, Milando C, Weinberger KR, Hess JJ, Errett NA, Wellenius GA. Association Between the 2021 Heat Wave in Portland, Oregon, and Seattle, Washington, and Emergency Department Visits. JAMA. 2022;328:2360-2.
17 Khalaj B, Lloyd G, Sheppeard V, Dear K. The health impacts of heat waves in five regions of New South Wales, Australia: a case-only analysis. Int Arch Occup Environ Health. 2010;83:833-42.
18 Zhai G, Tian Y, Zhang Y, Zhou W. The effect of ambient temperature and risk of cardiovascular disease hospitalization in China: a meta-analysis. Int J Biometeorol. 2023;67:1423-33.
19 Forcey DS, FitzGerald MP, Burggraf MK, Nagalingam V, Ananda-Rajah MR. 'Cold and lonely': emergency presentations of patients with hypothermia to a large Australian health network. Intern Med J. 2020;50:54-60.
20 Davis RE, Novicoff WM. The impact of heat waves on emergency department admissions in Charlottesville, Virginia, USA. Int J Environ Res Public Health. 2018;15:1436.
21 Johnson H, Kovats RS, McGregor G, Stedman J, Gibbs M, Walton H, et al. The impact of the 2003 heat wave on mortality and hospital admissions in England. Health Stat Q. 2005;25:6-11.
22 Oray NC, Oray D, Aksay E, Atilla R, Bayram B. The impact of a heat wave on mortality in the emergency department. Medicine (Baltimore). 2018;97:e13815.
23 Kovats RS, Hajat S, Wilkinson P. Contrasting patterns of mortality and hospital admissions during hot weather and heat waves in Greater London, UK. Occup Environ Med. 2004;61:893-8.
24 Fujimoto R, Suzuki E, Kashima S, Nakamura K, Naito H, Nakao A, et al. Heat Exposure Following the Rainy Season Is Associated With an Increased Risk of Cardiovascular Emergency Among the Elderly in Japan. J Am Heart Assoc. 2023;12:e027046.
25 Qu Y, Zhang W, Boutelle AM, Ryan I, Deng X, Liu X, et al. Associations Between Ambient Extreme Heat Exposure and Emergency Department Visits Related to Kidney Disease. Am J Kidney Dis. 2023;81:507-516.e1.
26 Generalitat de Catalunya. Pla operatiu per prevenir els efectes de la calor sobre la salut (POCS), estiu 2025. (Accessed 19 September 2025). Available at: https://scientiasalut.gencat.cat/bitstream/handle/11351/13313/pla-operatiu-prevenir-efectes-calor-salut-pocs-estiu-2025.pdf?sequence=1&isAllowed=y
27 Sistema d'Informació per a la Vigilància d'Infeccions a Catalunya. Departament de Salut. Generalitat de Catalunya. (Accessed 19 September 2025). Available at: https://salutpublica.gencat.cat/ca/ambits/vigilancia/sivic/