Delirium in hospitalized older adults: influence of sociodemographic and clinical factors in a longitudinal study

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Abstract

Objective: To analyze the effects of sociodemographic and clinical characteristics on the occurrence of delirium in hospitalized older adults. Method: A prospective longitudinal study was conducted with 427 older adults aged ≥60 years without delirium at hospital admission, between March 2022 and July 2023. Delirium was monitored daily until discharge or death. Kaplan–Meier curves were used to estimate survival, and Cox proportional hazards regression was used to calculate hazard ratios (95% CI), assessed using the Wald test. The proportional hazards assumption was verified using Schoenfeld residuals. Results: The risk of delirium was 5.47 times higher in frail individuals, 2.5 times higher in those receiving palliative care, and 2.51 times higher in individuals with dementia. Income greater than 3.1 minimum wages was a protective factor, reducing the risk by 71% compared with the 0–1 minimum wage category. Older adults with hospitalizations in the previous 12 months had a 56% lower risk of delirium. Age ≥80 years (p=0.0007), widowhood (p=0.0142), low body weight (p=0.0002), frailty (p<0.001), dementia (p≤0.0001), and palliative care (p≤0.0001) were associated with shorter time to first delirium episode. Conclusion: Frailty, dementia, and the need for palliative care were the main risk factors for delirium in older adults, whereas higher income showed a protective effect. Recognition of these factors allow the implementation of targeted, individualized, and more effective preventive and therapeutic strategies for delirium in hospitalized older adults.

Keywords: Aged. Hospitalization. Delirium. Observational Study. Risk Factors.

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INTRODUCTION

Delirium is an acute and multifactorial neuropsychiatric syndrome, considered one of the most prevalent conditions among hospitalized older adults, due to the concomitant presence of multiple risk factors[1]. It is characterized by alterations in consciousness and attention, disorganized thinking, fluctuation in cognitive status, as well as symptoms such as hallucinations, incoherent speech, emotional lability, and disturbances of the sleep–wake cycle[2]. These manifestations reflect the vulnerability of the central nervous system in the presence of acute clinical conditions, adverse effects of medications (including intoxication or withdrawal), surgical and anesthetic procedures, and metabolic or electrolyte imbalances[3].

The epidemiology of delirium varies according to the clinical and care context. In the hospital setting, the hospitalization process itself acts as a stressor for older adults, contributing to delirium rates ranging from 18% to 35% at admission and from 11% to 29% during hospitalization[4]. In a more detailed analysis, prevalence reaches 26.2% in clinical wards, being particularly high in palliative care (55.9%) and internal medicine wards (41%)[5]. Despite its high frequency, delirium remains underdiagnosed in approximately one third of cases, compromising patient safety and quality of care[6].

The consequences of delirium extend beyond the acute episode and associated distress, being related to increased morbidity and mortality[7], prolonged length of hospital stay, persistent functional and cognitive decline[8], as well as higher rates of institutionalization after discharge and increased healthcare costs[7].

Furthermore, delirium is not a uniform entity but rather a heterogeneous syndrome that encompasses patients with different sociodemographic profiles, degrees of vulnerability, cognitive reserve, and clinical presentations. Treating all cases as "one delirium with a single cause" makes it difficult to identify specific risk factors, underlying pathophysiological mechanisms, and personalized strategies for prevention and management[9]. Moreover, recent longitudinal studies have demonstrated that, even in specific clinical scenarios, delirium is strongly associated with increased in-hospital and post-discharge mortality[10,11].

Given its high prevalence in the hospitalized geriatric population and its functional and cognitive impact, it is imperative to understand its local epidemiology, identify modifiable risk factors, and improve prevention and management strategies[12]. Nevertheless, there is a lack of studies that systematically integrate sociodemographic and clinical characteristics in the Brazilian hospital context. In addition to these limitations, there is an important gap in the analysis of time to delirium onset, an essential aspect for identifying critical periods of risk and guiding timely preventive interventions. The absence of such data limits the identification of specific risk profiles and makes the implementation of targeted interventions more difficult.

In this context, the present study aimed to analyze the effects of sociodemographic and clinical characteristics on the occurrence of delirium in hospitalized older adults in an institution located in the southern region of Brazil.

METHOD

For the systematic development of this study, the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines were followed[13].

This is a prospective longitudinal study conducted with older adults aged ≥60 years, without a diagnosis of delirium at admission, hospitalized with clinical conditions that allowed follow-up in medical or surgical wards of a medium-complexity hospital in southern Brazil. Data collection was conducted between March 2022 and July 2023, and the follow-up period corresponded to the length of hospital stay. Delirium occurrence was assessed daily as the dependent variable. The prospective longitudinal design allows the observation of outcome incidence over time in the same individual, enabling the analysis of temporal changes and associations with greater methodological robustness[14].

To define the study sample, the following inclusion criteria were defined: age ≥60 years, hospitalization, and absence of delirium at hospital admission. Individuals presenting clinical instability were excluded, defined as the presence of hemodynamic, respiratory, or metabolic alterations, or acute symptoms associated with clinical severity at the time of evaluation, as well as those under droplet precautions.

This article is a subproject of the main study entitled "Physical frailty and clinical, functional, psychosocial, nutritional outcomes and care demands in hospitalized older adults". The time frame used for sample size calculation corresponded to the pre-pandemic period (year 2019). The calculation considered a prevalence of 50% of delirium in hospitalized older adults, a 95% confidence level, and a sampling error of 5%. Based on these parameters, the minimum sample size obtained was 352 patients, to which 20% was added to account for possible losses to follow-up.

From the initial sample of 547 older adults, 120 (21.9%) presented delirium at admission and were therefore excluded from longitudinal follow-up. Thus, 427 individuals were followed daily during hospitalization. The occurrence of delirium was assessed until discharge or death. Assessments were conducted by a trained research team using validated instruments for delirium detection, and diagnoses were confirmed by a geriatrician.

For data collection, a sociodemographic and clinical questionnaire was used, including the following variables of interest: sex, age, race/ethnicity, marital status, education, income, delirium, physical frailty, comorbidities, palliative care, and history of falls. Nutritional status was classified using the Body Mass Index (BMI), with values from 22 to 27 kg/m² considered normal weight, values below this range were classified as underweight, and values above as overweight[15]. Physical frailty was classified according to the five components of the Fried phenotype, namely: handgrip strength, gait speed, fatigue/exhaustion, weight loss, and energy expenditure. Based on the measurement of these five markers, older adults were classified into three categories: frail, when three or more criteria were present; pre-frail, when one or two markers were identified; and non-frail, when none of the markers were present[16]. The dependent variable (delirium) was assessed daily using the Confusion Assessment Method (CAM), a validated instrument that investigates four cardinal features: acute onset and fluctuating course, inattention, disorganized thinking, and altered level of consciousness[17].

At baseline, sociodemographic variables, clinical history, delirium, and physical frailty were collected from participants. During the in-hospital follow-up assessments, delirium was monitored daily, from admission until discharge or death, using the Confusion Assessment Method (CAM). At the final assessment (hospital discharge), physical frailty and delirium were reassessed, maintaining the same instruments and procedures used at baseline, in order to verify changes in the status of these participants.

To analyze the occurrence of the first diagnosis of delirium in relation to demographic variables and clinical conditions, the population profile at hospital admission was compared with the diagnosis of delirium. Ninety-five percent confidence intervals (95% CI) estimated using the Wilson score were presented instead of p-values, as they provide more relevant information for clinical and epidemiological interpretation, including the magnitude of the effect and the precision of the estimates. The proportional hazards assumption was evaluated using Schoenfeld residuals.

Initially, survival analysis was explored using Kaplan–Meier curves. The log-rank test was used to compare survival curves between groups, testing whether survival times were statistically different. The null hypothesis of this test assumes that there is no significant difference in survival between the compared groups. Since the log-rank test does not allow simultaneous testing of the effect of other independent variables on survival time, semiparametric Cox proportional hazards models were performed.

In the modeling stage, crude hazard ratio (HR) estimates were presented with their respective 95% confidence intervals (95% CI). Multivariable Cox regression was used to estimate adjusted associations between the variables of interest and the time to outcome occurrence. The significance of the

covariate coefficients in the survival models was assessed using the Wald test.

The selection of independent variables to compose the multiple Cox regression model was based on theoretical and epidemiological criteria, prioritizing biological plausibility and previous literature on factors associated with delirium and survival. A full-model approach was adopted, in which all covariates of interest and adjustment variables (sociodemographic, clinical, and laboratory) were retained simultaneously in the multivariable analysis, regardless of the level of statistical significance (p-value) observed in the crude analysis. This strategy was used to ensure unrestricted control of confounding factors and to present adjusted estimates of the effect of each variable in the presence of the others, avoiding bias resulting from the exclusion of variables based purely on automated statistical criteria.

The adequacy of the final model was confirmed by the analysis of Schoenfeld residuals to verify the proportional hazards assumption. All statistical tests adopted a significance level of 5%.

The main study received approval from the Research Ethics Committee involving Human Beings of the Health Sciences Sector of the Universidade Federal do Paraná (No. 7.913.461) and from the Research Ethics Committee involving Human Beings of the Municipal Health Department of Curitiba (No. 5.055.260). All ethical principles were respected, including voluntary and informed participation of older adults and their caregivers, in accordance with the recommendations of Resolution No. 466 of the Brazilian National Health Council, dated December 12, 2012.

DATA AVAILABILITY

The entire dataset supporting the results of this study is available upon request from the corresponding author.

RESULTS

Table 1 shows that 14.05% of the older adults followed developed delirium during hospitalization. There was a predominance of females among individuals with delirium (53.3%) compared with those without delirium (52.9%). The mean age was higher in the delirium group (79.5 ± 9.79 years) compared with the non-delirium group (73.6 ± 8.25 years). Among participants who developed delirium, 48.3% were widowed and 45% reported income between 0 and 1 minimum wage.

Table 2 shows that, among individuals who developed delirium during hospitalization, the most frequent comorbidities were Chronic Obstructive Pulmonary Disease, dementia, stroke, and cancer. Among older adults without delirium, the most frequent comorbidities were hypertension, diabetes, congestive heart failure, and ischemic heart disease.

Figure 1 shows that frailer older adults ($p<0.0001$), those aged over 80 years ($p=0.0007$), widowed individuals ($p=0.0142$), those receiving palliative care ($p\leq0.0001$), those with low body weight ($p=0.0002$), and those diagnosed with dementia ($p\leq0.0001$) experienced the first episode of delirium earlier during hospitalization. Income higher than three minimum wages was identified as a protective factor for incident delirium ($p=0.0106$).

Table 1. Frequency distribution of sociodemographic characteristics according to delirium occurrence (N=427). Curitiba, PR, 2022–2023.

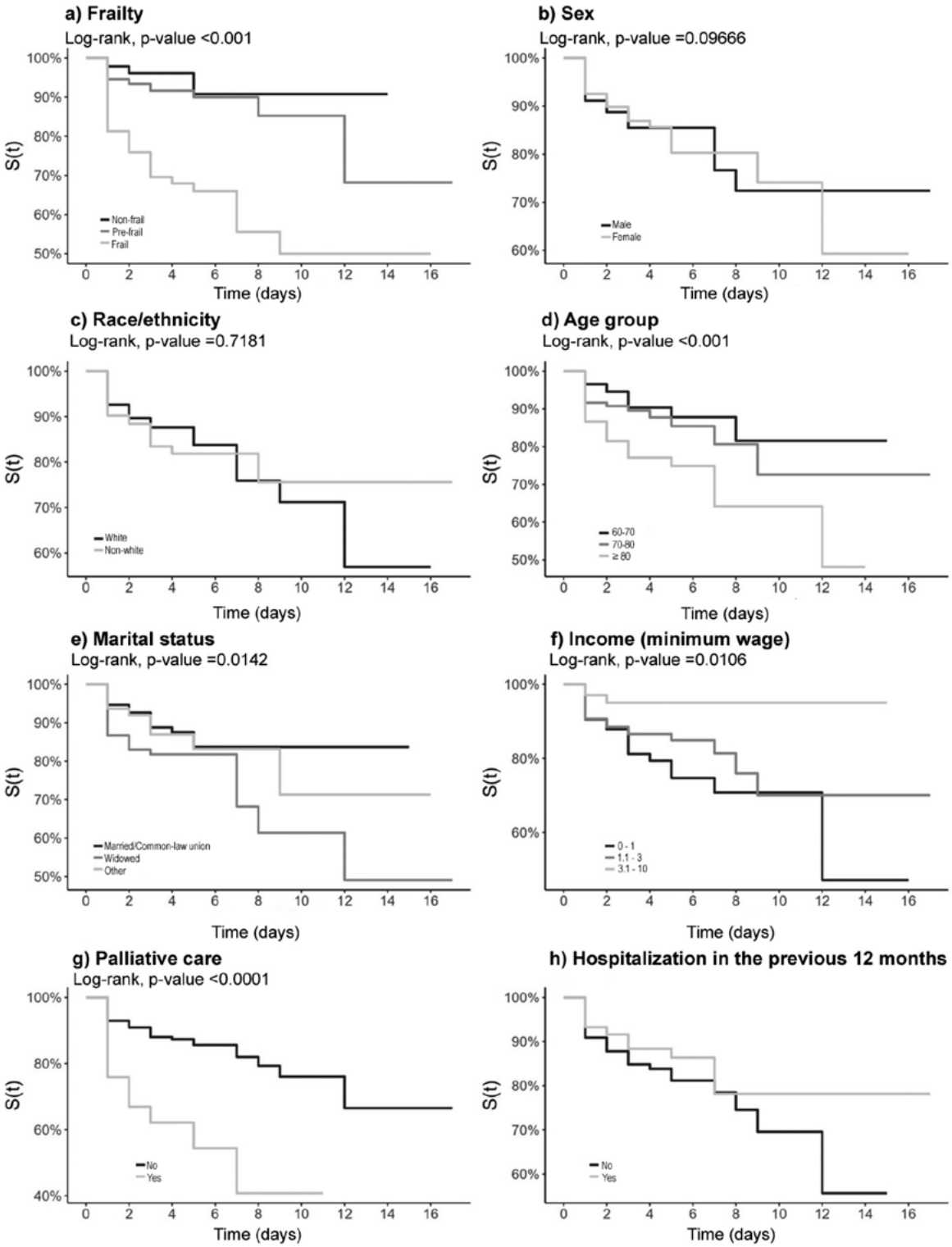
Variables	Occurrence of delirium			
	Yes		No	
	(N=60)	Relative frequency (95% CI)	(N=367)	Relative frequency (95% CI)
Sex				
Female	32	53.3% (40.9; 65.4)	194	52.9% (47.8; 57.9)
Male	28	46.7% (34.6; 59.1)	173	47.1% (42.1; 52.2)
Age				
Mean (SD)	79.5 (9.79)		73.6 (8.25)	
Median [Min, Max]	79 [60.100]		73 [60.95]	
Race/ethnicity				
White	38	63.4% (50.7; 74.4)	246	67% (62.1; 71.6)
Mixed-race	17	28.3% (18.5; 40.8)	99	27% (22.7; 31.7)
Black	5	8.3% (3.6; 18.1)	19	5.2% (3.3; 7.9)
Other	0	0% (0; 6)	3	0.8% (0.3; 2.4)
Marital status				
Married / Common-law union	21	35.1% (24.2; 47.6)	184	50.1% (45; 55.2)
Widowed	29	48.3% (36.2; 60.7)	114	31.1% (26.5; 36)
Divorced	5	8.3% (3.6; 18.1)	49	13.4% (10.2; 17.2)
Single	5	8.3% (3.6; 18.1)	18	4.9% (3.1; 7.6)
Other	0	0% (0; 6)	2	0.5% (0.1; 2)
Education (years of schooling)				
Illiterate	10	16.7% (9.3; 28)	65	17.7% (14.1; 21.9)
1 to 8 years	46	76.6% (64.6; 85.6)	280	76.3% (71.7; 80.4)
> 8 years	4	6.7% (2.6; 15.9)	22	6% (4; 8.9)
Occupational status / Income				
Retired	42	70% (57.5; 80.1)	263	71.7% (66.8; 76.0)
Pension / LOAS / Social benefit recipient	17	28.3% (18.5; 40.8)	51	13.9% (10.7; 17.8)
Working	1	1.7% (0.3; 8.9)	21	5.7% (3.8; 8.6)
Unemployed	0	0% (0; 6)	32	8.7% (6.2; 12)
Living arrangement				
Spouse and/or children	47	78.3% (66.4; 86.9)	266	72.5% (67.9; 77)
Parents and/or siblings	3	5% (1.7; 13.7)	8	2.2% (1.1; 4.3)
Relatives	1	1.7% (0.3; 8.9)	17	4.6% (2.9; 7.3)
Caregiver	1	1.7% (0.3; 8.9)	0	0% (0; 1)
Homes for the Aged	2	3.3% (0.9; 11.4)	3	0.8% (0.3; 2.4)
Living alone	6	10% (4.7; 20.1)	72	19.6% (15.9; 24.1)
Not informed	0	0 (0%)	1	0.3% (0.1; 0.8)
Older adult income (MW)				
0 – 1	27	45% (33.1; 57.5)	101	27.5% (23.3; 32.4)
1.1 – 3	27	45% (33.1; 57.5)	166	45.2% (40.3; 50.5)
3.1 – 5	2	3.3% (0.9; 11.4)	61	16.7% (13.2; 20.8)
5.1 – 10	1	1.7% (0.3; 8.9)	4	1.1% (0.4; 2.8)
No income	0	0% (0; 6)	20	5.4% (3.6; 8.3)
Not informed	3	5% (1.7; 13.7)	14	4.1% (2.3; 6.3)

LOAS: Brazilian Organic Law of Social Assistance; MW: Minimum Wage. Wilson score method.

Table 2. Frequency distribution of comorbidities and occurrence of delirium (N=427). Curitiba, PR, 2022–2023.

Variables	*Delirium*		No *delirium*	
	(n=60)	Relative frequency (95% CI)	(n=367)	Relative frequency (95% CI)
Hypertension				
No	15	25% (15.8-37.2)	88	24% (19.9-28.7)
Yes	45	75% (62.8-84.2)	278	76% (71.3-80.1)
Diabetes mellitus				
No	40	66.7% (54.1-77.3)	228	62.1% (57.1-66.9)
Yes	20	33.3% (22.7-45.9)	139	37.9% (33.1-42.9)
Chronic obstructive pulmonary disease				
No	49	81.7% (70.1-89.4)	309	84.2% (80.1-87.6)
Yes	11	18.3% (10.6-29.9)	58	15.8% (12.4-19.9)
Chronic kidney disease				
No	50	83.3% (72-90.7)	307	83.7% (79.5-87.1)
Yes	10	16.7% (9.3-28)	60	16.3% (12.9-20.5)
Congestive heart failure				
No	55	91.7% (81.9-96.4)	300	81.7% (77.5-85.4)
Yes	5	8.3% (3.6-18.1)	67	18.3% (14.6-22.5)
Dementia				
No	41	68.3% (55.8-78.7)	329	89.6% (86.1-92.4)
Yes	19	31.7% (21.3-44.2)	38	10.4% (7.6-13.9)
Stroke				
No	45	75% (62.8-84.2)	298	81.2% (76.9-84.9)
Yes	15	25% (15.8-37.2)	69	18.8% (15.1-23.1)
Depression				
No	52	86.7% (75.8-93.1)	324	88.3% (84.6-91.2)
Yes	8	13.3% (6.9-24.2)	43	11.7% (8.8-15.4)
Cancer				
No	54	90% (79.9-95.3)	336	91.6% (88.3-94)
Yes	6	10% (4.7-20.1)	31	8.4% (6-11.7)
Ischemic heart disease				
No	56	93.3% (84.1-97.4)	320	87.2% (83.4-90.2)
Yes	4	6.7% (2.6-15.9)	47	12.8% (9.8-16.6)

Wilson score method.



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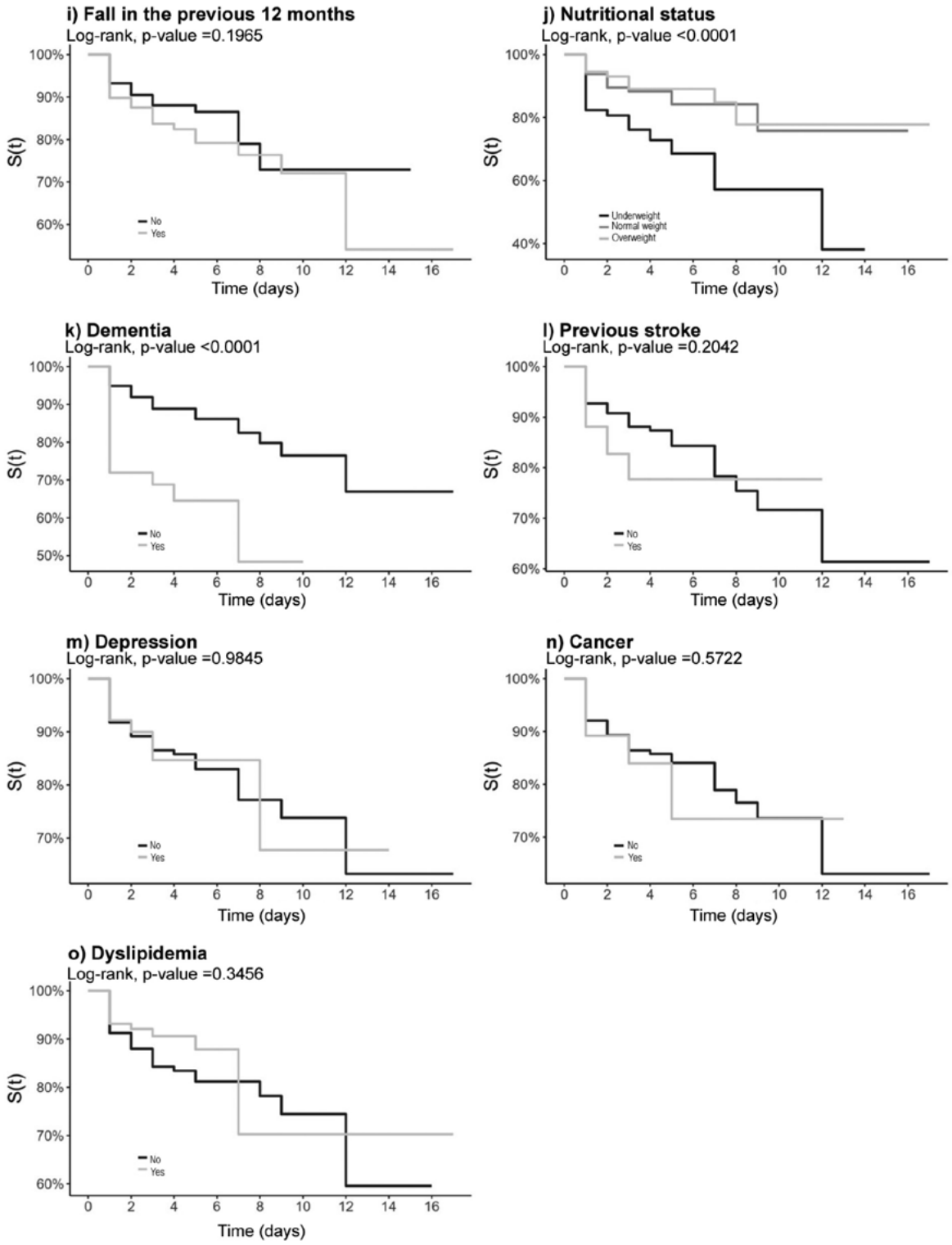


Figure 1. Kaplan–Meier survival curves for sociodemographic characteristics and comorbidities of hospitalized older adults until the development of delirium (N = 427). Curitiba, PR, 2022–2023.

Kaplan–Meier survival curves and log-rank test, $p<0.05$.

The overall Kaplan–Meier curve (Figure 2) shows that the cumulative probability of delirium-free survival remained above 50% throughout the observation period. Consequently, the median delirium-free survival time was not reached in the total sample (95% CI: 12 days to not reached). The restricted mean delirium-free survival time was 13.1 days (SE: 0.63).

Table 3 shows that frail older adults had a 5.47-fold higher risk of early-onset delirium. Receiving palliative care was associated with a 2.5-fold higher risk, and the presence of dementia was associated with a 2.51-fold higher risk of early-onset delirium. Income higher than 3.1 minimum wages was associated with a 71% lower risk of occurrence, and a history of previous hospitalizations was associated with a 58% reduction in the risk of early-onset delirium.

As shown in Figure 3, no violations of the proportional hazards assumption were identified. This finding was confirmed by the proportional hazards assumption test, whose p-values were greater than 0.05, indicating that the null hypothesis was not rejected. Therefore, the adjusted model adequately met the assumptions of the Cox proportional hazards model.

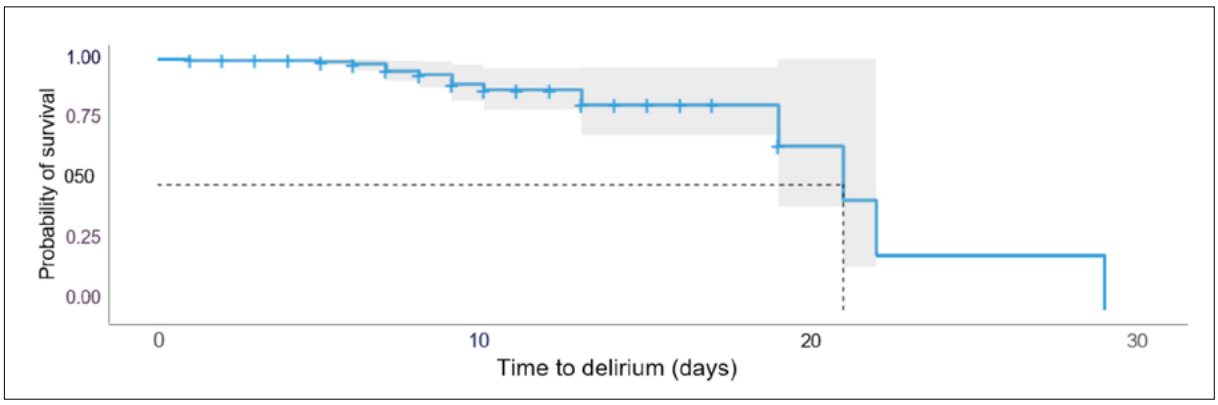
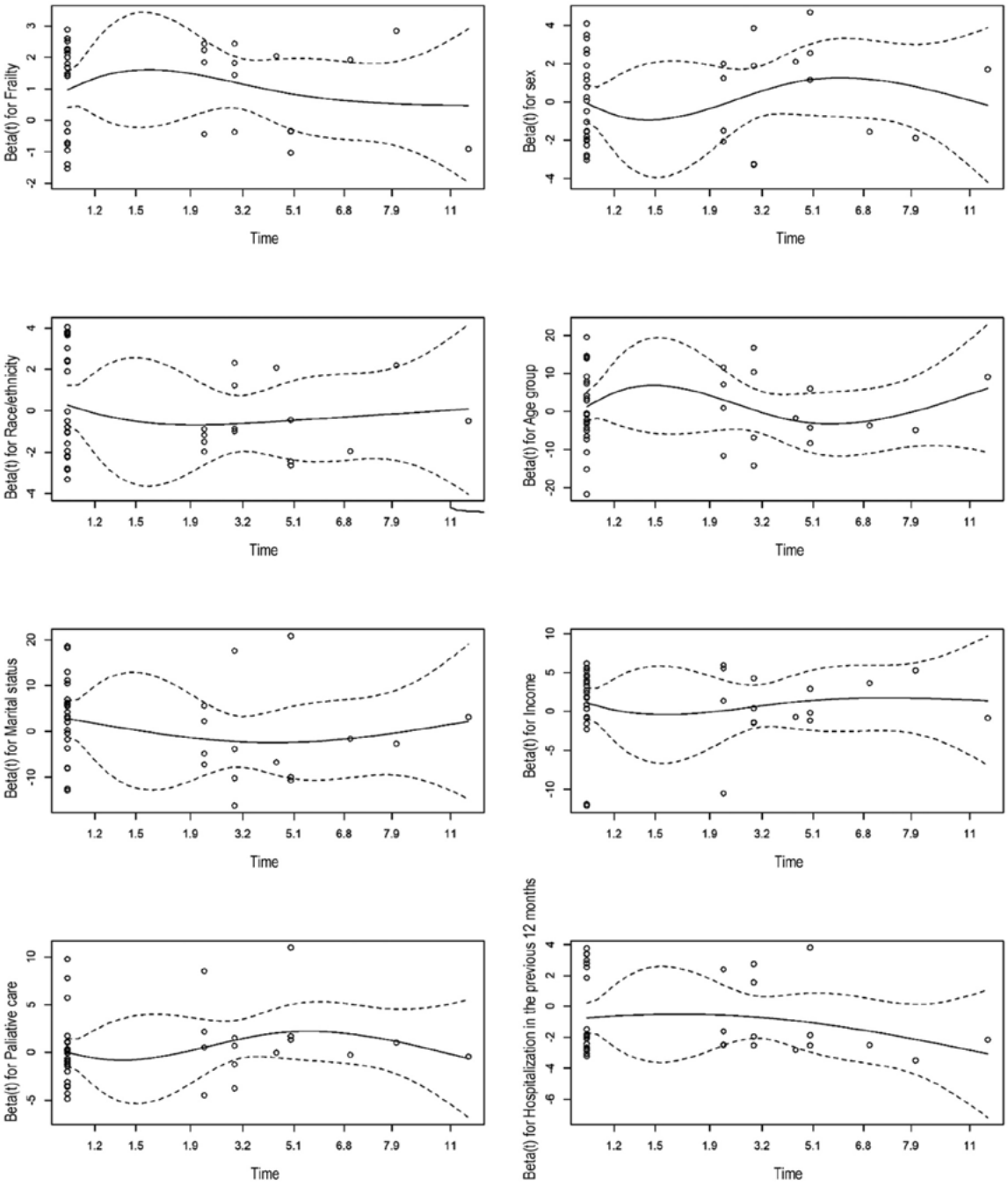


Figure 2. Kaplan–Meier survival curves of hospitalized older adults until the development of delirium (N=427). Curitiba, PR, 2022–2023.

Table 3. Cox proportional hazards models for the association between first diagnosis of delirium and sociodemographic characteristics and comorbidities of hospitalized older adults (N=427). Curitiba, PR, 2022–2023.

		HR	95% CI	p-value	Adjusted		
					HR	95% CI	p-value
Frailty	Non-frail	Ref.			Ref.		
	Pre-frail	1.86	0.63; 5.47	0.26	1.57	0.52; 4.78	0.426
	Frail	7.22	2.57; 20.28	0	5.47	1.77; 16.84	**0.003**
Sex	Female	Ref.			Ref.		
	Male	0.98	0.59; 1.64	0.95	1.58	0.86; 2.91	0.141
Race/ethnicity	White	Ref.			Ref.		
	Non-white	1.1	0.65; 1.87	0.71	1.02	0.57; 1.81	0.95
Age group	60–70	Ref.			Ref.		
	70–80	1.5	0.73; 3.10	0.27	1.04	0.48; 2.24	0.926
	≥80	2.87	1.46; 5.63	0	0.98	0.45; 2.15	0.959
Marital status	Married / Common-law union	Ref.			Ref.		
	Widowed	1.96	1.12; 3.45	0.02	1.7	0.86; 3.37	0.127
	Other	1.17	0.55; 2.50	0.68	1.11	0.49; 2.52	0.806
Older adult income (MW)	0 - 1	Ref.			Ref.		
	1,1 - 3	0.75	0.44; 1.28	0.3	0.92	0.52; 1.61	0.764
	3,1 - 10	0.24	0.07; 0.80	0.02	0.29	0.08; 0.99	**0.048**
Palliative care	No	Ref.			Ref.		
	Yes	3.7	1.96; 6.99	0	2.5	1.11; 5.63	**0.027**
Hospitalization in the previous 12 months	No	Ref.			Ref.		
	Yes	0.71	0.41; 1.23	0.22	0.44	0.24; 0.80	**0.008**
Fall in the previous 12 months	No	Ref.			Ref.		
	Yes	1.4	0.84; 2.33	0.2	1.4	0.80; 2.45	0.242
Nutritional status	Normal weight	Ref.			Ref.		
	Underweight	2.39	1.30; 4.40	0.01	1.05	0.49; 2.23	0.897
	Overweight	0.82	0.43; 1.57	0.55	0.93	0.46; 1.91	0.851
Dementia	No	Ref.			Ref.		
	Yes	3.76	2.18; 6.50	0	2.51	1.34; 4.70	**0.004**
Previous stroke	No	Ref.			Ref.		
	Yes	1.47	0.82; 2.63	0.2	0.89	0.45; 1.74	0.726
Depression	No	Ref.			Ref.		
	Yes	0.99	0.47; 2.09	0.98	1.09	0.46; 2.58	0.837
Cancer	No	Ref.			Ref.		
	Yes	1.28	0.55; 2.98	0.57	1.3	0.54; 3.11	0.561
Dyslipidemia	No	Ref.			Ref.		
	Yes	0.76	0.42; 1.36	0.35	0.73	0.39; 1.39	0.343

HR – Hazard Ratio; 95% CI – 95% confidence interval; MW – Minimum Wage; Stroke – Cerebrovascular accident. Cox proportional hazards regression model.



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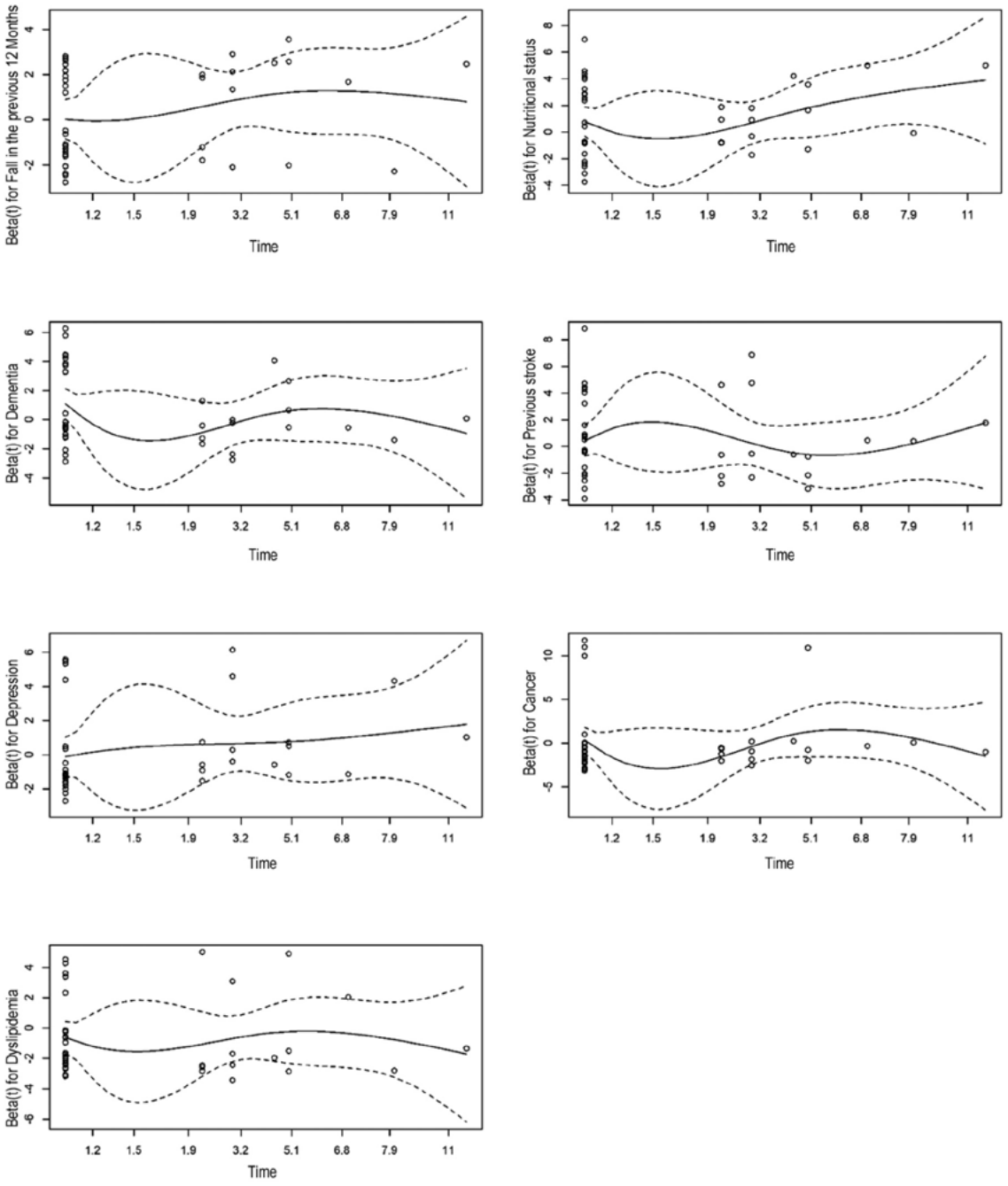

Figure 3. Schoenfeld residual plot – first diagnosis of delirium in hospitalized older adults (N=427). Curitiba, PR, 2022–2023.

DISCUSSION

The characteristics observed in the sample, such as frailty, dementia, and the need for palliative care, represent classical markers of physiological and cognitive vulnerability associated with delirium. Advanced age is associated with reduced homeostatic reserve, immune dysfunction, and a greater burden of comorbidities, increasing the risk of an exaggerated response to acute stressors[18]. Population-based data from Spain corroborate the importance of advanced age as a predisposing factor for delirium. In a sample of 4,628,397 hospitalized patients, an increase in delirium prevalence with advancing age was observed, reaching 48% among individuals aged 81 to 90 years[19].

Frailty, defined as a state of increased vulnerability to acute stressors[16], is a strong clinical predictor of delirium. In the present study, frail individuals had a 5.47-fold higher risk of delirium compared with non-frail individuals, in agreement with previous studies reporting a two- to threefold increased risk in hospitalized populations[20,21]. In a recent literature review, the authors stated that frailty and delirium share common pathophysiological mechanisms, including chronic inflammation, neurodegeneration, metabolic insufficiency, and increased vascular burden, suggesting that both may represent interrelated manifestations of an accelerated biological aging process[22]. These findings highlight the importance of systematic strategies for screening and management of frailty as a central component in the prevention of delirium in hospitalized older adults.

Frail older adults tend to develop delirium earlier than non-frail individuals. The relationship between frailty, delirium, and length of hospital stay was explored in a multicenter study using the Clinical Frailty Scale[23]. Delirium occurred earlier in frail patients. Among those who developed delirium during hospitalization, length of hospital stay did not vary according to frailty status; however, in older adults without delirium, greater frailty was associated with progressively longer hospital stay. Thus, the impact of delirium may outweigh the incremental effect of frailty on the duration of hospitalization[23].

Low body weight also emerged as a significant risk factor, associated with earlier onset of delirium, as reported in a study conducted in South Korea with 5,622 hospitalized older adults, in which the overall incidence of delirium reached 19%, with a significantly higher risk among underweight patients (OR 1.51; 95% CI 1.07–2.12)[24]. Although the literature addresses several risk factors for delirium development, there is still a gap regarding the analysis of time to onset of the condition.

Regarding dementia, the present study identified a 2.51-fold higher risk of delirium in individuals with this diagnosis, in agreement with the literature that identifies dementia as an important predisposing factor[25,26]. Reduced cognitive reserve and difficulty adapting to the hospital environment reinforce this vulnerability. Another variable explored was room type, with a lower risk of delirium observed in older adults hospitalized in single rooms (HR 0.66; 95% CI 0.48–0.93)[24]. A systematic review aimed to evaluate risk stratification instruments for delirium, and the synthesis of results identified dementia as the most frequent factor, with odds ratios ranging from 3.3 to 18.33[27].

Longitudinal studies demonstrate that the presence of dementia is associated not only with a higher risk of delirium but also with longer hospital stay (14.3 vs. 7.7 days) and increased hospital costs[28]. Therefore, this condition is highly relevant in planning care for hospitalized older adults.

In the social domain, variables such as widowhood and low income reveal less explored but critical dimensions related to vulnerability to delirium. Income higher than three minimum wages was identified as a protective factor against early occurrence of delirium, with a relative risk reduction of 71%. These findings are supported by a prospective cohort study conducted in Boston (USA), in which populations living in socioeconomically disadvantaged neighborhoods had a doubled risk of postoperative delirium (RR 2.0; 95% CI 1.3–3.1; p=0.01)[29]. These results suggest that social determinants should be interpreted considering contextual inequalities, access to trained caregivers, and the availability of social support networks. Lower

socioeconomic status has also been associated with a higher incidence of frailty, greater likelihood of progression to more advanced frailty states, and lower probability of reversal[30].

Widowhood, in turn, may reflect loss of social and emotional support, favoring isolation and reducing resilience to acute stressors. Studies indicate that older adults living alone constitute a heterogeneous group, in which some maintain independence and diversified support networks, while others present a higher risk of prolonged hospitalization and increased hospital costs[31,32]. These findings highlight the importance of integrated social approaches to mitigate vulnerabilities that predispose to delirium.

In the clinical domain, receiving palliative care emerges as a robust factor associated with increased risk of delirium. In the present study, older adults receiving palliative care had a 2.5-fold higher risk of delirium compared with those not receiving this type of care. Systematic reviews demonstrate widely variable prevalence of delirium in palliative care, estimated between 4% and 88%, with approximately one third of hospitalized patients in palliative settings presenting delirium[33], reaching up to 93% in terminal stages[34].

The high prevalence of delirium in palliative care reflects the complex interaction of multiple precipitating factors, including polypharmacy, use of medications with anticholinergic effects, metabolic disturbances, infections, and exacerbated physical and psychological distress, making this population particularly vulnerable[34]. Recognition of this increased risk reinforces the need for systematic strategies for prevention, early identification, and individualized management of delirium in palliative care, aiming to reduce suffering and improve quality of life for patients and caregivers.

Unexpectedly, older adults with a history of hospitalization in the previous 12 months showed a 58% lower relative risk of delirium diagnosis compared with those without previous hospitalization. One possible explanation for this finding is that prior hospitalizations may have facilitated the recognition of risk factors and the implementation of multicomponent preventive strategies, as demonstrated in programs such as the Hospital Elder Life Program[35]. In addition, a possible selection bias should be considered, since more fragile patients or those who had previously developed delirium may have died, characterizing a survivor bias.

Delirium is a challenging condition for research in the hospital setting, given its fluctuating presentation. A limitation of this study is the scarcity of investigations that systematically incorporate the variable "time to delirium onset" in hospitalized older adults, which makes direct comparisons difficult and increases the complexity of temporal analysis of this geriatric syndrome.

CONCLUSION

The identified risk factors represent markers of multidimensional vulnerability in older adults, indicating reduced physiological, cognitive, and social reserve to cope with acute stressors, with frailty, presence of dementia, and the need for palliative care standing out as the main independent risk factors. Conversely, higher income was identified as a significant protective factor, highlighting the role of socioeconomic determinants in the occurrence of delirium.

Survival analysis allowed the identification of significant differences in the time to the first episode, reinforcing the relevance of preventive strategies directed toward higher-risk groups. These findings contribute to the improvement of early screening and clinical management of delirium in older adults, with implications for clinical practice and health policy planning.

In this context, delirium should not be considered merely an episodic event, but rather a sign of overall clinical decompensation and increased risk for worse clinical outcomes, such as mortality and functional decline. The identification and management of these conditions are essential to prevent the occurrence of delirium and to mitigate its consequences.

AUTHOR CONTRIBUTIONS

- Clovis Cechinel — study conception and design; drafting or critical revision of the manuscript; final approval of the version to be published; responsibility for all aspects of the work; conceptualization; data curation; writing – review and editing; investigation; methodology; software; validation; visualization.

- Maria Helena Lenardt — drafting or critical revision of the manuscript; final approval of the version to be published; responsibility for all aspects of the work; project administration; formal analysis; methodology; supervision; validation; visualization.

- João Alberto Martins Rodrigues — study conception and design; drafting or critical revision of the manuscript; final approval of the version to be published; responsibility for all aspects of the work; formal analysis; conceptualization; data curation; writing – review and editing; investigation; methodology; software; validation; visualization.

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