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Impacts of the COVID-19 pandemic on the outpatient follow-up of preterm infants in a university hospital

Impactos da pandemia de covid-19 no acompanhamento ambulatorial de prematuros em um hospital universitário

Impactos de la pandemia de covid-19 en el seguimiento ambulatorio de prematuros en un hospital universitario

ABSTRACT

Objective: To analyze the impact of the COVID-19 pandemic on the outpatient follow-up of preterm infants. **Method:** Mixed-methods study including the analysis of 258 medical records and interviews with ten caregivers of twelve preterm children followed between 2019 and 2021. Quantitative data were analyzed using descriptive statistics, and qualitative data were examined through inductive thematic analysis. **Results:** Most infants were male (60.5%), late-preterm (48.1%), and delivered by cesarean section (81.8%). Three thematic categories emerged: repercussions of the pandemic on neonatal care; challenges experienced during the pandemic; and strategies implemented to ensure care quality. The most notable difficulties were reduced appointment frequency, socioeconomic impacts, and limited use of telehealth. **Final considerations:** Service reorganization, including increased spacing between appointments and the adoption of sanitary measures, was essential to maintaining continuity of care, ensuring caregiver satisfaction, and mitigating the effects of the pandemic.
Descriptors: Preterm infant; COVID-19; Ambulatory care.

RESUMO

Objetivo: Analisar o impacto da pandemia de covid-19 no acompanhamento ambulatorial de prematuros. **Método:** Estudo misto com análise de 258 prontuários e entrevistas com dez responsáveis por 12 crianças prematuras, acompanhadas entre 2019 e 2021. A análise quantitativa utilizou estatística descritiva e qualitativa e análise temática indutiva. **Resultados:** Observou-se predomínio do sexo masculino (60,5%), parto pré-termo tardio (48,1%) e cesariana (81,8%). Emergiram três categorias: repercussões da pandemia na assistência; desafios no contexto pandêmico; e estratégias para garantir a qualidade do atendimento. Destacam-se a redução das consultas, impacto socioeconômico e o uso limitado da teleconsulta. **Considerações finais:** A reorganização dos serviços, com espaçamento de consultas e medidas sanitárias, foi essencial para a continuidade da assistência, garantindo a satisfação dos responsáveis e minimizando os impactos da pandemia.
Descritores: Recém-nascido prematuro; Covid-19; Assistência ambulatorial.

RESUMEN

Objetivo: Analizar el impacto de la pandemia de COVID-19 en el seguimiento ambulatorio de prematuros. **Método:** Estudio mixto con análisis de 258 historias clínicas y entrevistas con diez cuidadores de doce niños prematuros atendidos entre 2019 y 2021. El análisis cuantitativo utilizó estadística descriptiva y el cualitativo, análisis temático inductivo. **Resultados:** Predominó el sexo masculino (60,5%), parto pretérmino tardío (48,1%) y cesárea (81,8%). Surgieron tres categorías: repercusiones de la pandemia en la atención neonatal, desafíos en el contexto pandémico y estrategias para garantizar la calidad del cuidado. Las principales dificultades incluyeron reducción de consultas, impacto socioeconómico y uso limitado de telemedicina. **Consideraciones finales:** La reorganización de los servicios, con espaciamiento de consultas y medidas sanitarias, fue fundamental para mantener la asistencia, garantizar la satisfacción de los cuidadores y minimizar los impactos de la pandemia.
Descriptores: Recién nacido prematuro; Covid-19; Atención ambulatoria.

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INTRODUCTION

Prematurity is the leading cause of death during the first year of life in Brazil. Although infant mortality has declined in recent years, rates remain high—particularly in the immediate neonatal period and early childhood—making preterm birth the most significant risk factor for infant morbidity and mortality[1].

Defined as a complex syndrome with multiple etiological factors, prematurity is associated with a broad spectrum of clinical conditions that determine survival as well as growth and developmental patterns among at-risk groups. Preterm birth—defined as delivery occurring before the expected time—refers to pregnancies ending between the 20th and 37th gestational weeks, that is, between 140 and 257 days after the first day of the mother's last menstrual period[2].

Preterm birth may affect children's physical health and their cognitive and behavioral development. Therefore, it is considered one of the most significant current public health challenges, underscoring the need for high-quality care during prenatal follow-up, childbirth, and the postpartum period. Considering the high susceptibility to neurodevelopmental alterations and the risk of chronic conditions later in life, premature infants require special attention during the first two years of life[3].

Furthermore, the first thousand days of life—also referred to as the golden window, encompassing the period from conception to the end of the second year—represent a critical developmental window in which the foundations of cognitive and emotional functioning are formed. During this period, habits and practices can be adopted that influence the child's future, making it decisive for healthy growth and development[4].

In the context of child health, developmental monitoring aims to promote well-being, ensure protection, and enable the early detection of modifiable alterations that may affect future outcomes. Premature infants, in particular, should be followed more frequently by a multidisciplinary team, according to the degree of prematurity and the presence of specific conditions, to ensure adequate investment in survival and to identify potential growth and developmental deficits[3].

COVID-19, a disease caused by the novel coronavirus SARS-CoV-2, represented a global threat due to its high transmissibility and rapid intercontinental spread, leading to substantial economic and public health impacts worldwide. Owing to its swift geographic dissemination, COVID-19 was declared a pandemic by the World Health Organization (WHO) in March 2020, becoming the most significant public health crisis of this generation[5].

The pandemic caused several indirect effects on childhood, including setbacks in education, socialization, and development; distancing from extended family; increased violence against children and reduced access to protective services; an abrupt decline in vaccination coverage, raising the risk of reemergence of vaccine-preventable diseases; excessive screen time; and reduced access to health services, both in primary care and in specialized units[6].

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greatest risk factor for infant morbidity and mortality[1].

Initially, strict safety and protective measures were implemented by government authorities and health institutions in order to minimize community transmission of the virus. Caregivers adhered to social distancing, motivated by the high number of deaths and the overcrowding of health services with infected individuals. However, as time passed, institutions were compelled to adopt new remote care models, such as teleconsultations and tele-orientation. Nevertheless, this new modality of follow-up was not able to reach most of the population served by the public system, as many caregivers of children followed in outpatient clinics did not have access to electronic devices with internet connectivity[6].

In this context, the impact caused by the need to cancel or postpone appointments during the pandemic was substantial. The health system's unpreparedness in the face of the pandemic led to the adoption of radical life-protecting measures, such as the immediate interruption of services considered non-essential. As a consequence, many children were deprived of regular health monitoring[6]. Despite this, outpatient follow-up for preterm infants remains essential due to specific warning signs that require frequent vigilance by healthcare professionals[3].

Despite the importance of the topic, scientific production addressing this issue is still limited. Therefore, the aim of this study was to analyze the impact of the COVID-19 pandemic on the outpatient follow-up of preterm infants in a university hospital. Specifically, the study sought to: (i) describe the socioeconomic and clinical profile of children followed in the pediatric outpatient clinic; (ii) identify the challenges faced by caregivers during the pandemic; and (iii) investigate the tools employed for the care and follow-up of these patients within this context.

METHODS

This was a mixed-methods study employing both quantitative and qualitative approaches. The quantitative component consisted of a descriptive cross-sectional study based on medical record analysis. The qualitative component was designed as a case study using in-depth interviews and narrative construction guided by semi-structured scripts.

The quantitative stage was conducted using medical records of children followed in the neonatology outpatient clinic of a university hospital located in the interior of Minas Gerais, Brazil, and integrated into the Brazilian Unified Health System (SUS).

To determine the sample size for the quantitative phase, data were obtained from the hospital's Statistics Department regarding children followed in the neonatology outpatient clinic between 2019 and 2021. All medical records of preterm infants receiving follow-up care due to prematurity during the study period were included. Records of non-premature children followed for other health conditions unrelated to prematurity were excluded.

Thus, quantitative data collection took place between May and July 2022, in person at the healthcare institution, using secondary data sources, totaling 258 medical records of children in outpatient follow-up due to prematurity during the COVID-19 pandemic.

For the qualitative component, the sample consisted of caregivers of prema-

ture children up to two and a half years of age who had attended at least ten follow-up consultations in the neonatology outpatient clinic. Based on the electronic medical record system, 31 caregivers were contacted; ten met the inclusion criteria. Sixteen were excluded due to unsuccessful contact attempts, and five declined participation and/or refused to sign the Informed Consent Form (ICF). Thus, the final sample comprised ten caregivers of twelve children (including three sets of twins).

Data collection instruments and procedures

A structured questionnaire developed by the researchers was used as the quantitative data collection instrument, with the purpose of identifying care outcomes during the pandemic as well as characterizing the socioeconomic and clinical profiles of the children. The variables analyzed were: sex, age, race/skin color, place of residence, religion, number of siblings, primary caregiver, number of consultations, presence of comorbidities, previous surgery, gestational age, birth weight and length, need for hospitalization after birth, pregnancy complications, and mode of delivery.

Between February and April 2022, qualitative data were collected through interviews guided by a semi-structured questionnaire, also developed by the authors, with the aim of understanding the main challenges faced by caregivers during the pandemic period. Initial contact occurred via telephone, during which the study objectives were briefly presented and participation was invited. Upon acceptance, the ICF was provided through a secure Google Forms® document sent via WhatsApp®, exclusively for reading and signature, thus avoiding the exchange of sensitive data via messaging applications. Interview scheduling followed according to caregiver availability.

Considering the social distancing measures imposed by the pandemic, interviews were conducted via phone call and digitally audio-recorded. All recordings were made with prior consent and immediately transferred to secure storage in encrypted, password-protected folders with access restricted to the researchers. Original recordings were deleted from the data collection devices after transfer. Interviews lasted an average of 16 minutes and were fully transcribed in Microsoft Word® immediately after completion. Reporting of the qualitative stage followed the Consolidated Criteria for Reporting Qualitative Research (COREQ), ensuring transparency regarding context, participants, and data collection and analytical procedures.

Data Analysis

Quantitative information extracted from the medical records was compiled in Microsoft Excel 2016 spreadsheets and stored in a database using IBM SPSS®. Data were analyzed using descriptive statistics and presented as absolute (n) and relative (%) frequencies, means, and standard deviations (±SD).

Qualitative data were interpreted according to the Inductive Thematic Content Analysis technique proposed by Bardin (2011). This method involves segmenting, aggregating, and classifying text fragments based on participants' statements, identifying units of meaning that are subsequently regrouped and interpreted within thematic categories. To enhance data

organization, the software Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires (IRAMUTEQ) was employed, facilitating clarity and comprehension of the social actors' perceptions regarding the study objective.

Ethical considerations

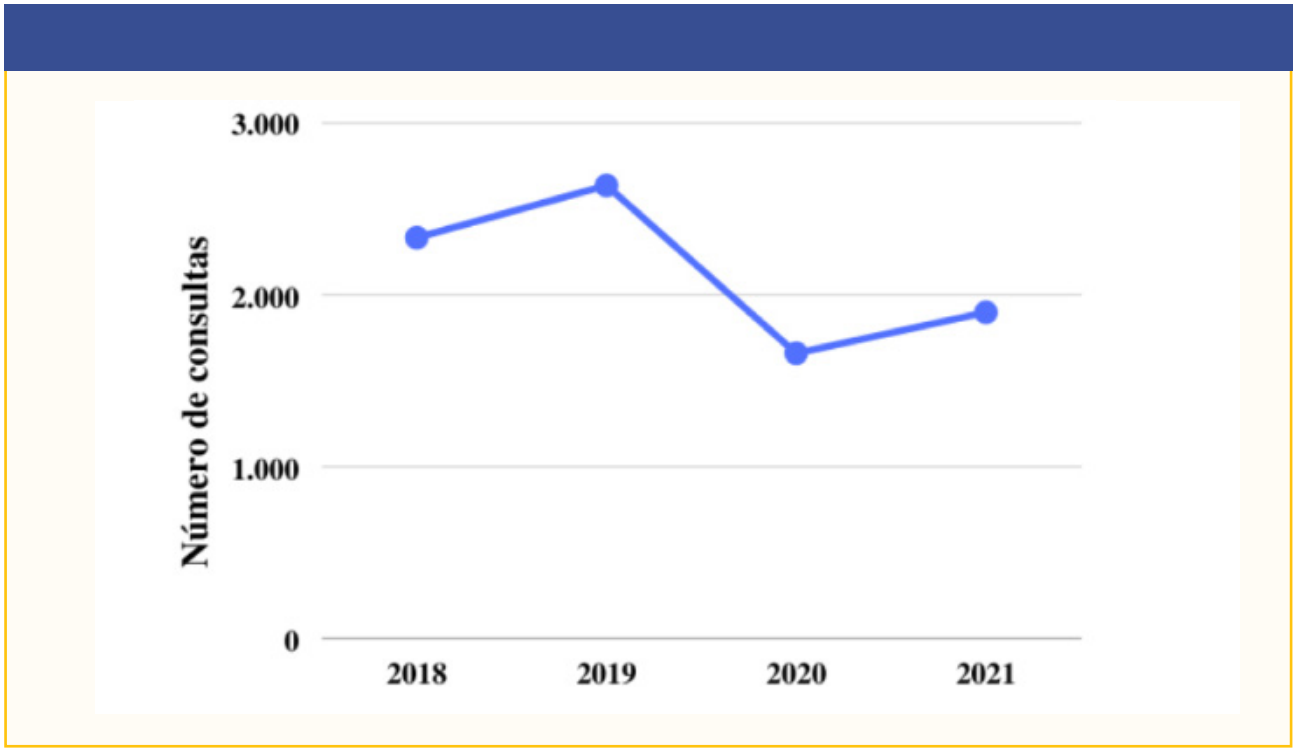
The study adhered to the ethical principles established in Resolutions No. 466/2012 and No. 510/2016 of the Brazilian National Health Council and was approved by the Human Research Ethics Committee (CEP) of the Federal University of Uberlândia (UFU), under approval No. 5.074.577. All participants signed the Informed Consent Form prior to participation and were assured the freedom to participate voluntarily and the right to withdraw from the study at any time. To ensure anonymity, participants were identified by the letter "R," referring to Responsável (caregiver), followed by a number corresponding to the order in which the interviews were conducted (R1 to R10). All quantitative and qualitative data were accessed exclusively by the responsible researchers and stored in encrypted, password-protected folders with controlled backup copies, minimizing the risk of data breaches.

RESULTS

Quantitative results

Between January 2019 and December 2021, the neonatology specialty conducted a total of 6,197 consultations. In 2019 alone, 2,638 consultations were performed. However, due to the health system collapse triggered by the COVID-19 pandemic, this number dropped to 1,660 in 2020, representing a 37.08% reduction, as shown in Figure 1.

Figure 1 - Number of consultations conducted in the neonatology outpatient clinic between 2019 and 2021



Source: Prepared by the authors.

A total of 258 medical records from patients followed in the neonatology outpatient clinic were analyzed. Table 1 presents the sociodemographic, clinical, neonatal, and maternal characteristics of these patients. Overall, there was a predominance of males (n = 156; 60.5%), children under 2 years of age (n = 155; 60.1%), White race/skin color (n = 160; 62.0%), and residence in the municipality of Uberlândia (n = 175; 67.8%). The mother was the primary caregiver in most cases (n = 250; 96.8%), and the mean number of follow-up consultations was 4.35 (SD = 3.13). Gestational age ranged from 23 weeks to 36 weeks and six days, with nearly half of the newborns classified as late-preterm. The most frequent pregnancy complications included multiple gestation (n = 57; 22.1%), preeclampsia (n = 61; 24.4%), and urinary tract infection (n = 47; 18.8%). Cesarean section was the most common mode of delivery (n = 211; 81.8%). Most newborns had low birth weight (n = 125; 48.4%) and required hospitalization after birth (n = 247; 95.7%), with respiratory complications being particularly prominent.

Table 1 - Sociodemographic and clinical variables from the analysis of medical records of patients seen in the neonatology outpatient clinic from 2019 to 2021

Sociodemographic variables		N	% / Mean ± standard deviation
Sex	Female Male	102 156	39.5 60.5
Age	0-24 months 25-48 months 49-72 months Death	155 87 13 3	60.1 33.7 5.0 1.2
Race/ ethnicity	White Black Brown/mixed	160 6 92	62.0 2.3 35.7
Place of residence	Uberlândia – MG Other municipality	175 83	67.8 32.2
Religion	Catholic Evangelical Other None	14 5 58 179	5.4 1.9 22.5 69.4
Number of siblings		**256**	**99.2** 1.08 ± 1.02
Primary caregiver	Mother Father Grandparents Adoptive parents	250 3 2 3	96.8 1.2 0.8 1.2
Number of consultations			4.35 ± 3.13
Comorbidities	Bronchopulmonary dysplasia Congenital malformation Congenital heart disease Congenital hypothyroidism Genetic disorder None	26 22 13 9 11 130	10.2 8.6 5.1 3.6 4.3 50.4

Continua

Neonatal data		N	% / Mean ± standard deviation
Gestational age	Extremely preterm infant	22	8.5
	Very preterm infant	59	22.9
	Moderately preterm infant	13	20.5
	Late-preterm infant	124	48.1
Birth weight	Extremely low birth weight	25	9.7
	Very low birth weight	59	22.9
	Low birth weight	125	48.4
	Normal weight	49	19.0
Size at birth	Appropriate for gestational age	206	79.8
	Small for gestational age	41	15.9
	Large for gestational age	11	4.3
Hospitalization after birth	Yes	247	95.7
	No	11	4.3
Length of hospitalization			33.91 ± 27.85
Neonatal complications	Respiratory distress syndrome	102	40.1
	Transient tachypnea of the newborn	74	28.9
	Jaundice	49	19.6
	Neonatal sepsis	26	10.4

Maternal data		N	% / Mean ± standard deviation
Pregnancy or childbirth complications	Preeclampsia	61	24.4
	Urinary tract infection	47	18.8
	Intrauterine growth restriction	42	16.8
	Preterm labor	41	16.4
	Gestational diabetes mellitus	32	12.8
	Premature rupture of membranes	23	9.2
	Maternal infection	23	9.2
	COVID-19	9	3.6
	No complications	15	5.8
Multiple gestation	Yes	57	22.1
	No	201	77.9
Mode of delivery	Cesarean	211	81.8
	Vaginal delivery	43	16.7
		254	**98.4**

Source: Prepared by the authors.

Qualitative results

Ten caregivers of twelve premature children—three sets of twins—who had a higher frequency of outpatient consultations in 2020 and 2021 participated in the interviews. Most caregivers were female, predominantly mothers, aged 22 to 53 years. Four (40%) had completed higher education, three (30%) reported being unemployed, and the mean family income was 2.5 minimum wages.

Regarding the children, there was a predominance of females (n = 10; 83.3%), all aged between 1 year and 3 months and 2 years and 6 months, of whom seven (58.3%) had no comorbidities. In terms of healthcare utilization, each child had an average of 11.2 consultations with the ne-

onatologist during the first two years of life; 91.7% had been followed in the outpatient clinic since birth, and only one began follow-up at two months of age. In addition to routine follow-up with the neonatologist, all children had priority access to specialized care provided by a multidisciplinary team composed of a physical therapist, speech therapist, endocrinologist, pulmonologist, and neurologist.

Table 2 presents all variables analyzed, including the relationship between gestational age and birth weight. It was observed that five children (33.3%) were born with extremely low birth weight and three (25%) were classified as small for gestational age.

Table 2. Sociodemographic and clinical data of 12 children most frequently seen in the neonatology outpatient clinic from 2019 to 2021

Sociodemographic variables		N	%
Sex	Female Male	10 2	83.3 16.7
Age	12-18 months 19-24 months 25-30 months	3 7 2	25.0 58.3 16.7
Race/ethnicity	White Black Brown/mixed	7 1 4	58.3 8.3 33.3
Place of birth	Uberlândia – MG	12	100
Comorbidities	Bronchopulmonary dysplasia Hypothyroidism Laryngomalacia None	3 2 1 7	25.0 16.7 8.3 58.3
Use of medications	Yes No	12 -	100 -
Number of outpatient consultations	10-12 consultations 13-15 consultations	10 2	83.3 16.7
	Caregiver data	**N**	**%**
Degree of kinship	Mother Father Grandparents	8 1 1	80.0 10.0 10.0
Age	20-35 years 36-53 years	6 4	60.0 40.0
Education level	Incomplete elementary education Completed elementary education Completed high school Completed higher education	1 2 3 4	10.0 20.0 30.0 40.0
Family income	Less than one minimum wage Between one and four minimum wages More than five minimum wages	2 6 2	20.0 60.0 20.0

Continua

	Neonatal data	N	%
Gestational age	Extremely preterm infant Very preterm infant Moderately preterm infant Late-preterm infant	4 6 - 2	33.3 50.0 0.0 167
Birth weight	Extremely low birth weight Very low birth weight Low birth weight Normal weight	5 5 1 1	41.7 41.7 8.3 8.3
Size at birth	Appropriate for gestational age Small for gestational age	9 3	75.0 25.0
	Hospitalization after birth	**N**	**%**
	Yes No	11 1	91,7 8,3
	Gestational data	**N**	**%**
Pregnancy or childbirth complications	Preeclampsia Cervical insufficiency Intrauterine growth restriction Preterm labor Others*	2 2 2 3 7	20.0 20.0 20.0 30.0 70.0
Mode of delivery	Cesarean Vaginal delivery	10 2	83.3 16.7

Source: Prepared by the authors.
Notes: Others (chronic hypothyroidism, uncontrolled chronic hypertension during pregnancy, placenta previa, gestational diabetes, urinary tract infection, premature placental abruption).

Overall perception of caregivers regarding access to child healthcare during the pandemic

Using IRAMUTEQ software, a word cloud was generated (Figure 2), enabling rapid visualization of the main terms mentioned in the interviews. The most frequently cited words were: be, not, people/we, because, appointment, and month. Based on this, it is evident that the most recurrent terms reflect the discourse of the majority of caregivers, who reported interruptions in their monthly follow-up appointments due to the pandemic.

Figure 2. Word cloud of terms frequently mentioned by the interviewees

Source: Prepared by the authors.

Through participants' discourse analysis and the use of IRAMUTEQ software, the following categories emerged: Category 1 – Repercussions of the COVID-19 pandemic on care for preterm infants; Category 2 – Challenges faced in the pandemic context; and Category 3 – Coping strategies and quality in outpatient care for preterm infants.

Category 1 – Repercussions of the COVID-19 pandemic on care for preterm infants

The COVID-19 pandemic generated repercussions at all levels of care for preterm newborns, spanning primary, secondary, and tertiary healthcare. At the outpatient level, in-person care was prioritized for high-risk children, those with comorbidities, extremely preterm infants, and those with low birth weight. However, despite this prioritization, reports indicated that some appointments needed to be rescheduled, mainly due to the absence of healthcare professionals infected with the virus or to quarantine measures affecting parents who were also infected.

Her last appointment was in December. She had one scheduled for February 8, but I had COVID and couldn't take her. So I asked to reschedule it for April (R3).

There was one appointment that got postponed. The doctor called to check whether the child was doing well, and if she was fine, they would schedule a later date—and that was her case. But it happened only that one time (R4).

She has pulmonary dysplasia, so we've been going to the pulmonologist since last year. The follow-up is every three months, but for her last appointment, he [the pulmonologist] got COVID, so it was rescheduled for the 22nd (R6).

Category 2 – Challenges in the pandemic context

Numerous challenges were faced by parents during the pandemic, further intensifying the vulnerability of this population. Regarding access to health services, a frequent concern was the restriction allowing only one accompanying adult for the child, which created stress and added burden, especially for mothers.

My main issue was that they wouldn't allow us to enter with another companion. For example, there were days when I stayed there from noon until five-thirty, and my mother had to wait outside to support me. How was I supposed to manage with a baby who breastfed exclusively, especially if I needed to go to the bathroom? (R5).

After she stopped using oxygen, he (the father) could no longer enter with us. I understand that this was expected to avoid crowding, but she was still very little. When you go with a child, you end up carrying so many things — a suitcase, a bag, documents — so it was really difficult to go to the appointments with her (R7).

Another factor affecting families was the worsening socioeconomic situation, resulting from unemployment and rising prices, which directly impacted the ability to purchase medications for the children.

I've been able to get her medications through SUS, at the public pharmacy. Sometimes I had to buy them because they were out of stock in SUS; the UAI didn't have them. But when I had to buy them, it weighed on me because they're expensive. The last box I bought was over eighty reais, so it was a bit pricey (R6).

We both lost our jobs during that period, so it affected us for a long time. I

think her first three months at home were really complicated. Even though I applied for emergency aid, mine was denied several times, and I had to go to court to get it approved. It was embarrassing and stressful because we were both in need — both unemployed. We never ran out of medication, but it was harder. Now we are having trouble again; things were already expensive before, especially Flixotide, which we used to pay eighty-nine reais for with a discount, and now it's one hundred eighty or one hundred twenty with a discount. It's really expensive, and it doesn't even last a month (R7).

I lost my job in Uberlândia in April 2021. I was offered another job in my hometown and decided to accept it, but it didn't work out because I wasn't doing well, I couldn't handle it, and I ended up resigning. So today, I am unemployed. I bought the vitamin until she was one and a half, but then we had to reduce expenses, and our income also decreased. Now she isn't taking it because of the cost. The iron supplement isn't so bad, but the vitamin — if I'm not mistaken — costs seventy reais, and buying it for three children is too much (R10).

Caregivers' feelings of fear, anxiety, and insecurity about exposing their children to the risk of infection—especially during travel to health services—were strongly present in their accounts. Nevertheless, their narratives tended toward a positive coping approach, as caregivers understood the importance of specialized follow-up for the health and appropriate development of preterm infants.

It was really difficult because we were afraid to go to the hospital with everything that was happening, but thank God everything turned out fine (R1).

I was really scared because I went to Uberlândia to see her three times a week, and I used public transportation during the peak of the pandemic. Some days I got there and didn't even hold her, because the clothes we wore on the way were the same ones used to hold the babies. I was afraid of being sick and passing it to her, so sometimes I didn't even pick her up (R4).

I was very afraid, especially in the first months of follow-up, because she used oxygen and came home still using oxygen [...] so I was really scared of the virus, you know? Because a tiny baby doesn't wear a mask (R7).

We were scared. Her father was even more afraid than I was, but we couldn't miss the appointments because she needed them. It was for her own good (R9).

Faced with the many deaths caused by COVID-19, one caregiver shared her experience of family bereavement and described the perceived impacts on the child's development following the mother's death.

Her mother got COVID and passed away eight months ago — she was my daughter. The baby was one year and one month old. At one year she was already walking, already talking, very active. I say she's premature in everything. At that time she felt the loss — she was traumatized. She became clingy, which she wasn't before. Even though she lived with me, I try, as an educator, to keep routines and give her a structured family upbringing. But she became clingy, more tearful, started falling more, and we connected all of that to the absence of her mother, at least that's what I believe (R3).

Category 3 – Coping strategies and quality of outpatient care for preterm infants

The health service had to reorganize itself in order to maintain comprehensive care for infants amid social distancing measures. Caregivers reported the use of several strategies, such as scheduling in-person appointments at staggered times to avoid crowding in the waiting room, and using telephone calls and teleconsultations in specific cases, although these were not frequently employed.

He had an online appointment with the pediatrician. The online consultation was very valuable to me, I really liked it. At first we get a little scared because we're not used to it, so it feels a bit strange. But as long as you're well attended, with the doctor giving all the explanations, it works. The contact is different, of course, but it was still good (R2).

Because everything was overcrowded at the time, one of the appointments was virtual, and it was very smooth. It didn't have that usual in-person contact, right? But she gave all the correct guidance (R8).

Despite recurring concerns, families expressed a high level of satisfaction with the care provided by professionals, the reorganization of outpatient services, and the adoption of hygiene measures recommended for disease prevention.

[...] the questions I had, everything I asked the doctor was answered very well (R2).

At UFU I wasn't afraid, because they were very careful about that part, and there weren't many people around (R5).

[...] after we started getting used to it, we noticed the separation of spaces, and that helped us adapt to the situation. The care there is unquestionable, really good (R8).

[...] In the beginning everything was very organized; they were scheduling fewer children, and we went in fifteen minutes before the appointment, so it was all very calm (R9).

At the Hospital de Clínicas, thank God, we were very well cared for, even now when they go to their routine appointments. After they were born, everything went well. Other than God, it was the hospital that, as I mentioned, saved one of the triplets, who needed to stay longer in the ICU and had some complications; the doctors resuscitated her. When the girls were in the Neonatal ICU, and even now during follow-up visits, we had access to the medical reports, to the information, to clear explanations about everything. Overall, everything was very calm; for me as a mother and for their father as well, the care was excellent, and the hospital offered all the support possible (R10).

DISCUSSION

The characterization of 258 preterm infants in outpatient follow-up at a university hospital in Minas Gerais allowed the compilation of sociodemographic and clinical data from the population served. A predominance of male infants, children under 2 years of age, late-preterm birth, and low birth weight was observed, findings similar to those reported in other studies[7,8].

Regarding gestational complications that may have contributed to preterm birth, 24.4% of pregnant women were diagnosed with preeclampsia. According to the Brazilian Ministry of Health, hypertensive disorders during pregnancy are important risk factors for preterm birth and may result in additional fetal repercussions, such as intrauterine growth restriction and low birth weight[9].

Maternal infections, particularly urinary tract infections, also increase the risk of preterm birth. Although their occurrence was low in this sample, recent studies have also reported an association between prematurity and maternal SARS-CoV-2 infection during pregnancy. A cohort study conducted in South Korea showed that 38.46% of women infected with the virus had preterm deliveries[10]. Such findings reinforce the need for adequate prenatal monitoring, including routine screening for infectious diseases, enabling early detection and treatment of asymptomatic infections to prevent possible maternal and neonatal complications.

Regarding delivery type, 81.8% of births occurred via cesarean section, a proportion similar to that found in other studies, which show a higher prevalence of cesarean delivery in cases of prematurity[11]. It is known that cesarean section is an effective surgical intervention to save the lives of both mother and child when appropriately indicated; however, when performed without proper justification, it may increase the risk of maternal and neonatal morbidity and mortality, including prematurity. This association may be explained by incomplete fetal maturation due to errors in gestational age estimation and early scheduling of the procedure[12].

Cesarean delivery is also associated with an increased occurrence of significant neonatal complications, such as pulmonary immaturity, which may exacerbate respiratory problems including respiratory distress syndrome and transient tachypnea of the newborn—conditions observed in many participants of this study. Additionally, the mode of delivery and prematurity may have repercussions on long-term child health outcomes, including an increased risk of obesity, diabetes, asthma, allergies, and other non-communicable diseases[12].

Bronchopulmonary dysplasia (BPD) was the most frequent comorbidity. BPD is a severe form of chronic lung disease in newborns, associated with prolonged mechanical ventilation and exposure to high oxygen concentrations. In this context, prematurity and low birth weight are considered major risk factors for the development of this condition, with incidence ranging from 4% to 40% in this population. In the present sample, BPD incidence was 10.2%, a value consistent with the range reported in the literature[13].

The COVID-19 pandemic provoked changes in specialized services caring for premature infants. The follow-up of these children was clearly affected, as evidenced by the considerable reduction in the number of consultations between 2019 and 2020 and by successive rescheduling of appointments. As a result, both healthcare professionals and families of preterm infants had to adapt their routines to ensure continuity of care[14].

According to studies conducted in 2021[15], the main reason for missed follow-up appointments was fear of the virus. In the present study, however, the main reason for discontinuity of care was parental or professional isolation due to infection or quarantine measures. This difference may be explained by the fact that the present study included caregivers of children who most frequently attended the outpatient clinic during the pandemic—that is, high-risk preterm infants whose in-person follow-up was prioritized.

Thus, despite reports of fear, insecurity, and anxiety, caregivers demonstrated awareness of the inherent vulnerabilities

and specificities of prematurity. In this context, preterm infants are more susceptible to health complications and developmental delays and must be followed regularly during the first two years of life. Therefore, caregivers displayed a positive coping approach, understanding that delays in neurodevelopment could generate greater short- and long-term impacts than the potential risk of viral exposure.

A major barrier to accessing healthcare was the restriction allowing only one accompanying adult per child. Notably, official guidelines from the Brazilian Society of Pediatrics (SBP), the Ministry of Health, and the Centers for Disease Control and Prevention do not explicitly recommend restricting the presence of a second caregiver during pediatric consultations in the context of COVID-19[14]. Nevertheless, as reported by participants, the studied service implemented this restriction, generating stress and maternal overload during healthcare visits.

In this respect, the reduced involvement of fathers in their children's healthcare was also evident. A reflexive analysis[16] emphasized that paternal participation is essential for fostering the father–child bond, providing emotional security to mothers, supporting breastfeeding, and promoting an engaged and affective fatherhood. Therefore, it is essential that health services and professionals value and facilitate the father's active participation, supporting the development of his role and contributing to family harmony and well-being.

Regarding childhood bereavement, mentioned in one interview, it is known that children under five years old perceive death as physical absence and a reversible event, lacking an understanding of cause and effect. Thus, the child's age directly influences how loss is perceived. Parental loss in childhood may have numerous consequences, as children at this stage are undergoing cognitive and emotional development. Although there are no specific studies on parental loss among children under three years old, important developmental changes have been reported. Literature indicates that, regardless of age, the loss of a parent generates intense feelings of abandonment and denial, as the figure previously associated with protection and security is no longer present[17].

The pandemic also exacerbated socioeconomic challenges in families, driven by rising unemployment. Similarly, a study[18] highlighted that the financial insecurity intensified by the pandemic may affect children's emotional and physical well-being, in both the short and long term, due to negative repercussions on nutrition and access to adequate medications—representing major risks to biopsychosocial health and development.

Regarding access to health institutions, findings show that the service prioritized in-person follow-up for high-risk preterm infants, consistent with SBP recommendations. Similarly, an analysis conducted in a maternity hospital in Paraíba[8] demonstrated the continuity of in-person follow-up for infants with comorbidities, extreme prematurity, or low birth weight. However, although less frequently used in this study, remote consultations played an important role in ensuring continuity of care.

Telehealth was a strategic tool used to mitigate overcrowding in health facilities and maintain care during social distancing. Nonetheless, despite its benefits, pediatric telehealth faces barriers such

as lack of access to electronic devices and internet, as well as weakened rapport and reduced thoroughness during remote consultations, limiting comprehensive child assessment and care[19,20].

Finally, the findings showed that, despite the significant burden placed on the healthcare system by the high number of infected individuals, the service maintained both in-person and remote follow-up according to each patient's clinical condition. As highlighted in other studies, healthcare professionals and managers had to modify their work environments and processes, adopting measures to reduce the impact of the pandemic on preterm infant care[14,21].

Among these strategies, strict adherence to hygiene measures, use of 70% alcohol and personal protective equipment—especially masks—environmental reorganization, and staggered appointment scheduling stood out, demonstrating compliance with sanitary recommendations[22].

In this sense, the reorganization of care practices was crucial to maintaining quality and ensuring caregiver satisfaction. The joint adaptation by the healthcare team and families, along with the adoption of strategic measures, was essential to ensuring safety in preventing viral spread without compromising child healthcare. Thus, reorganizing the flow of care was fundamental for the service to meet the health needs of users and their families during the pandemic.

FINAL CONSIDERATIONS

This study analyzed the impact of the COVID-19 pandemic on the outpatient follow-up of preterm infants in a university hospital. Most participants were late-preterm infants, predominantly male, and were mainly accompanied by their mothers, who generally had limited family income. The main difficulties faced during the pandemic included the reduction in the number of consultations—which decreased by 37.08% in 2020 compared with 2019—alongside socioeconomic challenges and caregivers' fear of exposing their children to the virus.

To mitigate these impacts, the health service implemented effective strategies: reorganizing appointments by increasing the interval between visits to avoid crowding, and using teleconsultations in specific cases, both of which were essential to ensure continuity of care. These measures proved crucial for maintaining care quality and caregiver satisfaction, ensuring assistance for high-risk children.

The main limitation of this study is that the qualitative interviews were conducted only with caregivers of children who had a high frequency of outpatient consultations. The absence of perspectives from parents whose children experienced more pronounced interruptions in follow-up represents a gap that may affect the comprehensiveness of the findings. Future studies should investigate the experiences of these caregivers to broaden understanding of the challenges and impacts of the pandemic on the follow-up of preterm infants.

FINAL CONSIDERATIONS

1. Moura EC, Cortez-Escalante J, Lima RTS, Cavalcante FV, Alves LC, Santos LMP, et al. Mortality in children under five years old in Brazil: evolution from 2017 to 2020 and the influence of COVID-19 in 2020 [Internet]. J. Pediatr. (Rio J.). 2022;98(6):626-34. DOI: 10.1016/j.

jped.2022.03.004.

2. Organização Mundial da Saúde (OMS). Preterm birth: key facts. Geneva: WHO; 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/preterm-birth.

3. Sociedade Brasileira de Pediatria (BR). Seguimento ambulatorial do recém-nascido de alto risco. 3a ed. Rio de Janeiro: SBP; 2023. Disponível em: https://www.sbp.com.br/fileadmin/user_upload/24651c-ManSeguimento_RN_AltoRisco_MIOLO.pdf.

4. Pereira SMS, Sousa MM, Oliveira TDO, Silva MRR, Araújo MFM. Riscos do consumo de açúcares de adição nos primeiros 1000 dias de vida: o que o Agente Comunitário de Saúde precisa saber? São Luís: EDUFMA; 2022. Disponível em: https://ares.unasus.gov.br/acervo/html/ARES/24528/1/1000%20DIA%20DE%20VIDA%20EBOOK%20-%2015.03%20FINAL.pdf .

5. Martins MM, Prata-Barbosa A, Magalhães-Barbosa MC, Cunha AJLA. Clinical and laboratory characteristics of SARS-CoV-2 infection in children and adolescents. Rev paul pediatr. 2021;39:e2020231. DOI: 10.1590/1984-0462/2021/39/2020231.

6. Regional Health-Americas TL. Reflections on one year in the Americas: What is next for the region? Lancet Reg Health Am. 2022 Sep 14;13:100370. DOI: 10.1016/j.lana.2022.100370.

7. Reichert AP, Soares AR, Guedes AT, Brito PK, Bezerra IC, Santos NC, et al. Restriction of follow-up of premature infants in the COVID-19 pandemic: a mixed approach. Acta Paul Enferm. 2022;35:eAPE02206. DOI: 10.37689/acta-ape/2022AO0220666.

8. Ianiro G, Punčochář M, Karcher N, et al. Variability of strain engraftment and predictability of microbiome composition after fecal microbiota transplantation across different diseases. Nat Med. 2022;28:1913-23. DOI: 10.1038/s41591-022-01964-3.

9. Etil T, Opio B, Odur B, et al. Risk factors associated with preterm birth among mothers delivered at Lira Regional Referral Hospital. BMC Pregnancy Childbirth. 2023;23:814. DOI: 10.1186/s12884-023-06120-4.

10. Engjom HM, Ramakrishnan R, Vousden N, et al. Perinatal outcomes after admission with COVID-19 in pregnancy: a UK national cohort study. Nat Commun. 2024;15:3234. DOI: 10.1038/s41467-024-47181-z.

11. Gemmill A, Casey JA, Catalano R, Karasek D, Margerison CE, Bruckner T. Changes in preterm birth and caesarean deliveries in the United States during the SARS-CoV-2 pandemic. Paediatr Perinat Epidemiol. 2022 Jul;36(4):485-89. DOI: 10.1111/ppe.12811.

12. Moreira A, Noronha M, Joy J, et al. Rates of bronchopulmonary dysplasia in very low birth weight neonates: a systematic review and meta-analysis. Respir Res. 2024;25:219. DOI: 10.1186/s12931-024-02850-x.

13. Reichert AP da S, Guedes ATA, Soares AR, Brito PKH, Bezerra IC da S, Silva LCL da, et al. Repercussões da pandemia da covid-19 no cuidado de lactentes nascidos prematuros. Esc Anna Nery. 2022;26(spe):e20210179. DOI: 10.1590/2177-9465-EAN-2021-0179.

14. Rao SPN, Minckas N, Medvedev MM, et al. COVID-19 Small and Sick Newborn Care Collaborative Group. Small and sick newborn care during the COVID-19 pandemic: global survey and thematic analysis of healthcare providers' voices and experiences. BMJ Glob Health.

2021 Mar;6(3):e004347. DOI: 10.1136/bmjgh-2020-004347.

15. Chmielewska B, Barratt I, Townsend R, et al. Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. Lancet Glob Health. 2021 Jun;9(6):e759-e772. DOI: 10.1016/S2214-109X(21)00079-6. Epub 2021 Mar 31. Erratum in: Lancet Glob Health. 2021 Jun;9(6):e758. DOI: 10.1016/S2214-109X(21)00223-0.

16. Alvis L, Zhang N, Sandler IN, Kaplow JB. Developmental manifestations of grief in children and adolescents: caregivers as key grief facilitators. J Child Adolesc Trauma. 2022 Jan 28;16(2):447-57. DOI: 10.1007/s40653-021-00435-0.

17. Reichert AP da S, Guedes ATA, Soares AR, Brito PKH, Dias TKC, Santos NCC de B. COVID-19 pandemic: experiences of mothers of infants who were born premature. Rev Gaúcha Enferm. 2021;42(spe):e20200364. DOI: 10.1590/1983-1447.2021.20200364.

18. Paz GM, Puty MC, Fonseca FMNS. Analysis of an approach to pediatrics in the context of the pandemic by COVID-19. Res Soc Dev. 2022;11(3):e1211326060. DOI: 10.33448/rsd-v11i3.26060.

19. Mélo CB, Farias GD, Ramalho HVB, Santos JMG dos, Rocha TT da, Gonçalves EJG, Moura RBB de, Piagge CSLD. Teleconsultation at SUS during the COVID-19 pandemic in Brazil. Res Soc Dev. 2021;10(8):e54010817675. DOI: 10.33448/rsd-v10i8.17675.

20. Sociedade Brasileira de Pediatria (BR). Atendimento ambulatorial pediátrico e neonatal na pandemia de covid-19. [Nota de alerta]. Departamento Científico de Neonatologia; 2020 Jul. Disponível em: https://www.sbp.com.br/fileadmin/user_upload/22625d-NA_-_Atend_ambulat_ped_e_neonatal_na_pandemia_COVID19.pdf.

Marques FRDM, Domingues LF, Carreira L, Salci MA. Reorganização do serviço ambulatorial de referência para condições crônicas durante a pandemia da covid-19. Esc Anna Nery. 2022;26:e20210354. DOI: 10.1590/2177-9465-EAN-2021-0354.

Ntounis T, Prokopakis I, Koutras A, et al. Pregnancy and COVID-19. J Clin Med. 2022 Nov 9;11(22):6645. DOI: 10.3390/jcm11226645.

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