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EVALUATION OF THE DEVELOPMENT AND FOLLOW-UP OF THE PRETERM BABY

AVALIAÇÃO DO DESENVOLVIMENTO E SEGUIMENTO DO BEBÉ PRÉ-TERMO

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Abstract: The diagnostic and therapeutic advances in the Neonatology area have resulted in a significant decrease in the mortality rate of preterm newborns and, consequently, an increase in the morbidity of these babies. The concern with the evaluation of its evolution has become increasingly evident, requiring strategies to reduce the repercussion of possible compromises and to increase the quality of life of these children. This study aims to investigate about the main instrument for assessing the development and follow-up of preterm babies. A systematic search was conducted in the main databases, consulting articles and books that provide detail on studies, evaluations and instruments. It was found that developmental assessment and follow-up are performed through screening and developmental diagnosis tests that examine the most relevant aspects in the various age groups. Twenty-one evaluation instruments for preterm development and follow-up were identified, which can be divided into three categories: the comprehensive, the specifics and the neurological and neurobehavioral exams. Studies show that the Bayley Scales of Infant Development - Bayley III (BSID III) are the most widely used scales for assessing the preterm. It is a comprehensive assessment tool that points out the strengths and weaknesses as well as the baby's competencies. The scales are most indicated for early identification of risk for development, elaboration of intervention projects and to provide guidance and information to parents about the evolution of the child, whose follow-up should be continuous and systematic, carried out by an interdisciplinary team.

Keywords: Preterm baby; Development; Evaluation; Follow-up; Bayley-III.

Resumo: Os avanços diagnósticos e terapêuticos na área da Neonatologia resultaram numa diminuição expressiva da taxa de mortalidade de recém-nascidos pré-termo e, consequentemente, num aumento da morbidade desses bebés. A preocupação com a avaliação do desenvolvimento foi-se tornando cada vez mais evidente, necessitando de estratégias para reduzir a repercussão de possíveis compromissos e potencializar a qualidade de vida dessas crianças. Este trabalho tem o objetivo de investigar o principal instrumento para a avaliação do desenvolvimento e o seguimento do bebé pré-termo. Foi realizada uma pesquisa sistemática nas principais bases de dados, consulta aos artigos e aos livros que fornecem detalhes sobre estudos, avaliações e instrumentos. Verificou-se que a avaliação do desenvolvimento e o seguimento de bebés pré-termo são realizados por meio de testes de triagem e diagnóstico que examinam os aspectos mais relevantes nas diversas faixas etárias. Foram identificados 21 instrumentos que podem ser divididos em três categorias: os completos, os específicos e os exames neurológicos e de neuro comportamento. Os estudos revelam que as Bayley Scales of Infant Development - Bayley III (BSID III) são as escalas mais utilizadas para avaliar o bebé pré-termo. É um instrumento de avaliação com alcance abrangente que aponta os pontos fortes e fracos bem como as competências do bebé. São as escalas mais indicadas para a identificação precoce de risco para o desenvolvimento, elaboração de projetos interventivos e para fornecer orientações e informações aos pais sobre a evolução da criança, cujo

seguimento deve ser contínuo e sistemático, realizado por uma equipa interdisciplinar.

Palavras-chave: Bebé pré-termo; Desenvolvimento; Avaliação; Seguimento; Bayley-III.

Introduction

The World Health Organization (WHO) warns that, throughout the world, annually, 15 million babies are born before the due time and it is estimated that this value tends to increase. Prematurity was responsible for nearly one million deaths of babies in 2013. Still according to the WHO, without a proper treatment, babies who survive problems caused by preterm delivery run the risk of having a lifetime of suffering (World Health Organization, 2018).

It is called preterm every baby born alive before completing the 37th week of gestation, being classified into three categories relatively to the time of gestation: extremely preterm (< 28 weeks), very preterm (28 < 32 weeks) or moderately preterm (32 to < 36 weeks).

The diagnostic, therapeutic and technological advances in the area of Neonatology resulted in significant improvements in neonatal intensive care and have guaranteed reduction in the mortality rate of newborns at risk, among them the preterm newborn (PTNB) and, therefore, an increase in its morbidity at varying levels, which indicates the relevance of the evaluation of the development and the follow-up of these babies (Silva et al., 2011).

Thus, in recent years, the concern with the development of PTNBs became more evident and many studies investigated the various areas of development, cognitive, linguistic, neurologic, psychomotor, socioemotional and or behavioral adaptation of these babies, with the goal of reducing the impact of possible impairment over time (Jackson, Needelman, Roberts, & MCMorris, 2012).

The literature indicates that the follow-up of the development of PTNBs should be a continuous and flexible process, including family history, observation during consultations, the valuation of the parents' opinions, the systematized neurological examination, the evaluation of

data for complete development and the implementation of tests and scales to identify difficulties during the process (Silva et al., 2011; Ministério da Saúde do Brasil, 2012).

Based on the English language, the term follow-up is used for monitoring programs for the growth and development of newborns at risk, created in the 1980`s (Silva et al., 2011).

The development in the early years of life should be especially valued once that this is a period of major modifications and acquisition of skills in several areas: cognition, language, motor skills and personal-social. At this stage, the main delays, disturbances and deviations that require early intervention are manifested (Sociedade Brasileira de Pediatria [SBP], 2012).

For the PTNBs at risk, especially those with very low birth weight, the routine evaluation is not sufficient, requiring a periodically systematic assessment, with the use of developmental screening tests and diagnostic scales. The main problems detected in these babies are: the transitional dystonia, low scores in tests of development, sensory impairments, delay in language and cerebral palsy. In school age, they may present: lower academic performance, especially in mathematics, reading and spelling; behavioral problems, especially hyperactivity and attention deficit; lower verbal fluency, cognitive impairment and memory; subtle motor problems and greater need for inclusive classroom or special school (SBP, 2012).

Considering the multiplicity of aspects to be examined that may present problems and require specific early intervention, the assessment of the development and follow-up of preterm babies are a work of a multidisciplinary team (SBP, 2012).

The follow-up of the preterm baby is organized in such a way that the child makes an overall assessment and in various specialties, starting with a first outpatient revision at the time of discharge and all other scheduled revisions after each consultation, as assessed by the professional specialist (SBP, 2012).

The screening of the evolutionary process is particularly essential for preterm babies, who are already at increased risk of delays in development, cognitive deficiencies, academic challenges and behavioral difficulties, due to prematurity itself (Doyle, 2001; Hintz, 2005).

The literature indicates that 60% to 70% of preterm babies are eligible for early intervention services (Keller-Marguli, Abrahamson, Llorens, & Dempsey, 2013). It is well established that as the degree of prematurity increases, the likelihood of developmental delays also increases (Aarnoudse-Moens, Weisglas-Kuperus, van Goudoever, & Oosterlaan, 2009; Bhutta, Cleves, Casey, Cradock, & Anand, 2002).

In accordance with the guidelines of the American Academy of Pediatrics (AAP), the screening for development with reliable and valid measures should occur at 9, 18 and 30 months of age (Dempsey, Abrahamson, & Keller-Margulis, 2016). However, in spite of the conducts for tracking, many children are not submitted to developmental screening to detect the need for early intervention. Approximately half of preterm babies with moderate to severe disabilities and three quarters with minor deficiencies do not receive adequate treatment prior to 2 years of age (Roberts et al., 2008).

Studies on the use of services to assist PTNBs indicate that the majority of these babies is forwarded to some type of care for early intervention. They also reveal that the standards of service received vary with age and also that occupational therapy and physiotherapy services are more frequently received (Dempsey, Abrahamson, & Keller-Margulis, 2016; Keller-Marguli, Abrahamson, Llorens, & Dempsey, 2013).

The researches also show that, even though few direct impediments to access for early intervention services are identified, 12% of preterm babies may no longer receive specialized care for reasons other than the lack of need or overcoming the delay or disorder (Keller-Marguli, Abrahamson, Llorens, & Dempsey, 2013).

Currently, there are several standardized instruments for the evaluation of the development and follow-up of preterm babies, whether for clinical use or in research (Moreira, & Figueiredo, 2013; Rocha, Dornelas, & Magalhães, 2013; Rodrigues, 2012; Silva et al., 2011; Vieira, Ribeiro, & Formiga, 2009).

These instruments will evaluate the degree at which the neural system is preserved, which ensures the functioning and the fullness of human body, in full or in a specific field. The choice of the instrument should consider good scores of reliability and validity to meet the objectives of the use.

Objective

To investigate about the main instrument for the evaluation of development and follow-up of the preterm baby.

Method - Design

This is an integrative review of the literature, which allows the search, critical evaluation and synthesis of available evidence on the investigated subject, being the final product the current state of knowledge of the investigated theme (Melnyk, 2003).

Procedure

A systematic research in the major data bases was performed, in addition to consulting articles and books that provide details about the studies, assessments and instruments, using the descriptors: "development of preterm newborns," "evaluation instruments", "follow-up" and "scales and tests".

It were included publications on evaluation of the development and follow-up of preterm babies published in Portuguese, English and Spanish and articles of intervention, review and works that did not include PTNB were excluded.

A time limit was not established, once that the study had the objective of identifying the main instrument for the evaluation of the development and follow-up of PTNBs from the earliest to the most recently published.

The data collected was organized in accordance with the chronological order of the publication of the instruments, and the following information was raised: objective, behavior or assessed items, specific age assessed, psychometric properties and limitations on the application of the instrument.

Results

In this research, 21 standardized instruments that can be used for

the evaluation of development and follow-up of the pre-term babies were identified. These instruments can be divided into:

a) The complete ones to assess the overall functional areas, which determine the degree of the child development in several areas;
b) Those for specific functional areas of development, which analyze a single functional area;
c) The neurological examinations and neuro behavior, which analyze the integrity of the nervous system and define the behavior of the newborn (Vieira et al., 2009).

Recent studies that assess the development of babies, especially those performed with PTNBs, indicate that the Bayley Scales of Infant Development- Bayley III (BSID III) are the most commonly used, since they allow the early identification of problems or delays in the development and indicate the need for further evaluation in a specific area (Field et al., 2010; Källén, Serenius, Westgren, & Marsál, 2015; Moreira, & Figueiredo, 2013; Polanska et al., 2011; Ronfani et al., 2015; Snoek et al., 2016; Struck et al., 2013; Toome et al., 2013; Valent et al., 2013; Vinnars, Vollmer, Nasiell, Papadogiannakis, & Westgren, 2015; Yu et al., 2013).

Discussion/Conclusion

The follow-up of PTNBs involves the combination of different evaluation techniques:

1) Interview with parents that may be open, semi-structured or structured, which objective is the collection of detailed data about the history of the baby, its routine and family interactions (Bleger, 1971; Mazet, & Stoleru, 1990);
2) The observation of the baby, which allows the analysis of its action and interactions with the environment (Mazet, & Stoleru, 1990; Piaget, 1978);
3) The objective assessment of various areas of development, with the application of tests and standard scales (Mazet, & Stoleru, 1990; MSB, 2012).

For the evaluation of development and follow-up of preterm babies there are several tools that can be applied in different age groups. At the moment, the BSID III are the most commonly used scales for the diagnosis of development during the first three years of life of these babies (Field et al., 2010; Källén, Serenius, Westgren, & Marsál, 2015; Polanska et al., 2011; Ronfani et al., 2015; Snoek et al., 2016; Struck et al., 2013; Toome et al., 2013; Valent et al., 2013; Vinnars, Vollmer, Nasiell, Papadogiannakis, & Westgren, 2015; Yu et al., 2013).

These scales are characterized as a playful and flexible instrument, with excellent standard of validity and internal consistency. It is a standardized set of measurements, originally developed by Nancy Bayley and collaborators of the University of Berkeley. Her scales were described, initially, in 1933, organized with the name of California First-Year Mental Scale with the objective of performing the evolutionary diagnosis of the development of the child (Bayley, 1969, 2006).

The Bayley Scales of Infant Development were reviewed in 1969, in 1993 and in 2006, in the United States, creating three versions: a) Bayley Scales of Infant Development - Bayley I (BSID I) published in 1969 (Bayley, 1969), b) Bayley Scales of Infant Development - Bayley II (BSID II) published in 1993 (Bayley, 1993) and, finally, c) Bayley Scales of Infant Development - Bayley III (BSID III) published in 2006 (Bayley, 2006).

This latest version is indicated to evaluate children between 15 days and 42 months of age, offering a comprehensive assessment in five separate areas: cognition, language (expressive and receptive communication), motor skills (coarse and fine), social-emotional and adaptive component. The first three domains are observed with the child in a test situation and the last two are observed by means of questionnaires filled out by the parents or caregivers (Bayley, 2006).

The cognitive scale investigates how children think, react and learn about the world around them and is composed of 91 items (Bayley, 2006).

The language scale is divided into two subtypes: a) receptive communication composed of 49 items that determine how the child rearranges sounds, understands, speaks and directs words and b) expressive communication composed of 48 items that determine how the child communicates using sounds, gestures and words (Bayley, 2006).

The motor skills scale is also divided into two subscales: a) the gross motor scale composed of 72 items that determine how the child moves its body in relation to gravity and b) the fine motor scale composed of 66 items that determine how the child uses his hands and fingers to do something (Bayley, 2006).

The socioemotional domain is checked by means of a question-naire completed by the main caregiver of the child. It is an adaptation of the Greenspan Social-Emotional Growth Chart: The Screening Questionnaire for Infants and Young Children (Greenspan, 2004) developed by Stanley Geenspan, expert in the field of socioemotional development. The socioemotional scale evaluates the acquisition of social and emotional skills in babies and small children, identifying acquisitions that must be achieved in each age range (Bayley, 2006).

The field of adaptive behavior affects the child's skills for the adaptation to various demands of the daily life routine. It is checked by means of the application of a questionnaire with the main caregiver of the child. This questionnaire is based in the form of parents and/or main caregivers (0-5 years of age) of the Adaptive Behavior Assessment System Second Edition - ABAS II (Harrison & Oakland, 2003) that evaluates the functioning of the adaptive skills. The scale of adaptive functioning evaluates the daily functional skills, measuring what the child does and what he or she might have the ability to do. The measured areas in this scale include communication (speech, language, hearing and non-verbal communication), community use (interests in activities outside home and recognition of different places), health and safety (demonstration of care and avoidance of physical damage), leisure (play, follow rules, involvement in recreational activities at home), self-care (feeding, bathing, intimate hygiene), self-direction (self-control, following instructions, making decisions), pre-academic knowledge (recognition of letters, counting, drawings of simple shapes), life in the domiciliary environment (aid in chores, care with personal belongings), social (socializing with other people, including good manners, offering help, recognition of emotions) and motor (locomotion and manipulation of the environment) (Bayley, 2006).

These scales are considered complementary, each having its importance in the evaluation of the child. The raw results of successfully

completed items are converted into four normative scores:

1) Weighted score, which is derived from the total gross score, with the interval 1-19, average of 10 and standard deviation (SD) 3, which may be calculated for all subtests and to the cognitive and socioemotional scales.
2) Composite score, which is derived from various sums of weighted score of the subtests and it is dimensioned for a metric with an average of 100, standard deviation (SD) 15 and interval of 40-160. It is available for all five scales.
3) Percentile rank, which indicates the position of the child in relation to the sample of standardization, ranging from 1 to 99, average of 50. It is available for the five scales.
4) Growth score, which is used to trace the development of the child over time in each subtest. For each subtest, a score of growth can be calculated based on total gross score. The growth score varies from 200-800, average of 500 and confidence interval of 100 (Bayley, 2006).

In addition, confidence intervals are available for the five scales. They consist of a score in which the result of the child's performance should be inserted, allowing another way of checking the accuracy of the results of the tests (Bayley, 2006).

It is also possible to calculate the equivalent age of development, which represents the average age in months for a certain gross total score that the child has reached. It is available for the cognitive scale and the subtests of receptive communication, expressive communication, fine and gross motor skills (Bayley, 2006).

The BSID III are internationally recognized with extensive use in studies, and the results are published in major journals of high credibility (Steenis, Verhoeven, Hessen, & Van Veenendaal, 2015). Although they have normalized scores with the population of the United States of America, its use is described in studies carried out in countries all over the world, among them in England (Field et al., 2010), Poland (Polanska et al., 2011), Germany (Struck et al., 2013), Estonia (Toome et al., 2013), Italy (Ronfani et al., 2015; Valent et al., 2013), Sweden (Källén et al., 2015;

Vinnars et al., 2015), as well as multi-centric studies in Germany and the Netherlands (Lees et al., 2015) and in the Netherlands and Italy (Snoek et al., 2016).

However, considering the various factors that influence the development of the child over time, whether relating to the biological aspects or those related to environmental and interactional aspects, or even the interrelationship between them, it is recommended caution in the use of the established norms for the North American population in other samples, with different characteristics and different languages. Investigations carried out with the use of the BSID III in countries of different continents, among them Australia, (Province et al., 2014; Walker et al., 2010), Denmark in Europe (Krogh et al., 2012), Taiwan in Eastern Asia (Yu et al., 2013), Sri Lanka in Southern Asia (Godamunne et al., 2014) and Ethiopia in Eastern Africa (Hanlon et al., 2016), indicate safety in the use of the American standardization, but they suggest caution and indicate some differences. Thus it is necessary, sometimes, to adjust the scores of the evaluated children.

The BSID III encompass the concepts of both neuro-maturational theory as the socio-interactionist theories, allowing the early identification of risk factors for development. They indicate the strengths and weaknesses as well as the competences of the baby, allowing the proper planning of a therapeutic intervention, as well as the monitoring of the evolution of interventions, being considered fundamental to a consistent work in interdisciplinary teams. It also allows greater involvement of parents who are participating in the evaluation.

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