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SHORT REPORT

The likelihood of admission to an intensive care bed dramatically decreased in elderly patients during the first wave of the COVID-19 pandemic in Spain

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Abstract

Background: During the first wave of the COVID-19 pandemic, the availability of mechanical ventilators was very limited and ad hoc recommendations establishing age to be used for patient triage for having access to intensive care beds (ICBs) were proposed. No reports have evaluated how this policy impacted ICB admission in Western countries.

Aims: We analyzed the age-related probability of ICB admission during first COVID-19 pandemic wave.

Materials and Methods: We included all patients ≥65 years attended in 42 Spanish emergency departments (EDs) covering around 22% of the Spanish population during 1-week of the first wave of the COVID-19 pandemic (9128 ED visits) and compared the probability of ICB admission respect to patients coming to these EDs 1-week of 1-year earlier (24,128 ED visits).

Results: We found that compared with patients aged 65, the probability of ICB admission was significantly reduced from 79 years and up during the pandemic period (odds ratio [OR] = 0.60 for patients aged 79, 95% confidence interval [CI] = 0.39–0.94), while a significant reduction of ICB admission probabilities was found from 88 years and up during the pre-COVID-19 period (OR = 0.66 for patients aged 88, 95% CI = 0.45–0.95) ($p < 0.001$ for interaction). Similar results were found when analyses were limited to hospitalized or deceased patients and also after adjustment using sex and several baseline status covariates.

Conclusion: There was a real limitation in clinical practice of ICB admission based on age during the first wave of the COVID-19 pandemic.

KEYWORDS

COVID-19, geriatric patients, ICU

1 | INTRODUCTION

During the first wave of the COVID-19 pandemic, the availability of mechanical ventilators (MVs) was very limited, but no Western country has reported an increase in mortality specifically attributed to the imbalance of MV availability to cover patients' needs during this period. Several scientific societies published ad hoc recommendations establishing an age limit of 80, 75, and even 70 years for having access to intensive care beds (ICBs) and MV during the worst weeks of the pandemic, when an imminent shortage of MV was forecasted.[1–3] The effort made by healthcare systems to provide more MV and ICB has allegedly been proposed as the reason why the application of such restrictive orders was unnecessary in the vast majority of cases and even that patient outcomes were not directly influenced by this limitation. However, no objective data analyzing the use of ICBs by elderly patients during the pandemic have been reported. Our aim was to analyze the probability of obtaining an ICB during the first wave of the COVID-19 pandemic according to age in elderly patients and ascertain if such age-related probabilities significantly differed with respect to pre-pandemic ICB usage in Spain.

2 | METHODS

We reviewed all patients (no exclusion criteria were applied) aged ≥65 years attending 42 Spanish emergency departments (EDs, 14% of public EDs in Spain covering around 22% of the Spanish population) during 1-week of the first wave of the COVID-19 pandemic (March 30 to April 5, 2020).[4] All 42 hospitals had intensive care units (ICUs). We recorded age, sex, comorbidity (according to the Charlson Comorbidity Index), depression, dementia, functional capacity (according to the Barthel Index), ability to walk, and falls during the 6 months prior to the current index episode in every patient included in the study.

The association of age with admission to an ICB during the ED index episode was analyzed using restricted cubic spline curves generated by logistic regression and using 3 knots placed at 10, 50, and 90 percentiles. We elaborated dose-response curves representing the odds ratio (OR) with 95% confidence interval (CI) for ICB admission for every age point. Patients aged 65 years were the reference (OR = 1). The entire ED population was analyzed including not only those diagnosed with COVID-19 but also non-COVID-19 patients who could have received limited supportive care due to ICB shortage and overwork in the ED related to the pandemic itself. The association between age and ICB admission was assessed thrice: using all ED patients, including hospitalized patients, and by only considering patients who died during the index episode. These associations were reported as unadjusted and adjusted for sex, comorbidity, depression, dementia, functional dependence, walking capacity, and previous falls.

The same analyses were repeated for all patients attending the same 42 EDs during 1-year earlier (April 1–7, 2019, pre-COVID-19 period).[5] Differences between ICB admission during the pre-COVID-19 period and the pandemic period were assessed by visual curve analysis and by thorough analysis of first-degree interaction between period and age.

For all the analyses and graph plots, we used the STATA package, version 13 (Stata Corp).

The Ethics Committee of the Hospital Clínico San Carlos, Madrid, Spain approved this study (HCSC/22/005-E). Because of the retrospective nature of the study and patient identification was removed from the final database, the Ethics Committee did not require written informed consent of patients to be included in the study.

3 | RESULTS

During the week of the first wave of the COVID-19 pandemic, ICB admission occurred in 212 of the 9128 consecutive ED comers aged 65 years or older (2.3%). On the other hand, during the week of the pre-COVID-19 period, ICB admissions occurred in 310 of the consecutive 24,128 ED comers aged 65 years or older (1.3%). Detailed distribution for each particular age in these two periods is presented in Table 1. When comparing the two periods, patients attending the ED during the COVID-19 period were older, more frequently male, and had more comorbidity, depression, dementia, functional dependence, and walking difficulties, while falls during the previous 6 months were less frequently present (Table 2).

During the COVID-19 period, unadjusted analyses of all patients (N = 9128), hospitalized patients (N = 5173), and deceased patients (inhospital death; N = 1242; 13.6%) showed that, with respect to patients aged 65, the probability of ICB admission was significantly reduced from 79 years (OR = 0.60, 95% CI = 0.39–0.94) and above, 78 years (OR = 0.57, 95% CI = 0.37–0.89) and above, and 66 years (OR = 0.92, 95% CI = 0.86–0.98) and above, respectively (Figure 1). With regard to the pre-COVID-19 period, the probability of ICB admission was significantly reduced from 88 years (OR = 0.66, 95% CI = 0.45–0.95) and above, 82 years (OR = 0.62, 95% CI = 0.42–0.92) and above, and 78 years (OR = 0.46, 95% CI = 0.22–0.98) and above when analyzing all patients (N = 24,128), hospitalized patients (N = 6120), and deceased patients (N = 776; inhospital death = 3.2%), respectively. Curves for the COVID-19 and pre-COVID-19 periods significantly differed with p values for interaction always

TABLE 1 Distribution of patients (total and admitted to an intensive care bed) during the pre-COVID-19 period (April 1 to 7, 2019, 7 days) and the COVID-19 period (first pandemic wave; March 30 to April 5, 2020, 7 days).

	Pre-COVID-19 period		COVID-19 period	
Age	ED attendances *N*	Admitted to an ICB *N* (%)	ED attendances *N*	Admitted to an ICB *N* (%)
65 years	547	5 (0.9)	218	8 (3.7)
66 years	851	6 (0.7)	313	15 (4.8)
67 years	933	16 (1.7)	316	13 (4.1)
68 years	907	15 (1.7)	327	11 (3.4)
69 years	934	12 (1.3)	349	9 (2.6)
70 years	992	14 (1.4)	291	12 (4.1)
71 years	995	23 (2.3)	343	16 (4.7)
72 years	950	12 (1.3)	380	19 (5.0)
73 years	964	18 (1.9)	366	9 (2.5)
74 years	1014	17 (1.7)	332	14 (4.2)
75 years	976	13 (1.3)	387	29 (7.5)
76 years	1009	20 (2.0)	354	9 (2.5)
77 years	795	6 (0.8)	376	11 (2.9)
78 years	894	12 (1.3)	294	10 (3.4)
79 years	1029	14 (1.4)	319	3 (0.9)
80 years	695	9 (1.3)	350	7 (2.0)
81 years	777	11 (1.4)	255	0 (0)
82 years	932	16 (1.7)	286	4 (1.4)
83 years	985	9 (0.9)	327	2 (0.6)
84 years	890	16 (1.8)	359	2 (0.6)
85 years	848	11 (1.3)	343	1 (0.3)
86 years	791	9 (1.1)	345	3 (0.9)
87 years	744	4 (0.5)	336	3 (0.9)
88 years	683	6 (0.9)	302	2 (0.7)
89 years	619	4 (0.6)	269	0 (0)
90 years	568	4 (0.7)	226	0 (0)
91 years	432	1 (0.2)	176	0 (0)
92 years	386	3 (0.8)	166	0 (0)
93 years	261	2 (0.8)	120	0 (0)
94 years	217	0 (0)	84	0 (0)
95 years	183	1 (0.5)	74	0 (0)
96 years	107	1 (0.9)	59	0 (0)
97 years	95	0 (0)	35	0 (0)
98 years	49	0 (0)	20	0 (0)
99 years	33	0 (0)	11	0 (0)
≥100 years	44	0 (0)	20	0 (0)
Total	24,128	310 (1.3)	9128	212 (2.3)

Abbreviations: ED, emergency department; ICB, intensive care bed.

TABLE 2 Baseline characteristics of all patients attending 42 Spanish emergency departments in the pre-COVID-19 period (April 1 to 7, 2019, 7 days) and in the COVID-19 period (first pandemic wave; March 30 to April 5, 2020, 7 days).

	Pre-COVID-19 period *N* = 24,128 *n* (%)	COVID-19 period *N* = 9128 *n* (%)	*p*-value
Age (in years) (median (IQR))	78 (71–85)	78 (72–85)	**<0.001**
Age (by categories)			**<0.001**[b]
65–69 years	4172 (17.3)	1523 (16.7)	
70–74 years	4915 (20.4)	1712 (18.8)	
75–79 years	4703 (19.5)	1730 (19.0)	
80–84 years	4279 (17.7)	1577 (17.3)	
85–89 years	3685 (15.3)	1595 (17.5)	
≥90 years	2374 (9.8)	991 (10.9)	
Female sex[a]	12,938 (54.8)	4350 (48.8)	**<0.001**
Comorbidity (by Charlson Comorbidity Index)			**<0.001**[b]
No (0 points)	6294 (26.1)	2158 (23.6)	
Mild (1–2 points)	9780 (40.5)	3694 (40.5)	
Moderate (3–4 points)	4648 (19.3)	1875 (20.5)	
Severe (≥5 points)	3406 (14.1)	1401 (15.3)	
Diagnosed with depression	3193 (13.2)	1078 (11.8)	**0.001**
Diagnosed with dementia	3182 (13.2)	1395 (15.3)	**<0.001**
Functional capacity (by Barthel Index)			**<0.001**[b]
Independent (100 points)	17,185 (71.2)	6307 (69.1)	
Mild or moderate (60–95 points)	5452 (22.6)	2120 (23.2)	
Severe or complete (<60 points)	1491 (6.2)	701 (7.7)	
Walking ability			**<0.001**[a]
Alone with no help	16,083 (66.7)	5893 (64.6)	
Needs help (walking aid or walking assistance)	5749 (23.8)	2191 (24.0)	
Unable to walk	2296 (9.5)	1044 (11.4)	
Having had falls in the previous 6 months	1703 (7.1)	545 (6.0)	**<0.001**

Note: Bold values denote statistical significance ($p < 0.05$).

Abbreviation: IQR, interquartile range.

[a]There were 719 patients in whom sex was not retrieved (514 in the pre-COVID-19 period and 205 in the COVID-19 period).

[b]*p* value for trend (calculated by chi-square).

being <0.001 for all comparisons (Figure 1). Very similar curves and estimations for the COVID-19 and pre-COVID-19 periods were found in the adjusted analyses also with *p* values <0.001 for all comparisons between groups (Figure 1).

Notably, when comparing the curves of the COVID-19 and pre-COVID-19 periods and independently of the type of analysis (overall/hospitalized/deceased, which exhibited very similar aspects), the ORs for ICB admission during the first wave of the COVID-19 pandemic were very similar between periods for patients aged 70 and 75 years (with a wide overlap of their 95% CI) and very similar to the reference category (patients aged 65). Differences between periods became evident at the age of 80 (with a lower probability of ICB admission during the COVID-19 period) and being clearly different for patients aged 85 years and older (no overlap of the 95% CI of OR of the COVID-19 and pre-COVID-19 periods) (Figure 2).

4 | DISCUSSION

Our findings are highly consistent, regardless of whether the analysis was performed in all patients, or limited to hospitalized or deceased patients. The results in this latter subgroup are especially relevant, as almost all hospitalized patients are evaluated for ICB

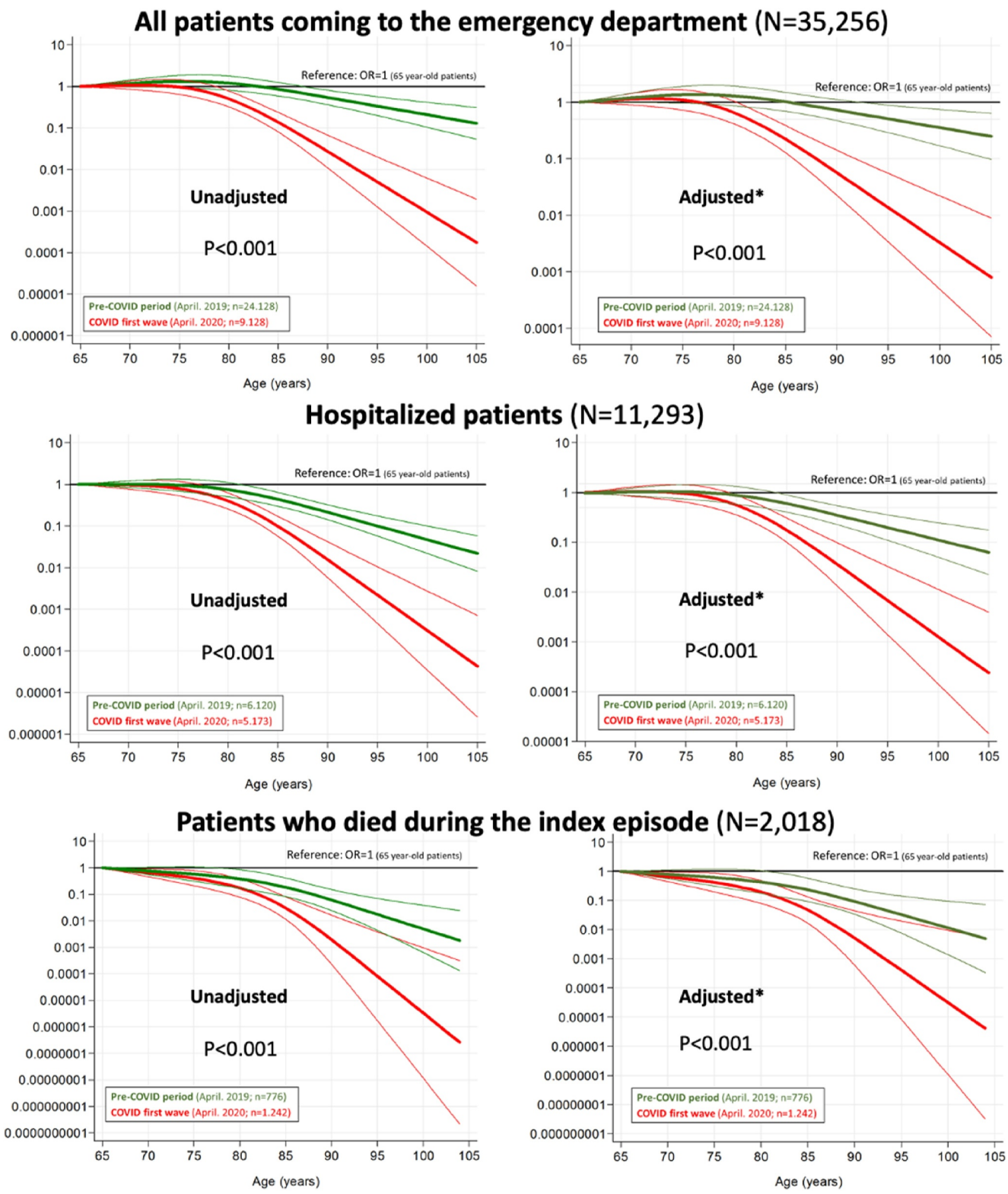

FIGURE 1 Dose-response curves using restricted cubic spline analysis representing the odds ratio (OR) of being admitted to an intensive care bed during the pre-COVID-19 (2019) and COVID-19 periods (April 2020, first wave). Restricted cubic spine curves were produced using three knots at percentiles 10, 50, and 90 using the Stata software, version 13.0 (Stata Corp). ORs for admission in an intensive care bed according to the patient age (referenced to patients aged 65) are represented by thick lines and 95% confidence interval (95% CI) limits by thin lines. *Adjusted for sex, comorbidity, depression, dementia, functional dependence, walking capacity, and previous falls. CI, confidence interval.

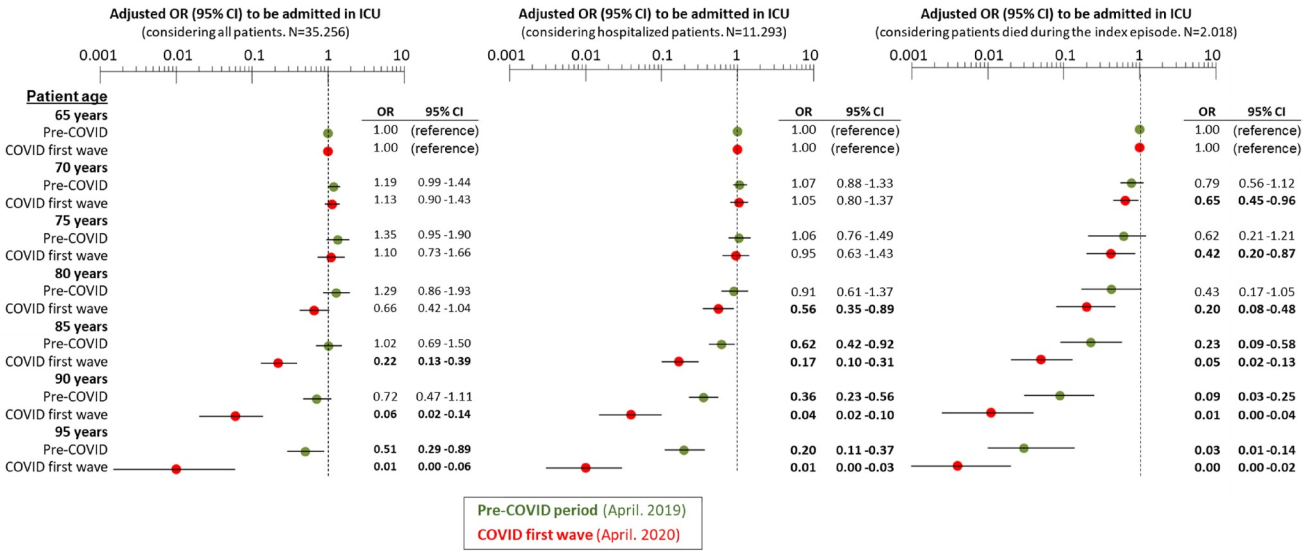

FIGURE 2 Comparison of adjusted* odds ratios for intensive care bed admission for different age points in the pre-COVID-19 and COVID-19 periods. CI, confidence interval; ICU, intensive care unit; OR, odds ratio. *Adjusted for sex, comorbidity, depression, dementia, functional dependence, walking capacity, and previous falls.

admission by the attending physician when they deteriorate and before death. These data illustrate and quantify the limitation of ICB access in elder patients during the first COVID-19 wave with a marked reduction in the probability of ICB admission for ages beyond 85 with respect to what had been observed in the pre-COVID-19 period. Although it is intuitive to think that the limitation of ICB admission during the COVID-19 period was determined (and experienced) by patients diagnosed with COVID-19, we did not explore the diagnoses of patients (in either the whole cohort or in patients admitted to the ICB) and we cannot make any firm comment in this respect. However, our results suggest that the effort to provide additional MV and ICB to cover population necessities was not sufficient in Spain.

A limitation of efforts at younger ages than usual is the most plausible cause of this decrease in the probability of ICB admission reported in the present study. Ageism or age discrimination is an old problem that should be overcome. Comorbidity, functional capacity, mental status, and patient frailty, among others, must always be taken into account.[6] As this information is sometimes not present in the clinical history and decisions in the ED must be made quickly, it is often easier to make such decisions based only on age in emergency medicine, especially during the first wave of the COVID-19 pandemic. Certainly, many other conditions aside from age limited admission to an ICB during the worst days of the COVID-19 pandemic in 2020. In a recent study exploring 2284 decisions of nonadmission to the ICU in 62 Spanish hospitals during the COVID-19 pandemic (ADENI-UCI study), age was mentioned in 31% of the decisions to limit ICU admission and was largely surpassed by an estimated future poor quality of life (involved in 62% of decisions), advanced chronic disease (in 60%), previous functional limitation (in 56%), and treatment futility (in 51%).[7] Age as the sole justification for nonadmission to the ICU was only recorded on 34 occasions (1.6%). In our study, we detected that the first wave of the COVID-19 pandemic modified the demographics of patients attending the ED, in part because of the characteristics of the population that was specially targeted by COVID-19 and in part because of the lock down itself.[8,9] Notoriously, our analysis adjusted the effect of age on the probability of ICB admission by some of the conditions previously discussed in the ADENI-UCI study, and even with this approach, the probability of ICB admission according to patient age were reduced beyond what routine ICB usage had been before the pandemic. In this sense, we found that the ORs for ICB admission during the COVID-19 period for patients older than 80 (respect to the age of 65, taken as reference) were the same as those in the pre-COVID-19 period for patients more than 5 years older. Therefore, even accepting that age was not the only parameter used for ICB admission of patients coming to the ED during the first wave of the COVID-19 pandemic, age was, in fact, an independent risk factor in decision-making for ICB use during this dramatic period.

It is noteworthy that despite the absence of guidelines arguing in favor of a "first come, first serve" approach for ICB admission during the COVID-19 pandemic, differences in how ICBs were assigned in different countries were reported.[10] Some national guidelines (such as in Switzerland or Austria) refer to short-term survival only as a key triaging criterion, while

others either do not specify survival (as in the United Kingdom and Belgium) or explicitly allow for the possibility that long-term prognosis (Germany) or a reduced life span, due to old age or to comorbidities, could affect patient access to MV (Italy). In Switzerland, an age limit was rejected as a criterion in itself, yet an age of over 85 years was mentioned as an exclusion criterion to admission to the ICU if no free beds were available. Therefore, our findings in Spain cannot be directly mirrored by other Western countries.

We acknowledge that the first wave of the COVID-19 pandemic was a catastrophe of a magnitude never seen by living doctors. Difficult and even unpopular decisions had to be made, such as limiting access to ICBs due to age, and we herein provide evidence that such decisions had a real impact on clinical practice. It is necessary to reflect and learn from possible mistakes. To avoid these possible erroneous actions, the foundations of what should be done if the situation were to repeat itself should be laid out.

AUTHOR CONTRIBUTIONS

Òscar Miró: Conceptualization; data curation; formal analysis; investigation; methodology; supervision; writing—original draft. **Guillermo Burillo**: Data curation; investigation; supervision; writing—review and editing. **Pedro López-Ayala**: Formal analysis; investigation; methodology; writing—review and editing. **Sira Aguiló**: Data curation; investigation; writing—review and editing. **Cesáreo Fernández**: Data curation; investigation; writing—review and editing. **Aitor Alquézar**: Data curation; investigation; writing—review and editing. **Juan González del Castillo**: Conceptualization; data curation; investigation; methodology; supervision; writing—review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

ETHICS STATEMENT

The EDEN project was approved by the Clinical Research Ethics Committee of the Hospital Clínico San Carlos de Madrid (protocol HCSC/22/005-E). Due to the non-interventional design of the registry, Spanish legislation allows central Ethical Committee approval, accompanied by notification to the local Ethical Committees. Due to the retrospective and non-interventional design of the EDEN project, patient informed consent was waived. The present study was carried out in strict compliance with the principles of the Declaration of Helsinki.

DATA AVAILABILITY STATEMENT

Data are available upon request from the authors.

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PEER REVIEW

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REFERENCES

1. Vergano M, Bertolini G, Giannini A, et al. Clinical ethics recommendations for the allocation of intensive care treatments in exceptional, resource-limited circumstances: the Italian perspective during the COVID-19 epidemic. *Crit Care*. 2020; 24(1):165. https://doi.org/10.1186/s13054-020-02891-w
2. White DB, Lo B. A framework for rationing ventilators and critical care beds during the COVID-19. *JAMA*. 2020;323(18):1773-1774. https://doi.org/10.1001/jama.2020.5046
3. Rubio O, Estella A, Cabre L, et al. Ethical recommendations for a difficult decision-making in intensive care units due to the exceptional situation of crisis by the COVID-19 pandemic: a rapid review & consensus of experts. *Med Intensiva*. 2020; 44(7):439-445. https://doi.org/10.1016/j.medine.2020.06.002
4. González Del Castillo J, Jacob J, García-Lamberechts EJ, et al. 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;34:428-436.
5. Miró O, Jacob J, García-Lamberechts EJ, et al. Sociodemographic characteristics, functional status, and health resource use of older patients treated in Spanish emergency departments: a description of the EDEN cohort. *Emergencias*. 2022;34:418-427.
6. Jung C, Guidet B, Flaatten H, et al. On behalf of the VIP study group. Frailty in intensive care medicine must be measured, interpreted and taken into account. *Intensive Care Med*. 2023;49(1):87-90. https://doi.org/10.1007/s00134-022-06887-8
7. Escudero-Acha P, Leizaola O, Lázaro N, et al. Age as a limiting factor of admission to an intensive care unit. *Med Intensiva*. 2021;45(8):e47-e49. https://doi.org/10.1016/j.medine.2021.08.012
8. Calastri C, Hess S, Wilson B. How did the use of ED change during the first wave of the SARS-CoV-2 pandemic in the UK? An observational study. *Emerg Med J*. 2023;40(7):518-524. https://doi.org/10.1136/emermed-2021-212058
9. Schranz M, Boender TS, Greiner T, et al. Changes in emergency department utilisation in Germany before and during different phases of the COVID-19 pandemic, using data from a national surveillance system up to June 2021. *BMC Publ Health*. 2023;23(1):799. https://doi.org/10.1186/s12889-023-15375-7
10. Joebges S, Biller-Andorno N. Ethics guidelines on COVID-19 triage-an emerging international consensus. *Crit Care*. 2020;24(1):201. https://doi.org/10.1186/s13054-020-02927-1

APPENDIX

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