

Original Article

Hospitalisation: A Good Opportunity to Detect Developmental Difficulty in Children

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Abstract This study aimed to determine children at risk of developmental difficulty by using a developmental monitoring tool during their hospital stay. The development of 113 hospitalised children aged 2-42 months was evaluated by using expressive and receptive language, fine and gross motor, social-emotional and relational functions, play, and self-help skills areas of the Guide for Monitoring Child Development (GMCD). There were 49 (42.4%) children with developmental difficulties. Developmental difficulty was found in 72.9% of the children of mothers who expressed a concern ($p<0.001$). Developmental difficulties were significantly more common in children of mothers without regular prenatal follow-up ($p<0.001$), with low educational level ($p<0.001$), and who had previously suffered stillbirth ($p<0.013$); and in children with a birth weight below 2500 g ($p<0.002$), and with consanguineous parents ($p<0.007$). The hospitalisation period is a good opportunity to identify children at risk of developmental problems and refer them for further assessment and early intervention.

Key words Child; Development; Hospitalisation

Introduction

The developmental disability rate in children is reported to be 10-15% in the United States of America.^{1,2} The number of studies on developmental problems in children aged 3 years and below in the world is inadequate, but it is obvious that these problems are more common in low and moderate

income (LAMI) countries³ with increased risk factors that influence early childhood development such as malnutrition, infectious disease, iron deficiency and low birth weight.⁴ High-income countries have healthcare systems that enable prevention, early diagnosis and management of developmental difficulties in young children⁵ whereas LAMI countries have only recently started to focus on these issues.³ It is reported that children with mild or moderate problems are not diagnosed until they start school in these countries although routine surveillance is required to quickly identify these children and prevent any loss of their potential with early intervention.⁶ The American Academy of Pediatrics has suggested every healthy child to be screened for development with a relevant instrument at 9, 18, 24 or 30 months even if the parents or caregivers have no concerns⁷ but such instruments are not in common use.⁸⁻¹⁰

The health care system does not routinely monitor and prevent the risk factors related to developmental problems in most LAMI countries. The families actually contact the health care system at a young age for vaccination, monitoring of growth and acute or chronic diseases.³ Hospitalisation

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can provide an important opportunity for paediatricians to perform screening for developmental difficulties in countries where vaccination and monitoring for growth are not generally performed by paediatricians.

The fact that children with confirmed developmental problems are more frequently hospitalised indicates that this may also be valid for children with as yet undetected developmental problems. Some studies have found a higher incidence of developmental disabilities in hospitalised children.¹¹⁻¹³ Such monitoring of hospitalised children for developmental problems may be especially important in developing countries where it may not be possible to monitor all children.

The purpose of this study was to determine the developmental difficulty prevalence in hospitalised children using a developmental monitoring tool, Guide for Monitoring Child Development (GMCD).¹⁴ The term 'developmental difficulty' was used to mean conditions that could put a child at risk for suboptimal development, or result in a developmental deviance, delay, disorder or disability.³

Methods

Participants

A total of 113 children aged 2-42 months who were hospitalised in a subspecialty ward (cardiology, gastroenterology, endocrinology, haematology, neurology, nephrology, respiratory disease) of the Turgut Ozal Medical Center in Malatya, Turkey for treatment of an acute disorder for more than 48 hours were included in this cross-sectional observational study. The centre is a tertiary hospital with 150 beds and serves children from Eastern Turkey. We invited 125 mothers accompanying their children to the study and included them after obtaining informed consent if they agreed (12 mothers refused). The study was approved by the Inonu University Ethics Committee.

Procedure

The medical information of the children was obtained from patient charts. A semi-structured questionnaire was used to collect information from the caregivers about sociodemographic variables such as mother's age, educational level, and family structure with a face-to-face interview. The GMCD was then administered with an open-ended, precoded, 10-minute interview with the primary caregiver by an investigator with relevant training. Based

on the interview, the children's developmental status was evaluated and recorded. The developmental support and managing parts of the instrument was not included in this study. Patients with suspected developmental difficulty were then referred to the developmental paediatrics department for follow-up and formal evaluation.

Measures

Guide for Monitoring Child Development (GMCD)

The GMCD was developed by Ertem et al in 2008 in Turkey with the aim of monitoring development in children aged under 42 months.¹⁴ It is administered with an open-ended, precoded, 10-minute interview with the primary caregiver. The sensitivity is 88% (CI % 95:0.69-0.96) and the specificity is 93% (CI % 95:0.83-0.97). A large, NIH-supported multinational study on the international standardisation, validation and efficacy of the GMCD is currently being conducted in Argentina, India, South Africa and Turkey.³

GMCD has three components as developmental monitoring, developmental support, and management of developmental difficulties. The parents are first asked whether they have any concerns and these are investigated further if the answer is positive. Otherwise the clinician explains why it is important to know how the child functions and asks the open-ended questions on the following developmental domains: expressive language, receptive language, fine and gross motor functions, social-emotional and relational functions, play, and self-help skills (for children older than 12 months). The responses are checked against specific milestones and additional questions are asked as necessary. A child that has reached all milestones at the required age is said to have a GMCD result that is "appropriate for age" whereas otherwise the result is "not appropriate for age" and "need for further evaluation with or without intervention".³ We defined children with a GMCD result that was not appropriate for age as "has developmental difficulty" in this study.

Data Analyses

The SPSS 17.0 software (SPSS Inc., Chicago) and chi-squared analysis were used for statistical analysis of the data. The chi-squared test was used to evaluate whether there was a significant difference between children with and without developmental difficulty regarding variables such as maternal age, education, and consanguinity.

Results

The age range of the 113 children was 2-42 months with a mean age of 11.4 ± 9.6 months. There were 56 (49.6%) males and 57 (50.4%) females. The reasons for admission were neurological (31.0%), gastrointestinal (15%) or respiratory (17.7%) problems. 91.2% were born at term and 19.5% were born with a birth weight less than 2500 g. Only 30 (26.5%) were the first child of the family. The mean maternal age was 29.0 ± 6.0 years. The educational level was secondary school or below in 77 (68.1%) mothers. Most of the mothers were housewives (90.3%). The socio-demographic characteristics of the study population are shown in Table 1.

GMCD evaluation of the children revealed 44 (39.9%) children with and 69 (61.1%) without a developmental difficulty. The male/female ratio was 0.91. The prevalence of children with a developmental difficulty only in one area was 13.6%. Many children had more than one difficulty. The difficulty was related to gross and fine motor skills in 37 (32.7%), verbal language skills in 33 (29.2%), receptive language in 28 (24.8%) personal/social skills in 31 (27.4%), and the play area in 39 (34.5%). We evaluated 45 children older than ten months for self-care activity and 17 (37.8%) had self-care problems. The prevalence of developmental difficulties according to developmental milestones is shown in Table 2. Among the 44 children with a developmental difficulty and acute problems, 8 children were already under follow-up (6 for Down syndrome and 2 for dysmorphic syndrome). This decreased the prevalence of children diagnosed with a developmental delay for the first time during hospitalisation to 31.8%.

A developmental concern was mentioned by 32 (28.3%) mothers. Most concerns were regarding gross and fine motor development (59.3%), speech (40%), nutrition and weight gain (15.6%). A developmental difficulty was found in 72.9% of the children of mothers who expressed a concern. Mothers of children with a developmental delay reported a statistically significantly higher number of concerns ($p < 0.001$).

Table 1 Sociodemographic characteristics

	n=113 (%)
Gender	
Female	56 (49.6)
Male	57 (50.4)
Age (month)	
2-6	43 (38.0)
7-12	31 (27.4)
13-18	14 (12.4)
19-24	12 (10.6)
25-42	13 (11.5)
Mother age (year)	
19-25	35 (31.0)
26-35	61 (54.0)
36-48	17 (15.0)
Mother education	
Illiterate	16 (14.2)
Primary school graduates	48 (42.5)
Secondary school graduates	13 (11.5)
High school graduate	28 (24.8)
University	8 (7.1)
Mother working status	
Housewife	102 (90.7)
Working	11 (9.3)
Number of siblings	
No sibling	30 (26.5)
One	39 (34.5)
Two	23 (20.4)
Three and more	21 (18.6)
Family structure	
Nuclear family	92 (81.4)
Extended family	21 (18.6)

Table 2 Developmental difficulty prevalence

Developmental milestones	Expressive language n=113 (%)	Receptive language n=113 (%)	Gross and fine motor n=113 (%)	Relationship n=113 (%)	Play n=113 (%)
Detected	33	28	37	31	39
Difficulty	(29.2)	(24.8)	(32.7)	(27.4)	(34.5)
Detected	80	85	76	82	74
No Difficulty	(70.8)	(75.2)	(67.3)	(72.6)	(65.5)

Developmental difficulties were significantly more common in children of mothers without regular prenatal follow-up ($p < 0.001$), with low educational level ($p < 0.001$), and who had previously suffered stillbirth ($p < 0.013$); and in children with a birth weight below 2500 g ($p < 0.002$), and with consanguineous parents ($p < 0.007$).

Factors such as gender, maternal age, family structure, and the child being the result of an unwanted pregnancy did not influence any of the outcomes.

Discussion

This observational study is the first to determine the developmental difficulty prevalence in hospitalised children in a LAMI country. We found that our sample of children aged 2-42 months hospitalised for acute illnesses had a higher incidence of developmental difficulty than the general population. The disability rate in the general population is 12.29% according to the Turkish Statistical Institute.¹⁵ The large number of neurological disorders and genetic disorders such as Down syndrome in this study sample has increased the rate of children with difficulties. However, this is also a solid indicator of children with developmental difficulties being hospitalised more often.

There are a few western studies on the incidence of developmental problems in hospitalised children. Although the sampling and study methods are different than our study, their reported incidences were also high.¹¹⁻¹³ The first study by Feldman et al in 1993 reported that the development of children aged less than 3 years monitored for more than 1 month in a tertiary hospital could be evaluated in 61% of the patients and a developmental problem was found in 78% of this subgroup.¹² Petersen et al reported a significant prevalence of developmental problems in hospitalised patients in their 2006 and 2009 studies.^{11,13}

Parents' concerns are thought to be effective in directing the primary caregiver to the early detection of behavioural and developmental problems.^{16,17} Glascoe used parental concerns as a screening device named Parents Evaluation of Developmental Status "PEDS" and found that motor, language and global/cognitive area concerns were able to identify 79% of children aged 21-84 months and thus showed high sensitivity.¹⁸ The first question of the GMCD is also about parental concerns and all the concern-related questions within PEDS. The question is: "By development I mean her learning, understanding, communicating,

relationships, her behaviour and emotions, how she uses her fingers and hands, legs and body, her hearing and vision. Do you have any concerns about your child's development in any of these areas?".¹⁴ The evaluation of each developmental state together with the query about parental concerns increases the sensitivity of GMCD in determining developmental difficulties.

A child may be confronted by many risk factors within a certain period or during development.¹⁹ This situation, called double jeopardy, is clearly demonstrated in this study. For example, the rates of specific developmental risk factors for children under 3 years of age such as consanguinity, low birth weight, and low maternal educational level were significantly higher in children with developmental difficulty. This shows once again the importance of evaluating biological and psychosocial risk factors as well during interventions.

The hospitalisation period provides an opportunity to determine the presence of developmental problems and appropriate referral, especially in LAMI countries where it is not easy for children to access health care services.³ However, hospitalisation may be the only time that children are evaluated by a paediatrician and a developmental problem can be recognised early in some countries.

This study had some limitations. First of all, the study was conducted at a single hospital so it is difficult to generalise our findings. The patients were hospitalised in subspecialty wards, with a high number of neurology patients, leading to a higher rate of developmental problems in the sample.

Children from LAMI countries have a higher risk of developmental difficulties and other medical problems. Children presenting with acute problems may not have other surveillance opportunities in the community and it may be possible to detect a subgroup of such children with developmental difficulties at this time. Hospitalisation can be an excellent opportunity to perform structured developmental assessment by interviewing the caretaker. Children presenting to acute settings may not have too many opportunities for surveillance in the community and an additional cohort of children with developmental difficulties could be detected by this method.

Declaration of Interest

There's no declaration of interest.

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