

Factors associated with in-hospital mortality in octogenarians managed by geriatric service in a referral hospital in Colombia

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Carlos Mario Cortes Bahamon^{1,2}, Jenny Rodríguez Ángel^{1,2} ,
Jennifer Katherine Ballesteros Tapias², Diego Andrés Chavarro-Carvajal^{1,2} 
and Oscar Mauricio Muñoz³ 

Abstract

Introduction: The demographic transition has significantly increased the number of hospitalizations in octogenarian patients. Previous studies have documented the importance of clinical, functional, and cognitive variables for in-hospital mortality risk, but their frequency and importance in Latin American populations is yet to be described. It is important because Colombia has multiple ethnic races, with different types of longevity, and we have a history of social violence that affects our life expectancy. The aim of this study is to define which risk factors are associated with in-hospital mortality in octogenarians, and how frequent they are and quantify the weight of each of these factors in the outcomes.

Methodology: We present an analytical observational retrospective cohort study in adult patients over 80 years of age hospitalized and followed by the geriatrics service at Hospital Universitario San Ignacio (Bogotá, Colombia). The association between in-hospital mortality and multiple clinical, functional, and cognitive variables was evaluated by means of univariate and multivariate logistic regression analysis.

Results: A total of 1235 hospitalizations were analyzed (age 85.5 ± 4.4 years, 58.62% women). Malnutrition was documented in 22.4%, dependency for basic activities (Barthel ≤ 95) in 75.9%, and positive screening for frailty (FRAIL ≥ 3) in 55.3%. Mortality was 5.67%. Factors independently associated with mortality were history of cancer (Odds ratio (OR): 2.31; 95% Confidence interval (CI): 1.34–3.98, $p < 0.003$), delirium (OR: 2.48; 95% CI: 1.44–4.28, $p < 0.001$), malnutrition (OR: 2.50; 95% CI: 1.46–4.28; $p = 0.001$), frailty (OR: 2.25; 95% CI: 1.13–4.45, $p = 0.019$), tachypnea on admission (OR: 1.09; 95% CI: 1.03–1.14, $p = 0.002$), and creatinine elevation (OR: 2.47; 95% CI: 1.47–4.15, $p = 0.001$).

Conclusion: Factors easily identifiable at hospital admission and amenable to intervention could predict an increased risk of mortality in octogenarian patients, such as the presence of malnutrition, frailty, and delirium. These findings facilitate the estimation of mortality risk and serve as a starting point to investigate the potential benefit of early interventions in this population.

Keywords

delirium, older adults, frailty, hospital mortality, malnutrition, hospital mortality

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Introduction

Colombia is undergoing a major demographic transition. The percentage of adults over 60 years of age was 13.9% by 2021.¹ This is expected to reach 17.5% by 2030 and up to 24.7% by 2050.² Mortality in this age group is high and variable. Previous studies have shown overall mortality rates of 6.7% by 2013,³ being higher in hospitalized patients, up to 14%.⁴

Different factors have been associated with overall mortality in older adults, such as malnutrition,⁵ frailty,⁶ and

¹Geriatrics Unit, Hospital Universitario San Ignacio, Bogotá, Colombia

²Institute of Aging of the Pontificia Universidad Javeriana, Bogotá, Colombia

³Department of Internal Medicine, Hospital Universitario San Ignacio, Pontificia Universidad Javeriana, Bogotá, Colombia

Corresponding author:

Carlos Mario Cortes Bahamon, Institute of Aging of the Pontificia Universidad Javeriana, Carrera 7 nro. 40-62. Floor 8, Bogotá 111101, Colombia.

Email: cm-cortes@javeriana.edu.co



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functional dependence.⁷ Although these risk factors are widely described worldwide, the frequency of these factors in Colombia may be different due to individual characteristics of social groups and population differences in the specific social determinants of health because Colombia has multiple ethnic races, and we have a history of social violence that affects our life expectancy.⁸ The specific weight of this association in our population may be different. The early identification of risk factors for mortality during inpatient treatment could contribute to proposing prompt and timely interventions to improve the prognosis for these patients.⁹

The objective of this study is to evaluate a cohort of patients over 80 years of age who were hospitalized in a high-complexity hospital in Bogota, Colombia, to define what are the risk factors most associated with in-hospital mortality, their frequency, and the weight of each of these factors in the outcome.

Methodology

Study design

Analytical observational study based on a retrospective cohort that included every adult patient over 80 years of age who was hospitalized for nonsurgical causes at Hospital Universitario San Ignacio (Bogotá, Colombia) between 1 July 2019 and 31 July 2020, and was followed up by the geriatrics service. Patients referred to another institution during hospitalization were excluded since it was impossible to determine the outcome of interest. Patients with a confirmed diagnosis of COVID-19 infection were also excluded because their mortality rate was higher than that for the general population. Ethical approval for this study was obtained from the Institutional Ethics Committee of the San Ignacio University Hospital and the Pontificia Universidad Javeriana in Bogota, Colombia with approval code (FM- CIE-0748-21). Written informed consent was waived by the institutional review board in the same approval code because data collection was retrospective, based on medical records review after patient treatment. Considering the large study sample, a notable percentage of the patients died (5.67%) and another large percentage of the patients did not return, the informed consent could not be provided to the population studied. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors, and the authors declare no conflict of interest in preparing this article.

The participant population was identified from the standardized registry of geriatric patients (REG-GER), which systematically includes all hospital admissions of older adult patients who enter the hospital and are evaluated by this service. For each patient, the variables of interest are systematically recorded using a standardized format, including demographic variables (age, sex), comorbidities, vital signs on admission, hospitalization diagnosis, initial paraclinical tests (taken within the first 48 h), functionality, frailty, mal-

nutrition on admission, mental sphere variables, and previous diagnosis of major neurocognitive disorder.

Hospitalization diagnoses were nonsurgical medical diagnoses divided by system (i.e., cardiovascular diseases, infectious diseases, or respiratory pathologies). The presence at the admission of tachycardia (heart rate > 100), fever (temperature $\geq 38.3^{\circ}\text{C}$), systolic hypertension (>140 mmHg), or systolic hypotension (<90 mmHg) was evaluated. Paraclinical variables of interest were the presence of leukocytosis (>10,000 cells/ μL), elevated creatinine (>1.2 mg/dL), which was coded as renal failure,^{10,11} and anemia (hemoglobin < 12 g/dL in women or <13 in men).¹² Within geriatric syndromes, *recurrent falls syndrome* was defined as two or more falls within the last year.¹³ Malnutrition was defined as a score ≤ 7 on the MNA-SF (*Mini Nutritional Assessment short form*).¹⁴ Functional dependence was categorized using the Barthel scales for the assessment of primary activities (Independence 100 points, mild dependence from 60 to 95 points, moderate dependence from 55 to 40 points, severe dependence from 35 to 20 points, and total dependence < 20 points),¹⁵ and the Lawton and Brody scale for the evaluation of instrumental activities (Total dependence: 0–1 points, severe dependence: 2–3 points, moderate dependence: 4–5 points, mild dependence: 6–7 points and autonomy: 8 points).¹⁵ Frailty was screened using the Frail scale (frailty > 3, prefrailty: 1–2, and robust with a score of 0).¹⁵ The mental sphere was evaluated with the confusion assessment method scale recorded at admission for clinical discrimination of delirium, taking it as positive when the values were above 3 points.¹⁵

Statistical analysis. The Freeman method was used for size calculation.¹⁶ Twelve variables, including demographic, clinical, paraclinical, functional, and mental variables, were evaluated. Assuming a mortality rate of 10%, the required sample size was 1200 patients.

Quantitative variables are presented as central tendency and dispersion measures, and qualitative variables are absolute numbers and percentages. To evaluate the association between mortality and the different factors, we proposed a logistic regression model, first univariate and then multivariate, including in the latter the variables identified as significant in the initial univariate analysis and the variables identified as associated with mortality in the literature reviewed; a value of $p < 0.05$ was considered significant. STATA software (Stata Statistical; Release 17; StataCorp LLC, College Station, TX, USA) was used for the analysis.

Results

A total of 1235 hospitalizations were included. The mean age of the patients evaluated was 85.5 ± 4.4 years, mostly women (58.6%). The most prevalent comorbidities were arterial hypertension (70.5%), chronic obstructive pulmonary disease (33.1%), and diabetes (23.7%).

Table 1. Baseline characteristics of hospitalized octogenarian patients.

Variable	n = 1235	Survivors n = 1165 (94.33%)	Fatalities n = 70 (5.67%)	p-Value
Age, years, mean (SD)	85.4 (4.34)	85.4 (4.34)	86.52 (4.73)	0.0387
Female sex, n (%)	724 (58.62)	681 (58.45)	43 (61.46)	0.624
Comorbidity, n (%)				
Arterial hypertension	871 (70.53)	824 (70.73)	47 (67.14)	0.523
Chronic obstructive pulmonary disease	418 (33.05)	392 (33.65)	26 (37.14)	0.548
Diabetes	193 (23.72)	279 (23.95)	14 (20.00)	0.451
Cancer	247 (20.00)	220 (18.88)	27 (38.57)	<0.001
Ischemic heart disease	191 (15.47)	186 (15.73)	5 (7.14)	0.047
Chronic kidney disease	173 (14.01)	155 (13.56)	15 (21.43)	0.066
Fractures	141 (11.42)	133 (11.42)	8 (11.42)	0.997
Osteoarticular disease	142 (10.86)	127 (10.90)	7 (10.00)	0.814
Heart failure	134 (10.85)	130 (11.16)	5 (7.14)	0.296
Cerebrovascular disease	81 (6.56)	77 (6.61)	4 (5.71)	0.769
Angina	3 (0.24)	3 (0.26)	0	0.671
Asthma	2 (0.16)	2 (0.17)	0	0.729
Clinical area, n (%)				
Malnutrition at entry	276 (22.35)	245 (20.18)	38 (40.86)	<0.001
Recurrent falls	123 (9.96)	117 (9.64)	10 (10.75)	0.213
Dysphagia	90 (7.29)	82 (6.76)	12 (12.9)	0.015
Functional sphere, n (%)				
Dependency in ABVD	926 (75.90)	891 (74.44)	79 (86.81)	<0.001
Frail	683 (55.30)	649 (53.46)	73 (78.41)	<0.001
Lawton and Brody**, mean (SD)	3.55 (2.94)	3.76 (2.94)	2.46 (2.77)	0.002
Mental sphere, n (%)				
Delirium on admission	225 (18.22)	202 (16.64)	41 (44.09)	<0.001
Dementia	335 (28.66)	328 (28.60)	11 (11.83)	0.014

ABVD: dependence on basic activities of daily living; SD: standard deviation.

Bold: Significant p-Values <0.05.

**Data from Lawton and Brody found 344 patients registered.

In the clinical sphere, the most frequent geriatric syndromes were the presence of malnutrition (22.4%) and recurrent falls syndrome (9.96%); in the functional sphere, some degree of dependence for basic activities (Barthel \leq 95) was found in 75.9% and positive screening for frailty (FRAIL \geq 3) in 55.3%. In the mental sphere, a previous diagnosis of dementia was identified in 43.6% and delirium at admission in 18.2%. The characteristics of the patients included are presented in Table 1. The most frequent paraclinical alterations in the first 48 h were the presence of leukocytosis (35.6%) and anemia (25.3%) (Table 2).

Mortality was 5.67% ($n=70$), with a mean hospital stay of 5.4 with a p -value of 0.0016 days. When comparing the admission characteristics of the patients who died with the survivors, tachycardia (p -value=0.007), tachypnea (p -value<0.001), hypotension (p -value<0.001), and hypertension (p -value<0.001) were more frequent in the first group, but not fever (Table 2). Tachycardia was the most frequent alteration in the patients who died (32.8%). At the same time, systolic hypertension was the most frequent

alteration among the survivors (32.8%). Similarly, among the deceased, infectious diseases, cardiovascular diseases, renal failure, and cancer were the most frequent diagnoses. Hospital stay was longer in the deceased (Median 7.52 vs 5.41 days, $p < 0.01$).

Univariate analysis showed an association with mortality for the following variables: diagnoses of infection on admission, presence of cancer and cardiovascular pathologies as comorbidities, evidence of tachycardia, hypertension, hypotension, alterations in respiratory frequency, presence of renal failure and paraclinical alterations due to leukocytosis, lymphocytosis, and anemia (see Table 2). Multivariate logistic regression analysis showed an independent association between mortality and cancer (OR: 2.31, 95% CI: 1.34–3.98, $p < 0.003$), delirium (OR: 2.48, 95% CI: 1.44–4.28, $p < 0.001$), malnutrition (OR: 2.50; 95% CI: 1.46–4.28, $p = 0.001$), frailty (OR: 2.25, 95% CI: 1.13–4.45, $p = 0.019$), the altered respiratory rate on admission (OR: 1.09, 95% CI: 1.03–1.14, $p = 0.002$), and creatinine elevation (OR: 2.47, 95% CI: 1.47–4.15, $p = 0.001$) (Table 3).

Table 2. Diagnoses, complications, and outcomes in the study population.

Variable	Survivors <i>n</i> = 1165 (94.33%)	Fatalities <i>n</i> = 70 (5.67%)	<i>p</i> -Value
Clinical diagnoses <i>n</i> (%)			
Respiratory	277 (23.78)	15 (21.43)	0.653
Infectious	137 (12.27)	16 (22.85)	0.006
Cancer	29 (2.49)	10 (14.29)	< 0.001
Cardiovascular	317 (26.11)	9 (9.68)	< 0.001
Gastrointestinal	171 (14.09)	9 (9.68)	0.234
Thromboembolic	22 (1.81)	4 (4.30)	0.098
Renal	41 (3.38)	2 (2.15)	0.523
Mental diagnoses <i>n</i> (%)			
Previous dementia	504 (43.30)	33 (47.83)	0.461
Depression	68 (5.84)	2 (2.90)	0.305
Vital signs at admission, <i>n</i> (%)			
Tachycardia	228 (19.72)	23 (32.86)	0.007
Hypertension	485 (41.63)	15 (21.43)	< 0.001
Fever	156 (13.29)	13 (18.57)	0.284
Hypotension	52 (4.46)	10 (14.2)	< 0.001
Oxygen saturation, mean (SD)	89.0 (5.2)	88.3 (7.7)	0.2761
Respiratory frequency, mean (SD)	19.9 (3.4)	21.5 (5.0)	< 0.001
Paraclinical at admission, <i>n</i> (%)			
Renal failure	361 (30.9)	40 (57.1)	< 0.001
Leukocytosis	400 (34.3)	38 (54.2)	< 0.001
Anemia men	184 (38.02)	15 (55.56)	0.069
Anemia women	158 (13.20)	22 (51.16)	< 0.001
Lymphocytes, mean (SD)	1757 (2553)	2832 (2219)	< 0.001
Complications during hospitalization, <i>n</i> (%)			
Pressure injury	4 (0.3)	4 (5.7)	< 0.001
Delirium	22 (1.8)	4 (5.7)	< 0.001
Recurrent falls	2 (0.1)	1 (1.0)	< 0.001
Disencounters during hospitalization			
Days hospital stay, mean (SD)	5.41 (5.4)	7.52 (5.9)	0.0016

ABVD: dependence on basic activities of daily living; CAM: confusion assessment method; SD: standard deviation; MNA-SF: mininutritional assessment short form.

Bold: Significant *p*-Values <0.05.

Table 3. Factors associated with in-hospital mortality in adults over 80 years of age. Multivariate analysis.

Variable	Raw analysis		Adjusted analysis	
	OR (95% CI)	<i>p</i> -Value	OR (95% CI)	<i>p</i> -Value
Age (average)	1.045 (1.00–1.11)	0.04	1.02 (0.96–1.08)	0.436
History of cancer	2.69 (1.63–4.46)	<0.001	2.31 (1.34–3.98)	0.003
Delirium on admission (CAM ≥ 3)	4.51 (2.75–7.40)	<0.001	2.48 (1.44–4.28)	< 0.001
Malnutrition at admission (MNA-SF ≤ 7)	4.08 (2.50–6.59)	<0.001	2.50 (1.46–4.28)	0.001
Frail (FRAIL ≥ 3)	4.17 (2.21–7.85)	<0.001	2.25 (1.13–4.45)	0.019
Respiratory frequency (average)	1.11 (1.04–1.15)	<0.001	1.09 (1.03–1.14)	0.002
Renal failure	2.96 (1.82–4.84)	<0.001	2.47 (1.47–4.15)	0.001
Days hospital stay (average)	1.04 (1.01–1.07)	0.006	1.03 (1.00–1.15)	0.046

CAM: confusion assessment; FRAIL: fatigue resistance, aerobic, illnesses, loss of weight; MNA-SF: mini nutritional assessment short form.

Bold: Significant *p*-Values <0.05.

Discussion

This study conducted in patients over 80 years of age hospitalized by the geriatrics service at a referral hospital in Bogotá, Colombia, identified factors associated with

in-hospital mortality, highlighting the presence of cancer, delirium, malnutrition, frailty, renal failure, and tachypnea as powerful predictors of fatal outcomes in this population.

The first interesting finding was the mortality rate, which was 5.6%, notably lower than that reported in other Latin

American hospitals, as in the Lama Valdivia study in Peru, where the cumulative incidence of mortality was 12.5% even though the patients included were younger, with a mean age of 60 years.⁴ In this study, the authors suggest that mortality has decreased over time.⁴ The differences in mortality may be explained by the fact that in their population, there was a higher proportion of functional dependence despite being a younger population.

Comparing the mortality rate with that reported in the study by Cortes Sierra (37%),¹⁷ the differences may be due to the lower prevalence of cancer in our population (20% vs 39%), especially if we consider that cancer in our patients was not always one of the direct causes of the fatal outcome. However, a history of cancer showed an increased risk of mortality independent of disease stage of up to 2.31 times (95% CI: 1.34–3.98) in our study.

Arterial hypertension, with 70.5%, was above cancer as the most frequent comorbidity; however, when the data were analyzed, there was no statistical association with in-hospital mortality, probably because only 26.1% of the hospitalization diagnoses corresponded to cardiovascular causes. Mortality was lower among patients admitted with isolated systolic hypertension, which may be associated with less tissue hypoperfusion in these patients.

History of ischemic heart disease was associated with mortality in the univariate analysis by the WHO, with ischemic heart disease being the leading cause of mortality worldwide, at 16% in 2020.¹⁸ In this cohort, the prevalence of patients who died with this diagnosis was 9.7%. However, in contrast to the study by Silva et al.,¹⁹ where ischemic heart disease was identified as a significant predictor of in-hospital mortality in older patients, our study did not find a statistically significant association between this condition and in-hospital mortality. This discrepancy may be explained by differences in the population characteristics, as well as the chronological difference between the studies.

We screened for frailty using the FRAIL instrument, finding it in more than half of the patients, a finding that was associated with up to a 2.25-fold increase in mortality. It has been previously described in two studies. The FRADEA study showed that frail patients had up to a 4.7-fold increase in mortality.⁶ Similarly, the Tufan et al.²⁰ study, determined that frailty, malnutrition, and sarcopenia were the most common values associated with mortality. They found a higher prevalence of frailty in nonsurvivors (100% vs 74.3% in survivors).

In the FRADEA study, the decrease in physiological reserve in these patients leads to a decrease in the capacity to respond to chronic or acute stressors.^{6,21} The estimate of the weight of frailty as an estimator of mortality was lower in the systematic review by Gotaro Kojima, who found that the OR was between 1.02 and 1.89.²² The discordance in estimation may be due to differences in follow-up time and in the instruments used to measure frailty. For example, in the FRADEA study, they used frailty phenotype; in the systematic review,

they used the calculation of deficit accumulation or frailty index. It will, therefore, be necessary to standardize the diagnostic and screening tools in the older adult population when talking about frailty.

It is striking that functional dependence in our study was not associated with in-hospital mortality, unlike what was reported by Lozano Keymolen et al.,⁷ where it was evidenced that the risk increases with the degree of functional dependence. This may be explained by the fact that most of our patients had mild dependence, limiting our probability of finding this association.

An interesting finding was the increase in mortality up to 2.5 times in patients with malnutrition, similar to that found in Ronson's study in Argentina⁵ and by Rodríguez M. in the Colombian population, pointing out that malnutrition not only behaves as a risk factor but also as a causal agent. For the census from 2014 to 2016, 3275 deaths due to malnutrition in older adults were documented in Colombia, being more frequent in octogenarians.²³ This association is explained by the relationship between malnutrition with iron deficiency anemia, falls, predisposition to infectious pathologies, and increased risk of hospital admissions.^{23,24} Further studies should determine whether early intervention could have a benefit in reducing the risk of in-hospital death.

Delirium was associated with 2–3 times higher mortality risk among hospitalized patients older than 80 years of age, similar to the findings of Carrasco.²⁵ This finding reinforces the importance of implementing institutional strategies that actively seek to reduce its incidence, as demonstrated by the existing evidence on the benefits of multicomponent interventions in the prevention of delirium in hospitalized patients.²⁶

Our study also documents that identifiable characteristics during the patient's evolution may be associated with mortality, such as prolonged hospital stay, as shown by previous studies that found that a stay of more than 5 days has a higher risk of mortality^{27,28} given the complex combination of multiple comorbid conditions and polypharmacy.²⁹ Thus, interventions in patients approaching this threshold could reduce the risk, such as programs to achieve early and safe discharge, identifying individual needs, and the treatment by multidisciplinary teams including the clinical nutrition service, rehabilitation therapies, and pharmacological surveillance.

Different independent factors are associated with the risk of hospital mortality in older adults. Malnutrition and frailty seem to be more frequent in Latin America. Identifying these factors makes it possible to promote early and timely interventions to reduce the risk of mortality among octogenarians.

The results of this study provide a novel perspective by focusing on the Latin American population, specifically octogenarians in Colombia, a demographic group characterized by unique social, ethnic, and historical contexts. While prior research has documented the significance of clinical, functional, and cognitive variables in predicting in-hospital mortality among older adults, few studies have examined

this topic in Latin America. The distinct demographic and epidemiological profile of this region, shaped by diverse ethnic backgrounds and a history of social violence, may influence the prevalence and impact of these risk factors.

This article contributes significantly to our knowledge by identifying specific, modifiable predictors of in-hospital mortality in a population that has been underrepresented in previous studies. The findings emphasize malnutrition, frailty, and delirium—factors often under prioritized in acute care settings—as critical targets for early intervention. Additionally, the study highlights the utility of easily identifiable admission characteristics, such as vital signs and basic laboratory values, in predicting outcomes.

By providing data derived from a comprehensive geriatric assessment in a high-complexity hospital setting, this research not only corroborates findings from global studies but also enriches them with insights tailored to the Latin American context. This contribution lays the groundwork for designing interventions and predictive tools that address the specific needs of aging populations in similar sociocultural and healthcare environments.

Our study has important strengths, such as the comprehensive geriatric assessment with a holistic view of hospitalized patients, including functional, mental, and clinical demographic variables. The main limitation of this research is the relatively small number of mortality events, which may generate imprecision in the estimates. Another limitation is the determination of malnutrition using screening tools, which provide us a diagnostic suspicion of risk of malnutrition or malnutrition, but not a confirmatory diagnosis. Future studies in which the diagnosis of malnutrition is confirmed with etiological or phenotypic criteria (GlobalLeadership Initiative on Malnutrition criteria)³⁰ will be necessary to confirm our findings.

Conclusion

This study identifies clinical, functional, and mental factors associated with in-hospital mortality among octogenarians treated by a geriatrics service in a reference hospital in Colombia. Key findings reveal significant associations between mortality risk and conditions such as cancer, malnutrition, frailty, delirium, tachypnea at admission, and elevated creatinine, underscoring the importance of comprehensive evaluation at hospitalization.

Malnutrition, associated with a 2.5-fold increase in mortality risk, emerges as a prevalent yet potentially reversible issue. This finding aligns with previous studies in Latin America, highlighting the need for early screening and nutritional interventions as part of a multidisciplinary approach. Similarly, frailty, present in over half of the patients, was significantly linked to increased mortality risk, suggesting that geriatric rehabilitation programs aimed at enhancing functional reserve could benefit this population.

Delirium, another critical factor identified, was associated with a 2- to 3-fold higher risk of mortality, emphasizing the need for institutional strategies to prevent its occurrence. Multicomponent interventions addressing precipitating factors and ensuring a safe hospital environment have proven effective and should be prioritized in in-hospital geriatric care.

Another notable finding is that, although cancer independently increased mortality risk, it was not always the direct cause of death. This underscores the importance of early palliative care focused on improving quality of life and symptom management for these patients.

Finally, the study highlights the utility of easily measurable admission characteristics, such as altered vital signs and laboratory parameters, for estimating mortality risk. Implementing predictive tools based on these findings could enhance risk stratification and enable personalized interventions to mitigate mortality risk.

This study underscores the importance of a comprehensive geriatric assessment to identify modifiable risk factors and develop strategies to reduce in-hospital mortality among octogenarians. These findings serve as a foundation for future research aimed at validating mortality prediction scales and evaluating the effectiveness of targeted interventions, such as nutritional optimization, functional rehabilitation, and delirium prevention. Such efforts have the potential to transform care for older adults, improving clinical outcomes and quality of life in this vulnerable population.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics approval

Ethical approval for this study was obtained from the Institutional Ethics Committee of the San Ignacio University Hospital and the Pontificia Universidad Javeriana in Bogota, Colombia with approval code (FM- CIE-0748-21).

Informed consent

Informed consent was not sought for this study because the Institutional Ethics Committee of the San Ignacio University Hospital and the Pontificia Universidad Javeriana in Bogota, Colombia with approval code (FM- CIE-0748-21). Written informed consent was waived by the institutional review board in the same approval code because data collection was retrospective, based on medical records review after patient treatment. Considering the large study sample, a notable percentage of the patients died (5.67%) and another large percentage of the patients did not return, the informed consent could not be provided to the population studied.

Trial registration

Not applicable.

ORCID iDs

Jenny Rodríguez Ángel  <https://orcid.org/0000-0002-9163-6164>

Diego Andrés Chavarro-Carvajal  <https://orcid.org/0000-0002-8584-3191>

Oscar Mauricio Muñoz  <https://orcid.org/0000-0001-5401-0018>

References

- DANE. Quality of Life Survey. Older people in Colombia, towards inclusion and participation [Internet]. XV International Congress on Aging and Old Age: Decade of Healthy Aging 2020–2030; 2021.
- Arrieta Romero MA, Lara MA and Rojas KG. Older persons in Colombia: towards inclusion and participation. *Dane information for all*, 2022.
- Otero A. Departmental differences in the causes of mortality in Colombia. *Banco de la república, centro de estudios económicos regionales*, 2013.
- Lama Valdivia J, Cedillo-Ramirez L and Soto A. Factors associated with mortality in hospitalized older adults in an internal medicine service. *Rev Peru Med Exp Public Health* 2021; 38(2): 284–290.
- Roson M, Benchimol J, Rodota L, et al. Effect of nutritional status on mortality and functional recovery in older adults with hip fracture. *Acta Ortop Mex* 2021; 34(2): 96–102.
- Martínez-Reig M, Flores Ruano T, Fernández Sánchez M, et al. Frailty as a predictor of mortality, incident disability and long-term hospitalization in Spanish elderly FRADEA study. *Rev Esp Geriatria Gerontol* 2016; 51(5): 254–259.
- Lozano Keymolén D, Montoya Arce BJ, Gaxiola Robles, Linares SC, et al. Functional dependence and its relationship with overall mortality in older adults. Mexico: 2001–2015. *Poblac Salud En Mesoamérica* 2017; 15(2): 38–68.
- Tamayo Giraldo FJ, Baracaldo Pinzón LI, Valencia Almonacid SL, et al. Active aging index in Colombia: analysis based on the National Survey of Health, Well-being and Aging (SABE Colombia 2015). *Rev Panam Public Health* 2021; 45: e69.
- Teresa Vidán Astiz M, Sánchez García E, Alonso Armesto M, et al. Functional deterioration during hospitalization in the elderly. Benefits of admission to the geriatrics service. *Rev Esp Geriatria Gerontol* 2008; 43(3): 133–138.
- Verhave JC, Fesler P, Ribstein J, et al. Estimation of renal function by serum creatinine and predictive formulas in Cuban lithiasic population. *Rev Cuba Med* 2014; 53(3): 254–265.
- Chronic Kidney Disease Prognosis Consortium; Matsushita K, van der Velde M, et al. Association of estimated glomerular filtration rate and albuminuria with all-cause and cardiovascular mortality in general population cohorts: a collaborative meta-analysis. *Lancet* 2010; 375(9731): 2073–2081.
- World Health Organization (WHO). *Guideline on haemoglobin cutoffs to define anaemia in individuals and populations*. Geneva: WHO, 2024.
- Curcio C, Gomez F and Osorio J. Recurrent falls in the elderly. *Acta Medica Colomb* 2019; 34(3): 103–110.
- Chavarro-Carvajal DA, Heredia R and Venegas LC. *Frequently used scales in geriatrics* [Internet]. 2a edition. Bogotá, Colombia; 2020, pp. 27–28.
- Chavarro-Carvajal DA, Heredia R and Venegas LC. *Frequently used scales in geriatrics* [Internet]. 2a edition. Bogotá, Colombia, 2020, pp. 49–60.
- IBM. Friedman test. IBM, 2024.
- Cortés-Sierra D, Forero-Durán NJ, Sarmiento-Reyes ÉM, et al. Mortality in patients hospitalized in the internal medicine service of a University Hospital in Bogotá. *Acta Méd Colomb* 2019; 44(1): 11–16.
- World Health Organization. *Top 10 causes of death*. Geneva: World Health Organization, 2020.
- Silva TJ, Jerussalmy CS, Farfel JM, et al. Predictors of in-hospital mortality among older patients. *Clinics (Sao Paulo)* 2009; 64(7): 613–618.
- Tufan A, Tolu T, Senturk Durmus N, et al. FRAIL Scale: an independent predictor of in-hospital mortality among older adults. *Eur Rev Med Pharmacol Sci* 2023; 27(21): 10396–10402.
- Acosta-Benito MÁ and Martín-Lesende I. Frailty in primary care: diagnosis and multidisciplinary management. *Aten Prim* 2022; 54(9): 102395.
- Kojima G, Iliffe S and Walters K. Frailty index as a predictor of mortality: a systematic review and meta-analysis. *Age Ageing* 2018; 47(2): 193–200.
- Rodríguez MG and Sichacá EG. Mortality due to malnutrition in the elderly, Colombia, 2014–2016. *Biomédica* 2019; 39(4): 663–672.
- Espinosa EH, Abril-Ulloa V and Encalada TL. Prevalence of malnutrition and associated factors in older adults in the canton of Gualaceo, Ecuador. *Rev Chil Nutr* 2019; 46(6): 675–682.
- Carrasco M and Zalaquett M. Delirium: an epidemic from the emergency department to the critical patient unit. *Rev Méd Clín Las Condes* 2017; 28(2): 301–310.
- Siddiqi N, Harrison JK, Clegg A, et al. Interventions for preventing delirium in hospitalized non-ICU patients. *Cochrane Database Syst Rev* 2016; 3(3): CD005563.
- López Pardo P, Socorro García A and Baztán Cortés JJ. Influence of length of hospital stay on mortality after discharge in elderly patients with acute medical pathology. *Gac Sanit* 2016; 30(5): 375–378.
- Herrera Viloche M. Prolonged hospital stay associated with mortality in Hospital Regional Docente de Trujillo, 2014. *Rev ECIPerú* 2018; 63–67.
- Tal S. Length of hospital stay among oldest-old patients in acute geriatric ward. *Arch Gerontol Geriatr* 2021; 94: 104352.
- Gutiérrez Oliet M and León Sanz M. GLIM (Global Leadership Initiative on Malnutrition) criteria: development, validation and application in clinical practice. *Nutr Clin En Med* 2022; XVI(3): 195–207.