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Original artide

COVID-19 in institutionalized older adults: Clinical repercussions and death risk factors*

COVID-19 em pessoas idosas Institucionalizadas: repercussões clínicas e fatores de risco para óbito
COVID-19 en ancianos institucionalizados: repercusiones clínicas y factores de riesgo de defunción

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Abstract

Objective: To analyze the clinical repercussions and death risk factors in institutionalized older adults infected with the coronavirus (SARS-CoV-2). **Method**: A quantitative study was conducted with 205 older adults in a Long-Term Care Facility (LTCF) in northeastern Brazil. Descriptive statistics, Pearson's chi-square test, and logistic regression were used, and $p<0.05$ was adopted. **Results**: 134 (66.7%) older adults had COVID-19, 44.8% evidenced clinical manifestations, and the mortality rate was 6.0%. Dependent individuals were more likely to progress to death. Diabetes, kidney disease, referral to hospital services, and use of oxygen therapy were associated with higher mortality. In the multivariate logistic regression model, dependence on care and diabetes mellitus remained as risk factors for death from COVID-19. **Conclusion**: COVID-19 mortality in institutionalized older adults is related to functional dependence and comorbidities, diabetes mellitus, and poor care conditions, highlighting the need for clinical protocols and public policies for long-term care facilities aimed at safe care and risk reduction.

Descriptors: Coronavirus Infections; Homes for the Aged; Health of the Elderly; Risk Factors; Cause of Death

Resumo

Objetivo: analisar as repercussões clínicas e fatores de risco para óbito de idosos institucionalizados infectados pelo coronavírus (SARS-CoV-2). **Método:** estudo quantitativo, realizado com 205 pessoas idosas em uma Instituição de Longa Permanência (ILPI) no nordeste brasileiro. Empregou-se estatística descritiva, Qui-quadrado de Pearson, regressão logística e adotou-se $p<0,05$. **Resultados:** 134 (66,7%) idosos com COVID-19, 44,8% apresentaram manifestações clínicas e a mortalidade foi de 6,0%. Dependentes tiveram maior chance de óbito. Diabetes, doença renal, encaminhamento ao serviço hospitalar, uso de oxigenoterapia estiveram

associados à maior letalidade. No modelo de regressão logística multivariada permaneceram como fatores de risco para óbito por COVID-19 as variáveis de dependência de cuidados e diabetes mellitus. **Conclusão:** evidenciou-se que a mortalidade por COVID-19 em idosos institucionalizados relaciona-se a dependência funcional e comorbidades, diabetes mellitus e condições assistenciais precárias, destacando a necessidade de protocolos clínicos e políticas públicas para ILPI, visando assistência segura e redução de riscos.
Descritores: Infecções por Coronavírus; Instituição de Longa Permanência para Idosos; Saúde do Idoso; Fatores de risco; Causas de Morte

Resumen

Objetivo: Analizar las repercusiones clínicas y los factores de riesgo de mortalidad en adultos mayores institucionalizados infectados con el coronavirus (SARS-CoV-2). **Método**: Se realizó un estudio cuantitativo con 205 adultos mayores en un centro de cuidados a largo plazo (CCLP) del noreste de Brasil. Se utilizaron estadística descriptiva, la prueba de chi-cuadrado de Pearson y regresión logística, con un nivel de significancia de $p < 0,05$. **Resultados**: 134 (66,7 %) adultos mayores contrajeron COVID-19; el 44,8 % presentó manifestaciones clínicas y la tasa de mortalidad fue del 6,0 %. Las personas dependientes tuvieron mayor probabilidad de defunción. La diabetes, la enfermedad renal, la hospitalización y el uso de oxigenoterapia se asociaron con una mayor mortalidad. En el modelo de regresión logística multivariante, la dependencia y la diabetes mellitus se mantuvieron como factores de riesgo de muerte por COVID-19. **Conclusión**: La mortalidad por COVID-19 en adultos mayores institucionalizados está relacionada con la dependencia funcional y las comorbilidades, la diabetes mellitus y las malas condiciones de atención, lo que destaca la necesidad de protocolos clínicos y políticas públicas para los centros de atención a largo plazo dirigidas a una atención segura y a la reducción de riesgos.
Descriptores: Infecciones por Coronavirus; Hogares para Ancianos; Salud del Anciano; Factores de Riesgo; Causas de Muerte

Introduction

The elderly population constitutes a high-risk group for coronavirus infection due to physiological changes associated with aging, less effective immune responses, and a higher prevalence of comorbidities. This vulnerability is even more critical among senior residents of Long-Term Care Facilities (LTCFs), who are exposed to additional risks such as greater dependence on collective care, structural limitations, and reduced access to health services. These factors increase susceptibility to disease and hinder the control of outbreaks, requiring specific protection strategies.[1]

This increased vulnerability was dramatically reflected during the COVID-19 pandemic, with high mortality rates among institutionalized older adults. The percentage of COVID-19 deaths in LTCFs in England was 27%, and the proportion of deaths among residents in institutions was 38%, with an excess death rate during the

pandemic of 44%. In France, 34% of all COVID-19 deaths occurred in institutionalized older adults, reaching a mortality rate of 51% among institution residents.[2]

In Brazil, the number of older adults residing in LTCFs and the COVID-19 mortality rate in this group remain uncertain. Given this knowledge gap, one study estimated that approximately 44.7% of COVID-19 deaths occurred among institutionalized older adults, totaling more than 107,000 deaths (107,528 deaths) in the country.[3]

Coronavirus infection has resulted in an unfavorable backdrop for older adults, with an increased risk of hospital admission, more significant impairment of functional capacity, exacerbating the frailty of this population and increasing the risk of mortality.[4]

Given this situation, older adults, especially those residing in institutions, found themselves at the center of the COVID-19 pandemic discussion and required specialized health care to minimize the impact on the health system and society.[5] LTCFs should seek to avoid or minimize the contamination of older adults and professionals working in these establishments and reduce the morbimortality of residents.[6]

Although institutionalized older adults are one of the most vulnerable and at-risk segments for the development of outbreaks and more severe forms of COVID-19[7], there are still inconsistencies regarding the profile of this population group in Brazil, and even less so regarding the potential impact of the pandemic on this population segment.[8] The scarce systematized information and reliable data on the epidemiology of infection in this group have hindered the response to the pandemic and the establishment of emergency public policies.[3,8]

Considering the knowledge gap regarding the epidemiological profile and mortality rate of institutionalized older adults during the COVID-19 pandemic, this study aims to analyze the clinical repercussions and risk factors for death among institutionalized seniors infected with the coronavirus (SARS-CoV-2).

Methods

This quantitative, retrospective, and documentary study collected data from October 2020 to January 2021. The sample consisted of medical records of older adults residing in an LTCF between March and June 2020, totaling 205 participants. This period was defined by the date of the first notification of a suspected COVID-19 case (March 24,

2020) and the last suspected case (June 20, 2020) at the institution. All medical records of senior residents at the LTCF were analyzed.

The research was conducted at an LTCF in Fortaleza, Ceará, Brazil, in the Brazilian northeast. Considered a regional benchmark, it provides care for independent and/or dependent older adults requiring partial or total health assistance. This institution was chosen by convenience. The institution had a staff of 22 senior caregivers and 19 nursing technicians, working 12 x 36-hour shifts, including day and night shifts; and five nurses, four of whom were registered nurses (one in the morning shift, one in the afternoon shift, and two in the night shift), and one health manager.

The study included the medical records of older adults with confirmed COVID-19 contracted within the LTCF, identified by rapid testing and nasopharyngeal swab RT-PCR. Records, spreadsheets, or forms with incomplete or missing information, and the records of older adults who temporarily left the institution during the pandemic period, were excluded.

The data were collected using a standardized form, developed in-house and divided into three sections: a) sociodemographic variables: identification of the older adult (anonymity code recorded), age (complete years), gender (male and female according to institutional records); b) care variables: length of institutionalization (complete months since admission to the LTCF), dependency level (independent, moderately dependent, totally dependent), bedridden older adult (yes/no), referral to a reference service (yes/no), respiratory isolation (yes/no, according to the institutional protocol in effect during the pandemic); c) clinical variables: palliative care (yes/no), COVID-19 diagnosis (confirmed by rapid test or nasopharyngeal swab RT-PCR), symptoms (list of symptoms (e.g., fever ≥37.8°C, cough, dyspnea) recorded as present/absent), disease severity (classified per the World Health Organization (WHO) criteria (mild, moderate, severe)), treatment and medications for COVID-19, continuous medication use, polypharmacy (use of ≥5 continuous medications), psychotropic use, comorbidities (list of pre-existing conditions recorded in the medical record), tobacco use, alcohol abuse, nutritional status (assessed by BMI), death (yes/no), and oxygen therapy (yes/no).

The collected data were entered into a spreadsheet for descriptive and analytical analysis, using Excel 2010 and the Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive analysis was employed, using frequency distribution and measures of position and dispersion (standard deviation). Pearson's chi-square test was performed to assess significant associations between categorical variables (p-values ≤ 0.05 were considered significant).

Odds ratios (OR) were calculated, and a 95% confidence interval (CI) was adopted to examine individual risk factors. Additionally, the "enter" conditional logistic regression was applied to the dependent variable death. Variables with $p<0.20$ in the bivariate analysis and that did not have frequencies lower than 2 in any of the cells were considered. This approach was used to reduce the risk of excluding potential confounding or relevant predictor variables.

The Research Ethics Committee (CEP) of the State University of Ceará approved the study under Opinion N°4.584.538 and CAAE: 39013120.0.0000.5534, following Resolutions N°466/2012 and N°510/2016 of the National Health Council. This article is an excerpt from a larger research project entitled "Protocol for the safe administration of medicines by nursing staff in Long-Term Care Facilities for Older Adults: Creation, validation and testing". However, the data presented here are of documentary origin, and a Data Confidentiality Agreement was signed for their acquisition. Thus, the application of an Informed Consent Form was waived by the CEP.

Results

The characterization of the sociodemographic profile of older adults showed that 116 (57.7%) were female, with 125 (62.1%) having dependency levels II and III, and 134 (66.7%) were receiving palliative care. The mean age was 79 years (SD: ±9.4; minimum: 60, maximum: 106), and the predominant age range was 70-79 years (35.8%). The mean length of institutionalization for older adults was eight years (SD: ±8.5; minimum: 6 months; maximum: 58 years), and 119 (59.2%) resided in wards and semi-dependent rooms.

Regarding tobacco use and alcohol abuse, 168 (83.6%) did not smoke, and 189 (94%) did not consume alcoholic beverages. Before the first suspected case in

March 2020, 36.8% of older adults had adequate weight, despite the number of older adults with low weight (36.2%). Older adults with at least one comorbidity arrived at 77.1%; 46.3% had dementia, and 8% had cognitive impairment. Among the comorbidities, hypertension and dyslipidemia were the most prevalent, with 57.2% and 48.3%, respectively.

A total of 134 older adults (66.7%) were reported with a COVID-19 diagnosis. The most frequent signs and symptoms were fever (74.4%), adynamia (52.9%), tachypnea (49.6%), coryza (47.1%), loss of appetite (46.3%), and myalgia (41.3%). Clinical manifestations were classified according to the severity of signs and symptoms as mild, moderate, and severe.6 Regarding case severity, 54.6% were classified as mild, 32.2% as severe, and 13.2% as moderate.

Regarding medicine use, 107 (53.2%) of the older adults received some medicine treatment for COVID-19. Of these, 97.2% used Azithromycin, 96.3% Ivermectin and Prednisone, and 16.8% Heparin, medications indicated in the first wave of COVID-19. Concerning referrals of older adults to tertiary care/field hospitals, 21 (10.4%) of the residents were hospitalized. As for oxygen therapy, 37 (18.4%) of the older adults used some oxygen delivery device. The mortality rate was 11.5%, with 6.0% due to confirmed COVID-19, 3.5% due to suspected COVID-19, and 2.0% due to other causes.

Of the older adults who died, 12.9% were male, with dependency levels II and III (15.2%), aged 90-106 years (16.1%), located in wards and semi-dependent rooms (16.8%), in palliative care (14.2%), with diabetes (24.5%), and kidney disease (31.6%). They were using continuous medication (11.9%), were referred to the hospital service (42.9%), used oxygen therapy (48.6%), and received treatment for COVID-19 (18.7%).

With respect to death risk factors in older adults with COVID-19 residing in an LTCF, Tables 1 and 2 show the bivariate analysis of the association between sociodemographic and clinical variables and death from COVID-19. This analysis showed that dependent elderly people (level II and III) (OR= 8.6 – 95% CI: 1.09;67.38), and smokers (OR= 1.17 – 95% CI: 1.08;1.26) were more likely to progress to death. Regarding comorbidities, higher lethality in older adults was significantly associated with Diabetes Mellitus (OR= 5.61 – 95% CI: 1.87;16.86) and kidney disease (OR= 5.5 - 95% CI: 1.56;19.34).

Also related to a worse prognosis (death) were disease severity (p= 0.000; OR=0.10- 95% CI: 0.03-0.39), the treatment for COVID-19 adopted by the institution, which was significantly associated with a better prognosis for older adults (p=0.001; OR= 1.22) - 95% CI: 1.10;1.35), as well as the referral of older adults to the hospital service (p= 0.000; OR= 5.83 - 95% CI: 1.78;19.13) and the use of oxygen therapy (OR= 30.12 - 95% CI: 10.03;90.42) (TABLE 1).

Table 1 - Death risk factors in COVID-19-affected older adults residing in an LTCF. Fortaleza, Ceará, Brazil, 2025

Variable	Death n (%)	Non-death n (%)	p-value[a]	OR[b] (CI95%[C])
Gender			0,685	
Male	7 (10,8)	58 (89,2)		1,24 (0,43;3,55)
Female	9 (13)	60 (87)		
Dependence level			**0,016***	8,6 (1,09;67,38)
G I	1 (2,3)	43 (97,7)		
G II e III	15 (16,7)	75 (83,3)		
Age group (years)				
60 – 69	0 (0)	22 (100)	**0,05**	0,85 (0,75;0,59)
70 – 79	7 (14,9)	40 (85,1)	**0,05**	0,85 (0,75;0,59)
80 – 89	7/47 (14,9)	49/47 (85,1)	0,10	0,88 (0,75;1,04)
90 – 106	2/18 (11,1)	16/18 (88,9)	0,18	2,01 (0,70; 5,77)
Tobacco use			**0,04**	1,17 (1,08;1,26)
Yes	0/25 (0)	25/25 (100)		
No	16/109 (14,7)	93/109 (85,3)		
COVID-19 severity				
Mild	3/65 (4,6)	62/65 (95,4)	**0,000***	**0,10 (0,03-0,39)**
Moderate/severe	17/55 (30,9)	38/55 (69,1)		
COVID-19 treatment			**0,002***	
Yes	0/45 (0)	45/45 (100)		1,22 (1,10;1,35)
No	16/87 (18,4)	71/87 (81,6)		
Referral			**0,001***	
Yes	6/17 (35,3)	11/17 (64,7)		5,83(1,78;19,13)
No	10/117 (8,5)	107/117 (91,5)		
Oxygen therapy			**0,000***	
Yes	4/21 (19)	17/21 (81)		30,12(10,03;90,42)
No	10/10 (100)	0/10 (0)		
Palliative care			0,20	

Yes	13/90 (14,4)	77/90 (85,6)		2,30(0,62;8,56)
No	3/44 (6,8)	41/44 (93,2)		
Alcohol abuse			0,25	
Yes	0/9 (0)	9/9 (100)		1,14(1,07;1,22)
No	16/125 (12,8)	118/134 (88,1)		
Comorbidities			0,98	
Yes	14/102 (13,7)	88/102 (86,3)		2,38 (0,51;11,11)
No	2/32 (6,3)	30/32 (93,8)		
Diabetes mellitus (DM)			**0,001***	
Yes	10/37 (27)	27/37 (73)		5,61 (1,87;16,86)
No	6/97 (6,2)	91/97 (93,8)		
Kidney disease			**0,004***	
Yes	5/14 (35,7)	9/14 (64,3)		5,5 (1,56;19,34)
No	11/120 (9,2)	109/120 (90,8)		
Yes	10/67 (14,90)	57/67 (85,1)		1,78 (0,60;5,22)
No	6/67 (9)	61/67 (91)		
Venous/arterial insufficiency			0,27	
Yes	4/21 (19)	17/21 (81)		1,98 (0,57; 6,86)
No	12/103 (10,6)	101/113 (89,4)		
Cardiovascular disease			0,30	
Yes	3/15 (20)	12/15 (80)		2,03 (0,50;8,18)
No	13/119 (10,9)	106/119 (89,1)		
Asthma/COPD			0,22	
Yes	0/10 (0)	10/10 (100)		1,14 (1,07;1,22)
No	16/124 (12,9)	108/124 (87,1)		

a) Pearson's chi-square test p-value; b) OR: Odds Ratio; c) $CI_{95\%}$: 95% confidence interval.

The variables dependence level, tobacco use, diabetes mellitus, kidney disease, severity, COVID-19 treatment, hospital referral, and oxygen therapy, which in the bivariate analysis had $p<0.20$ and which did not show frequencies less than 2 in any of the cells, were included in the logistic regression model. However, only the variables Diabetes Mellitus ($p<0.02$), referral ($p<0.003$), and dependence level ($p<0.03$) remained as risk factors for death from COVID-19 (TABLE 2).

Table 2 - Adjusted logistics regression using the enter method of the "Death" dependent variable, Fortaleza, Ceará, Brazil, 2025

Variable	OR[a]crude	OR[a]adjusted	95% CI[b]	p
Treatment	1,22	0,21	0,05 - 0,85	0,029
Comorbidities	2,38	1,41	0,25 – 7,96	0,693
DM	5,61	6,93	**2,02 – 23,73**	0,020
Kidney disease	5,61	2,45	0,65 – 9,22	0,184
Referral	5,83	10,41	**2,19 – 49,36**	0,003
Dependence level	8,6	11,01	**1,26 – 95,6**	0,030

a) OR: odds ratio; b) 95%CI: 95% confidence interval.

Discussion

The profile of older adults who participated in this research shares similar characteristics to those of participants in studies in LTCFs in Brazil, Canada, and Germany.[9-10] Studies indicate that 82% of long-term care residents are women.[11] The higher life expectancy of women (84.9 years versus 81.1 years for men)[12] may help explain the predominant female composition in long-term care facilities.

In contrast to this female predominance in long-term care facilities, SARS-CoV-2 infection was statistically significant in males, findings consistent with international studies.[13-15] This apparent paradox may be explained by greater male biological vulnerability. In previous SARS and MERS epidemics, men were more vulnerable to infection than women, which may be due to women's X chromosomes and sex hormones that play a role in the immune system.[16] Furthermore, males are more negligent regarding health and protective measures.[17,18]

this epidemiological backdrop, a COVID-19 prevalence rate of 66.7% was observed among residents, confirmed by rapid test or RT-PCR. This rate aligns with the 64% reported in a North American study conducted in the early days of the pandemic.[19] This international similarity suggests that, regardless of regional differences in the structure of long-term care facilities, the high transmissibility of SARS-CoV-2 in congregate environments equally affected these vulnerable populations.

The mortality rate in the study was 6.0% for COVID-19 and 3.5% for suspected COVID-19, showing a case fatality rate lower than other international studies. Research conducted at an institution in the United States recorded a mortality rate of 26%.[19] In France, a medium-sized institution reached a case fatality rate of 27%.[11]

This difference can be attributed to the early adoption of containment measures (respiratory isolation and systematic testing). However, we should consider that variations in the definition of death and in the clinical profile of residents can influence comparisons and underreported cases; mild and asymptomatic cases may have been underestimated.

This research revealed that COVID-19 mortality in institutionalized older adults is intrinsically related to specific clinical and care factors, particularly diabetes mellitus, functional dependence level, and the need for hospital referral. Multivariate analysis revealed that seniors with diabetes mellitus were 2.3 times more likely to be at risk of death, a finding consistent with the pathophysiology of COVID-19, which involves greater ACE-2 expression in diabetic patients and impaired immune response.[20,21]

Functional dependence emerged as the strongest predictor of unfavorable outcome, with bedridden older adults (Level III) showing a fourfold mortality rate compared to their independent peers, corroborating other scientific evidence.[19,22] This association reflects physiological vulnerability and mainly the structural conditions of Brazilian LTCFs, where overcrowding and limited staff hinder the effective isolation of dependent residents.

Hospital referral is associated with a 3.5-fold increase in the risk of death and reveals a critical paradox: while transfer to hospitals is essential for severe cases, it can represent a marker of irreversible clinical deterioration in frail older adults. These transfers occurred due to the persistence of more severe symptoms and prolonged use of oxygen, which favored adverse clinical outcomes. The more severe symptoms reported in older adults with severe acute respiratory syndrome (SARS) may be justified by their physiological vulnerability associated with the COVID-19 pathophysiology, which is characterized by pulmonary infiltration and injury, making respiratory symptoms more severe.[22]

In Australia, the prevalence of cardiovascular and respiratory diseases was considered the leading risk factor for adverse clinical outcomes in institutionalized older adults.[23] Similarly, in this study, older adults with asthma and/or chronic obstructive pulmonary disease (COPD) were more likely to be referred to the hospital service.

Regarding nutritional status, 70.6% of older adults lost weight between the period in which the first and last COVID-19 cases were reported in 2020 at the studied LTCF. This situation may have been caused by their loss of appetite, which was considered one of the main clinical manifestations of the disease, also evidenced in other available literature,[24,25], as well as the presence of olfactory and gustatory dysfunction, directly impacting their nutritional status.

The increased incidence of malnutrition among older adults with COVID-19 has been highlighted in other scientific evidence[26,27]. Nutritional deficiency weakens the immune system, increases mortality, reduces muscle mass, and predisposes older adults to the development of sarcopenia.[28]

Regarding lifestyle, tobacco use was associated with greater symptom severity. Smokers, former smokers, and people with COPD, due to increased expression of angiotensin-converting enzyme 2 (ACE2) in the lower airways, are a risk group for COVID-19 infection and complications, both because of tobacco-related comorbidities and elevated levels of C-reactive protein (CRP), D-dimer, and pro-inflammatory cytokines.[29]

This study has limitations that should be considered when interpreting the results. The single-center nature of the research, with data collected from a single long-term care facility, may limit the generalizability of the findings, since specific institutional characteristics (such as resident profile, physical structure, and care protocols) may differ between long-term care facilities in other locations. Additionally, case underreporting may have occurred due to limited access to diagnostic testing during the initial period of the pandemic and the lack of systematic asymptomatic testing, factors that may have underestimated the true magnitude of the infection and its outcomes.

Despite these limitations, the results provide relevant contributions to the literature on COVID-19 in institutionalized populations. The study identified independent

death risk factors, particularly severe functional dependence and the presence of diabetes mellitus, even after adjusting for potential confounders.

Conclusion

This study identified that the high mortality rate from COVID-19 in institutionalized older adults (6.0% confirmed) is associated with specific clinical and care conditions, reinforcing the extreme vulnerability of this population. Severe functional dependence and the presence of diabetes mellitus emerged as the main predictors of death, suggesting that frailty and metabolic dysregulation enhance the risk of fatal outcomes. Institutional conditions, such as overcrowding and limitations in access to oxygen therapy, also contributed to case deterioration, highlighting the intersection between individual and structural factors.

This study expands the understanding of nursing actions in addressing COVID-19 and its clinical repercussions in institutionalized older adults, offering elements to support managers and healthcare professionals in developing strategies to facilitate the provision of safe care to this group.

These findings bridge an important gap in understanding the pandemic by focusing on a vulnerable population that is often neglected in population-based epidemiological studies. The evidence produced can inform the development of targeted clinical protocols and public policies for long-term care facilities in future health crises.

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