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Recording actions to prevent child morbidity in children's health cards

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Abstract *The aim of this study was to analyze the registering of preventative actions in relation to child morbidity using information regarding vaccinations, as well as iron and vitamin A supplements, which are recorded in children's health cards. This transversal study used a quantitative approach and was performed in Family Health Units in the city of João Pessoa, Paraíba; the sampling was by convenience and totaled 116 children's health cards. The data was collected by observing the cards and the analysis was simple, statistical. The highest percentage of children had their vaccination cards up to date (92.2%) and those that did not were aged between 6 and 12 months: 78.9% of the cards did not have records relating to iron and vitamin A supplements and others only had records of one of the supplements being administered. The vaccination status of children in the first year of life was found to be satisfactory; however, discrepancies were observed in the recordings of the administration of iron and vitamin A supplements, which complicates monitoring performed by child health care professionals. It is hoped that this study will contribute to discussions and strategies aimed at improving the monitoring and recording of micronutrients in children's health cards.*

Key words *Immunization, Dietary supplements, Morbidity, Children's health*

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Introduction

Children's health care starts at the pre-natal stage and continues through routine visits which monitor the growth and development of the child. Given that children (especially those under the age of five) are vulnerable to the emergence of diseases that can result in serious complications and even death, comprehensive attention to the health-disease process can reduce infant morbidity and mortality.

In accordance with guidance from the Brazilian Ministry of Health, actions to prevent, promote and treat the most common children's health problems are related to the promotion of breastfeeding, the reduction of nutritional deficiencies, the care and control of acute respiratory infections, immunization, the control of diarrheal diseases and the monitoring of children's growth and development. The latter is central to the other actions and is intended to reduce infant morbidity and mortality[1].

Among the actions carried out within the overall area of primary health care (PHC), immunization and micronutrient supplementation are priorities for the prevention of infant morbidity and they are administered through the National Immunization Program (PNI)[2], the National Program for Iron Supplementation (PNSFe)[3] and the National Program for Vitamin A (PNSVITA)[4], which are coordinated and provided by the Ministry of Health.

The PNI establishes the immunization schedule, with mandatory vaccines for different age groups, aiming to break the chain of transmission and to control the occurrence of serious diseases that endanger the health of the population[2]. The PNSFe[3] and PNSVITA[4] use strategies to control and reduce anemia due to iron deficiency and nutritional deficiency in relation to vitamin A in areas of Brazil that are considered to be at risk, such as the northeast, the state of Minas Gerais (the north, Vale do Jequitinhonha and Vale do Mucurici) and the Vale do Ribeira in the state of São Paulo.

It is the right of every child to receive free vaccines and nutritional supplementation, and it is the duty of the person responsible for the child, and health professionals, to facilitate access to public health services. Health professionals should refer children to the vaccination room and provide iron supplementation during consultations, but it is the responsibility of the nursing staff to administer and record the necessary doses of vaccines and the supply of vitamin supplements in the child's records and in the Children's Health Card (CSC) in order to monitor the vaccination status and to verify the distribution of supplements[5].

The CSC is the primary document used by the health services for the comprehensive evaluation of children's health. It serves as a tool to provide a dialogue between health professionals and families due to its applicability in terms of information and essential guidelines for the care and monitoring of children's growth and development. The CSC contains the child's health history and it reinforces the implementation of comprehensive care for children because it provides guidance on such issues as health warning signs, growth and development, diarrhea, dehydration, healthy nutrition, immunization, accident prevention, and the supplementation of iron and vitamin A[5].

However, some studies have shown inconsistencies regarding recording information in CSCs, delays in the vaccination schedule, and failures to record important data regarding children's health, including the lack of information regarding registration of the supplementation of micronutrients[6,7].

A study in 2010[8] demonstrated that CSCs were not being used properly and were therefore not fulfilling their role in monitoring and promoting children's health. Failure to complete information in the CSC, or incorrect information being recorded, may result in families devaluing the importance of this document in terms of their children's health.

A study performed in the city of Cuiabá in the state of Mato Grosso[6] analyzed 950 CSCs and found about 40% of children with some delay in their vaccination status. Another study[9] evaluated the implementation of the PNSFe in the city of Viçosa in the state of Minas Gerais in terms of its impact on non-anemic infants aged from 6-18 months. The study identified a low adherence to supplementation: of the 97 children who attended the revaluation carried out by the study, 21.6% had stopped using the supplement for over a month and of the 69 children who continued to be evaluated, 26.1% had low adherence after one month. Moreover, the incidence of anemia in the children with poor adherence was 55.6%.

Given the above, it can be seen that there is a need to record these actions in the CSC in order to achieve effective monitoring of programs regarding immunization and iron and vitamin A supplementation within the general area of PHC, given the importance of the early identification of risk in relation to children's health.

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Thus, the present study is highly relevant because it analyzes actions in relation to the prevention of childhood morbidity based on records related to immunization records and iron and vitamin A supplementation found in CSCs.

Method

This transversal study had a quantitative approach and was conducted from December 2012 to March 2013 in Family Health Units (USF) in João Pessoa. This municipality has 186 Family Health Teams (ESF), which are distributed in five Health Districts (DS), and which are responsible for the care of 568,082 service users.

At the time the research was performed, DS III had 53 ESFs, which were responsible for 90.5% of the registered population. These ESFs were distributed in nine integrated units, which included three or four teams in the same physical and organizational space, and 16 separate units, i.e., with only one active team. It was decided to study the separate units because they represented the original ESF model and at the time that this research was conducted integrated units had only recently been introduced in João Pessoa. The choice of the district was due to the fact that it was the largest, and therefore covered a greater number of registered users, thus enabling a greater representation and characterization of the reality of the records in the CSCs.

The study population consisted of mothers who, at the time of interview, carried their CSC with them when they were seeking assistance at a separate unit within DS III. They corresponded to the following criteria: the mother had a child less than one year old that was registered in the unit, and the mother was able to answer the interview questions. Mothers were excluded if they did not have a CSC with them at the time of data collection, and also if their children were older than one year. In order to quantify the sample the following factors were considered: the number of children aged less than one year who were registered in the Information System of Primary Care (SIAB) and registered in the separate USF within that district in July 2012: this came to a total of 553 children. From this total, a sample of 228 CSCs were taken and a tolerable sampling error of 5% and 95% level of trust were adopted. Selecting the stratified sample by unit was performed by convenience sampling during the visits by mothers to the USF. However, the final sample was of 116 CSCs because during the data collection period one of the health care facilities was closed due to refurbishment and also some of the other mothers who attended the unit did not meet the inclusion criteria.

The empirical material was collected from interviews with the mothers and direct observation of child care consultation records actions related to immunizations and iron and vitamin A supplementation contained in the CSCs. The interviews with the mothers occurred when they were waiting for their children to be attended at the health unit, or afterwards. A questionnaire was filled out by the researcher about the socio-demographic and economic characteristics of the mother and her child, as well as information regarding the child's diet. In order to evaluate the number of childcare consultations that were performed, the Ministry of Health's recommendations regarding visits to monitor growth and development, depending on the child's age group, were considered.

The information about iron and vitamin A supplementation and vaccination status was analyzed by direct observation of the records in the CSCs. Immunization was considered to be delayed when it was found that a child had not received the recommended dose for their age within 30 days of the date when it should have been administered; this was adopted for the basic schedule of vaccines, and iron and vitamin A supplementation.

The data were entered into the Excel 2007 program and analyzed using the Statistical Package for Social Science (SPSS) version 20.0 for Windows software. The descriptive statistics were represented by the absolute and relative frequency of the variables. To check the association between the variables the chi-square test of association was used and in the case of a cell with an expected frequency of less than five, Fisher's exact test was performed.

The research was conducted according to the regulations of Resolution 466/12 of the National Council Health[10] and was approved by the Research Ethics Committee of the Center for Health Sciences at the Federal University of Paraíba - Protocol 0096/12. The individuals who participated in the research signed a consent form.

Results

Table 1 shows the socio-demographic characteristics of the children and their mothers, which are considered to be important factors because they

affect the understanding of families about immunization and micronutrient supplementation. The predominant age group of the children was between 0 and 6 months (60.3%), the majority (52.6%) were male; 51.8% were in mixed feeding, and about 73% had received 1-6 routine visits. With regard to the mothers, most were aged between 21 and 30 (40.5%), were in stable relationships (46.6%), had secondary education (48.3%) and about 76.7% worked in the home. Regarding the number of residents in the home, 45.7% of households were made up of 4-5 people and there was a predominance in those households of only one child (49.1%). These households had low socio-economic status (65.5%) because the predominant monthly income was between one and two minimum wages (R $678.00).

Table 1. Distribution of characteristics of children and mothers, João Pessoa, PB, Brazil, 2013.

Variables	n = 116	
	n	%
Child		
Age in months		
0 - 6	70	60.3
7 - 12	46	39.7
Sex		
Female	55	47.4
Male	61	52.6
Type of food		
EBF*	28	24.1
Mixed feeding	60	51.8
Family food	28	24.1
Child health consultations		
1-6	85	73.3
7 or more	10	8.6
None	21	18.1
Mothers		
Age		
20 or under	35	30.2
21 – 30	47	40.5
Over 30	34	29.3
Marital status		
Single	32	27.5
Steady relationship	54	46.6
Married	29	25
Separated	1	0.9
Education		
Never went to school	2	1.7
Elementary school	47	40.5
High school	56	48.3
Higher education	11	9.5
Working outside the home		
Yes	27	23.3
No	89	76.7
Number of children		
1	57	49.1
2	38	32.8
3	21	18.1
Number of people living at home		
Up to 3	39	33.6
4-5	53	45.7
6 or more	24	20.7
Family income (MS)**		
Less than 1	16	13.8
1-2	76	65.5
More than 2	24	20.7

* Exclusively breastfeeding. ** Minimum salary, equivalent to BR$ 678.00 in January 2013.

With regard to the records relating to immunization and iron and vitamin A supplementation which were observed in the CSCs (Table 2), a high percentage of children had their vaccination schedule up-to-date (92.2%) and had received appointments for subsequent doses of vaccines (98.3%). Among the children with delayed immunization, the highest percentage had only one delayed vaccination (44%). The age group of 6-12 months had the highest number of delayed vaccinations. In relation to the supplementation of iron and vitamin A, 78.9% of the CSCs had no records of such supplementation, while in others there were only records of Vitamin A (66.7%) or iron (24.6%).

The analysis of the association between the recording of iron and vitamin A supplementation, and the number of child health visits among children aged 6-12 months (Table 3), showed no significant association between these variables

Discussion

Vaccination and supplementation with iron and vitamin A are designed to prevent ill-health and to promote and protect good health in children. They directly influence the growth and development of children by providing that they are free of disease, even if they are exposed to environments that are prejudicial to health[11]. However, for these actions to be implemented it is necessary that there is a relationship between the family and health professionals in order to ensure that children's rights are protected.

Immunization is a primary and significant action to reduce morbidity and mortality from vaccine-preventable diseases, especially in infants and children in early infancy, who represent the group most susceptible to these diseases in Brazil and worldwide[12].

Table 2. Frequency and percentage of actions to prevent morbidity registered in Children's Health Cards (CSC) in João Pessoa, PB, Brazil, in 2013.

Variables	n	%
Scheduled vaccinations (n = 116)		
Up-to-date	107	92.2
Delayed	9	7.8
Deferred vaccinations (n = 116)		
Yes	114	98.3
No	2	2.7
Number of delayed vaccinations per CSC* (n = 9)		
1	4	44.4
2	2	22.2
3	1	11.2
5	2	22.2
Number of children with delayed vaccinations by age (n = 9)		
Less than 6 months	2	22.2
6-12 months	7	77.8
Delayed vaccinations		
VIP/OPV	5	55.6
PENTA	4	44.4
Pneumococcal	6	66.7
Rotavirus	2	22.2
Meningococcal	4	44.4
Suplementation of iron and Vitamin A** (n = 57)		
Vitamin A		
Yes	38	66.7
No	19	33.3
Iron		
Yes	14	24.6
No	43	75.4
Both supplements	57	100
Yes	12	21.1
No	45	78.9

* Percentual calculado para o total de nove CSC com calendário vacinal atrasado. ** Percentual calculado para o total de crianças a partir dos seis meses de idade, faixa etária inicial para a suplementação de vitamina A e ferro.

Table 3. Association between records of iron and Vitamin A supplementation and the number of child health visits among children aged 6-12 months, João Pessoa, PB, Brazil in 2013.

Variable	Records of consultations (n = 57)				p value*
	1 - 6		7 or more		
	n	%	n	%	
Vitamin A					0.469
Yes	30	63.8	8	80.0	
No	17	36.2	2	20.0	
Iron					0.423
Yes	13	27.7	1	10.0	
No	34	72.3	9	90.0	

* Fisher's test (existence of cell with expected frequency of less than 5)

The PNI makes more than 300 million annual doses available and these are distributed via 44 biopharmaceuticals, including vaccines, serums and immunoglobulins. The scheduled vaccines for children, which are part of the routine of the Family Health Units, are: BCG; hepatitis B (recombinant); OPV (attenuated); VIP (inactivated); adsorbed diphtheria; tetanus; pertussis; haemophilus influenzae b (conjugated) - PENTA; adsorbed diphtheria, tetanus and pertussis - DTP; human rotavirus (attenuated); MMR; meningococcal C (conjugated); and 10-valent pneumococcal (conjugated)[13].

To follow up the vaccinations of children under the age of one, those who are responsible for them should attend the USF carrying with them the respective CSC[14]. In the present study only 7.8% of the CSC's that were analyzed had delayed scheduled vaccinations, which differed from the results of other studies[6,15-18] conducted in different regions of Brazil, in which over 20% of children had delayed vaccinations.

Some factors may have influenced the fact that the vaccinations were up-to-date, including the fact that most of the mothers had only one child, and they also worked at home. Studies[15,19] have indicated that mothers with high numbers of children are less inclined to participate in preventive health activities, and mothers who work at home probably have more free time to care for their children and monitor their health, which results in greater continuity and quality in terms of monitoring the health of those children.

Regarding the issue of age and scheduled vaccinations, it was found that children aged between six and twelve months had a higher percentage of delay in their vaccinations. A similar trend was observed in a study carried out in Argentina[20], which evaluated delays in the scheduled immunizations of children less than two years of age. That particular study identified a higher incidence of delayed immunization in children aged 12 months and showed that there was greater vaccine control in the first months of life.

It is the responsibility of nurses to direct actions in relation to health education in order to guide mothers on the importance of vaccines and

keeping them up-to-date. This action should take place in any meeting with the child, either at the time of a routine visit and/or in the vaccination room. Thus, nurses play an important role in monitoring vaccinations and offering guidance within the wider spheres of comprehensive child-care, the expansion of immunization coverage, and compliance with scheduled vaccinations[21]; historically, nurses have been the professionals responsible for this service within the ESF.

Studies in different Brazilian states[15-17,22] have confirmed that vaccines which require three doses for primary vaccination (minimum doses that confer immunity) have shown higher percentages of delay. In the present study, the vaccinations that were most delayed were pneumococcal, VIP/OPV and pentavalent, which require three doses. Given that the first doses of these vaccines are essential for subsequent doses, the delay in the administration of any of them results in the delay of subsequent doses, or even the loss of the vaccination schedule; consequently, children are likely to acquire vaccine-preventable diseases[16].

Literature reports[16,17,20,23] have stressed that the main reasons for delayed immunization in children are the lack of vaccine in the health service, sickness of nursing staff, mother's neglect, the child's illness, antibiotic treatment, ignorance about the schedule for vaccinations, lack of guidance from professionals, and lack of professionals to administer the vaccine.

Regarding the continuation of the vaccination schedule, it was clear that all the CSCs contained recommendations for deferrals, demonstrating that professionals were hampered in terms of implementing immunization. It is worth pointing out that phasing significantly reduced the chance of missing opportunities for vaccination, given that mothers/carers keep in their minds the day that they will go back to work[6].

Regarding the supplementation of iron and vitamin A, deficiencies in these micronutrients contribute to the occurrence of damage to children's health, especially in children under the age of two, which can lead to iron-deficiency anemia, blindness, diarrhea, respiratory morbidity, and impaired infant growth and development[3,4]. Multiple micronutrient deficiencies are common in childhood, especially in underprivileged areas where morbidity is persistent[24,25]. Thus, prevention strategies are critical in order to control the occurrence of these problems and to reduce child mortality[3,4].

In order to prevent iron-deficiency anemia, the World Health Organization drew up a scheme for administrating prophylactic doses of iron for the following: children aged 6-18 months and who were exclusively breastfeeding; for newborn, pre-term, and low birth weight children from the 30th day; and from 4 months for children who were not exclusively breastfeeding[3].

Vitamin A deficiency is prevented by the oral supplementation of vitamin A, which is distributed every six months for children aged from 6 to 59 months who live in areas considered to be at risk. The dose is 100,000 IU for children aged 6-11 months and 200,000 IU for those aged 12-59 months[4].

All children should receive supplementation of these micronutrients; however, studies[9,26] have demonstrated inconsistencies in supply and/or poor adherence of mothers to such programs, even though the vitamins are distributed free of charge at health facilities. These failures result in the occurrence of iron and vitamin A deficiency in children. Based on records in the CSCs, the present study also identified problems in providing these micronutrients; these were mainly related to the lack or records regarding iron supplementation.

A study conducted in the state of Acre[27] investigated complementary feeding practices and nutritional status in children under the age of 24 months and found that 94% of children aged 9-11 months had iron deficiency; the figure was 58% for children aged 12-24 months. Another study[26] analyzed the functioning of the PNSVITA in the state of Paraíba from the perspective of those responsible for children under the age of five and found that vitamin distribution in children aged 6-17 months was higher than for children aged 12-59 months.

Bearing in mind that the supplementation of iron and vitamin A are most often supplied to children from the age of six months, the two studies cited above[26,27] reported a discrepancy regarding prophylactic distribution because iron deficiency was more present in children aged 9-11 months, unlike the administration of vitamin A, in which the coverage was higher in children aged 6-11 months. This observation was confirmed in the present study, where out of the 57 children who were within the age group recommended for iron and vitamin A supplementation, only 21.1% had records of the two supplementations. The highest percentage of records was for vitamin A supplementation, compared to the records in relation to iron supplementation.

In this respect it is worth mentioning the contribution of vitamin A supplementation in

reducing anemia. A study carried out in Ethiopia in 2011[25] noted a slight increase in hemoglobin in a group of children supplemented with vitamin A. Consequently, the offer of two supplementations at the age indicated by the Brazilian Ministry of Health contributes to the reduction of the occurrence of anemia in supplemented infants.

Regarding the prevention of anemia, the present study found that a significant number of children aged 0-6 months were no longer exclusively breastfeeding and should have been receiving ferrous sulfate supplementation. However, what was observed was a low prevalence of records for this particular supplementation in the CSCs. Nevertheless, it is important to note that it was not possible to state with certainty whether these children were not receiving iron supplements because some mothers reported that their children *did* receive the corresponding dose, although there were no records of this occurring. Similar situations were found in another study that analyzed the filling in of information in CSC's in the city of Belo Horizonte[28].

In relation to the recording of supplementation, Almeida et al.[8] reported that some health professionals do not control the administration of doses of vitamin A; they record the supply exclusively on daily maps that do not allow monitoring by professionals and parents/guardians. This attitude hampers the identification of the doses given to children and interferes with comprehensive monitoring, which is a fundamental principle of the CSC.

The Ministry of Health's *Manual for use of the CSC*[29] provides guidance to health professionals regarding recording the administration of vitamin A and the distribution of bottles of ferrous sulfate syrup. Considering that records are essential to verify the effectiveness of these actions, deficiencies in recording information in the CSC hamper the identification of providing supplements and jeopardize the effectiveness of the iron supplementation program for children in the first year of life.

The low levels of effectiveness of the supplementation programs in municipalities may be related to a lack of the following: professional training; monitoring; active efforts to locate children who require supplements, as well as deficiencies in health education activities related to these actions. Furthermore, a study[9] concluded that forgetfulness, lack of interest, and the lack of guidelines for mothers on this issue contributed to non-adherence to supplementation. A further study[26] found that 80% of 657 people who were interviewed stated that they did not know about the vitamin A program or about the importance of supplementation; about 35% reported not knowing the frequency of supplementation of Vitamin A doses, which is a factor that can directly affect adherence to these programs.

The results of the present study showed no significant association between the records of iron supplementation and the number of child health visits. This leads to the inference that visits to health centers for consultations did not seem to influence the supply of supplementation. It seems that this should occur, because children have to attend the health centers to receive supplementation and/or vaccination regardless of child health consultations.

On this point, other studies[20,23,26] have confirmed that opportunities to take actions to prevent child morbidity are frequently missed during moments when children come into contact with health services, whether in terms of consultation or vaccination. Based on the foregoing, it is clear that the CSC is extremely important in terms of disease prevention and health promotion because its records make it possible to evaluate the health actions carried out for the child. Thus, the CSC is a tool that couples immunization programs and iron and vitamin A supplementation and, therefore, it should be incorporated into the routine of the USFs. The CSC is also a tool for assessing the quality of care provided by health teams[18]. For these reasons, health professionals who provide assistance to children should register all their interventions in the CSC, so that other professionals can monitor the child's health status and therefore ensure that comprehensive care is provided.

Conclusion

This research focused on actions to prevent child morbidity from the point of view of immunization records, and iron and vitamin A supplementation which were recorded in Children's Health Cards (CSCs). It was found that despite the fact that the vaccination status of children in the first year of life was satisfactory, the highest percentage of delay in immunization occurred in children in the second half-year of life. Moreover, the records of iron and vitamin A supplementation were flawed because the majority of the CSCs only showed records of the administration of vitamin A, and did not show records relating to iron supplementation.

To reverse this situation, it is necessary that health professionals take responsibility, not only for distribution and monitoring, but also for improving records regarding preventive measures in relation to child morbidity, especially supplementation. Furthermore, they should conduct active surveillance and effectively commit to the micronutrient supplementation program. Health education programs are also required in order to inform parents or guardians about the importance of supplementation to promote healthy growth and development in children.

Because this study was limited to children who had their CSC with them at the time of data collection, the results did not allow us to draw a picture of what happened to the health of all the children registered in the surveyed health units, especially those who did not possess a CSC. The latter are likely to constitute an even more vulnerable group because the CSC is a powerful tool for promoting health when used correctly. Another limitation of this study was that it did not investigate the relevance of the records of supplemental actions in the CSCs from the perspective of health professionals, as well as the fact that the research was limited to the records in CSCs, without also consulting the general medical records of the children.

It is hoped that this study will contribute towards reinforcing discussions and strategies to improve the monitoring and recording of vaccinations and the supplementation of micronutrients in CSCs, given that these preventive measures are essential to control the occurrence of morbidity in the first year of life. Furthermore, it is suggested that other studies are developed to examine the effectiveness of micronutrient supplementation programs in other Brazilian cities, in particular in relation to records in CSCs regarding iron supplementation, in view of the importance of the latter in reducing infant morbidity and mortality.

Collaborations

DS Vieira, NCCB Santos and APS Reichert participated equally in all stages of the writing of the article. DKG Costa, MM Pereira and EMC Vaz contributed in the write-up, critical and final revisions of the article.

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