Paediatr Croat. 2014;58:8-14
IZVORNI ZNANSTVENI RAD / *ORIGINAL SCIENTIFIC PAPER*
www.paedcro.com
http://dx.doi.org/10.13112/PC.2014.2

Early detection of developmental disorders in primary health care

Lidija Ristovska[1], Zora Jachova[2], Vladimir Trajkovski[2]

The aim of this paper is to analyze the ways of detecting developmental disorders in children in primary health care. We processed data from medical records of 2 634 children examined at Pediatric Dispensary, Military Hospital, Skopje, Republic of Macedonia, during the 2000-2009 period. Children were born between 1990 and 2009. In this retrospective study, we analyzed the High Risk Registry and collected data on 211 588 visits. We also conducted unstructured interview with pediatricians. For statistical data analysis, we used chi-square test with the level of significance of $p<0.05$. During the 2000-2009 period, developmental disorders were detected in 172 (6.5%) children, 112 male and 60 female. Most children (81.9%) had specific developmental disorders of speech and language. From all children, 272 (10.3%) had perinatal biological risk factors. Fifty-seven (21%) children with risk factors had developmental disorders. Our study showed that in most children, developmental disorders were detected after 24 months of age. Most children with developmental disorders were males. Because of the more intensive follow up, developmental disorders in children born with perinatal biological risk factors were detected earlier than in children born without these risk factors. Further studies could focus on the prevention of risk factors and developmental disorders.

Keywords: early diagnosis; developmental disabilities; risk factors

INTRODUCTION

Developmental impairments are a heterogeneous group of conditions which start early in life and present with delay and/or an abnormal pattern of progression in one or more domains, for example, sensation, perception, cognition, language, communication, movement and behavior (1). Detection of developmental disorders at an early age and early intervention are very important. Early intervention can be successful because of neuroplasticity. The injured cortex can be modified by various treatments, and this modification is modulated by various factors. The compensatory plastic changes in the brain following brain injury are age dependent (2). Considerable plasticity can be expected when lesions occur between 2 and 3 months before and 6 and 8 months after term age (3). Approximately 15% to 18% of children in the United States have developmental or behavioral disabilities. The American Academy of Pediatrics' Committee on Children with Disabilities recommends that pediatricians use validated screening tools at each health supervision visit (4). Primary care practitioners (e.g., pediatricians and family practitioners), preschool teachers, day care providers, and early intervention providers are in a critical position to provide monitoring and preventive management of the behavior and development of infants and toddlers. Between 12% and 25% of children who are seen in primary care have significant psychosocial problems, but only a subset of these children are identified and referred for treatment (5).

Many studies found an association between risk factors and developmental disorders. A number of studies focusing on the influence of biological risk factors bear on prematurity

[1] City General Hospital "8 September", Department of Otorhinolaryngology, Division of Audiology, Skopje, Republic of Macedonia
[2] University "Ss Cyril and Methodius", Faculty of Philosophy, Institute of Special Education and Rehabilitation, Skopje, Republic of Macedonia

The research was conducted in the Pediatric dispensary, Military Hospital, Skopje, Pariska bb. 1000 Skopje, Republic of Macedonia

Correspondence to:
Vladimir Trajkovski, MD, PhD, University "Ss Cyril and Methodius", Faculty of Philosophy, Institute of Special Education and Rehabilitation, Blvd. Goce Delchev 9A – PO Box: 567, 1000 Skopje, Republic of Macedonia, E-mail: vladotra@fzf.ukim.edu.mk

Primljeno/Received: 25. 11. 2012., Prihvaćeno/Accepted: 10. 1. 2013

and low birth weight. It is estimated that in 2005, 12.9 million births, or 9.6% of all births worldwide, were preterm (6). Early developmental interventions for preterm infants have a significant impact on cognitive development at preschool age (7). Social and environmental risk factors tend to become increasingly important determinants of children's development as they get older (8). In terms of early detection, in recent years there has been an increasing rate of developmental screening. As a result of the Assuring Better Child Health and Development (ABCD) project, the overall rate of developmental screening among children aged 0-24 months in North Carolina rose from 15.3% in 2000 to 75% in 2004 (9).

PATIENTS AND METHODS

This retrospective study included a random sample of 2 634 children aged 0-19, born from 1990 to 2009 that were examined at Pediatric Dispensary, Military Hospital, Skopje, Republic of Macedonia, during the period from January 1, 2000 to December 31, 2009. Inclusion criteria were the presence of complete medical record of the child at the time of the study and available data on perinatal risk factors in the High-Risk Registry. We processed data from medical records on 211 588 visits and conducted unstructured interview with pediatricians. For statistical data analysis we used chi-square test with the level of significance of $p<0.05$. We used the International Classification of Diseases (ICD-10).

RESULTS

The total number of children surveyed in our study was 2 634 (1 276 male and 1 358 female). In the ten-year period, developmental disorders were detected in 172 (6.5%) children. This percentage is not reliable because the group was heterogeneous. Gender distribution showed that 65.1% of the children were male (m) and 34.9% were female (f). A total of 141 out of 172 (81.9%) children had specific developmental disorders of speech and language (Table 1).

TABLE 1. Number of children with developmental disorders and special educational needs

Developmental disorders	Male	%	Female	%	Total	%
Specific developmental disorders of speech and language	95	55.2	46	26.7	141	81.9
Cerebral palsy	1	0.6	5	2.9	6	3.5
Autism and mild intellectual disability	4	2.3	0	0	4	2.3
Mild intellectual disability	2	1.2	1	0.6	3	1.7
Specific developmental disorders of scholastic skills	2	1.2	1	0.6	3	1.7
Hyperkinetic disorders	2	1.2	1	0.6	3	1.7
Autism	2	1.2	0	0	2	1.2
Leukemia	1	0.6	1	0.6	2	1.2
Hearing loss	1	0.6	1	0.6	2	1.2
Deafness	0	0	1	0.6	1	0.6
Blindness	0	0	1	0.6	1	0.6
Visual impairment	1	0.6	0	0	1	0.6
Specific developmental disorder of motor function	1	0.6	0	0	1	0.6
Congenital heart disease	0	0	1	0.6	1	0.6
Rett syndrome and moderate intellectual disability	0	0	1	0.6	1	0.6
Total	**112**	**65.1**	**60**	**34.9**	**172**	**100**

The sampled population included five children with multiple disabilities: four children with autism and mild intellectual disability, and one child with Rett syndrome and moderate intellectual disability. Three children had special educational needs because of their health status: two children with leukemia and one child with congenital heart disease (congenital mitral stenosis).

In most children (63.4%), developmental disorders were detected at the age 5.1-6 years or older. In seven (4.1%) children, developmental disorders were detected in the first year of life and in three (1.7%) children at the age of 1.1-2 years. At the age of 2.1-3 years, developmental disorders were detected in 17 (9.9%), at the age of 3.1-4 years in 18 (10.5%), and at the age of 4.1-5 years in 18 (10.5%) children.

To test our hypothesis that developmental disorders in most children are detected after 24 months of age, we excluded data on 134 children because of the impossibility to detect their developmental disorders at an early age, i.e. 125 children with specific developmental disorders of speech and language, three children with specific developmental disorders of scholastic skills, and three children with hyperkinetic disorders. Three children with poor health status were also excluded. The total number of children was 38, i.e. 25 (65.8%) male and 13 (34.2%) female. At the age 0-24 months, developmental disorders were detected in nine (23.7%) and after 24 months of age in 29 (76.3%) children.

There was statistical significance in the age at detection of developmental disorders ($\chi^2=5.52$; df=1; $p=0.018$). In most children, developmental disorders were detected after 24 months of age.

Perinatal biological risk factors in children were recorded according to the National List of Risk Factors. In 2004, this Na-

tional List was revised and some risk factors were excluded, for example, delivery by cesarean section, forceps or vacuum extractor, multiple deliveries and postmaturity. They were recorded only in children born from 1990 to 2004. Some others factors were included, i.e. newborn affected by maternal complications of pregnancy and child for adoption. They were recorded in children born from 2005 to 2009. Table 2 shows the types and frequency of risk factors that were present in all of the children.

TABLE 2. **Perinatal biological risk factors in all children born from 1990 to 2009**

Risk factor	Male	%	Female	%	Total	%
Delivery by cesarean section, forceps or vacuum extractor	36	9.9	28	7.7	64	17.6
Prematurity	32	8.8	29	8.0	61	16.8
Congenital malformations	29	8.0	24	6.6	53	14.6
Asphyxia	19	5.2	13	3.6	32	8.8
Multiple delivery (twins)	18	4.9	12	3.3	30	8.2
Hyperbilirubinemia	14	3.9	11	3.0	25	6.9
Low Apgar score (≤7 at 5 min)	7	1.9	8	2.2	15	4.1
Intracranial hemorrhage	6	1.6	4	1.1	10	2.7
Sepsis of newborn	6	1.6	3	0.8	9	2.5
Respiratory distress of newborn	4	1.1	3	0.8	7	1.9
Postmaturity	5	1.4	2	0.5	7	1.9
Neonatal aspiration syndrome	3	0.8	3	0.8	6	1.6
Newborn affected by maternal complications of pregnancy	6	1.6	0	0	6	1.6
Cerebral palsy	0	0	5	1.4	5	1.4
ABO isoimmunization	3	0.8	2	0.5	5	1.4
Cephalhematoma	4	1.1	1	0.3	5	1.4
Neonatal brachial plexus palsy	2	0.5	3	0.8	5	1.4
Small for gestational age	1	0.3	3	0.8	4	1.1
Child for adoption	1	0.3	2	0.5	3	0.8
Disseminated intravascular coagulation	1	0.3	1	0.3	2	0.5
Neonatal acidosis	1	0.3	1	0.3	2	0.5
Rh isoimmunization	1	0.3	1	0.3	2	0.5
Neonatal infection	1	0.3	1	0.3	2	0.5
Retinopathy of prematurity	0	0	1	0.3	1	0.3
Hematemesis	0	0	1	0.3	1	0.3
Birth injury to facial nerve	1	0.3	0	0	1	0.3
Convulsions	1	0.3	0	0	1	0.3
Total	**202**	**55.5**	**162**	**44.5**	**364**	**100**

Risk factors were present in 272 of 2 634 (10.3%) children, while 2 362 (89.7%) children did not have risk factors. Of the children with risk factors, 155 were male and 117 female. The most frequent risk factors were delivery by cesarean section, forceps or vacuum extractor (17.6% of all risk factors), prematurity (16.8%), and congenital malformations (14.6%).

We separately display the perinatal biological risk factors in children with developmental disorders and special educational needs (Table 3). Some children had two or more risk factors. Of the total number of 172 children, 49 (28.5%) children had risk factors, i.e. 28 male and 21 female children. One hundred and twenty-three (71.5%) children were born without risk factors, i.e. 84 male and 39 female. The most

TABLE 3. **Perinatal biological risk factors in children with developmental disorders born from 1990 to 2009**

Risk factor	Male	%	Female	%	Total	%
Delivery by cesarean section, forceps or vacuum extractor	12	13.9	3	3.5	15	17.4
Low Apgar score (≤7 at 5 min)	8	9.3	5	5.8	13	15.1
Prematurity	4	4.7	5	5.8	9	10.5
Multiple delivery (twins)	4	4.7	3	3.5	7	8.1
Congenital heart disease	1	1.2	5	5.8	6	7.0
Hyperbilirubinemia	5	5.8	1	1.2	6	7.0
Cerebral palsy	0	0	5	5.8	5	5.8
Asphyxia	3	3.5	1	1.2	4	4.7
Respiratory distress of newborn	3	3.5	1	1.2	4	4.7
Sepsis of newborn	2	2.3	1	1.2	3	3.5
Neonatal infection	2	2.3	1	1.2	3	3.5
Convulsions	2	2.3	0	0	2	2.3
Congenital dislocation of hip	1	1.2	1	1.2	2	2.3
Intracranial hemorrhage	1	1.2	0	0	1	1.2
Neonatal aspiration syndrome	1	1.2	0	0	1	1.2
Neonatal brachial plexus palsy	1	1.2	0	0	1	1.2
Retinopathy of prematurity	0	0	1	1.2	1	1.2
ABO isoimmunization	1	1.2	0	0	1	1.2
Newborn affected by maternal complications of pregnancy	1	1.2	0	0	1	1.2
Postmaturity	0	0	1	1.2	1	1.2
Total	**52**	**60.5**	**34**	**39.5**	**86**	**100**

frequent risk factors were delivery by cesarean section, forceps or vacuum extractor (17.4%), low Apgar score (≤7 at 5 min) with 15.1%, and prematurity (10.5%).

We analyzed the association of prematurity with developmental disorders. There were 61 preterm children, 56 of them born from 33 to 36 weeks of gestation (w.g.). Only five of them had developmental disorders. Two children had cerebral palsy and three children had dyslalia. In the other group of preterm infants (≤ 32 w.g.), two children had dyslalia, one child had retinopathy of prematurity, one child had dyslalia and dyslexia, and one child was without disorders.

The total number of children with the risk factor of asphyxia was 32, including 30 term infants and two preterm infants. Of the term infants with asphyxia, only three children had developmental disorders. Two children had dyslalia and one child had mild intellectual disability. Of the preterm infants with asphyxia, one child had dyslalia and one child had dyslalia and dyslexia.

With the intention to see whether developmental disorders in children with perinatal biological risk factors were detected earlier than children born without risk factors, we analyzed the occurrence of developmental disorders in all children with risk factors. Of the total number of children (N=272), 57 (21%) children had developmental disorders, while 215 (79%) children were without developmental disorders. Analysis of age at detection included only data on 38 children. We excluded 134 children because of the impossibility to detect their developmental disorders at an early age. Thus the sample included 19 children with and 19 children without risk factors (Table 4).

TABLE 4. **Age at detection of developmental disorders according to the presence of perinatal biological risk factors**

Age at detection	With risk factors		Without risk factors		Total	
	n	%	n	%	N	%
0-36 months	14	73.7	8	42.1	22	57.9
After 36 months	5	26.3	11	57.9	16	42.1
Total	19	100	19	100	38	100

χ^2=3.886; df=1; p=0.049

There was a statistically significant correlation between the age at detection of developmental disorders and the presence of perinatal biological risk factors (p=0.049). Developmental disorders in children with risk factors were detected earlier than in children without risk factors.

DISCUSSION

The sample with developmental disorders included 65.1% of male and 34.9% of female children. *Blackburn et al.* report similar findings. In the sample of disabled children, they found 61.2% of male and 38.8% of female children (10). Our study demonstrated that in most children, developmental disorders were detected after 24 months of age. *Jachova et al*. also found that most children with disabilities were recorded after 24 months of age (11). A study that analyzed the inclusion of preterm children with developmental disabilities in early intervention programs at the age of 2 years showed that almost 50% of the children with moderate to severe disabilities and 72% of the children with mild disabilities were not receiving early intervention services at the age of 2 years (12). In our sample, 10.3% of children had perinatal biological risk factor. In a similar sample assessed in 2001, 20.8% of the children had a risk factor (13). In another study performed in 2004, 8.3% of children had risk factors (11). There is not an international list of risk factors, so there is a difference between the percentages of children with risk factors in different countries. In preterm children (≤ 32 w.g.), we found retinopathy of prematurity, dyslalia, and learning disabilities. *Johnson et al*. identified a high prevalence of learning deficits that impacted significantly upon school performance of extremely preterm children (≤ 25 w.g.) (14). In a cohort of very prematurely born children with gestational age ≥ 24 and < 32 weeks, 60% had developmental disorders at the routine follow-up assessment at 5 years of age (15). Very preterm infants (< 32 or 33 w.g.) had major disabilities in childhood. They had increased risks of cognitive delay, language delay and emotional/behavioral adjustment problems, and showed severe deficits in mathematics, reading, spelling and poor executive function (verbal fluency, working memory, cognitive flexibility) (16-21). In preterm children (33-36 w.g.), we found cerebral palsy and dyslalia. Other studies in low-risk moderately preterm children (32-37 w.g.) found learning or adaptation problems, a slightly lower IQ, behavioral problems, emotional problems and association of attention-deficit/hyperactivity disorder and prematurity (22-25). In a recent research, late preterm infants (34-37 w.g.) and early term infants (37-38 w.g.) have increasingly been regarded as "at risk" rather than "low-risk" infants. It was found that they were at an increased risk of neurodevelopmental disabilities, have worse developmental outcomes and are associated with an increased risk of poorer educational achievement (26-28). Motor performance and movement quality in particular are significantly impaired in preterm children with very low birth weight (29). We did not find good records on low birth weight as a risk factor and we also had suspicion about the percent of prematurity (2.3% in comparison with 9.6% worldwide). There is a possibility of omissions in records. The study that examined relations between structural cerebral development at term equivalent and later cognitive functioning showed that 57.1% of preterm children were

characterized by mild white matter abnormalities and 18.7% by moderate to severe white matter abnormalities on qualitative magnetic resonance imaging evaluations (30). One retrospective study showed that the most common risk factors in the cohort were the length of stay in neonatal unit > 5 days, birth weight < 2500 g and perinatal asphyxia (31). In a small number of children with asphyxia, we found developmental problems. Some studies have reported different findings. During the first three years of life, high-risk infants have a significantly lower general developmental outcome in comparison to the control group. Asphyxia is responsible for the difference in the general developmental outcome in high-risk infants (32). Our sample was too small to make any conclusions.

Analyzing detection of developmental disorders, we found almost all components of developmental surveillance: eliciting and attending to the parents' concerns about their child's development; documenting developmental history; making observations of the child; identifying risk factors; and maintaining records on documenting the process and findings. On identifying the presence of risk factors, the focus was only on the perinatal biological risk factors, not environmental, social, genetic or other risk factors. We found a weakness in the developmental screening, too. Pediatricians used the Denver Developmental Screening Test, but not regularly. According to the American Academy of Pediatrics, general developmental screen is recommended at 9-, 18-, and 30- or 24-month visits. Autism-specific screening tool should be administered to all children at the 18-month visit (33). The mean age at detection of autism was 3.7 years. Autism screening tools were not administered. *Mandell et al*. found that in Pennsylvania, children with autistic disorder received the diagnosis at a mean age of 3.1 years (34). The evidence to date suggests that we can reliably diagnose autism in some children as young as 18 months of age (35). Recent data suggest that the positive predictive value of the Modified Checklist for Autism in Toddlers may be lower in children aged 16-23 months, which emphasizes the importance of repeated assessment (36). In terms of vision screening, only in a few preterm children screening was conducted for retinopathy of prematurity. In order to detect the presence of amblyopia or its risk factors, the US Preventive Services Task Force recommends vision screening for all children at least once between the ages of 3 and 5 years (37). Hearing screening was also performed only in a few children with risk factors or family history of hearing impairment. Infants identified with permanent congenital hearing loss through the Universal Neonatal Hearing Screening have a significantly earlier referral, diagnosis, and treatment than those identified in other ways (38). Most programs in the Universal Neonatal Hearing Screening used a 2-stage screening protocol, in which an infant who fails the initial test (Otoacoustic Emissions or Auditory Brainstem Response) is retested (39). The strongest evidence continues to indicate that the best outcomes follow very early diagnosis of congenital hearing loss (before 6 months of age) (40).

CONCLUSION

Early detection of developmental disorders in children is a complex process and if we do not pay attention to all of its parts, it may not be successful. Our study showed that in most children, developmental disorders were detected after 24 months of age. In terms of gender, most children with developmental disorders were male. Because of the more intensive follow up, developmental disorders in children born with perinatal biological risk factors were detected earlier than in children born without risk factors. We emphasize the importance of early detection of developmental disorders in children. Further studies could focus on the prevention of risk factors and developmental disorders.

ACKNOWLEDGMENTS

We thank Dr. Manuel F. Casanova for his valuable help in proofreading the manuscript.

NOVČANA POTPORA/*FUNDING*

Nema/*None*

ETIČKO ODOBRENJE/*ETHICAL APPROVAL*

Vojna bolnica, Dječji dispanzer, Skopje, Republika Makedonija/*Military Hospital, Pediatric dispensary, Skopje, Republic of Macedonia*

DOPRINOSI AUTORA/*DECLARATION OF AUTHORSHIP*

Svi autori su jednako doprinijeli izradi članka/*All authors have equally contributed to the work*

SUKOB INTERESA/*CONFLICT OF INTEREST*

Autori su popunili *the Unified Competing Interest form na www.icmje.org/coi_disclosure.pdf (dostupno na zahtjev)* obrazac i izjavljuju: nemaju potporu niti jedne organizacije za objavljeni rad; nemaju financijsku potporu niti jedne organizacije koja bi mogla imati interes za objavu ovog rada u posljednje 3 godine; nemaju drugih veza ili aktivnosti koje bi mogle utjecati na objavljeni rad./*All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.*

REFERENCES

1. Sharma A. Developmental examination: birth to 5 years. Arch Dis Child Educ Pract Ed. 2011;96:162-75. http://dx.doi.org/10.1136/adc.2009.175901
2. Kolb B, Brown R, Witt-Lajeunesse A, Gibb, R. Neural compensations after lesion of the cerebral cortex. Neural Plast. 2001;8:1-16. http://dx.doi.org/10.1155/NP.2001.1
3. Hadders-Algra M. Early brain damage and the development of motor behavior in children: clues for therapeutic intervention? Neural Plast. 2001;8:31-49. http://dx.doi.org/10.1155/NP.2001.31

4. Glascoe FP. Early detection of developmental and behavioral problems. Pediatr Rev. 2000;21:272-80. http://dx.doi.org/10.1542/pir.21-8-272
5. Drotar D. Detecting and managing developmental and behavioral problems in infants and young children: The potential role of the DSM-PC. Infants Young Child. 2004;17:114-24. http://dx.doi.org/10.1097/00001163-200404000-00003
6. Beck S, Wojdyla D, Say L, et al. The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity. Bull World Health Org. 2010;88:31-8. http://dx.doi.org/10.2471/BLT.08.062554
7. Spittle A, Orton J, Doyle LW, Boyd R. Early developmental intervention programs post hospital discharge to prevent motor and cognitive impairments in preterm infants (Review). Cochrane Database Syst Rev. 2007;2:1-72.
8. To T, Guttmann A, Dick PT, et al. Risk markers for poor developmental attainment in young children. Arch Pediatr Adolesc Med. 2004;158:643-9. http://dx.doi.org/10.1001/archpedi.158.7.643
9. Pinto-Martin JA, Dunkle M, Earls M, Fliedner D, Landes C. Developmental stages of developmental screening: steps to implementation of a successful program. Am J Public Health. 2005;95:1928-32. http://dx.doi.org/10.2105/AJPH.2004.052167
10. Blackburn CM, Spencer NJ, Read JM. Prevalence of childhood disability and the characteristics and circumstances of disabled children in the UK: secondary analysis of the Family Resources Survey. BMC Pediatr. 2010;10:21. http://dx.doi.org/10.1186/1471-2431-10-21
11. Jachova Z, Dimitrova-Radojichikj D, Chichevska-Jovanova N. Early intervention of children with disabilities. JSER. 2004;5:47-59.
12. Roberts G, Howard K, Spittle AJ, Brown NC, Anderson PJ, Doyle LW. Rates of early intervention services in very preterm children with developmental disabilities at age 2 years. J Paediatr Child Health. 2008;44:276-80. http://dx.doi.org/10.1111/j.1440-1754.2007.01251.x
13. Trokanovic J, Mitrovic N. Psychomotor development of preschool children, especially those with hearing impairment and their treatment and rehabilitation in the municipality of Negotin. AMM. 2001;3:77-86.
14. Johnson S, Hennessy E, Smith R, Trikic R, Wolke D, Marlow N. Academic attainment and special educational needs in extremely preterm children at 11 years of age: the EPICure study. Arch Dis Child Fetal Neonatal Ed. 2009;94:283-9. http://dx.doi.org/10.1136/adc.2008.152793
15. Agerholm H, Rosthøj S, Ebbesen F. Developmental problems in very prematurely born children. Dan Med Bull. 2011;58:1-5.
16. Cooke RWI. Perinatal and postnatal factors in very preterm infants and subsequent cognitive and motor abilities. Arch Dis Child Fetal Neonatal Ed. 2005;90:60-3. http://dx.doi.org/10.1136/adc.2004.059188
17. O'Brien F, Roth S, Stewart A, Rifkin L, Rushe T, Wyatt J. The neurodevelopmental progress of infants less than 33 weeks into adolescence. Arch Dis Child. 2004;89:207-11. http://dx.doi.org/10.1136/adc.2002.006676
18. Woodward LJ, Moor S, Hood KM, et al. Very preterm children show impairments across multiple neurodevelopmental domains by age 4 years. Arch Dis Child Fetal Neonatal Ed. 2009;94:339-44. http://dx.doi.org/10.1136/adc.2008.146282
19. Luu TM, Ment L, Allan W, Schneider K, Vohr BR. Executive and memory function in adolescents born very preterm. Pediatrics. 2011;127:639-46. http://dx.doi.org/10.1542/peds.2010-1421
20. Aarnoudse-Moens CSH, Weisglas-Kuperus N, van Goudoever JB, Oosterlaan J. Meta-analysis of neurobehavioral outcomes in very preterm and/or very low birth weight children. Pediatrics. 2009;124:717-28. http://dx.doi.org/10.1542/peds.2008-2816
21. Luu TM, Ment LR, Schneider KC, Katz KH, Allan WC, Vohr BR. Lasting effects of preterm birth and neonatal brain hemorrhage at 12 years of age. Pediatrics. 2009;123:1037-44. http://dx.doi.org/10.1542/peds.2008-1162
22. Van Baar AL, Vermaas J, Knots E, de Kleine MJK, Soons, P. Functioning at school age of moderately preterm children born at 32 to 36 weeks' gestational age. Pediatrics. 2009;124:251-7. http://dx.doi.org/10.1542/peds.2008-2315
23. Lindström K, Lindblad F, Hjern A. Preterm birth and Attention-Deficit/Hyperactivity Disorder in schoolchildren. Pediatrics. 2011;127:858–65. http://dx.doi.org/10.1542/peds.2010-1279
24. Potijk MR, de Winter AF, Bos AF, Kerstjens JM, Reijneveld SA. Higher rates of behavioral and emotional problems at preschool age in children born moderately preterm. Arch Dis Child. 2012;97:112-7. http://dx.doi.org/10.1136/adc.2011.300131
25. Boyle EM, Poulsen G, Field DJ, et al. Effects of gestational age at birth on health outcomes at 3 and 5 years of age: population based cohort study. BMJ. 2012;344:e896. http://dx.doi.org/10.1136/bmj.e896
26. McGowan JE, Alderdice FA, Holmes VA, Johnston L. Early childhood developmemt of late-preterm infants: A systematic review. Pediatrics. 2011;127:1111-24. http://dx.doi.org/10.1542/peds.2010-2257
27. Woythaler MA, McCormick MC, Smith VC. Late preterm infants have worse 24-month neurodevelopmental outcomes than term infants. Pediatrics. 2011;127:622-9. http://dx.doi.org/10.1542/peds.2009-3598
28. Quigley MA, Poulsen G, Boyle E, et al. Early term and late preterm birth are associated with poorer school performance at age 5 years: a cohort study. Arch Dis Child Fetal Neonatal Ed. 2012;97:167-73. http://dx.doi.org/10.1136/archdischild-2011-300888
29. Schmidhauser J, Caflisch J, Rousson V, Bucher HU, Largo RH, Latal B. Impaired motor performance and movement quality in very-low-birthweight children at 6 years of age. Dev Med Child Neurol. 2006;48:718-22. http://dx.doi.org/10.1017/S001216220600154X
30. Woodward LJ, Edgin JO, Thompson D, Inder TE. Object working memory deficits predicted by early brain injury and development in the preterm infant. Brain. 2005;128:2578–87. http://dx.doi.org/10.1093/brain/awh618
31. Resegue R, Fiorini Puccini R, Koga da Silva EM. Risk factors associated with developmental abnormalities among high-risk children attended at a multidisciplinary clinic. Sao Paulo Med J. 2008;126:4-10. http://dx.doi.org/10.1590/S1516-31802008000100002
32. Dukovska V, Sofijanova A, Duma F, Juzevski Zh. Asphyxia and developmental outcome in high risk infants. JSER. 2010;11:25-38.
33. American Academy of Pediatrics, Council on children with disabilities, Section on developmental behavioral pediatrics, Bright futures steering committee, Medical home initiatives for children with special needs project advisory committee. Identifying infants and young children with developmental disorders in the medical home: an algorithm for developmental surveillance and screening. Pediatrics. 2006;118:405-20.
34. Mandell DS, Novak MM, Zubritsky CD. Factors associated with age of diagnosis among children with Autism Spectrum Disorders. Pediatrics. 2005;116:1480-6. http://dx.doi.org/10.1542/peds.2005-0185
35. Watson LR, Baranek GT, DiLavore PC. Toddlers with autism: developmental perspectives. Infants Young Child. 2003;16:201-14. http://dx.doi.org/10.1097/00001163-200307000-00003
36. Zwaigenbaum L, Bryson S, Lord C, et al. Clinical assessment and management of toddlers with suspected Autism Spectrum Disorder: insights from studies of high-risk infants. Pediatrics. 2009;123:1383-91. http://dx.doi.org/10.1542/peds.2008-1606
37. US Preventive Services Task Force. Vision screening for children 1 to 5 years of age: US Preventive Services Task Force recommendation statement. Pediatrics. 2011;127:340-6. http://dx.doi.org/10.1542/peds.2010-3177
38. Nelson HD, Bougatsos C, Nigren P. Universal newborn hearing screening: Systematic review to update the 2001 US Preventive Services Task Force recommendation. Pediatrics. 2008;122:266-76. http://dx.doi.org/10.1542/peds.2007-1422
39. Thompson DC, McPhillips H, Davis RL, Lieu TA, Homer CJ, Helfand M. Universal Neonatal Hearing Screening, summary of evidence. JAMA. 2001;286:2000-10. http://dx.doi.org/10.1001/jama.286.16.2000
40. Wake M, Poulakis Z, Hughes EK, Carey-Sargeant C, Rickards FW. Hearing impairment: a population study of age at diagnosis, severity, and language outcomes at 7-8 years. Arch Dis Child. 2005;90:238-44. http://dx.doi.org/10.1136/adc.2003.039354

SAŽETAK

Rano otkrivanje razvojnih poremećaja u primarnoj zdravstvenoj zaštiti

Lidija Ristovska, Zora Jachova, Vladimir Trajkovski

Cilj ovog rada je analiza načina otkrivanja razvojnih poremećaja u djece u primarnoj zdravstvenoj zaštiti. Analizirani su podatci iz zdravstvenih kartona 2 634-ero djece koja su pregledana u dječjem dispanzeru u Vojnoj bolnici u Skoplju, Republici Makedoniji u razdoblju od 2000.-2009. godine. Djeca su rođena u razdoblju od 1990. do 2009. godine. U našoj retrospektivnoj studiji analizirali smo Registar visokog rizika i prikupili smo podatke o 211 588 pregleda. Također smo proveli nestrukturirani razgovor s pedijatrima. Za statističku analizu podataka primijenili smo hi-kvadrat test s razinom značajnosti p <0,05. U razdoblju 2000.-2009. razvojni poremećaji otkriveni su u 172-je djece (6,5%), 112 muškog i 60 ženskog spola. Većina djece (81,9%) imalo je specifične razvojne poremećaje govora i jezika. Od ukupnog broja djece 272-je (10,3%) imalo je perinatalne biološke čimbenike rizika. Pedeset i sedmero djece s rizičnim čimbenicima (21%) imalo je razvojnih poremećaja. Naša studija pokazuje da su razvojni poremećaji u većini djece otkriveni nakon 24. mjeseca života. Većina djece s poteškoćama u razvoju bila je muškog spola. Zbog intenzivnijeg praćenja razvojni poremećaji u djece rođene s perinatalnim biološkim čimbenicima rizika otkriveni su ranije od onih u djece rođene bez rizičnih čimbenika. Daljnje studije mogle bi se usredotočiti na prevenciju rizičnih čimbenika i razvojnih poremećaja.

Ključne riječi: rano otkrivanje; razvojni poremećaji; rizični čimbenici