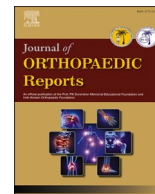




Contents lists available at ScienceDirect

## Journal of Orthopaedic Reports

journal homepage: [www.journals.elsevier.com/journal-of-orthopaedic-reports](http://www.journals.elsevier.com/journal-of-orthopaedic-reports)

## Does the weekend have an influence? Early mortality after hip fracture in the Spanish National Hip Fracture Registry (RNFC)

Guillermo García Cruz<sup>a,\*</sup>, Cristina Ojeda Thies<sup>b,c</sup>, Angelica Muñoz Pascual<sup>d</sup>,  
Gonzalo Gálvez Marquez<sup>a</sup>, Pilar Saez López<sup>e,f</sup>, María Pilar Rubio-Sáez<sup>g,h</sup>,  
José Cordero Ampuero<sup>h,i</sup>

<sup>a</sup> Department of Orthopedics and Traumatology, General Hospital of Segovia, Spain

<sup>b</sup> Department of Orthopedics and Traumatology, University Hospital 12 de Octubre, Madrid, Spain

<sup>c</sup> Department of Surgery, Universidad Complutense de Madrid, Spain

<sup>d</sup> Department of Geriatrics, General Hospital of Segovia, Spain

<sup>e</sup> Geriatrics Unit, Fundación Alcorcón University Hospital, Madrid, Spain

<sup>f</sup> Head Coordinator of the Spanish National Hip Fracture Registry, Madrid, Spain

<sup>g</sup> University Rey Juan Carlos, Madrid, Spain

<sup>h</sup> Department of Orthopedics and Traumatology, University Hospital La Princesa, Madrid, Spain

<sup>i</sup> Department of Surgery, Universidad Autónoma de Madrid, Spain

## ARTICLE INFO

## Keywords:

Weekend effect  
Early mortality  
Hip fracture  
Risk mortality

## ABSTRACT

**Introduction:** Hip fractures are among the orthopaedic injuries leading to the greatest morbidity and mortality in older adults; their impact in older populations like Spain, which has one of the greatest aging rates in Europe, is significant. Audits such as the Spanish National Hip Fracture Registry (Registro Nacional de Fracturas de Cadera, RNFC) aim to improve care quality through data analysis reducing unjustified variability. The weekend effect is one possible factor affecting the care process, with patients managed differently depending on whether they are admitted on weekends or public holidays increasing surgical delay. This study analyses the weekend effect on 30-day mortality of patients at least 75 years old with hip fractures, with a secondary objective of analysing other risk factors.

**Methods:** A retrospective analysis was conducted on data from 57,450 patients collected by the RNFC between 2017 and 2022, with an average surgical delay of 65.26 (SD: 64.92) hours and a 30-day mortality of 8.44%. The sample was divided into the weekend group (admitted Thursday-Sunday and on national holidays) and the weekday group (Monday-Wednesday).

**Results:** There were no differences on mortality between groups, so day of admission were not a risk factor for mortality. Surgical delay instead was longer in the weekend group (68.51 (61.41) hours vs. 61.1 (68.94) hours during the week ( $p < 0.001$ )), being a risk factor for mortality  $>48$ h delay (OR 1.22 [1.14-1.31]).

**Conclusions:** There is no weekend effect on 30-days mortality, despite a longer surgical delay in the weekend group, which was a risk factor for 30-days mortality.

### 1. Introduction

Hip fractures in older adults are associated with significant morbidity and mortality, as well as a decrease in functional capacity, with a 30-day mortality rate of approximately 10%<sup>1-3</sup>. As a fragility fracture, they are clearly related to the patient's age and bone density, with incidences increasing after the age of 60. With nearly 20% of the

population over 65 years old and one of the longest life expectancies in Europe, Spain has one of the most aged populations, and further aging is expected in the future as in other European countries.<sup>4,5</sup> The incidence of hip fractures will increase within the context of this population aging, making it crucial for the healthcare system to prevent these fractures and reduce their consequences by improving patient care, for which treatment strategies and clinical guidelines have been developed in

\* Corresponding author.

E-mail addresses: [guillegc1994@gmail.com](mailto:guillegc1994@gmail.com) (G.G. Cruz), [ojedathies@gmail.com](mailto:ojedathies@gmail.com) (C.O. Thies), [angelicamupa27@gmail.com](mailto:angelicamupa27@gmail.com) (A.M. Pascual), [gongalmar4@gmail.com](mailto:gongalmar4@gmail.com) (G.G. Marquez), [pisalop@gmail.com](mailto:pisalop@gmail.com) (P.S. López), [rubiosaezmaria@gmail.com](mailto:rubiosaezmaria@gmail.com) (M.P. Rubio-Sáez), [jose.cordero@uam.es](mailto:jose.cordero@uam.es) (J.C. Ampuero).

<https://doi.org/10.1016/j.jorep.2026.100924>

Received 10 December 2025; Accepted 8 February 2026

Available online 9 February 2026

2773-157X/© 2026 The Authors. Published by Elsevier B.V. on behalf of Professor P K Surendran Memorial Education Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

recent years<sup>6-8</sup>.

Continuous audit of the care process is one of the tools to improve the quality of care, and national and international hip fracture registries allow for the identification of areas for improvement, such as surgical delay or early mobilization, to optimize the management of these patients.<sup>9</sup>

Since the establishment of the Swedish Rikshöft registry in 1986, numerous national registries have been created to study and promote the improvement of care quality<sup>10</sup> The Spanish National Hip Fracture Registry (Registro Nacional de Fracturas de Cadera, RNFC) was created in 2016, collecting data from patients over 75 years old and it produces reports, organizes meetings for scientific enrichment, and proposes indicators and quality standards; it has shown an improvement in the quality of care among the centres participating in the registry.<sup>3,9,11</sup>

There are various non-modifiable risk factors for poor outcomes, such as age, prefracture functional and cognitive status, and the ASA (American Society of Anaesthesiologists) risk score. Living in a nursing home prior to the fracture is also associated with increased mortality, delayed early mobilization, and more comorbidities.<sup>10</sup> Identifying these factors helps recognize the greater vulnerability of these patients and their worse prognosis, but it may also influence clinical decisions, such as increasing the indication for nonoperative treatment.<sup>12,13</sup>

There are also several modifiable factors associated with poor outcomes, with surgical delay being the most studied. It is recommended to operate on hip fracture patients within the first 24-48 h, with delays beyond this period justified only in cases of treatable intercurrent medical conditions that may improve with early optimization<sup>12,14-16</sup>.

Another factor that may affect patient outcomes is the day of the week of admission. Surgical capacity varies between weekdays and weekends, which can delay surgery, especially during weekends. Additionally, available medical personnel and nurse-to-patient ratios change, so patients admitted on the eve of a weekend or a holiday may have less access to preoperative medical optimization (as only on-call services are available), early mobilization, early physiotherapy, and nursing care.<sup>17</sup> This has been described as the weekend effect<sup>12,14,18-20</sup>. Despite the definition of the effect, it is not clear what should be considered as weekend group; in fact, some authors such as Segura et al. observed an increase in delay in patients admitted on Thursdays compared to Mondays (21)]. A deleterious effect of weekend admission has been described for other clinical entities such as stroke, decompensated heart failure, pulmonary thromboembolism, ischaemic cardiomyopathy and even elective orthopaedic procedures<sup>20-24</sup>.

Since data collection began in 2017, 105 hospitals across Spain (approximately 25% of total amount of hospitals), most of them within the public national health system, have voluntarily and altruistically participated in the RNFC, turning it into the one of the most big registry in Europe.<sup>2,25</sup> According to the RNFC's annual reports, surgical delay has shown a decreasing trend over the years, but the impact on this delay of being admitted on a Thursday, weekend, or holiday, as well as other potential effects, has not been analysed.<sup>2,11</sup>

The goal of this study is to compare 30-day mortality in patients aged over 75 years with hip fractures depending on whether they are admitted on Thursday-Sunday (weekend) or national holidays, or on other days of the week.

## 2. Material and methods

A retrospective cohort study was conducted using data from the National Hip Fracture Registry (RNFC), which collects information from patients aged 75 years or older who were admitted for hip fractures in participating hospitals. This study analysed cases collected between January 1st, 2017, and December 31st, 2022, and received approval from the ethics committees of each participating centre. The variables included in the study at admission were: sex, age, relevant medical history, walking ability, prior residence, anaesthetic risk, use of anti-osteoporotic medication, as well as fracture type also dividing them

into extra and intracapsular, this division being basic in the choice of concept to be carried out in surgery, and in cases of pathological fractures, their classification. Variables collected during hospitalization included: the day and time of admission, time of surgery, type of anaesthesia used, clinical interdisciplinary collaboration (geriatrics, internist, both of them, none or other type of specialist), use of anaesthetic block, mobilization on the first postoperative day, hospital stay, anti-osteoporotic treatment, discharge destination, and in-hospital mortality. Also was included 30-days after discharge, data on patients' residence, walking ability, anti-osteoporotic treatment, readmissions for medical or surgical causes, and the type of intervention, if performed, were collected, as well as 30-days mortality. In the case of the variables delirium during admission measured with the 4AT scale and the diagnosis of malnutrition using the Global Leadership Initiative on Malnutrition (GLIM) criteria, data are only obtained from the year 2022, so their n is lower, being 2756 and 2918 respectively. For analysing those last variables, we only include patients that were admitted on year 2022.

The main comparison was 30-day mortality following hip fracture. The secondary outcomes evaluated were surgical delay, both numerical and whether it was <48h or >48h, and hospital stay. A descriptive analysis was performed, summarizing categorical variables as numbers and percentages, and continuous variables as means and standard deviations or medians and interquartile ranges (p25-p75), depending on whether the distribution was normal. Two analysis groups were defined based on the day of initial presentation to the hospital: those admitted from Monday to Wednesday were classified as the "weekdays" group, and those admitted from Thursday to Sunday, including national holidays, were classified as the "weekend" group. Thursday was included in this "weekend" group given the difficulty of performing the scheduled intervention of these patients on Friday due to the presence of other patients already scheduled for surgery, causing often delays until Mondays. National holidays were defined according to Spain's official calendar of non-working days for each year and included: January 1st and 6th, Good Friday, May 1st, August 15th, October 12th, November 1st, and December 6th, 8th, and 25th.

Comparisons of means between groups were performed using Student's t-test for numerical variables and the Chi-squared test for categorical variables. Finally, despite the few events of deaths thanks to the great number of patients, a multilevel analysis could be performed to assess the effect of other variables on mortality in relation to the day of admission, using logistic regression for the significant variables identified in the bivariate analysis. To rule out confounding factors in the variables year of admission and hospital, a comparison was made with the Chi Square test to compare the dichotomous distributions and thus eliminate, if necessary, this bias in the heterogeneity in clinical practice with respect to the day of admission. A statistical significance threshold of a 5% alpha error was defined.

## 3. Results

During the years analysed, the RNFC included 57,450 patients, of which 76% were women, with a mean age of 86.80 (5.73) years. The mean surgical delay was 65.30 (65.26) hours and 48.2% was operated in <48 h, 65.5% of patients were assessed by geriatrics during hospitalization, and 8.44% had died within 30-days of the fracture.

A total of 32,265 patients (56.2%) presented to the hospital between Thursday and Sunday and on public holidays ("weekend group"), while 25,185 patients (43.8%) presented between Monday and Wednesday ("weekday group"). No significant differences were observed in the variables at admission (Table 1), except for a slightly higher proportion of patients with an ASA I anaesthetic risk in the "weekend group" and a higher proportion of ASA II, III, and IV categories in the "weekday group" (p = 0.034).

Surgical delay was higher in the "weekend group" (68.51 [61.41] hours vs. 61.1 [68.94] hours in the "weekday group", p < 0.001) and was also >48h in the "weekend" group (57.7% vs 44.3%, p < 0.001).

**Table 1**

Descriptive analysis of the sample and by subgroups, as well as comparative analysis, to observe which variables were statistically significant of pre-admission variables and in-hospital variables.

Variables		Weekend (56.2%)	Weekday (43.8%)	Total N = 57450	P
<b>ASA (n, %)</b>	I	249 (0.77%)	184 (0.73%)	433 (0.76%)	<b>0.034*</b>
	II	7477 (23.23%)	5867 (23.4%)	13344 (23.3%)	
	III	18909 (58.8%)	14873 (59.3%)	33782 (59%)	
	IV	3749 (11.7%)	2925 (11.7%)	6674 (11.7%)	
	V	48 (0.15%)	46 (0.18%)	94 (0.16%)	
<b>Surgical delay, hours (mean, SD)</b>		68.51 (61.41)	61.1 (68.94)	65.26 (64.92)	<b>&lt;0.001**</b>
<b>Surgical delay categorical (n, %)</b>	>48h	17938 (57.7%)	10745 (44.3%)	26683 (51.8%)	<b>&lt;0.001**</b>
	<48h	13139 (42.3%)	13521 (55.7%)	26660 (48.2%)	
<b>Type of anaesthesia (n, %)</b>	General	2117 (6.81%)	1776 (7.32%)	3893 (7.03%)	<b>0.038*</b>
	Neuraxial	28584 (92%)	22199 (91.4%)	50783 (91.8%)	
	Regional	211 (0.68%)	152 (0.63%)	363 (0.66%)	
<b>Antiresorptive treatment at discharge (n, %)</b>	Yes	130006 (42.4%)	9932 (41.5%)	22938 (42%)	<b>0.032**</b>
<b>Malnutrition (n, %)</b>	No	1122 (53.7)	431 (52)	11553 (53.2)	<b>0.041*</b>
	Moderate	696 (33.3)	295 (35.6)	991 (34)	
	Severe	216 (10.3)	94 (11.3)	310 (10.6)	

Significant differences were also found in the type of anaesthesia used as well as anti-osteoporotic treatment been prescribed at discharge but not on 30-days.

At 30-day follow-up after discharge (Table 2), more readmissions related to hip fractures were observed in patients who had been admitted during the week (7.17% vs. 6.56%,  $p = 0.005$ ). Place of residence at 30-day follow-up was fewer patients in the "weekend group" living at home (51.4% vs. 52.4%,  $p = 0.017$ ).

For the remaining variables, no statistically significant differences were observed.

The mortality observed at 30-day follow-up after the fracture was 8.44% overall, without any detectable differences between them (8.4% vs 8.5%,  $p = 0.533$ ), which means not being a risk factor being part of the "weekend group" (OR 1.04 [0.93-1.17]). Table 3 shows the results of the multilevel analysis of the effect of the included variables on 1-month mortality. Regarding surgical delay, when the delay was analysed as a numerical variable, its influence was observed, but very small (OR:

**Table 2**

Descriptive analysis of the sample and by subgroups, as well as comparative analysis, to observe which variables were statistically significant of variables at one-month follow-up.

Variables		Weekend N=32265 (56.2%)	Weekday N=25185 (43.8%)	Total N=57450	P
<b>Readmissions related to the hip fracture (n, %)</b>	Yes	2011 (6.56%)	1577 (7.17%)	3726 (6.83%)	<b>0.005**</b>
<b>Place of residence at 30 days (n, %)</b>	Home	15134 (51.4%)	12030 (52.4%)	27164 (51.8%)	<b>0.017**</b>
	Skilled nursing care	9802 (33.3%)	7434 (32.4%)	17236 (32.9%)	
	Hospital	573 (1.94%)	480 (2.09%)	1053 (2.01%)	
	Long-term care hospital	367 (1.25%)	240 (1.04%)	607 (1.16%)	
	Geriatric rehabilitation unit	2536 (8.61%)	1919 (8.35%)	4455 (8.49%)	
<b>Death at 30 days (n, %)</b>		2704 (8.4%)	2137 (8.5%)	4841 (8.44%)	0.533

**Table 3**

Logistic regression of the variables that involve mortality risk in the study, showing their results with Odds Ratio (OR), 95% confidence interval (CI), and p-value.

Variable	Odds Ratio (OR)	IC 95%
<b>Day of admission</b>	1.04	0.93-1.17
<b>Female sex</b>	0.49	0.46-0.54
<b>Age</b>	1.10	1.09-1.10
<b>Intracapsular fracture</b>	1.13	1.05-1.12
<b>Surgical delay (hours)</b>	1.001	1.001-1.002
<b>Surgical delay (&gt;48h)</b>	1.22	1.14-1.31
<b>Involvement of geriatrician (orthogeriatric comanagement)</b>	0.71	0.67-0.077
<b>Involvement of other specialists</b>	0.77	0.63-0.92
<b>Involvement of both geriatrician and internist</b>	1.48	1.07-2.01
<b>No interdisciplinary collaboration</b>	0.49	0.39-0.608
<b>Hospital stay</b>	1.01	1.01-1.02
<b>Readmission related to the hip fracture at 30 days</b>	5.64	4.92-6.45

1.001 [1.001-1.002, however, when it was analysed as a categorical variable, an increase in mortality was observed if > 48h (OR 1.22 [1.14-1.31]). Thus, it could be said that the risk of 30-days mortality increases by 0.1% for each hour and 22.5% when it is > 48 h. An association was also found with the length of stay, which was a risk factor (OR 1.01 [1.01-1.02]) and with patients who had been readmitted due to pathology related to the hip fracture (OR 5.64 [4.92-6.45]). The protective factor against mortality of the involvement of a clinical specialist in geriatrics in the hip fracture (OR 0.71 [0.67-0.77]), as well as by other specialists (OR 0.77 [0.63-0.92]), is noteworthy. It should also be noted it is worth highlighting the increased risk of mortality in patients assessed by geriatricians and internists (OR 1.48 [1.07-2.00]) and the decrease in mortality in those not assessed by any specialty (OR 0.49 [0.39-0.61]), probably due to patient selection bias.

In the comparative analysis of possible confounding factors with respect to hospitals or year of admission, no statistically significant differences were observed between the "weekend" and "weekday" groups, with  $p = 0.381$  in the case of the annual distribution and  $p = 0.395$  in the different hospitals, making a multilevel analysis unnecessary to correct the bias.

#### 4. Discussion

As we observed, mortality was very low in our study, with no differences between the two groups, making the day of admission not being a risk factor of mortality. Although surgical delay is a well-established risk factor for adverse outcomes after hip fractures, the existence and implications of the weekend effect remain controversial, with some authors even denying its existence<sup>26-29</sup>. In our analysis, surgical delay was longer in the "weekend" group and became a risk factor when exceeding 48 h. However, patients admitted during the "weekend" group was not associated with 30-days mortality (OR 1.04 [0.93-1.17]).

Segura et al. reported an increased surgical delay among patients on Thursdays, Fridays, and Saturdays compared to Mondays, a fact that

could increase complications in these patients.<sup>30</sup> For this reason, Thursday was included in our study as the "weekend" group. However, as no studies performed this analysis on the eve of a holiday; therefore, we only included holidays and not their preceding days.

Thomas et al. analysed the influence of the weekend effect on short-term mortality, showing a higher one-month mortality among weekends admissions (OR: 1.4 [1.29-1.54]).<sup>31</sup> Multicentre studies in countries such as Australia and the Netherlands have similarly shown increased mortality within the first month due to the weekend effect.<sup>32</sup> In Dutch hospitals, mortality risk was significantly higher for patients admitted on weekends compared to Monday (ORs of 1.33, 1.20, and 1.17 for Friday, Saturday, and Sunday, respectively).<sup>32</sup> Conversely, Nijland et al., deny the existence of the weekend effect when comparing one-month and one-year mortality between patients admitted on weekends or holidays versus other days of the week.<sup>19</sup> A closer examination of several of these studies shows that many did not observe differences in surgical delay between weekday and weekend admissions, suggesting that timely treatment may mitigate the potential weekend effect. Similarly, studies reporting no association between weekend admission and hip fracture mortality typically describe surgical delays shorter than 48 h [13,18,26-28,33](#).

Notably, the study by Mathews et al. demonstrated the absence of a weekend effect on mortality in a UK hospital, although they did find a significantly higher percentage of patients with a surgical delay of >36 h among those admitted in winter compared to other periods ( $p < 0.05$ ). Unfortunately, they did not compare mortality between these two periods.<sup>34</sup>

National hip fracture registry analyses also show contradictory findings. The National Hip Fracture Database of England, Northern Ireland and Wales observed increased 30-day mortality among patients undergoing surgery on Sundays, as well as among discharged on Sundays or out-of-hours periods. However, they did not explain why this increase was observed on Sundays specifically, and not on Saturdays.<sup>35</sup> In contrast, the Norwegian registry confirmed a weekend effect at admission, with increased mortality in the first two months (HR 1.03), although no such effect was observed when analysing the day of surgery, even though weekend surgeries were performed by less experienced surgeons. This study highlighted the need to optimize patients care during weekends.<sup>36,37</sup> Finally, the Danish registry also observed an increased risk of mortality for patients admitted on weekends, with an OR of 1.13 (1.04-1.23), which could not be fully attributed to surgical delay.<sup>38</sup>

Our findings differ from most previous reports, although surgical delay was longer in the weekend group, we found no relationship between the weekend effect and mortality. It is possible that despite the increase in surgical delay, the magnitude of the weekend effect is too small to have a clinically meaningful impact on 30-days mortality. Additionally, variations in hospital operating protocols over time did not influence the distribution of admissions between groups, suggesting these factors were not confounders. We also found no differences on other known risk factors of mortality such as mobilization 1st day after surgery, discharge destination or clinical interdisciplinary collaboration, indicating comparable perioperative management in both groups. Given the mean hospital stay of six days, patients admitted on weekend likely received most of their postoperative care during weekdays, which may further reduce differences in outcome.

Some authors have examined whether weekend surgeries performed by less experienced surgeons may contribute to higher mortality; however, these studies found no increase in mortality related to surgeon's experience, weakening arguments against performing surgeries during weekends even when the usual surgical team is unavailable.<sup>15,19</sup>

We found a higher proportion of patients re-admitted within 30-days for hip-fracture-related issues in the "weekdays group", as well as higher proportion of patients at home or hospitalized at 30 days. These small differences may reflect organizational factors in discharge planning but are unlikely to be clinically relevant.

Pasternack et al. reported significantly higher complication rates in the weekend admissions, which they attribute to longer surgical delays.<sup>33</sup> In contrast, although our study also showed significantly longer surgical delay was observed in the "weekend group", this did not translate into higher mortality or increased reoperation rate, even though our 30-day mortality was comparable to other studies. Differences in anaesthetic risk and type of anaesthesia, were also noted between groups, but these were accounted for in the multilevel analysis. Longer follow-up could be needed to clarify the long-term implications of the weekend effect.

The proportion of patients receiving interdisciplinary care from a clinical specialist was similar across groups. We assessed specialist involvement throughout the entire hospitalization, not only in the pre-operative phase, although unmeasured differences in timing may exist. Importantly, geriatrician involvement remained a protective factor for 30-days mortality after multilevel adjustment, consistent with existing evidence supporting the benefits of orthogeriatric co-management.<sup>39</sup> Patients evaluated by both an internist and a geriatrician had higher mortality risk, whereas those not assessed by any additional specialty had lower risk, likely reflecting that the most severely ill patients required multidisciplinary input, whereas the less severely ill did not. Differences in the proportion of patients discharged with antiresorptive therapy may also relate to patient clinical status, as those admitted on weekend had higher anaesthetic risk (and possibly comorbidity and/or frailty), and therefore more frequently received osteoprotective treatment at discharge.

Our study has several limitations. First, as is inherent to registries, the number of variables that can be collected is limited, and other factors not captured by the registry may influence the weekend effect. However, the use of databases like these allows the analysis of many prospectively collected cases with clearly defined inclusion criteria and variables. Moreover, the database incorporated some variables later, such as cementation of hip arthroplasties (from 2019). We included Thursdays as "weekend group" because in Spain, most of patients admitted on Thursdays must wait until Monday to have surgery, this limits comparisons with other studies that do not include Thursdays. Nevertheless, not including this day on "weekend group" could lead into bias because of our healthcare organization. The analysis did not account for local holidays in different autonomous regions or municipalities. Additionally, the follow-up period was relatively short, with only 30-days post-discharge, and there may be long-term effects of the weekend effect, such as surgical complications, that were not studied. It is worth highlighting the limited sample in some variables such as malnutrition and delirium on admission given that we only have 1 year of data collection. Despite these limitations, the study is highly relevant, as it presents a large sample (57,450 patients) that allows us to observe the differences related to the weekend effect in the Spanish population.

## 5. Conclusions

We observed no weekend effect on hip fracture mortality at one month, although differences were observed in surgical delay, which represents a risk factor for one-month mortality. The weekend effect has no impact in the first month, but maybe it does have an impact in the long term. A longer-term analysis of the weekend effect would be desirable.

### Guardian/patient's consent

Authors declare that RNFC is the guardian of patient's consent.

### Ethics in publishing statement

This research presents an accurate account of the work performed, all data presented are accurate and methodologies detailed enough to permit others to replicate the work.

This manuscript represents entirely original works and or if work and/or words of others have been used, that this has been appropriately cited or quoted and permission has been obtained where necessary.

This material has not been published in whole or in part elsewhere.

The manuscript is not currently being considered for publication in another journal.

That generative AI and AI-assisted technologies have not been utilized in the writing process or if used, disclosed in the manuscript the use of AI and AI-assisted technologies and a statement will appear in the published work.

That generative AI and AI-assisted technologies have not been used to create or alter images unless specifically used as part of the research design where such use must be described in a reproducible manner in the methods section.

All authors have been personally and actively involved in substantive work leading to the manuscript and will hold themselves jointly and individually responsible for its content.

### Credit author statement

G.García Cruz. He did writing, fata curation, analysis, investigation, resources, editing and software.

C. Ojeda Thies. She did resources, writing reviews, methodology, conceptualization.

A. Muñoz Pascual. She did writing review.

G. Gálvez Márquez. He did resources, validation, methodology.

M. P. Saez López. She did supervision, validation, resources.

M. P. Rubio-Sáez. She did visualization.

J. Cordero Ampuero. He did writing review and project administration.

### Funding statement

Authors declare that no fundings were used on this paper.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Acknowledgements

We thank the company 3 datos for their help in the statistical study of the article.

### References

- Dyer SM, Crotty M, Fairhall N, et al. A critical review of the long-term disability outcomes following hip fracture. *BMC Geriatr*. 2016;16(1).
- Pilar Sáez López Juan, Montalvo Ignacio González, Thies Cristina Ojeda, Campelo Paloma Gómez, Teresa Pareja Sierra Patricia, Alvarado Ysabel Condorhuamán. *Registro Nacional de Fracturas de Cadera*. RNFC ed. Madrid: Informe Anual 2020; 2020.
- Sáez-López P, González-Montalvo JI, Ojeda-Thies C, et al. Spanish National Hip Fracture Registry (SNHFR): a description of its objectives, methodology and implementation. *Rev Española Geriatria Gerontol*. agosto de 2018;53(4):188–195.
- Pérez Díaz Julio, Ramiro Fariñas Diego, Aceituno Nieto Pilar, et al. Un perfil de las personas mayores en España, 2023 Indicadores estadísticos básicos. *Informes Envejecimiento en red*. 2023;30.
- Hartholt KA, Oudshoorn C, Zielinski SM, et al. The epidemic of hip fractures: are we on the right track?. Taylor WJ, editor *PLoS One*. 2011;6(7), e22227.
- Neuburger J, Currie C, Wakeman R, et al. The impact of a national clinician-led audit initiative on care and mortality after hip fracture in England. *Med Care*. 2015; 53(8):686–691.
- Royal College of Physicians. Annual report. *National Hip Fracture Database*. 2019.
- DrHOFTEBRUD Dansk Tværfagligt Register for Hoftebrud. 2017 (november 2016).
- Ojeda-Thies C, Sáez-López P, Currie CT, et al. Spanish National Hip Fracture Registry (RNFC): analysis of its first annual report and international comparison with other established registries. *Osteoporos Int*. 2019.
- Alarcon T, Ojeda-Thies C, Sáez-López P, et al. Usefulness of a national hip fracture registry to evaluate the profile of patients in whom antiosteoporotic treatment is prescribed following hospital discharge. *Osteoporos Int*. 2020;31(7):1369–1375.
- Condorhuamán-Alvarado PY, Pareja-Sierra T, Muñoz-Pascual A, et al. Improving hip fracture care in Spain: evolution of quality indicators in the Spanish National Hip Fracture Registry. *Arch Osteoporosis*. diciembre de 2022;17(1):54.
- Pincus D, Ravi B, Wasserstein D, et al. Association between wait time and 30-Day mortality in adults undergoing hip fracture surgery. *JAMA*. 28 de noviembre de 2017;318(20):1994.
- Nandra R, Pullan J, Bishop J, Baloch K, Grover L, Porter K. Comparing mortality risk of patients with acute hip fractures admitted to a major trauma centre on a weekday or weekend. *Sci Rep*. 27 de abril de 2017;7(1):1233.
- Simunovic N, Devereaux PJ, Sprague S, et al. Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. *Can Med Assoc J*. 19 de octubre de 2010;182(15):1609–1616.
- Lim AH, Lane S, Page R. The effect of surgical timing on the outcome of patients with neck of femur fracture. *Arch Orthop Trauma Surg*. noviembre de 2015;135(11): 1497–1502.
- Greve K, Ek S, Bartha E, Modig K, Hedström M. Waiting more than 24 hours for hip fracture surgery is associated with increased risk of adverse outcomes for sicker patients: a nationwide cohort study of 63,998 patients using the Swedish Hip Fracture Register. *ActaO*. 27 de febrero de 2023;94:87–96.
- Farrow L, Hall A, Aucott L, Holt G, Myint PK. Does quality of care in hip fracture vary by day of admission? *Arch Osteoporosis*. diciembre de 2020;15(1):52.
- Klestil T, Röder C, Stotter C, et al. Impact of timing of surgery in elderly hip fracture patients: a systematic review and meta-analysis. *Sci Rep*. 2018;8(1), 13933.
- Nijland LMG, Karres J, Simons AE, Ultee JM, Kerkhoffs GMMJ, Vrouwenraets BC. The weekend effect for hip fracture surgery. *Injury*. julio de 2017;48(7):1536–1541.
- Rickett J. On patient safety: the weekend effect. *Clin Orthop Relat Res*. octubre de 2025;483(10):1821–1822.
- Clarke MS, Wills R-A, Bowman RV, et al. Exploratory study of the ‘weekend effect’ for acute medical admissions to public hospitals in Queensland, Australia. *Intern Med J*. noviembre de 2010;40(11):777–783.
- Kim SB, Lee BM, Park JW, Kwak MY, Jang WM. Weekend effect on 30-day mortality for ischemic and hemorrhagic stroke analyzed using severity index and staffing level. Chen RJ, editor *PLoS One*. 22 de junio de 2023;18(6), e0283491.
- Mounsey LA, Chang PP, Sueta CA, Matsushita K, Russell SD, Caughey MC. In-hospital and postdischarge mortality among patients with acute decompensated heart failure hospitalizations ending on the weekend versus weekday: the ARIC study community surveillance. *JAMA*. 6 de agosto de 2019;8(15), e011631.
- Ranganathan S, Riveros C, Tsugawa Y, et al. Postoperative outcomes following preweekend surgery. *JAMA Netw Open*. 4 de marzo de 2025;8(3), e2458794.
- Puime AO, Gutiérrez-Misis A, Sáez-López P, Gómez-Campelo P, Ojeda-Thies C, Mazzucchelli R, et al. El registro nacional de fracturas de cadera (rnf) y el conjunto mínimo básico de datos son útiles para investigar sobre fracturas de cadera: comparación de ambos registros(\*). *Rev Esp Salud Publica*.
- Pang C, Aqil A, Mannan A, Thomas G, Hossain FS. Hip fracture patients admitted to hospital on weekends are not at increased risk of 30-day mortality as compared with weekdays. *J Orthop Traumatol*. diciembre de 2020;21(1):23.
- Sheikh HQ, Aqil A, Hossain FS, Kapoor H. There is no weekend effect in hip fracture surgery – a comprehensive analysis of outcomes. *Surgeon*. octubre de 2018;16(5): 259–264.
- Rezaie W, Roukema G, Van De Meulebroucke B. Weekend admission of intracapsular femoral neck fractures not associated with a greater rate of mortality or morbidity. *Geriatr Orthop Surg Rehabil*. 2018;9, 215145931878122.
- Sanz-Reig J, Mas Martínez J, Cassinello Ogea C, et al. participants in the Spanish National Hip Fracture Registry. Time to surgery and 30-day mortality after hip fracture: an observational study of 29,695 patients reported to the Spanish National Hip Fracture Registry (SNHFR). *Injury*. 2024;55(suppl 5), 111653.
- Segura-Nuez JC, Infantes-Morales M, García-Hernández A, Segura-Nuez J, Martín-Hernández C, Roche-Albero A. The weekend effect in hip fracture: the critical role of resource management. *J Healthc Qual Res*. septiembre de 2025;40(5), 101131.
- Thomas CJ, Smith RP, Uzoigwe CE, Braybrooke JR. The weekend effect: short-term mortality following admission with a hip fracture. *Bone Jt J*. marzo de 2014;96-B(3): 373–378.
- Ruiz M, Bettle A, Aylin PP. The global comparators project: international comparison of 30-day in-hospital mortality by day of the week. *BMJ Qual Saf*. agosto de 2015;24(8):492–504.
- Pasternack JB, Ciminero ML, Silver M, Chang J, Simon RJ, Kang KK. Effect of weekend admission on geriatric hip fractures. *WJO*. 2020;11(9):391–399.
- Mathews JA, Vindlacharuvu M, Khanduja V. Is there a weekend effect in hip fracture patients presenting to a United Kingdom teaching hospital? *WJO*. 2016;7(10):678.
- Sayers A, Whitehouse MR, Berstock JR, Harding KA, Kelly MB, Chesser TJ. The association between the day of the week of milestones in the care pathway of patients with hip fracture and 30-day mortality: findings from a prospective national registry – the National Hip Fracture database of England and Wales. *BMC Med*. diciembre de 2017;15(1):62.
- Boutera A, Dybvik E, Hallan G, Gjertsen JE. Is there a weekend effect after hip fracture surgery? A study of 74,410 hip fractures reported to the Norwegian Hip Fracture Register. *Acta Orthop*. 2 de enero de 2020;91(1):63–68.
- Asheim A, Nilsen SM, Toch-Marquardt M, Anthun KS, Johnsen LG, Bjørngaard JH. Time of admission and mortality after hip fracture: a detailed look at the weekend

- effect in a nationwide study of 55,211 hip fracture patients in Norway. *Acta Orthop.* 2 de noviembre de 2018;89(6):610–614.
38. Kristiansen NS, Kristensen PK, Nørgård BM, Mainz J, Johnsen SP. Off-hours admission and quality of hip fracture care: a nationwide cohort study of performance measures and 30-day mortality. *Int J Qual Health Care.* junio de 2016; 28(3):324–331.
39. Van Heghe A, Mordant G, Dupont J, Dejaeger M, Laurent MR, Gielen E. Effects of orthogeriatric care models on outcomes of hip fracture patients: a systematic review and meta-analysis. *Calcif Tissue Int.* febrero de 2022;110(2):162–184.