

# Survey of risk indicators for child development in a Primary Health Care program: a speech-language pathology perspective

Levantamento dos indicadores de risco para o desenvolvimento infantil em um programa de Atenção Primária à Saúde: uma perspectiva fonoaudiológica

Encuesta de indicadores de riesgo para el desarrollo infantil en un programa de Atención Primaria de Salud: una perspectiva fonoaudiológica

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## Abstract

**Introduction:** Risk factors for child development can cause changes in communication, such as language and speech, auditory and stomatognathic functions. The *Bebê Precioso*, inserted in primary care in the city of Joinville, Santa Catarina State, aims to monitor newborn children (NC) and infants aged 0 to 24 months, discharged from the Neonatal Unit, with a history of risk factors for changes in global development. **Objective:** To identify the main risk factors for child development and related to

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### Authors' contributions:

JSF: Study conception and design; Data collect; Analysis and writing of the manuscript.

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speech therapy, of newborn and infant children followed by this primary health care program. Method: Retrospective descriptive study, with quantitative analysis of data from medical records of NC and infants treated in the program from March 2019 to March 2020. **Results:** The study sample consisted of 58 NC and infants. The most frequent risk factors were prematurity (77.5%), low birth weight (72.5%), respiratory disorders (50%), perinatal asphyxia (19%), hyperbilirubinemia (13.8%), of severe infection (12%), congenital malformations and genetic syndromes (5.2%) and neurological alterations (5%). 53.5% of the NBs were attended by Speech-Language Pathology students. Of these, 61.3% presented speech-language disorders, being 42.1% in orofacial motricity, 42.1% auditory and 15.8% in language development. **Conclusion:** The participants of this study presented risk factors for speech-language disorders in language, orofacial motricity and auditory skills. The importance of the speech therapist in follow-up programs is emphasized.

**Keywords:** Premature newborn; Child development; Speech, Language and Hearing Sciences; Primary Health Care; Risk factors.

## Resumo

**Introdução:** Fatores de risco para o desenvolvimento infantil podem ocasionar alterações na comunicação, como linguagem e fala, funções auditivas e estomatognáticas. O programa Bebê Precioso, inserido na atenção básica da cidade de Joinville, Santa Catarina, visa acompanhar recém-nascidos (RNs) e lactentes de 0 a 24 meses, egressos da Unidade Neonatal, com histórico de fatores de risco para as alterações no desenvolvimento global. **Objetivo:** Identificar os principais fatores de risco para o desenvolvimento infantil e relacionados à fonoaudiologia, de RNs e lactentes acompanhados por este programa de atenção primária à saúde. **Método:** Estudo retrospectivo de caráter descritivo, com análise quantitativa de dados de prontuários de RNs e lactentes atendidos no programa no período de março de 2019 a março de 2020. **Resultados:** A amostra do estudo foi composta por 58 RNs e lactentes. Os fatores de risco mais frequentes foram a prematuridade (77,5%), baixo peso ao nascer (72,5%), alterações respiratórias (50%), asfixia perinatal (19%), hiperbilirrubinemia (13,8%), quadro de infecção grave (12%), malformações congênitas e síndromes genéticas (5,2%) e alterações neurológicas (5%). 53,5% dos RNs foram atendidos pelos discentes de fonoaudiologia. Destes, 61,3% apresentaram alterações fonoaudiológicas, sendo 42,1% na motricidade orofacial, 42,1% auditivas e 15,8% no desenvolvimento da linguagem. **Conclusão:** Os participantes do presente estudo, apresentaram fatores de risco para alterações fonoaudiológicas de linguagem, motricidade orofacial e habilidades auditivas. Enfatiza-se a importância do fonoaudiólogo em programas de *follow-up*.

**Palavras-chave:** Recém-nascido prematuro; Desenvolvimento infantil; Fonoaudiologia; Atenção Primária à Saúde; Fatores de risco.

## Resumen

**Introducción:** Los factores de riesgo para el desarrollo infantil pueden provocar cambios en la comunicación, como el lenguaje y el habla, las funciones auditivas y estomatognáticas. El programa Bebé Precioso, insertado en atención primaria en la ciudad de Joinville, Santa Catarina, tiene como objetivo acompañar a recién nacidos (RN) y lactantes de 0 a 24 meses, dados de alta de la Unidad Neonatal, con antecedentes de factores de riesgo de cambios en el desarrollo. global. **Objetivo:** Identificar los principales factores de riesgo para el desarrollo infantil y relacionados con la logopedia, de recién nacidos y lactantes monitoreados por el programa de Atención Primaria de Salud. **Método:** Estudio retrospectivo de carácter descriptivo, con análisis cuantitativo de los datos de las historias clínicas de los recién nacidos y lactantes atendidos en el programa de marzo de 2019 a marzo de 2020. **Resultados:** La muestra del estudio estuvo constituida por 58 recién nacidos y lactantes. Los factores de riesgo más frecuentes fueron prematuridad (77,5%), bajo peso al nacer (72,5%), trastornos respiratorios (50%), asfixia perinatal (19%), hiperbilirrubinemia (13,8%), infección grave (12%), malformaciones congénitas y síndromes genéticos (5,2%) y trastornos neurológicos (5%). El 53,5% (n=31) de los recién nacidos fueron atendidos por estudiantes de logopedia. De estos, el 61,3% presentó trastornos del habla y el lenguaje, con el 42,1%

en la motricidad orofacial, el 42,1% auditiva y el 15,8% en el desarrollo del lenguaje. **Conclusión:** Los participantes del presente estudio presentaron factores de riesgo para trastornos del habla y lenguaje, motricidad orofacial y habilidades auditivas. Se enfatiza la importancia del logopeda en los programas de seguimiento.

**Palabras clave:** Recien Nacido Prematuro; Desarrollo Infantil; Fonoaudiología; Atención Primaria de Salud; Factores de Riesgo.

## Introduction

In the last decades, there have been significant changes in neonatal care, favoring the survival of preterm newborns (PTNB), with low weight and with serious complications at birth, since this population can present morbidities during growth and development, evidenced through risk factors for child development<sup>1-3</sup>.

Between these factors, maternal variables stand out, with special attention to risk and vulnerability criteria; and neonatal, in which perinatal asphyxia is reported, with Apgar < 4 in the 5th minute and repeated apneas; prematurity with GA < 32 weeks, low birth weight < 2,500 grams, neurological disorders, hyperbilirubinemia with exchange transfusion levels, congenital malformations, genetic syndromes, symptomatic hypoglycemia, congenital infections, necrotizing enterocolitis, use of mechanical ventilation (MV) and inborn errors of metabolism; and other clinical manifestations<sup>4</sup>.

With the monitoring and early care of the infant, objective actions to minimize delays and/or sequelae can be performed in Primary Health Care (PHC), allowing them to develop with less global impairments, as well as in the speech-language pathology aspects<sup>5</sup>. This follow-up should be carried out jointly with the family in outpatient clinics, known as follow-up programs for NC and infants and high-risk. The follow-up program aims to follow the children's global development in a longitudinal way. Medium and long-term actions are defined according to clinical evolution, with emphasis on verifying cognitive and motor skills, executive functions, vision, hearing, speech, language, attention, behavior and educational processes<sup>2,6</sup>.

The speech therapy inserted in PHC works effectively in this population, through prevention and health promotion actions, with activities aimed at monitoring, identifying harmful factors that interfere with the acquisition and development of speech, language and hearing. Thus, speech therapy

in primary care will enable directive and assertive referrals to specialized services, with a view to providing comprehensive and quality care<sup>2,7-9</sup>.

Comprehensive care for NC and infants is a matter for public health, since the creation and implementation of public health programs and policies are essential<sup>1</sup>. Thus, to meet the demand of children with risk factors and reduce the still high rates of infant morbidity and mortality in the state of Santa Catarina, the *Bebê Precioso* program was created in 2009 in the city of Joinville. This program aims to monitor NC and infants at risk and high risk from the Neonatal Intensive Care Unit and at risk for growth and development, covering the age group from 0 to 24 months<sup>10</sup>. Thereby, it integrates the line of care and promotion of children's health in primary care, with emphasis on health surveillance and dialogue between levels of care<sup>4</sup>. NC and infants are cared for by a multidisciplinary team composed of a Pediatrician, Physiotherapist, Occupational Therapist and Psychologist. Speech-Language Pathology and Audiology was introduced into the team in 2019 through a supervised curricular internship for students of the Speech-Language Pathology and Audiology course.

The objective of this study was to identify the main risk factors for the global development and related to speech-language pathology, of infants followed by the *Bebê Precioso* program in the city of Joinville, Santa Catarina.

## Methodology

The research was characterized by a retrospective, descriptive study, with quantitative analysis of data from the medical records of infants followed up in the *Bebê Precioso* program in the city of Joinville, Santa Catarina, with approval by the Research Ethics Committee opinion 3,988,510 /2020 and CAEE: 30685720.0.0000.5365.

The inclusion criteria were infants followed up by the program team and referred for speech-language pathology evaluation from March 2019 to

March 2020. The exclusion criteria involved infants whose medical records did not provide records with all the stipulated and necessary variables for the study.

The reference variables of the clinical history collected were: gender, weight and gestational age at birth, length of stay in the Neonatal Unit, Apgar at 1 and 5 minutes, use of respiratory support, peri or postnatal complications, speech-language pathology aspects related to development of orofacial motricity, language and hearing.

From the main base, like, the complaints reported by parents and described in the medical records, concerning language development, results of the Universal Neonatal Hearing Screening (UNAT), aspects of breastfeeding and food introduction, a protocol was applied. of behavioral hearing screening and oral language developed by the group of students, together with the behavioral auditory assessment. The behavioral auditory assessment is composed of sound spectrum emitters and known intensity through standardized instrumental sounds, in which the expected responses are the startle reaction, the cochlea-palpebral reflex, and the direct and indirect location to the sound in different literalities.

For the analysis and description of risk factors, technical note No. 03/GEABS/SUG/SES/2018 of

the State Health Department of Joinville (2018) was used, which governs the inclusion criteria in the priority monitoring of the *Bebê Precioso* program, to assess infants with risk factors for development.

The information to this research were tabulated in a Microsoft Excel 2016 spreadsheet and, after analysis, represented in tables and graphs, using descriptive statistics using absolute numbers, percentages and averages.

## Results

Of the 84 medical records analyzed after verifying the inclusion and exclusion criteria, the study sample consisted of 58 infants, 56.9% (n=33) of the male gender and 43.1% (n=25) of the female gender and, 5.1% (n=3) twins.

The frequency of care for infants ranged from 1 to 11 times, with an average of 3 times. The frequency of returns from 1 week to 4 months was observed.

Table 1 shows the frequency of birth weight, gestational age and hospitalization days of the sample, in which 77.5% (n=45) were preterm newborns (PTNBs) and 22.5% (n=13) term births, ranging from 24 weeks to 41 weeks of gestational age (GA), with a mean of 37 weeks (265 days).

**Table 1.** Frequency of birth weight, gestational age, and days of hospitalization of the sample.

Variables	Minimum Value	Maximum Value	Average
Birth weight (grams)	675	4380	2024
G.I*. Birth	24 wks**	41 wks**	37 wks**
Hospitalization days (dias)	2	113	29
TOTAL		58 NC and infants	

\*G.I = Gestational Age

\*\*Wks= Weeks according to the Somatic Capture Method.

Regarding birth conditions, for the Apgar score, 77.6% (n=45) NBs did not present asphyxia (Apgar between >7 in the 5th minute), 19% (n=11) with mild asphyxia (Apgar between 5 to 7) and 3.4% (n=2) had severe asphyxia (Apgar between <4 in the 5th minute).

In Table 2, the medical diagnoses collected from the sample records were established, characterizing prematurity (77.5%) as the most prevalent diagnosis.

**Table 2.** Frequency of diagnoses of the infants and newborns in the sample.

Diagnosis	N	Frequency (%)
Prematurity	45	77,5
Prematurity and Genetic Syndromes	1	1,7
Genetic Syndromes	1	1,7
Prematurity and Neurological Changes	3	5,2
Neurological Changes and MAS	1	1,7
MAS	3	5,2
Neonatal Abstinence Syndrome	1	1,7
Myelomeningocele	1	1,7
Without description in the medical record	2	3,6
TOTAL	58	

\*SAM: Meconium Aspiration Syndrome

The results found for the risk factors for the infant development of infants according to the criteria of the *Bebê Precioso* program were defined in Table 3.

**Table 3.** Risk Factors for infant and young child development according to *Bebê Precioso* program criteria.

Risk Factors	Frequency (%)
Prematurity	77,5
Respiratory alterations	50
Low birth weight < 2,500g	72,5
Neurological alterations	5
Hyperbilirubinemia	13,8
Congenital malformations and genetic syndromes	5,2
Severe infection	12
Perinatal Asphyxia	19

Table 4 shows the speech-language disorders presented by the population studied, assisted by speech-language therapists. Of the 58 infants in the study, 53.5% (n=31) received speech therapy, and 38.7% (n=12) did not present speech-language disorders and 61.3% (n=19) presented alterations. As for the main complaints and occurrences of

speech-language disorders, it was recorded that 42.1% (n=8) had alterations in orofacial motricity, 42.1% (n=8) hearing alterations and 15.8% (n=3) alterations of language. There was a relationship of 68.4% (n=13) infants with only one speech-language disorder and 31.6% (n=6) with two speech-language disorders.

**Table 4.** Speech alterations in infants and newborn children seen by speech therapy.

Phonoaudiological alterations	N	Frequency (%)
Orofacial Motricity	8	42,1
Hearing	8	42,1
Language	3	15,8
TOTAL	19	

It was found that 46.5% (n=27) of the infants didn't receive speech therapy care by students of the Speech, Language Pathology and Audiology course, and it was possible to collect through notes in the medical records and family complaints that 7.5% (n=2) had complaints and occurrences of possible speech-language disorders in language, 11% (n=3) in hearing and 7.5% (n=2) in language and hearing.

## Discussion

The results found in this study regarding the main risk factors for child development are widely discussed in the literature, associated with global changes in child development<sup>3,5,13-16</sup>.

Neonatal factors such as lower Apgar in the fifth minute, male gender and longer hospital stay were correlated with impacts on developmental risks<sup>5</sup>. The present study corroborates the findings in the literature, evidencing significant risk factors in relation to the prevalence of males (56.9%) and longer hospital stay<sup>3,5,11</sup>.

Lower birth weight and GA were associated with aspects related to child development, with 72.5% having low birth weight (< 2,500 grams) and 65.4% of children younger than 34 weeks. A study carried out in Juiz de Fora concluded that the performance of children born prematurely and with low weight was inferior when compared to the performance of children born at term, for adaptive gross and fine motor, social and language development<sup>12</sup>.

The most prevalent risk and diagnosis factor found in this study was prematurity (77.5%). due to the delay in neurobiological maturation caused by prematurity, impairing aspects of neuronal plasticity, which is active in this period, thus altering development in several aspects<sup>3,11-13</sup>.

Once analyzed the infants who received speech therapy and presented alterations in the language assessment, impaired speech intelligibility, phonological alterations and age-restricted vocabulary were observed, in accordance with research on infants at risk for development between zero and 18 months<sup>17</sup>. Literature review studies<sup>18,19</sup> report that infants with risk factors such as prematurity, extreme birth weight, gestational age, use of mechanical ventilation and nasal Continuous Positive Airway Pressure (CPAP), reduced Apgar score and respiratory distress, produce statistically significant

fewer words when compared with infants without risk and, consequently, delays in the assessment of certain pre-linguistic skills, negatively influencing language development.

Another article<sup>20</sup> verified the frequency of language alterations in PTNBs followed up in a segment outpatient clinic, requiring special attention to sensorimotor and language development in the first two years of life. Language delay is mentioned as a frequent speech-language pathology complaint, affecting more than 40% of PTNBs who were born weighing less than 1,000 grams, articulating the future risk of learning problems, reading and writing skills, behavioral problems and social adjustment<sup>20</sup>. Concomitantly, unanimously, follow-up with a multidisciplinary team and early speech therapy is recommended<sup>18-21</sup>.

The complaints and alterations related to hearing revealed altered results of the tests of Evoked Otoacoustic Emissions and/or Automatic Brainstem Auditory Evoked Potential (BAEP-A), in the Universal Neonatal Hearing Screening (UNA), therefore, 25.8% of the infants of the study, showed altered responses when evaluated with behavioral auditory assessment, in which they were referred to perform an audiological assessment in a specialized service, together with auditory monitoring.

NC and infants with risk factors may be affected by hearing disorders, as the presence of a factor increases the probability of hearing loss, especially sensorineural hearing loss<sup>13</sup>. In addition to the importance of researching risk factors, it is essential to know the Risk Indicators for Hearing Impairment (RIHL), in order to help the speech therapist in the establishment of conducts, since these indicators result in the progressive or congenital onset of hearing loss<sup>22</sup>.

It is necessary to collect data from the medical records or health booklet of the IRDA, due to the fact that infants with a risk factor in their clinical history have a higher prevalence of hearing loss, ranging from 0.3% to 20.68%, when compared the infant without risk factor<sup>13,25</sup>.

IRDAs are correlated with prolonged stay in a Neonatal Unit, exposure to ototoxic drugs, gestational age below 32 weeks, prolonged use of mechanical ventilation, hyperbilirubinemia, perinatal asphyxia, weight below 1,500 grams, perinatal and/or neonatal infections, genetic malformations and congenital<sup>6,13,21-24</sup>. In the present study, in the infants who identified risk factors and alterations



in the behavioral auditory assessment according to their corrected age, they presented the IRDAs described in the literature.

According to the guidelines of the Ministry of Health (2015), if the infant monitored in the follow-up program presents a risk factor for development, monitoring and audio logical follow-up is suggested, from 6 months of age until language acquisition. The delay in the diagnosis of hearing loss causes great damage, not only in the acquisition of speech and language, but also in the global development, impairing the cognitive evolution<sup>1,2,22,25</sup>.

Complaints and changes associated with orofacial motricity were related to short lingual frenulum, difficulty in breastfeeding and dietary aspects, related to food introduction, food selectivity by type or texture, refusal to eat solid foods, changes in oral motor pattern, micrognathia or retrognathia, cleft lip and palate and dysphagia.

In this perspective, episodes of incoordination between sucking, breathing and swallowing are frequent comorbidities found in PTNBs and low birth weight, along with the presence of other orofacial alterations. Thus, in this study, alterations related to orofacial motricity and food were correlated with findings in the literature<sup>7,26-28</sup>.

In a literature review study, authors<sup>29</sup> concluded that PTNBs, especially those born with low birth weight, are more likely to have feeding problems in the early stages of life and during childhood, when compared to full-term NC and infants, corroborating the findings. results of the present study. For these authors<sup>29</sup>, the follow-up and monitoring of these children through objective and direct assessments of food made by a speech-language pathologist is highly recommended, with the aim of early diagnosing changes in orofacial motricity and/or eating disorders in infants with risk factors, and accompany all the milestones of the food transition, providing better chances of succeeding in the intervention.

With interpretation that understands 46.5 (n=27) infants who did not receive speech therapy care by students of the speech therapy course, the supervised curricular internship included only two semesters in 2019, when compared to the time of data collection.

Regarding the multiplicity of aspects that need to be evaluated in the infant with risk factor, ideally it should be carried out by a trained and integrated multidisciplinary team. Studies<sup>6,20</sup> sug-

gest that the organization of the follow-up service needs to include the coordination of the Pediatrician professional, involving the assistance of the Physiotherapist, Speech Therapist, Psychologist, Occupational Therapist, Social Worker, Nutritionist, Neurologist, among others, promoting an early quality intervention.

Therefore, the effective participation of the speech therapist in follow-up programs is fundamental for the enrichment of the work of the multidisciplinary team, contemplating in-depth knowledge of the anatomophysiology of stomatognathic functions (suction, breathing, swallowing), auditory evaluation and monitoring, management in the presence of hearing impairment, assistance with difficulties in sucking, breathing, swallowing and eating coordination, and in the strategies for speech and language stimulation<sup>1-3</sup>.

This is the first study to focus on the inclusion of speech therapy in a PHC program in the city of Joinville, Santa Catarina. Thus, the importance of this professional in the multidisciplinary team for monitoring child development is highlighted, promoting the assessment of linguistic, auditory and orofacial skills, considering their structural, functional and social dimensions<sup>21,30</sup>.

Based on the results of this study, the need for greater participation of speech-language therapists working in PHC is highlighted, especially in follow-up programs, aiming to meet the high demand and adapt services to the current reality, therefore, it requires speech-language pathologists prepared to work in public health and government support for public politicians.

## Final Considerations

The most frequent risk factors for child development in the study sample and described in the literature were prematurity, low birth weight, respiratory alterations, perinatal asphyxia, hyperbilirubinemia, severe infection, congenital malformations, genetic syndromes and neurological alterations, which significantly influenced complaints, delays and speech-language disorders in language development, orofacial motricity and especially in auditory skills related to the development of children's communication.

The role of speech therapy in PHC is essential, essentially in follow-up programs for newborns and infants at risk, among which is the *Bebê Precioso*

program, in order to promote a better understanding of risk factors for child development and its relationship with different communication and swallowing disorders. Identifying infants with risk factors for child development monitored in the program and raising complaints and speech-language disorders, provides a contribution to research related to child growth and development, and favors the basis of public policies in relation to maternal and child health that promote actions of attention to the follow-up of the NB and infant with a risk factor. Therefore, education strategies in health prevention and development are essential, in order to reduce the impact of these demands on specialized services in the future, which represent a high cost for the health system.

It's suggested that further research be carried out in this area, aiming to guide health actions, in order to promote different preventive and care practices, and to identify possibilities for improving care for this population.

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