

Relationship Between Difficulty in Oral Cavity Hygiene and Self-Care in Post-COVID-19

Relação Entre a Dificuldade para Higienização da Cavidade Bucal e Autocuidado em Pacientes Pós COVID-19
Relación Entre la Dificultad en la Higiene de la Cavidad Bucal y el Autocuidado en Pacientes Post-COVID-19

RESUMO

Objetivo: Verificar a relação entre a dificuldade para higienização da cavidade bucal e autocuidado de pacientes 12 meses após admissão em Unidades de Terapia Intensiva pós-covid-19 grave. **Método:** Trata-se de um estudo transversal analítico com abordagem quantitativa, com dados sociodemográficos, clínicos, de autoavaliação de saúde e escala WHODAS 2.0 de pacientes egressos do HURCG. A análise foi realizada através da Mineração de Dados em um processo de Knowledge Discovery in Databases. **Resultados:** O autocuidado é capaz de classificar a dificuldade de higienização da cavidade bucal. Pacientes com condições de saúde mais graves, menor condição socioeconômica e maior ocorrência de incapacidade verifica-se um alto risco em apresentar dificuldade de higienização da cavidade apesar de ter uma autopercepção de saúde geral e bucal muito positiva. **Conclusão:** Os pacientes internados em UTI covid-19 apresentam dificuldade para higienização oral embora haja uma boa autopercepção de saúde, devido à aceitação passiva de suas condições.

DESCRIPTORES: Higiene bucal; Autocuidado; Covid-19.

ABSTRACT

Objective: To investigate the relationship between difficulty in oral hygiene and self-care among patients 12 months after admission to intensive care units after severe covid-19. **Method:** This is a cross-sectional, analytical study with quantitative approach, using sociodemographic, clinical, self-rated health, and WHODAS 2.0 data from patients discharged from the HURCG. The analysis was performed using data mining in a Knowledge Discovery in Databases process. **Results:** Self-care can classify difficulty in oral hygiene. Patients with more severe health conditions, lower socioeconomic status, and a higher incidence of disability are at high risk of having difficulty in oral hygiene despite having a very positive self-perceived general and oral health. **Conclusion:** Patients admitted to the covid-19 ICU have difficulty with oral hygiene despite having a good self-perceived health, due to the passive acceptance of their conditions.

DESCRIPTORS: Oral hygiene; Self-care; Covid-19.

RESUMEN

Objetivo: Investigar la relación entre la dificultad en la higiene bucal y el autocuidado entre pacientes a los 12 meses de su ingreso a unidades de cuidados intensivos tras covid-19 grave. **Método:** se trata de un estudio transversal, analítico, con enfoque cuantitativo, en el que se utilizaron datos sociodemográficos, clínicos, de autopercepción de salud y de WHODAS 2.0 de pacientes egresados del HURCG. El análisis se realizó mediante minería de datos en un proceso de Descubrimiento de Conocimiento en Bases de Datos. **Resultados:** El autocuidado puede clasificar la dificultad en la higiene bucal. Los pacientes con afecciones de salud más graves, nivel socioeconómico más bajo y mayor incidencia de discapacidad tienen un alto riesgo de tener dificultades en la higiene bucal a pesar de tener una salud general y bucal positiva. **Conclusión:** Los pacientes ingresados en la UCI covid-19 tienen dificultades con la higiene bucal a pesar de tener una buena salud autopercebida, debido a la aceptación pasiva de sus afecciones.

DESCRIPTORES: Higiene bucal; Autocuidado; Covid-19.

RECEIVED: 10/10/2025 APPROVED: 10/23/2025

How to cite this article: Scendrzyk EAB, Schiochet GF, Fugita ES, Santos CB, Fadel GH, Pereira SB, Fadel CB. Relationship Between Difficulty in Oral Cavity Hygiene and Self-Care in Post-COVID-19. Saúde Coletiva (Edição Brasileira) [Internet]. 2025 [acesso ano mês dia];16(101):17558-17581. Disponível em: DOI: 10.36489/saudecoletiva.2025v16i101p17558-17581

ID Ethyenne Alessandra Berechavinski Scendrzyk
Graduate in Dentistry. State University of Ponta Grossa
ORCID: <https://orcid.org/0009-0002-1100-6048>

ID Gabriela Fernanda Schiochet
Doctoral Student in Health Sciences. Institution: State University of Ponta Grossa (UEPG)
ORCID: <https://orcid.org/0000-0001-7377-1445>

ID Eduarda da Silva Fugita
Undergraduate Student in Dentistry. Institution: State University of Ponta Grossa (UEPG)
ORCID: <https://orcid.org/0009-0004-6715-903X>

ID Celso Bilynkiewicz dos Santos
Doctorate in Production Engineering. Institution: Federal Technological University of Paraná (UTFPR)
ORCID: <https://orcid.org/0000-0003-2107-8299>

ID Gabrielly Hneda Fadel
Undergraduate Student in Medicine. Institution: Campo Real University Center
ORCID: <https://orcid.org/0009-0001-0542-1248>

ID Sthefany Barreto Pereira
Undergraduate Student in Dentistry. Institution: State University of Ponta Grossa (UEPG)
ORCID: <https://orcid.org/0009-0008-5556-0001>

ID Cristina Berger Fadel
Doctorate in Preventive and Social Dentistry. Institution: State University of Ponta Grossa (UEPG)
ORCID: <https://orcid.org/0000-0002-7303-5429>

INTRODUCTION

Since the identification of the SARS-CoV-2 virus in China, COVID-19 has rapidly spread throughout the world, demonstrating a wide spectrum of severity and health threats, with impacts on the population and health services that have not yet been fully assessed. Individuals in the risk group are those who are more likely to develop severe or critical symptoms of COVID-19, including the elderly, smokers, and those with pre-existing comorbidities, such as chronic kidney, lung, and heart disease^{1,2}.

Individuals who have had a severe form of the disease, requiring mechanical ventilation and intensive care, have an increased likelihood of developing so-called long COVID^{3,4}, a term adopted by health experts and medical organizations such as the World Health Organization (WHO) and the UK National Health Service (NHS). This condition is characterized by a series of clinical manifestations that persist after infection, affecting various systems of the human body, including the circulatory, neurological, and respiratory systems. In addition, long COVID can cause

damage to individuals' mental health and well-being⁵. Common symptoms include weakness, muscle pain, anxiety, depression, memory loss, difficulty with mobility, inability to perform usual activities, and problems with self-care⁶, which result in a deterioration of daily life and quality of life, posing challenges for both patients and healthcare professionals and providers.

In addition, depressive and anxiety symptoms may persist chronically in COVID-19 survivors, influencing their inability to perform routine activities, such as oral hygiene, thus generating a harmful effect on their quality of life^{7,8}. Therefore, addressing and promoting self-care by maintaining a healthy lifestyle and physical exercise can be fundamental to strengthening physical and mental health^{9,10}, allowing for greater autonomy, self-control, self-knowledge, and improved quality of life^{11,12}.

Individuals with disabilities and dependence in performing activities of daily living generally have difficulty brushing their teeth due to low muscle strength, resulting in functional impairment¹³. The preservation of oral health is associated with nutritional intake, reduced risk of re-

spiratory and cardiovascular diseases, and better quality of life¹⁴. In addition, poor chewing performance and biofilm accumulation are associated with poorer nutritional status, leading to dehydration, anorexia, weight loss, embarrassment when eating, and isolation, damaging the individual's overall functionality¹⁴.

Given this scenario, the multisystemic involvement of long COVID demonstrates the need for integrative and continuous rehabilitation, with the support of motor and respiratory physiotherapy, nutrition, speech therapy, occupational therapy, and dental teams, in order to restore physical, psychological, and social conditions¹⁵⁻¹⁷.

To face these challenges, dental surgeons must develop exponential knowledge on the subject and take a critical look at strategies for providing safe and quality oral health care to patients with long COVID. In view of the above, this study aims to verify the relationship between difficulty in oral hygiene and self-care in patients after severe COVID-19 at a university hospital in southern Brazil.

METHOD

This is a cross-sectional, analytical study with a quantitative approach, based on primary data from patients discharged from the Regional University Hospital of Campos Gerais (HURCG), Paraná, Brazil. This research followed the guidelines of Resolution 466/2012 of the National Health Council, with approval number 4.735.765/2021 from the Research Ethics Committee of Plataforma Brasil.

The research participants were all patients discharged from the HURCG's COVID-19 Intensive Care Units (ICUs) between March 2020 and March 2022. The inclusion criteria were: patients who were admitted to the ICU for SARS-Cov-2 infection for a period longer than 8 days (as indicated in the respective patients' medical records); having been discharged from the hospital at least 365 days prior to data collection; being over 18 years of age; and not having died.

The exclusion criteria were: patients with cognitive impairment (according to the family's assessment); uncorrected hearing loss that prevents understanding of the questions (according to the researcher's assessment); inability to speak (according to the family's assessment).

To include patients who participated in the study, we first searched the electronic medical records of patients who were admitted to the HURCG ICU, made available by G-SUS and Tasy, with permission to access the data from the hospital management. Of these, to locate patients who met the inclusion criteria, each medical record was read individually, seeking the inclusion criteria, thus resulting in patients eligible for research. The primary data were obtained through a recorded telephone interview conducted directly with the patient, based on a structured instrument with questions on self-perception of oral health and the 12-item WHO-

DAS 2.0 scale, translated and validated for the Portuguese language in Brazil by Castro and Leite¹⁸⁻¹⁹. The World Health Organization Disability Assessment Schedule (WHODAS 2.0) is an instrument for assessing health and disability at the population or clinical level developed by the WHO. The 12-item version includes two questions for each of the six domains—cognition, mobility, self-care, interpersonal relationships, daily activities, and participation—providing an indicator of overall functionality (WHO, 2015)²⁰. Data collection was performed by trained researchers, and there was no time limit for responses. The participants' identities were fully preserved.

The dependent variable was self-perception of oral health, measured by the question "Did you have any difficulty cleaning your mouth (teeth, dentures, or gums) after hospitalization for COVID-19?", with a response scale of "yes" and "no." The independent variables were clinical questions related to self-care, including the following questions: "Have you practiced any physical activity in the last 30 days?", "Do you consider your diet to have been healthy in the last 30 days?" and the 12-item WHODAS 2.0 version, including only the self-care domains with the questions: "Washing your whole body?" and "Getting dressed?".

Supervised and unsupervised data mining techniques were used in a Knowledge Discovery in Databases (KDD) process. This process enables the extraction of implicit knowledge from the data, revealing previously unknown information, and is divided into three macro stages: i) Data Mining (DM) pre-processing; ii) Data Mining; iii) Data Mining post-processing.

Mining techniques enabled the description of the profile of the population and its subgroups; the identification of predictor variables for the

target variable; and the development of predictive models. More specifically, they identified the dependency relationships between indicators of difficulty in oral health care and self-care, and the independent variables capable of explaining the clusters that subdivide the sample.

Pre-processing aimed to eliminate noise and standardize input data, as well as enrich this data by creating quantitative and qualitative quality of life indicators that measure the difficulty of oral hygiene and self-assessment of oral health. Initially, the sample was described through unsupervised learning, using clustering techniques to label the sample.

Data mining itself encompasses the description/selection of attributes, classification, and regression. Unsupervised and supervised learning techniques were used to describe and label the sample and identify factors (independent variables) related to the dependent variable. Clusters were formed using the SimpleK-means algorithm in Weka, defining the formation of two centroids (groups I and II) with characteristics that allow them to be labeled.

In a second step, dimensionality reduction techniques were used, applying the supervised learning technique, using the Correlation-based Feature Selection (CFS) algorithms, which, according to Santos (2016), selects the group of variables with the greatest explanatory power for the outcome variable, seeking the set of variables with low collinearity among themselves and high correlation with the target attribute, which in the present study refers to "difficulty in oral hygiene." In addition, through the Wrapper Algorithm, it was possible to obtain a set of variables capable of predicting the classification of the sample based on the index and classes of difficulty, motivation, and self-assessment of oral health status. Thus, to understand the variables with the

greatest potential to explain the target attribute, the so-called folds indicate the number of data subsets that, after testing, show correlation between the variables. Therefore, when a variable appears in all subgroups, it indicates a parameter of 100%, that is, the greater the relevance of the attributes involved in explaining the target attribute.

The classification models are then transformed into production rules in the post-processing macro-stage and interpreted together with the results of the data exploration, with the aim of obtaining the relationship between the variables as determinants for the classification of the groups. In this stage, the results of the sample description and the selected variables were interpreted together with the

results of the data exploration, with the aim of obtaining the relationship between the variables capable of explaining the group labels and the dependent variables.

To arrive at the domains, the equation for inverting negative scales (Figure 1) was also used, adopted in domains that have questions with a negative character, as in the case of the disability domain used in the present study, before applying the geometric mean.

RESULTS

A total of 267 patients were eligible for the study, of whom 94 did not answer the three calls made on different days and at different times, 29 died in the first years after hos-

pital discharge, 27 had incorrect or non-existent telephone numbers, and 9 individuals refused to participate in the interview. In the end, 108 patients were included in the study.

After data mining, it was possible to group and describe the sample into two centroids for a better understanding of the study, labeled by their majority characteristics, resulting in the groups: “high risk” and “lower risk.” Their main differences are described in Table 1 according to sociodemographic, clinical, and self-perceived health variables of the respondents. Thus, it was found that 29 (26%) individuals belong to the high-risk group, while 79 (74%) individuals are grouped in the lower-risk group.

Chart 1 – Characterization of clusters based on sociodemographic and clinical variables and self-perceived health. Paraná, Brazil, 2024.

Group	I	II
Variables	High-risk group	Lower risk group
Sociodemographic	Older population and higher proportion of women Lower level of education and variation in family income brackets	Younger population and higher proportion of men Higher level of education and better family income conditions
Clinical	More serious health conditions, such as grade II obesity, high blood pressure, and uncontrolled diabetes Higher consumption of daily medications and higher prevalence of chronic diseases	Generally less severe health conditions, associated with a lower incidence of serious heart problems and extreme obesity Lower consumption of daily medications and lower incidence of chronic diseases
Self-perceived health (WHODAS scale)	Higher occurrence of disabilities related to mobility and self-care	Lower incidence of significant disabilities and better self-assessment of health

Source: The authors

The high-risk group (Group I) consists of 18 (62%) women with a mean age of 57 years and low educational attainment (approximately 8 years). In this group, there is a notable number of individuals with compromised health conditions, such as 11 (37%) patients with grade II obesity, 20 (68%) patients with high blood pressure, and 17 (58%) suffering from diabetes, taking an average of 5 medications daily. Regarding difficulty in

cleaning/hygiene of the oral cavity in the last 30 days, 21 (72%) individuals reported no difficulty, and 20 (68%) did not feel less motivated to perform this activity.

For the lower risk group (Group II), 45 (56%) individuals are male, with a mean age of 53 years. Of the 79 individuals allocated to Group II, 76 (96%) live independently in the community, with different work situations: 22 (27%) of the patients have paid work, 21 (26%) are retired, and

21 (26%) work as self-employed. In addition, this group has a higher family income when compared to Group I, as well as less severe health conditions: 27 (34%) of the patients are obese grade I, 42 (53%) do not have high blood pressure, 52 (65%) do not have diabetes, and take approximately 3 medications per day. No patient in this group had difficulty cleaning their mouth in the last 30 days, and 74 (93%) did not feel less motivated to perform this activity.

Original Article

Scendrzyk EAB, Schiochet GF, Fugita ES, Santos CB, Fadel GH, Pereira SB, Fadel CB
Relationship Between Difficulty in Oral Cavity Hygiene and Self-Care in Post-COVID-19

The sample and grouping data based on the selected variables are shown in Tables 1, 2, and 3, which present sociodemographic, clinical,

and self-perceived health data for the groups formed, showing the mean and standard deviation of the numerical data, the mode, frequency distri-

bution, and percentage of the classes of the categorical variables in the sample.

Table 1 - Sample and grouping data based on sociodemographic variables. HURCG, Paraná, Brazil, 2024

	Class	Groups		
		Overall	I	II
	N	108	29	79
Gender		M	F	M
	M	56.0 (51%)	11.0(37%)	45.0(56%)
	F	52.0 (48%)	18.0 (62%)	34.0 (43%)
Age		54.7315	57.7931	53.6076
		±13.1395	±15.7579	±11.9555
Years of study		10.3738	8.7715	10,962
		±4.6915	±5.9713	±4.011
Living conditions at the time of the interview		Independent	Independent	Independent
	Independent	98.0 (90%)	22.0 (75%)	76.0(96%)
	with assistance	9.0 (8%)	7.0 (24%)	2.0 (2%)
	Hospitalized institutionalized	1.0	0.0	1.0 (1%)
Status of your work activity		Retired	retired	Paid work
	paid work	23.0 (21%)	1.0	22.0(27%)
	retired	29.0	8.0 (27%)	21.0 (26%)
	self-employed	26.0 (24%)	5.0 (17%)	21.0 (26%)
	unemployed	4.0	2.0 (6%)	2.0 (2%)
	other	5.0(4%)	5.0 (17%)	0.0
	housewife	16.0(14%)	4.0 (13%)	12.0(15%)
	unemployed due to health problems	5.0(4%)	4.0 (13%)	1.0
Has own income		Yes	yes	yes
		yes	79.0 (73%)	21.0 (72%)
		No	29.0(26%)	8.0 (27%)
What is your family's monthly income (minimum wage)?		four or more	more than two	four or more
	four or more	29.0 (26%)	4.0 (13%)	25.0 (31%)
	up to one	15.0 (13%)	7.0 (24%)	8.0 (10%)
	greater than three	20.0(18%)	4.0 (13%)	16.0 (20%)
	greater than two	27.0 (25%)	8.0 (27%)	19.0 (24%)
	greater than one	17.0(15%)	6.0 (20%)	11.0 (13%)

Source: The authors

Table 2 - Sample and grouping data based on clinical conditions. HURCG, Paraná, Brazil. 2024

	Class	Groups		
		Overall	I	II
	N	108	29	79
BMI	Grade I obesity	35.0 (32%)	8.0 (27%)	27.0 (34%)
	normal	11.0 (10%)	3.0 (10%)	8.0 (10%)
	overweight	30.0 (27%)	4.0 (13%)	26.0 (32%)
	extreme obesity	7.0(6%)	2.0 (6%)	5.0 (6%)
	Class II obesity	24.0 (22%)	11.0 (37%)	13.0 (16%)
	rickety	1.0 (0%)	1.0 (3%)	0.0
High blood pressure		Yes	yes	no
	no	51.0 (47%)	9.0 (31%)	42.0 (53%)
	Yes	57.0 (52%)	20.0 (68%)	37.0 (46%)
Diabetes		No	yes	no
	no	64.0 (59%)	12.0(41%)	52.0(65%)
	Yes	44.0(40%)	17.0 (58%)	27.0 (34%)
Joint or bone disease		No	yes	no
	no	72.0 (66%)	14.0 (48%)	58.0(73%)
	Yes	36.0 (33%)	15.0 (51%)	21.0 (26%)
Heart disease		No	No	no
	no	92.0(85%)	20.0 (68%)	72.0 (91%)
	Yes	16.0 (14%)	9.0 (31%)	7.0 (8%)
Stroke		No	No	no
	no	102.0(94%)	25.0 (86%)	77.0 (97%)
	Yes	6.0	4.0 (13%)	2.0(2%)
Other diseases		No	yes	no
	no	78.0 (72%)	14.0 (48%)	64.0(81%)
	Yes	30.0 (27%)	15.0 (51%)	15.0 (18%)
How many medications do you take per day?		3.8293	4.6838	3.5156
		±2.0815	±2.4236	±1.8612
Days of hospital admission		31.7963	34,827.6	30,6835
		±18.7745	±22.9255	±17.0351
Days of ICU admission		19.4352	19.6552	19.3544
		±11.8647	±12.6245	±11.6564
Self-care (class)		high	high	high
	high	91.0 (84%)	13.0 (44%)	78.0 (98%)
	low	7.0	7.0 (24%)	0.0(0%)
	medium	10.0 (9%)	9.0 (31%)	1.0(1%)
Incapacity		low	high	low
	low	76.0 (70%)	4.0 (13%)	72.0 (91%)
	high	23.0 (21%)	18.0 (62%)	5.0 (6%)
	average	9.0(8%)	7.0 (24%)	2.0 (2%)

Source: The authors

Table 3 - Sample and cluster data based on self-perceived health. HURCG. Paraná, Brazil, 2024

	Class	Groups		
		Overall	I	II
	N	108	29	79
Self-care		high	high	high
	high	91.0 (84%)	13.0 (44%)	78.0 (98%)
	low	7.0	7.0 (24%)	0.0(0%)
	medium	10.0(9%)	9.0 (31%)	1.0 (1%)
Did you engage in any physical activity before being hospitalized for COVID-19?		Yes	Yes	yes
	Yes	60.0 (55%)	17.0(58%)	43.0(54%)
	No	48.0(44%)	12.0 (41%)	36.0 (45%)
Have you done any physical activity in the last 30 days?		No	No	no
	Yes	42.0 (38%)	6.0 (20%)	36.0 (45%)
	No	66.0 (61%)	23.0 (79%)	43.0 (54%)
Considered their diet healthy before hospitalization for COVID-19		Yes	Yes	yes
	Yes	75.0 (69%)	15.0(51%)	60.0(75%)
	No	33.0	14.0 (48%)	19.0 (24%)
Do you consider your diet to have been healthy over the last 30 days?		Yes	Yes	yes
	Yes	92.0 (85%)	23.0 (79%)	69.0(87%)
	No	16.0(14%)	6.0 (20%)	10.0 (12%)
Had difficulty cleaning/hygenizing their mouth in the last 30 days		No	No	no
	no	100.0(92%)	21.0(72%)	79.0 (100%)
	Yes	8.0 (7%)	8.0 (27%)	0.0 (0%)
How would you rate your overall health in the last 30 days?			Good	fair
	very poor		2.0(6%)	0.0(0%)
	bad	2.0(1%)	9.0 (31%)	3.0 (3%)
	average	12.0 (11%)	13.0 (44%)	17.0 (21%)
	good	30.0	5.0 (17%)	43.0 (54%)
	Very good	48.0(44%)	0.0 (0%)	16.0 (20%)
How would you rate your oral health over the last 30 days?		16.0 (14%)	good	good
	poor	Good	4.0(13%)	4.0(5%)
	average	8.0(7%)	5.0 (17%)	10.0 (12%)
	good	15.0(13%)	18.0 (62%)	49.0 (62%)
	Very good	67.0(62%)	2.0 (6%)	16.0 (20%)

Source: The authors

With regard to the most important variables for the study, self-assessment of general health status is lower for group I (higher risk), in which 13 (44%) of individuals describe their health condition as average and 11 (37%) as poor, in contrast to group II, in which 59 (74%) individuals

allocated to this group report a high level of health. As for self-perception of oral health, 20 (68%) of the individuals in group I had a positive self-assessment, as did 65 (82%) patients in group II. For self-care, only 1 (1%) individual in group II reported average self-care, while 79 (99%) reported high self-care. In group I, 13

(44%) individuals reported high self-care, however, in this group, 7 (24%) and 9 (31%) reported low and average self-care, respectively.

Based on supervised learning techniques, the predictive variables with the greatest ability to explain the classification outcomes were identified. The most significant factors, attri-

butes selected in all folds (100%), are those with the greatest potential to classify the existence of difficulty in oral hygiene. The variables related to self-care issues, the focus of this study, are highlighted in Table 2.

Chart 2 – Selected variables with the potential to explain difficulty in cleaning/hygienizing the mouth (Paraná, Brazil, 2024)

CFS Algorithm	Wrapper Algorithm
(99%) Has own income (99%) High blood pressure (38%) Other diseases (100%) How many medications do you take per day (100%) Were you taking any medication before hospitalization for COVID-19? (100%) Did you have any depressive symptoms such as persistent sadness/discouragement and low self-esteem before hospitalization for COVID? (100%) Did you have any depressive symptoms such as persistent sadness/discouragement and low self-esteem in the last 30 days? (100%) Did you engage in any physical activity before hospitalization for COVID-19? (100%) Did you engage in any physical activity in the last 30 days? (98%) Did you consider your diet to be healthy before hospitalization for COVID-19? (95%) Had difficulty concentrating in the last 30 days (100%) Felt less motivated to clean/brush their teeth in the last 30 days (99%) Needed prone positioning (100%) Days of ICU hospitalization (100%) Cognition (100%) Participation (100%) Self-care (100%) Self-assessment of general health status (100%) Self-assessment of oral health status	(100%) Other diseases (2%) Did you engage in any physical activity before hospitalization for COVID-19? (32%) In general, over the last 30 days, for how many days were these difficulties present? (100%) Cognition

Source: The authors

Thus, with the aim of the study being to identify the variables most strongly related to difficulties in oral hygiene with self-care issues, it is possible to verify in Table 2 that issues involving self-care, such as: self-care itself in 100% of cases, physical activity before and after hospitalization for COVID-19 (100%) and healthy eating (98%) were present, showing that self-care strongly influences difficulty in oral hygiene. Furthermore, all variables present are related to difficulty in oral hygiene.

DISCUSSION

In this study, it was possible to verify the relationship between self-care and its potential to classify the existence of difficulties in oral hygiene in patients who had suffered from severe COVID-19. In the high-risk group, 8 (27%) individuals reported

experiencing difficulties in performing oral hygiene, whereas none of the individuals in the lower-risk group reported such difficulties. On average, individuals in the lower-risk group have a more positive self-perception of their oral and general health when compared to the higher-risk group, as well as for self-care.

The lower-risk group includes individuals with less severe health conditions and higher levels of education, while the high-risk group includes individuals with more severe comorbidities, advanced age, sedentary lifestyles, and lower socioeconomic status, factors that are related to higher morbidity and mortality rates in the first year after COVID-19²¹⁻²³, justifying the discrepancy in the number of individuals in each group. In addition, these more severe health and life conditions are themselves related to a loss of quality of life due to the disability they cause²⁴⁻²⁶. After ad-

mission to the ICU, there is a greater tendency to have limitations in daily life, occupational performance, and the performance of activities of daily living and instrumental activities¹⁵, which includes oral hygiene.

Furthermore, the longer the hospitalization time for COVID-19, the greater the sequelae, making the patient partially or totally dependent on assistance to perform activities of daily living, such as eating and hygiene¹⁵. This data reinforces the findings of this study, which points to a relationship between the length of ICU hospitalization and the difficulty of oral hygiene, impacting the individual's self-care. Such serious health conditions are associated with factors such as low socioeconomic status, lower education, physical inactivity, and poor diet, which, in turn, increase the risk of disability and difficulty in oral hygiene.

According to the World Health

Organization (WHO), self-care refers to the abilities of individuals, families, and communities to promote and maintain health, prevent and deal with diseases and disabilities, with or without the support of a health professional²⁷. These actions involve regular physical activity, healthy eating, correct use of medications, and personal and oral hygiene^{28,29}, which promotes patient autonomy, independence, and self-care³⁰⁻³², reflecting on the individual's quality of life^{15, 25,26}.

Thus, in this study, in addition to questions about difficulties in "Washing your entire body" and "Getting dressed," questions involving physical activity and healthy eating were used to assess patient self-care. Regarding physical activity, before and after admission to the ICU, there was a decrease in the percentage of individuals who practiced physical activity, with only 42 (38%) performing such activity, demonstrating greater difficulty in performing exercises and less self-care after admission³³, which may be related to lower muscle strength, difficulty with mobility, fatigue, and lower self-care as a sequela of COVID-19^{3,6}.

In addition to this, there is a prevalence of individuals above the ideal weight in both groups, which can be explained by the association between obesity and the development of more severe symptoms of COVID-19, higher rates of hospitalization, and mortality³⁴. Poor diet and inadequate nutritional status weaken the individual's immune system, making them vulnerable³⁵. This study found an association between obesity, physical activity, and poor nutrition with an increased risk of difficulty in oral hygiene. These results are in line with the literature, which indicates that obese patients who have developed severe forms of COVID-19 often face difficulties in performing daily activities due to persistent symptoms such as dyspnea and fatigue³⁶⁻³⁷.

In relation to the scenario dis-

cussed, one of the sequelae found in long COVID is the presence of lesions in the upper limbs of patients, interfering with their daily activities, such as oral hygiene¹⁵. This lesion is related to neuropathy, appearing with great intensity in individuals who have undergone long periods of hospitalization, demonstrating the need for practical interventions to assess, prevent, and rehabilitate, minimizing such damage in the future¹⁵.

Therefore, poor oral hygiene can result in the development of caries and periodontal disease. The presence of these inflammatory foci is related to the worsening of several systemic diseases, such as cardiovascular and respiratory changes, diabetes, dysphagia, and sarcopenia³⁸⁻³⁹. In addition, dental problems lead to a deterioration in quality of life due to pain and discomfort during eating and speaking, negatively impacting confidence, self-esteem, and nutrition⁴⁰⁻⁴¹. Individuals with two or more systemic diseases simultaneously tend to be unable to perform instrumental activities, have a lower chance of having functional dentition, and have a poorer self-perception of oral health^{42,43}.

In this study, individuals with more severe health conditions (group I) had a lower self-perception of general and oral health when compared to the self-perception of individuals with less severe conditions and better socioeconomic conditions (group II). This is because self-perceived health is understood as the interpretation that individuals make about themselves and their daily experiences based on social and historical contexts⁴⁴⁻⁴⁶. In addition, self-perceived oral health was better than self-perceived systemic health, demonstrating that even individuals who say they are dissatisfied with their general health consider their oral health to be good, suggesting that they consider their oral health condition to be normal when compared to their systemic condi-

tion⁴⁷, demonstrating a passive acceptance of the deterioration of their hygiene condition⁴⁸ by neglecting their oral health care^{12,49}.

Furthermore, self-perception of oral health can influence the search for dental care and self-care practices⁵⁰. Patients who have a positive self-perception of health are more likely to seek dental care regularly and adopt healthier habits, while individuals who have low self-perception may neglect their oral health, seek less care, diagnosis, and treatment for oral problems, negatively affecting their mental health and self-esteem⁵⁰.

Therefore, self-care in patients who have had severe COVID-19 has proven to be an important aspect in classifying the difficulty of oral hygiene, especially in individuals at higher risk. This highlights the need for individualized actions to rehabilitate functionality through practices of adaptation, autonomy, safety, and independence, generating a positive response to self-care and oral hygiene, promoting oral and general health.

The limitations of this study are related to access to a telephone and availability of time to respond to the telephone interview. The lack of a control group made it difficult to infer whether the reported symptoms and difficulties were caused by SARS-CoV-2 infection, pre-existing comorbidities, or social effects related to the pandemic. Another limitation may be associated with individuals' subjective perceptions of their functional health status and long COVID manifestations.

CONCLUSION

Oral self-care can be assessed through the performance of activities of daily living associated with functional capacity, reflecting on the subject's quality of life. Patients with comorbidities associated with ICU admission for COVID-19 may ex-

perience long-term disabilities that limit their performance and ability to carry out activities, including oral hygiene.

In this study, research subjects with more serious health conditions had a lower self-perception of gener-

al and oral health when compared to healthier individuals allocated to the group at higher risk of presenting difficulties in oral hygiene. In addition, self-perception of oral health is more positive in relation to general health, demonstrating passive acceptance of

their oral condition. Therefore, it is important for public health to understand the implications of severe COVID-19, both for the rehabilitation of patients with disabilities and for the self-care of these individuals.

REFERENCES

1. JIANG, CM; et al. Changes in Oral Health Policies and Guidelines During the COVID-19 Pandemic. *Front Oral Health*. 2021, v. 2. Disponível em: <https://doi.org/10.3389/froh.2021.668444>.
2. CUTLER, DM. The Costs of Long COVID. *JAMA Health Forum*. 2022, 3(5):e221809. Disponível em: [10.1001/jamahealthforum.2022.1809](https://doi.org/10.1001/jamahealthforum.2022.1809).
3. COSTA, TDC.; RIBEIRO, FS; SILVA, GJP. Capacidade funcional de pacientes pós COVID-19 e fatores associados. *Rev Estudos Interdisciplinares, São Luís*, v. 3, n. 1, jan/mar 2023. Disponível em: <https://periodicos.undb.edu.br/index.php/rem/article/view/78/88>.
4. DEL RIO, C; COLLINS, LF; MALANI, P. Long-term Health Consequences of COVID-19. *JAMA*. 2020, 324(17):1723-1724. doi:10.1001/jama.2020.19719.
5. MALIK, P; PATEL, K; PINTO, C; JAISWAL, R; TIRUPATHI, R; PILLAI, S; PATEL, U. Post-acute COVID-19 syndrome (PCS) and health-related quality of life (HRQoL) – A systematic review and meta-analysis. *Wiley, Journal of medical virology*. 2021, v. 94, ed. 1. Disponível em: <https://doi.org/10.1002/jmv.27309>.
6. POLETTI, S; et al. Long-term consequences of COVID-19 on cognitive functioning up to 6 months after discharge: role of depression and impact on quality of life. *Eur Arch Psychiatry Clin Neurosci*. 2022, v. 272, p. 773-782. Disponível em: <https://doi.org/10.1007/s00406-021-01346-9>.
7. COELHO, BB.; MACHADO, J; JÚNIOR, GRS; FIGUEIREDO, DR. Agreement between self-reported oral disorders during and after COVID-19 and clinical conditions of patients in municipality in Southern Brazil. *RFO UFP, Passo Fundo*, v. 28, n. 1, p.132-146, jan/abr, 2023. Disponível em <http://dx.doi.org/10.5335/rfo.v28i1.15169>.
8. HAMER, M; KIVIMÄKI, M; GALE, CR; BATTY, GD. Lifestyle risk factors, inflammatory mechanisms, and COVID-19 hospitalization: A Community-based cohort study of 387,109 adults in UK. *Brain, Behavior and Immunity*, v. 87, p. 184-186, Jul 2020. Disponível em: <https://doi.org/10.1016/j.bbi.2020.05.059>.
9. NARASIMHAN, M; ALLOTEY, P; HARDON, A. Self Care interventions to advance health and wellbeing: a conceptual framework to inform normative guidance. *The BMJ*, 2019. Disponível em: <https://doi.org/10.1136/bmj.l688>.
10. BERMEJO-MARTINS, E.; et al. Different Responses to Stress, Health Practices, and Self-Care during COVID-19 Lockdown: A Stratified Analysis. *Int. J. Environ Res Public Health*, v. 18, ed. 5, 2021. Disponível em: <https://doi.org/10.3390/ijerph18052253>.
11. GÓIS ARS; RODRIGUES TS; TELES RBA. Functional capacity and self-care in post-COVID-19 patients in a recovery program. *Aquichan*. 2024;24(2):e242X. <https://doi.org/10.5294/aqui.2024.24.3.3>.
12. GOMES, MJ; RAMOS, OM. Saúde oral e qualidade de vida em idosos institucionalizados. *Egitania Ciencia*, 29 (jun/dez), 2021, p.153-168. Disponível em: <https://doi.org/10.46691/es.v2i29.29>.
13. RAMOS, TMC. Saúde bucal e condição funcional de idosos que vivem em instituições de longa permanência. 2023, p. 169 [dissertação]. Disponível em: <http://hdl.handle.net/1843/60099>.
14. FERREIRA, RP; ALVES, LM; MANGILLI, LD. Associação entre risco de disfagia e sinais sugestivos de sarcopenia, estado nutricional e frequência de higiene oral em idosos hospitalizados. *CoDAS*, n. 36, ed. 1, 2024. Disponível em: <https://doi.org/10.1590/2317-1782/20232022232pt>.
15. THOMAS, C; et al. An evaluation of handgrip strength in post-COVID-19 patients with upper limb dysfunction and its impact on functionality. *Rev Conjecturas*, v. 22, n. 4, 2022. Disponível em: <https://doi.org/10.53660/CONJ-730-A05>.

16. LING NA; STREIM, JE. Psychosocial Well-Being Associated With Activity of Daily Living Stages Among Community-Dwelling Older Adults. *Sage Journals. Gerontology and Geriatric Medicine*, 2017. Disponível em: <https://doi.org/10.1177/2333721417700011>.
17. PAN AMERICAN HEALTH ORGANIZATION, World Health Organization. Epidemiological alert: complications and sequelae of COVID-19. Geneva, 12 Aug. 2020. Disponível em: <https://www.paho.org/en/documents/epidemiological-alert-complications-and-sequelae-covid-19-12-august-2020>.
18. CASTRO SS, LEITE CF. Avaliação de Saúde e Deficiência: Manual do WHO Disability Assessment Schedule (WHODAS 2.0). Organização Mundial da Saúde, 2015.
19. CASTRO SS, LEITE CF. Tradução e adaptação transcultural do World Health Organization Disability Assessment Schedule-WHODAS 2.0. *Fisioterapia e Pesquisa*, v. 24, n. 4, p. 385-391, 2017.
20. OMS. Avaliação de Saúde e Deficiência: Manual do WHO Disability Assessment Schedule (WHODAS 2.0). 2015. Disponível em: chrome-extension://efaidnbmn-nnibpcajpgclclefindmkaj/https://apps.who.int/iris/bitstream/handle/10665/43974/9788562599514_por.pdf;sequence=1.
21. SOEIRO, AM; PÊGO-FERNANDES, PM. Alterações cardiológicas pós-Covid-19. *Rev Diagnóstico e Tratamento*, 2021;26(4):137-9.
22. ARAÚJO et al. Risk factors for the persistence of symptoms thirty days and one year after the diagnosis of COVID-19. *Electronic Journal Collection Health*, v. 23(8), 2023. Disponível em: <https://doi.org/10.25248/REAS.e13248.2023>.
23. SILVEIRA; et al. Aspectos das manifestações da síndrome pós-Covid-19: uma revisão narrativa. *Rev Eletrônica Acervo Saúde*, v. 13(12), 2021. Disponível em: <https://doi.org/10.25248/REAS.e9286.2021>.
24. CARVALHO, EA. Autocuidado de pessoas com diabetes mellitus e hipertensão arterial sistêmica em condições pós-Covid [dissertação], 2024.
25. MALTA, DC; et al. Probabilidade de morte prematura por doenças crônicas não transmissíveis, Brasil e regiões, projeções para 2025. *Revista Brasileira de Epidemiologia*, v. 22, p. 1-13, 2019.
26. ORGANIZAÇÃO MUNDIAL DE SAÚDE. Doenças não comunicáveis. 2022. Disponível em: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>.
27. WORLD HEALTH ORGANIZATION. Putting people first in managing their health: new WHO guideline on self-care interventions. Geneva: WHO, 2021.
28. BRASIL. Ministério da Saúde. Secretaria de Atenção Primária à Saúde. Departamento de Prevenção e Promoção da Saúde. Autocuidado em Saúde e a Literacia para a Saúde no contexto da promoção, prevenção e cuidado das pessoas em condições crônicas: guia para profissionais da saúde [recurso eletrônico] / Ministério da Saúde, Secretaria de Atenção Primária à Saúde, Departamento de Prevenção e Promoção da Saúde. – Brasília: Ministério da Saúde, 2023.
29. PINTO, AH; et al. Capacidade funcional para atividades da vida diária de idosos da Estratégia de Saúde da Família da zona rural. *Ciência & Saúde Coletiva*, v. 21, n. 11, p. 3545-3555, nov. 2016.
30. MACAYA BP; ARANDA GF. Cuidado y autocuidado en el personal de salud: enfrentando la pandemia COVID-19. *Revista Chilena de Anestesia*, 49(3), 356-362, 2020. Disponível em: <https://doi.org/10.25237/revchilanest-v49n03.014>.
31. CORDEIRO, ARC. E depois da doença Covid-19? Cuidados da enfermagem de reabilitação. 2022, p. 157, Lisboa [dissertação]. Disponível em: <http://hdl.handle.net/10400.26/45541>.
32. TORRES, HC; SOUZA, ER; LIMA, MHM; BODSTEIN, RC. Intervenção educativa para o autocuidado de indivíduos com diabetes mellitus. *Acta Paul Enferm*, n. 24, ed. 4, 2011. Disponível em: <https://doi.org/10.1590/S0103-21002011000400011>.
33. LOPES, LB; SOUZA, GTB; SILVA, MC; BARBOSA, RRB. Fatores relacionados à intolerância ao exercício na alta de pacientes hospitalizados pela COVID-19. *Acta Fisiárt, set*, 2023. Disponível em: <https://doi.org/10.11606/issn.2317-0190.v30i3a214174>.
34. MOTA; et al. The influence of obesity on severe Covid-19. *Research, society and development*, v. 10, n. 11, e552101120108, 2021. Disponível em: <http://dx.doi.org/10.33448/rsd-v10i11.20108>.
35. DUTRA, AFFO; DIAS, ADC; ARAÚJO, DGS; SILVA, EM;

SILVA, IMF.; GOMES, LMF. A importância da alimentação saudável e o estado nutricional adequado frente à pandemia de Covid-19. *Braz J of Develop*, Curitiba, v. 6, n. 9, p.66464-66473, 2020. Doi: 10.34117/bjdv6n9-181.

36. OLIVEIRA, RM; AZEVEDO, GS. Análise da capacidade funcional de obesos em fase pré-operatória de cirurgia bariátrica pós-Covid-19. *Rev Bras de Obesidade, Nutrição e Emagrecimento*, v. 16, n. 101, p. 362-373, 2022.

37. PEÑAS; et al. Obesity is associated with a greater number of long-term post-Covid Symptoms and poor sleep quality: A multicentre case-control Study. *Int J Clin Pract*, 2021. doi: <https://doi.org/10.1111/ijcp.14917>.

38. SANTOS, CB; PEDROSO, B; SCANDELARI, L; PILATTI, LA. Qualidade de vida: Interpretação da sintaxe do SPSS para análise de dados do WHOQOL-100. *Revista de Salud Pública*, v. 11, n. 5, p. 836-841, 2009. ISSN 0124-0064.

39. SANTOS, FR; FIAMONCINI, JD; CERA, ML; SATLER, CE. Impacts on cognition of older adults infected by COVID-19: A literature Review. *Uningá Review*, 38, eURJ4463, 2023. Doi: doi.org/10.46311/2178-2571.38.eURJ4463.

40. KIM, YT et al. Association between health status and tooth loss in Korean adults: Longitudinal results from the National Health Insurance Service-Health Examinee Cohort, 2002-2015. *Journal of Periodontal & Implant Science*, 2019;49(3):158-70. Doi: 10.5051/jpis.2019.49.3.158.

41. KONISHI M; et al. An investigation of tooth loss factors in elderly patients using panoramic radiographs. *Oral Radiology*, 2020;37(3), 436-442. Doi: 10.1007/s11282-020-00475-6.

42. KOGA, RS; TEIXEIRA, DSC; DUARTE, YAO, FRAZÃO, P. Dependência funcional e qualidade de vida relacionada à saúde bucal em um coorte de 15 anos com pessoas idosas: um estudo caso controle. *Rev Bras Geriatr Gerontol*, n. 27, 2024. Disponível em: <https://doi.org/10.1590/1981-22562024027.230268.pt>.

43. FERREIRA, ACD; et al. Oral hygiene and its correlation with the general health of dependent elderly people: A literature review. *Research, Society and Development*, v. 10, n. 8, p. e20410817061, 2021. DOI: 10.33448/rsd-v10i8.17061.

44. MATTOS, S; MOREIRA, T; FLORÊNCIO, R; CESTARI, V. Elaboração e validação de um instrumento para mensurar Autopercepção de saúde em adultos. *Saúde Debate*, n. 45 (129), 2021. Disponível em: <https://doi.org/10.1590/0103-1104202112909>.

45. KREVE S; D'AVILLAS GC; SANTOS LO; REIS AC. Autopercepção da saúde bucal de idosos. *Clin Lab Res Den. Aged; Self Concept; Oral Health*. 2020.

46. PAVÃO, ALB; WERNECK, GL; CAMPOS, MR. Autoavaliação do estado de saúde e a associação com fatores sociodemográficos, hábitos de vida e morbidade na população: um inquérito nacional. *Cad Saúde Pública*, n. 29, ed. 4, Abril, 2013. Disponível em: <https://doi.org/10.1590/S0102-311X2013000400010>.

47. MELO, LA; SOUSA, MM; MEDEIROS, AKB; CARREIRO, AFP; LIMA, KC. Fatores associados à autopercepção negativa da saúde bucal em idosos institucionalizados. *Ciência e saúde coletiva* 21 (11), nov 2016. Doi: <https://doi.org/10.1590/1413-812320152111.08802015>

48. NOGUEIRA, CMR; FALCÃO, LMN; NUTO, SAS; SAINTRAIN, MVL; VIEIRA-MAYER, APGF. Autopercepção de saúde bucal em idosos: estudo de base domiciliar. *Rev. Bras. Geriatr. Gerontol*. 2017; 20 (1): 7-19.

49. RIBEIRO, AE; SANTOS, GS; BALDANI, MH. Edentulismo, necessidade de prótese e autopercepção de saúde bucal entre idosos institucionalizados. *Saúde Debate*, 47 (137), 2023. Disponível em: <https://doi.org/10.1590/0103-1104202313716>.

50. OLIVEIRA; PHM. Itinerários terapêuticos de adultos negros periféricos em busca de saúde bucal na pandemia da covid-19. 2023, p. 104 [dissertação]. Disponível em: <https://repositorio.ufba.br/handle/ri/40050>.

ACKNOWLEDGMENTS, FINANCIAL OR TECHNICAL SUPPORT, DECLARATION OF FINANCIAL CONFLICT OF INTEREST AND/OR AFFILIATIONS:

The authors thank the Araucária Foundation and other collaborators for their financial support and encouragement of research. The authors declare that there is no conflict of financial interest and/or affiliations.