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ORIGINAL ARTICLE

Impacts of the pandemic on the characteristics of care for children and adolescents in a public emergency room

HIGHLIGHTS

1. The pandemic changed the profile of pediatric care in the emergency room.
2. Increase in non-urgent cases and hospital discharges.
3. Cardiorespiratory diseases surpassed external causes during the pandemic period.

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ABSTRACT

Objective: To compare the characteristics of care for children and adolescents in a public emergency room before and during the coronavirus pandemic. **Method:** Cross-sectional study that analyzed 18,488 care instances for children and adolescents, conducted in a large emergency room between 2019 and 2023. Descriptive and inferential statistical analyses were performed using the chi-square test for comparisons. **Results:** During the pandemic period, there was a reduction in visits (from 54.55% to 45.45%; p<0.001). In contrast, an increase was observed among children aged 0–7 years and adolescents aged 18–19 years, along with a higher frequency of green/low-urgency triage classification and an increase in cardiorespiratory diseases (from 2.12% to 6.90%; p<0.001). Discharge remained the main outcome, with reductions in patient elopement and hospital admissions. **Conclusion:** The pandemic affected the profile of care, with reduced demand, changes in age distribution, risk classification, and outcomes, reflecting shifts in the use of emergency services.

DESCRIPTORS: COVID-19; Emergency Nursing; Emergency Medical Services; Child; Adolescent.

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INTRODUCTION

In Brazil, according to the 2022 demographic census, the population of children and adolescents aged 0 to 18 years was estimated at 54,505,203 inhabitants, representing about 26.8% of the total population[1]. This number highlights the importance of understanding the specific needs of this age group, which undergoes dynamic and complex processes of growth and development.

In the process of growth and development of children and adolescents, the social determinants of health (SDH), such as income, education, and environment, also influence their physical and mental health, especially in contexts of health crises, such as the COVID-19 pandemic[2]. Environments characterized by low family income, poor basic sanitation conditions, and unequal access to health services are related to the persistence of mortality from infectious and parasitic diseases, especially in vulnerable populations such as children and adolescents[3].

Brazil faces the reality of a triple burden of diseases, encompassing external causes, non-communicable chronic diseases (NCDs), and communicable diseases, which will also affect low-income and socially marginalized populations more significantly due to their greater exposure to risk factors and lesser access to health services and healthy environments[3].

Adding to this reality is the COVID-19 pandemic that began in 2020, which intensified these challenges, negatively impacting lifestyles and the health of the population, increasing socioeconomic inequalities[2]. Children and adolescents were especially affected by social distancing, which altered routines such as the shift to remote learning, increasing screen exposure by 80% and reducing physical activities[2]. These changes contributed to sedentary behavior, inadequate nutrition, and the emergence of diseases such as obesity and cardiovascular conditions, with potential impacts on the physical and mental health of adolescents[2].

The pandemic also negatively impacted vaccination adherence among children and adolescents, due to fears of contamination, difficulties in organizing health services, lack of public awareness, and fear of adverse reactions, which directly affects the health of this population[4].

Regarding health services, this scenario impacted the supply, demand, and utilization of these services, especially those of Primary Health Care (PHC), which were limited to clinical protocols for managing patients with respiratory symptoms, leading to delays and reductions in the follow-up of users with NCDs and child health care[5].

The Urgency Care Network also underwent changes. A study conducted in the emergency service (ES) of a reference center in Brazil found a 52% reduction in the volume of care for other clinical conditions unrelated to COVID-19, as well as a proportional increase in the hospitalization rate of patients with COVID-19. There was also a reported reduction in pediatric care reaching 71% compared to the numbers from previous years[6].

The city of Belo Horizonte in Minas Gerais (MG), like other capitals, faced significant challenges during the pandemic, especially in the public health system. Social distancing measures, mobility restrictions, and the overload of health services may have altered emergency care patterns, especially among vulnerable populations such as children and adolescents. National studies conducted in the state of São Paulo addressed the reduction in pediatric visits to emergency services during the pandemic, but did not discuss the characteristics of these visits or the pandemic's impact on this population[4,6].

Although there are studies on the impact of the pandemic on health systems, there is a gap in the literature regarding the characterization of emergency care aimed at the pediatric population, especially in the context of a public ES, thus demonstrating the need for studies that investigate this theme, particularly as it concerns a population undergoing a dynamic and complex process of physical, emotional, and social maturation that was strongly impacted by the social distancing caused by the pandemic. Moreover, characterizing the care is crucial to understand the impacts of the pandemic on pediatric health and to contribute to the planning and management of future crises.

Thus, the objective of this study was to compare the characteristics of care for children and adolescents in a public emergency room before and during the coronavirus pandemic.

METHOD

This is a cross-sectional study conducted with secondary data from the ES of a large public hospital located in the Metropolitan Region of Belo Horizonte, Minas Gerais. The ES, 100% SUS, and with open-door service 24 hours a day, performs more than 50,000 annual visits, serving both adult and child populations, although it does not have a formal pediatric specialty. The risk classification (RC) is based on the Manchester Triage System (MTS)[7]. During the COVID-19 pandemic, the hospital reorganized its flow, structuring specific areas for respiratory complaints[8].

The study population consisted of children and adolescents treated in the institution's emergency service from January 1, 2019, to March 31, 2023, and classified by the MTS. The definition of age groups followed the recommendation of the World Health Organization (WHO), considering children those aged between 0 and 9 years and adolescents, between 10 and 19 years, 11 months, and 29 days[9].

For the study, the dependent variable was considered to be the period of care before the COVID-19 pandemic (January 2019 to March 10, 2020) and during the pandemic (March 11, 2020, the start of the pandemic declared by the WHO,[10] to March 31, 2023). The end of the pandemic was declared on May 5, 2023[11].

As independent variables, the study used sociodemographic characteristics: age group (0 to 2 years; 3 to 7 years; 8 to 12 years; 13 to 15 years; 16 and 17 years; 18 and 19 years); sex (male, female) and city of origin (Belo Horizonte; Metropolitan Region; Other cities in Minas Gerais; Other states) and profile of the attendances: day of the week (Monday to Sunday); companion (Boyfriend; Friend/Neighbor; Professionals; Family; The same; Others); level of clinical priority according to the MTS (Red/Emergency; Orange/Very urgent; Yellow/Urgent; Green/Less urgent; Blue/Not urgent, White); clinic responsible for the care (Surgery; General clinic; Orthopedics/Trauma); Diagnoses according to the International Classification of Diseases and Health-Related Problems (ICD-10) (Cardiopulmonary diseases; Genitourinary/Gastrointestinal diseases; Neurological/Psychiatric diseases; External causes; Pain; Musculoskeletal/Rheumatic diseases) and Outcome of care (Discharge after care; Hospitalization; Transfer; Evasion; Death).

The study variables were categorized according to the specifics of the investigation. The level of clinical priority was determined based on the MTS, which establishes the degree of urgency and the recommended target time for medical care, applying to both routine conditions and emergency situations, such as disasters or multiple victims[12]. To

ensure the standardization of medical diagnoses, the ICD-10, developed by the WHO, was adopted.

Data extraction occurred through access to the database generated by the institution's electronic system, which has two storage software, one for managing medical records documents and another for conducting and recording the RC, according to the MTS. The data from the software were made available for this study by the Information Technology department of the scenario institution after the completion of ethical procedures. The information extracted from the institutional system was organized into a new database, constructed by the authors in Excel® program. Medical diagnoses were recategorized into broader groups, according to the variables defined in this study, to facilitate statistical analysis.

Initially, the relative frequencies (%) of the variables of interest were estimated. Comparisons between the period before and during the pandemic were performed using Pearson's chi-square test, adopting a significance level of $p \leq 0.05$. For comparisons between categories, Bonferroni's test was used. Statistical analyses were conducted using Stata® (version 14.2) and SPSS® (version 29).

The project was approved by the Ethics and Research Committee of the Federal University of Minas Gerais under the substantiated opinion no. 6.537.504.

RESULTS

The study sample consisted of 18,488 attendances to children and adolescents, with 10,086 (54.55%) conducted before the pandemic and 8,402 (45.45%) during the pandemic period.

A higher proportion of services was observed for the male sex (10,433; 56.43%). The predominant age group was 18 to 19 years (5,089; 27.58%), and most users (10,564; 64.44%) resided in Belo Horizonte (Table 1).

Table 1. Sociodemographic characteristics of children and adolescents attended in the emergency room, Belo Horizonte, Minas Gerais, Brazil, 2024

Variable	n	%
Age group (in years)		
0-2	1,981	10.72
3-7	2,688	14.54
8-12	2,853	15.43
13-15	2,828	15.30
16-17	3,039	16.44
18-19	5,099	27.58
Sex		
Male	10,433	56.43
Female	8,055	43.57
City of origin		
Belo Horizonte	10,564	64.44
Metropolitan region	5,605	34.19
Other cities in Minas Gerais	147	0.90
Cities from other states	77	0.47

Legend: n=18,488.

Source: The authors (2024).

The services occurred relatively homogeneously throughout the week, varying between 2,270 (13.85%) cases on Saturdays and 2,592 (15.81%) on Mondays. Most patients (13,494; 72.99%) were accompanied by a family member. Patients classified with a green/low urgency priority level predominated (7,295; 43.32%). Regarding medical diagnoses, external causes were the most frequent (8,114; 54.87%), and, concerning the outcome of the service, most (12,958; 72.05%) were discharged after initial evaluation and care (Table 2).

Table 2. Profile of services for children and adolescents in the emergency room, Belo Horizonte, Minas Gerais, Brazil, 2024

Variable	n	%
Day of service		
Sunday	2,297	14.01
Monday	2,592	15.81
Tuesday	2,352	14.35
Wednesday	2,312	14.10
Thursday	2,294	13.99
Friday	2,277	13.89
Saturday	2,27	13.85
Responsible		
Boyfriend	634	3.43
Friend/neighbor	440	2.38
Professionals	336	1.82
Familiar	13,494	72.99
The same	3,041	16.45
Others	543	2.94
Clinical priority after classification		
Red/emergency	240	1.43
Orange/very urgent	3,693	21.93
Yellow/urgent	5,51	32.72
Green/low urgency	7,295	43.32
Blue/not urgent	92	0.55
White	9	0.05
Responsible clinic for care		
Surgeries	5,918	35.15
General clinic	4,984	29.60
Orthopedics/trauma	5,934	35.25
Medical diagnoses		
External causes	8,114	54.87
Musculoskeletal/rheumatic diseases	3,542	23.95
Pain	1,019	6.89
Neurological/psychiatric diseases	766	5.18
Genitourinary/gastrointestinal diseases	700	4.73
Cardiorespiratory diseases	647	4.38
Not informed	1,637	9.18
Others	1,404	7.87
Care outcomes		
Discharge	12,985	72.05
Evacuation	3,029	16.81
Hospitalization	1,787	9.92
Transfer	212	1.18
Death	10	0.06

Legend: n=18,488.

Source: The authors (2024).

When comparing the services provided in the periods before and during the pandemic, significant variation was observed in various sociodemographic characteristics and the services provided. There was a proportional increase in services for children aged 0 to 2 years, 3 to 7 years, and adolescents aged 18 to 19 years, a reduction in services accompanied by family and by friends/neighbors, an increase in cases classified at the green/low urgency priority level, and regarding medical diagnoses, a significant increase in cardiorespiratory diseases was observed during the pandemic. Regarding the outcome of the service, an increase in the proportion of discharges and transfers was observed, along with a reduction in hospitalizations and dropouts (Table 3).

Table 3. Comparison of the characteristics of services for children and adolescents before and during the COVID-19 pandemic, Belo Horizonte, Minas Gerais, Brazil, 2024

(continue)

Variable	Before the pandemic		During the pandemic	
	n	%	n	%
Age (in years)				**p< 0.001**
0-2	985	9.77[a]	996	11.85[b]
3-7	1,415	14.03[a]	1,273	15.15[b]
8-12	1,666	16.52[a]	1,187	14.13[b]
13-15	1,555	15.42[a]	1,273	15.15[a]
16-17	1,761	17.46[a]	1,278	15.21[b]
18-19	2,704	26.81[a]	2,395	28.51[b]
Sex				**p= 0.937**
Male	5,689	56.40[a]	4,744	56.46[a]
Female	4,397	43.60[a]	3,658	43.54[a]
Responsible				**p< 0.001**
Boyfriend	387	3.84[a]	247	2.94[a]
Friend/neighbor	278	2.76[a]	162	1.93[b]
Professionals	186	1.84[a]	150	1.79[a]
Familiar	7,582	75.17[a]	5,912	70.36[b]
The same	1,344	13.33[a]	1,697	20.20[b]
Others	309	3.06[a]	234	2.79[a]
Clinical priority after classification				**p< 0.001**
Red/emergency	131	1.44[a]	109	1.41[a]
Orange/very urgent	1,95	21.37[a]	1,743	22.60[a]
Yellow/urgent	3,123	34.22[a]	2,387	30.95[b]
Green/low urgency	3,858	42.27[a]	3,437	44.57[b]
Blue/not urgent	56	0.61[a]	36	0.47[a]
White	9	0.10[a]	0	0.00[b]
Responsible clinic for care				**p=0.055**
Surgeries	3,162	34.66[a]	2,756	35.74[a]
General clinic	2,672	29.29[a]	2,312	29.98[a]
Orthopedics/trauma	3,29	36.06[a]	2,644	34.28[b]
Medical diagnoses				**p< 0.001**
External causes	4,374	55.97[a]	3,74	53.64[b]
Musculoskeletal/rheumatic diseases	1,948	24.93[a]	1,594	22.86[b]
Pain	553	7.08[a]	466	6.68[a]
Neurological/psychiatric diseases	387	4.95[a]	379	5.44[a]
Genitourinary/gastrointestinal diseases	387	4.95[a]	313	4.49[a]
Cardiorespiratory diseases	166	2.12[a]	481	6.90[b]

Table 3. Comparison of the characteristics of services for children and adolescents before and during the COVID-19 pandemic, Belo Horizonte, Minas Gerais, Brazil, 2024

(conclusion)

Variable	Before the pandemic		During the pandemic	
	n	%	n	%
Outcome of the service				
Discharge	6,593	58.5[a]	6,392	76.1[b]
Evacuation	1,914	19.9[a]	1,115	13.3[b]
Hospitalization	1,018	10.6[a]	769	9.2[b]
Transfer	89	0.9[a]	123	1.5[b]
Death	7	0.1[a]	3	0.0[a]

Note: letters "a"; "b" are related to the Bonferroni test, identical letters indicate that there were no statistically significant differences (p>0.05) and distinct letters indicate statistically significant changes before and during the pandemic (p≤0.05).
Legend: n=18.48
Source: The authors (2024).

External causes were the most prevalent medical diagnoses between 2019 and 2023. However, there was a progressive reduction from 3,765 cases in 2019 to 164 in 2023. Diagnoses for musculoskeletal/rheumatic diseases also showed a decline, while no statistically significant differences were observed in the other groups (Figure 1).

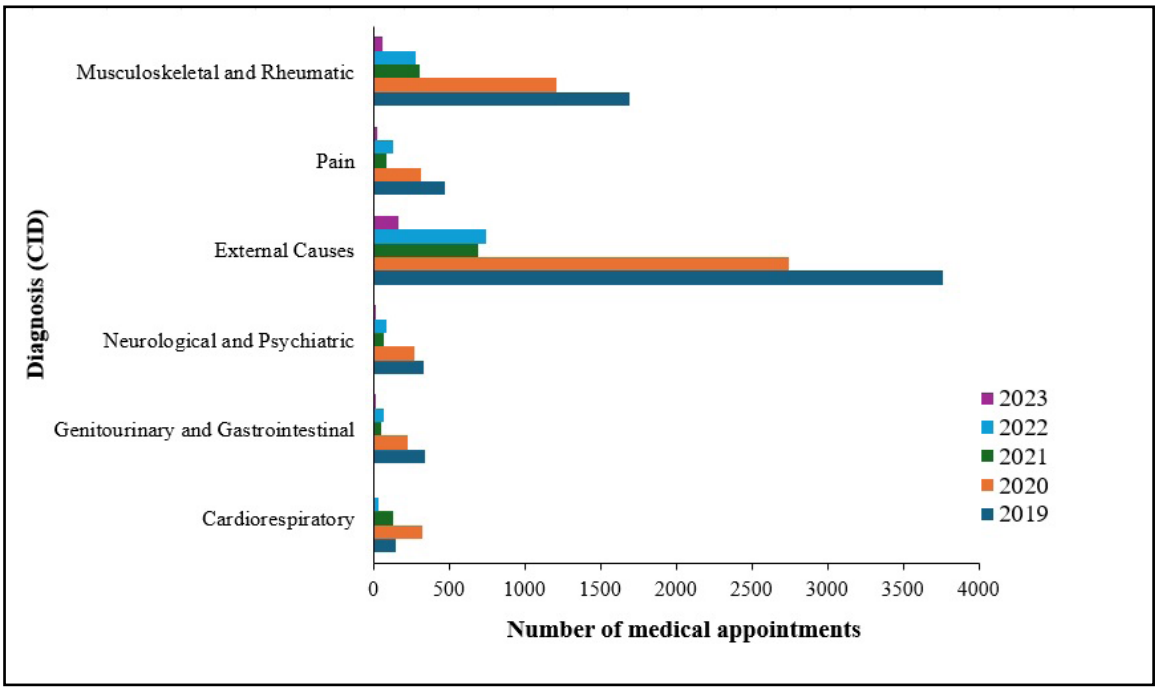

Figure 1. Annual distribution of medical diagnoses among children and adolescents treated in the emergency room, Belo Horizonte, MG, Brazil, 2024

Source: The authors (2024).

DISCUSSION

The present study compared the care provided to children and adolescents in a public emergency service in the Metropolitan Region of Belo Horizonte, before and during the COVID-19 pandemic, and highlighted changes in the profile of care, especially regarding sociodemographic and clinical characteristics, similar to findings from other national studies. In reference centers, there were declines of over 50% in

general care and up to 70% among children and adolescents[6,13]. Such reduction can be attributed to factors such as social distancing measures, the population's fear of exposure to the virus[14], and logistical difficulties, such as the decrease in the fleet of public transport in Belo Horizonte[15].

Changes in the age profile were also significant. There was an increase in care for children under seven years old and adolescents aged 18 to 19, while the age groups of 8 to 12 and 16 to 17 showed a significant reduction. In the case of children, this trend may be related to the greater vulnerability perceived by caregivers, especially in the face of respiratory symptoms, even if mild, that raise suspicion of COVID-19. Among older adolescents, it is possible that greater exposure to work contexts, especially in informal occupations, contributed to the increase in risks and demand for health services[16]. On the other hand, the decrease in care among those aged 8 to 17 may be associated with a higher degree of adherence to isolation, with the closure of schools, parks, and leisure centers, environments traditionally associated with greater circulation and interaction of this population [7].

Another relevant finding was the increase in the number of unaccompanied adolescents, although family members remained the main companions. The reduction of family companions can be explained both by pandemic control measures and by the greater autonomy of adolescents, especially those over 12 years old, who have the right to unaccompanied care according to the Statute of the Child and Adolescent[17].

Regarding clinical priority, there was an increase in cases classified as non-urgent/green and a reduction in urgent/yellow cases. The search for emergency services, even for low-severity situations, can be explained by the fact that the emergency service operates as an open door and is available 24 hours, in addition to the well-known trend of overloading these services with demands that could be resolved in primary health care[18].

The reduction in cases classified as urgent may be associated with the decrease in trauma care, especially given the lower circulation of people and the reduction of outdoor activities during the pandemic period. This is also reflected in the decline of care for external causes, a category that, although still the most prevalent, showed a significant reduction.

External causes, such as accidents, violence, and falls, represent an important factor of morbidity and mortality among children and adolescents[19]. In the present study, a significant reduction in these care cases was observed during the pandemic period, a result that can be attributed to the fact that social distancing measures and the closure of schools, businesses, and public spaces significantly reduced the circulation of people and, consequently, exposure to external risks, such as traffic accidents and episodes of interpersonal violence[20-21].

Home confinement may have contributed to the reduction of unintentional accidents, especially among children, due to increased family supervision. The constant presence of parents or guardians in the home environment may have acted as a protective factor, decreasing the occurrence of falls, burns, and poisonings[22-23]. However, some studies highlight the increase in domestic accidents during the pandemic, such as burns from hot liquids, falls, and poisonings from cleaning products related to the use of hand sanitizer and the overload of caregivers[22,24]. These data suggest that, although supervision played a protective role, the home environment also concentrated new risks, requiring greater attention to care and prevention practices in the family context.

It becomes important to consider the phenomenon of underreporting, especially in cases of domestic violence. The difficulty of access to formal reporting channels during social isolation may have masked the real magnitude of these occurrences. It is known that, even in contexts of reduced records, violence persisted. In Rio Grande do Sul, there was a 65% drop in reports of violence against children and adolescents in 2020, compared to 2019[20]. On the other hand, the 15th Brazilian Yearbook of Public Security pointed to an increase in intentional violent deaths among children and adolescents, despite the reduction in formal crime records such as rape, possibly due to the limitation of police station operations and the guidance for the population to avoid leaving home[21].

Still among medical diagnoses, a significant reduction in cases of musculoskeletal and rheumatic diseases was observed during the pandemic. These conditions involve changes in the musculoskeletal system, are often associated with the practice of physical and sports activities, especially in school or recreational environments[25]. The closure of schools, the suspension of physical education classes, and the limitation of public spaces for sports activities during social isolation reduced exposure to risk factors such as falls, sprains, and bruises[26]. In addition, many patients with chronic diseases avoided seeking health services for fear of contracting the coronavirus. About 30% of patients with rheumatic diseases interrupted their treatments during the pandemic[27]. This may have contributed to the reduction in demand for care in the emergency service, even though, paradoxically, it implied a greater risk of clinical worsening.

Another relevant aspect was the significant increase in diagnoses of cardiorespiratory diseases during the pandemic. This finding is consistent with the clinical picture of COVID-19, whose main symptoms include cough, fever, dyspnea, chest pain, and a drop in oxygen saturation[28]. In children, symptoms may include tachypnea, hypoxemia, feeding difficulties, and seizures. The emergency service, functioning as a 24-hour entry point, was the main alternative for the initial assessment of suspected cases, especially in a context of reorganization and overload of Primary Health Care[5].

Regarding the clinical outcomes of the care provided, there was an increase in discharges and transfers, and a reduction in absences and hospitalizations. The increase in discharges may be related to the proportional growth of cases classified as non-urgent, whose resolution usually occurs on an outpatient basis. The rise in transfers may reflect the institutional profile of the hospital, which is not a reference in pediatrics, sending more complex cases to other specialized services.

On the other hand, the reduction in absences may be associated with the population's fear regarding the outcomes of COVID-19, which may have led to greater adherence to complete care. Additionally, the fear of contamination and the prioritization of hospital resources for severe cases may also have contributed to the reduction in hospitalizations, as observed in other Brazilian states. A study showed that, in 2020, the volume of emergency admissions fell by 9.2% compared to 2019[29].

This study has limitations. The data were extracted from secondary records, filled out by healthcare professionals, which may generate inconsistencies, underreporting, or absence of diagnostic information. Moreover, the results reflect the profile of a single emergency room, which limits the generalization of the findings to other regional realities. Despite this, the analyzed data allow for the identification of relevant trends and provide support for improving assistance planning in contexts of health crises.

Despite the limitations, this is an original analysis based on real data from a large emergency service, covering an extensive period that includes before and during the COVID-19 pandemic. The identification of changes in age groups, clinical priority levels,

prevalent diagnoses, and referral patterns can support the planning of public policies, strengthen primary care, and reorganize hospital care with a focus on resolution and equity.

CONCLUSION

The results showed that the COVID-19 pandemic significantly impacted the profile of care for children and adolescents. There was a reduction in the total number of visits during the pandemic period. Notably, there was an increase in demand from children aged 0 to 7 years and adolescents aged 18 to 19 years, as well as a rise in unaccompanied visits and cases classified as non-urgent. There was also an increase in diagnoses related to cardiorespiratory diseases and a reduction in external causes and musculoskeletal diseases.

Such findings contribute to the understanding of the effects of the pandemic on pediatric emergency services and reinforce the importance of planning public policies that consider the redirection of care flows, the strengthening of primary care, and the expansion of health surveillance, especially in contexts of health crises. For the scientific field, it helps to fill gaps related to the impact of the pandemic on pediatric and youth care in emergency services and to encourage new research, including comparative regional analyses and in-depth investigations into the specific causes of the observed changes.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **da Silva AG, Reis MAS, Pereira FA, Corrêa AR.** Drafting the work or revising it critically for important intellectual content - **da Silva AG, Reis MAS, Pereira FA, de Sousa FCP, Giaquinto BCD, da Silva TMR, Corrêa AR.** Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **da Silva AG, Corrêa AR.** All authors approved the final version of the text.

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