



Research Article

## ATTENDANCE OF NEWBORNS IN PEDIATRIC MEDICAL EMERGENCY: IS IT JUSTIFIED AND WHAT ARE THE REASONS BEHIND IT?

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### ABSTRACT

**Introduction:** The use of pediatric medical emergency services is becoming important with an increasing newborns flow, which exposes them to a major infectious risk, particularly during the epidemic.

We aimed to determine the epidemiological and clinical characteristics and to identify the factors associated with the use of pediatric medical emergencies by newborns.

**Materials & Methods:** A six-month prospective, cross-sectional observational study carried out at the Pediatric Medical Emergency Department at the children's hospital of Rabat.

656 newborns were enrolled in the study where we included in our study any newborn of age equal to or less than 28 days consulting directly or referred by a health professional. An operating report has been produced informing the following variables: For newborns: age, sex, term, birth weight, type of breastfeeding, pattern and time of consultation after onset of symptoms, admission times, mode of recourse and evolution. For mothers: age, the course of the pregnancy, the mode of delivery, length of stay in hospital after delivery, consanguinity, parity, school level and childbirth residence.

**Results:** We conclude in our research that 92% came from the serving area, 58.3% were younger than 14 days, and premature infants accounted for 9.6% of the cases. Furthermore, the sex ratio was equal to 1.1 (343 boys), the average birth weight was 3.034 Kg. The reasons for consultation were dominated by jaundice, digestive signs, fever and respiratory distress. The evolution was marked by the outpatient care of 50% of newborns against 50% of hospitalization. Otherwise, the average age of mothers was 27 years, 49% were primiparous and 86.6% were urban. Pregnancy was followed in 76.5% of cases and delivery was performed in a medical setting at 97.1%. The delivery route was low in 88% of cases and high in 12% of cases. 16.8% of mothers have stayed less than 24 hours after childbirth.

**Conclusion:** The study showed a high rate of non-urgent consultation by often young, primiparous mothers, reflecting parental anxiety. This is compounded by the shortening of hospital stay and the lack of counseling for maternity. This current trend requires a set of measures, such as the development of the activities of childcare workers, the strengthening of advice and information provided to young mothers, welcoming young parents and creating circuits dedicated to newborns.

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## INTRODUCTION

### Background

The use of pediatric medical emergency services is becoming an important reality with an increasing newborns flow, which exposes them to a major infectious risk, particularly during the epidemic. In our Moroccan context, the short period of

hospitalization after delivery, the lack of support and assistance facilities for young mothers and the scarcity of publications prompted us to carry out this study.

In this prospective study, we aimed to determine the epidemiological and clinical characteristics and to identify the factors associated with the use of pediatric medical emergencies by newborns and to verify if it was justified.

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## MATERIALS AND METHODS

This study was conducted prospectively over a six-month period, it was a cross-sectional and observational carried out at the pediatric emergency medical department of children's hospital of Rabat, which is classified as level 3, including a neonatal service with a capacity of 45 beds and attached to a maternity which Registered 16864 births in 2015, all newborns, who attended our department directly or physicians referred in the neonatal period ( $\leq 28$  days of age), were included.

However, an operating report has been produced informing the following variables: For newborns: age, gender, term, birth weight, type of breastfeeding, place of birth, time of consultation after onset of symptoms, admission times, mode of recourse and evolution. For mothers, the parameters studied were age, the course of the pregnancy, the mode of delivery, time of discharge after delivery, consanguinity, parity, school level. In addition, The following variables were defined by the following modalities: A pregnancy was considered to have been followed if 3 prenatal consultations had taken place and the method of recourse addressed by a midwife, a general practitioner or a pediatrician, self-referral, And finally an evolution through outpatient treatment, childcare advice, assessment and hospitalization.

### Statistical Analysis

The data was collated in a Microsoft office Excel table (2007), and the statistical analysis was carried out by software SPSS 13.0. The analysis plan was divided into 2 stages: The first one was descriptive; the qualitative variables were expressed in numbers and percentages, the quantitative variables were expressed as mean and standard deviation for those that have a normal distribution, those of non-Gaussian distribution were expressed in median and interquartile range. And the second was analytic where we performed an univariate and multivariate regression in order to determine the factors associated to the attendance of emergencies by the newborns.

## RESULTS

### Neonatal population: (Table 1)

**Table 1** Newborns Characteristics n(%)

Origine	
Rabat-Salé-Kénitra	605 (92.2)
Tanger-Tétouan-Elhoceima	15 (2.3)
Casablanca-Settat	32 (4.9)
Sex	
Male	343 (52.4)
Female	312 (47.6)
Age	
Less than 14 d	341 (58.3)
Greater than 14 d	244 (41.7)
Birth weight	
Less than 2500 g	109 (19.2)
Greater than à 2500 g	460 (80.8)
Terme	
Preterm	63 (9.6)
At term	589 (89.9)
Post-terme	3 (0.5)
Consanguinity	
Yes	44 (6.7)
No	612 (93.3)
Breastfeeding	
Maternal	496 (76.7)
Mixed	109 (16.8)
Commercial	42 (6.5)

During the study period, 656 newborns attended the Pediatric Medical Emergency Department (PMED), 92.2% were from regions of Rabat Salé Kenitra, which are the service area. Newborns below 14 days of age were 58.3%, the mean age was 12 +/- 7d (extreme 2 hours of life at 28d), sex ratio was 1.1 (343 boys). The Preterm infants accounted for 9.6% of cases. Otherwise, the mean birth weight (BW) was 3.034 Kg; 19.2% of newborns had a BW of less than 2500g compared with 80.8% with a BW greater than 2500g. And 93.3% of newborns were from non-consanguineous parents (n = 612). Additionally, Breastfeeding was exclusively maternal in 76.7% of cases, artificial in 6.5% and mixed in 16.8%.

### Maternal population: (Table 2)

**Table 2** Maternal Characteristics n (percentage)

<b>Age</b>	
27 years [16-46]	321(49)
<b>Parity</b>	334(51)
<b>Primipara</b>	
<b>Multipara</b>	
<b>School level</b>	38 (5.8)
Unschooling	149 (22.9)
Primary	247 (37.9)
Middle school	177 (27.2)
High school	40 (6.1)
University	
<b>Pregnancy follow-up</b>	154 (23.5)
No	500 (76.5)
Yes	
<b>Residence</b>	568 (86.6)
Urban	88 (13.4)
Rural	
<b>Mode of delivery</b>	577 (88)
Vaginal delivery	79 (12)
Caesarean section	
<b>Place of birth</b>	19 (2.9)
At home	170 (26)
CHU	369 (56.3)
CHP	51 (7.8)
Childbirth home	46 (7)
Private clinic	
<b>Period of discharge after birth</b>	110 (16.8)
< 24 hours	468 (71.3)
24-48 hours	78 (11.9)
> 48 hours	

**Table 3** Characteristics and outcome of the consultation n (percentage)

<b>Time between symptoms and consultation (day)</b>		1.84 [0-20]
<b>Time's consultation</b>	Workday	504 (76.8)
	Public holiday	152 (23.2)
	Before 18h	386 (59.1)
	After 18h	267 (40.9)
<b>Referred</b>	Self-referred	443 (67.7)
	Midwife	2 (0.3)
	General practitioner	142 (21.7)
	Pediatrician	67 (10.2)
<b>Reasons for consultation</b>	Digestive symptoms	134 (20.4)
	Neurological symptoms	81 (12.3)
	respiratory distress	95 (14.5)
	Jaundice	155 (23.6)
	Fever	122 (18.6)
	Crying	28 (4.3)
<b>Evolution</b>	Outpatient treatment	296 (45.1)
	Balance sheet	27 (4.6)
	Arriving deceased	2 (0.3)
	Hospitalization	328 (50)
<b>Balance sheets</b>	Yes	131 (20)
	No	525 (80)

The average age of mothers was 27 years (extremes 16 years and 46 years), 49% were primiparous. About 23% of mothers had a primary school level and 6.1% had a university one. Pregnancy was followed in 76.5% of cases (general practitioner 79.6% gynecologist 20.4%). However, the delivery was performed in a healthcare environment at 97.1%, the vaginal delivery represents 88% of the cases whereas the cesarean section accounted for 12% of the cases, and more than 16% of mothers have been hospitalized for less than 24 hours. Mothers resided in urban areas in 86.6% of cases, compared with 13.4% in rural areas.

**Newborns consultation and outcome: (Table 3)**

Forty-seven newborns or 7.2% were taken by their single mothers to the Pediatric Medical Emergency Department (PMED), while 43.8% by both parents (n = 287) and 37.6% by more than 2 family members of one of the two parents (n = 311). For 67.7% of the consultants, the PMED was their first contact after leaving the maternity, while 10.2% were referred by a pediatrician and 21.7% by a general practitioner. The reasons for consultation were dominated by the medical causes: Jaundice represents 23.6% followed by digestive symptoms 20.4% then Fever with 18.6% against 14.5% for respiratory distress and 12.3% for neurological symptoms. Workdays Had 76.8% of affluence compared to 23.2% on public holidays and weekends. 93% of the consultations took place before midnight. The consultation period was 1.84 days on average. Further tests were requested in 20% of the cases by doctors in the PMED. Half of the newborns consulting the PMED were hospitalized compared with 49.7% who received outpatient treatment and childcare counseling.

**Analytical study: (Table 4)**

**Univariate analytical study**

Male infants had relatively higher relative risk (RR) than female infants. The lower was the age of the newborn; the greater was the risk of hospitalization. In one hand the newborns who had consulted beyond midnight were three times more likely to be hospitalized, in the other hand the Newborns who were referred by a general practitioner or pediatrician were more likely to be hospitalized with an RR of 9.31 (1.81-2.89), p <0.001. The presence of neurological signs or respiratory signs was statistically correlated with the risk of hospitalization with respectively an odds ratio of 6.73 and 1.87. However, the presence of fever multiplied the risk of hospitalization by 10.7 and the prematurity of 3. Multiparity, advanced maternal age and out-of-school were risk factors for hospitalization of newborns with an odds ratio of 1.54, 1.05 and 7, respectively. Newborns from caesarian section had a relative risk of 1.36 to be hospitalized.

**Multivariate analytical study**

All the variables of the univariate study that had a statistical correlation with the risk of hospitalization of newborns were analyzed by multivariate logistic regression. The prognostic factors statistically correlated with the risk of hospitalization were: the presence of fever or respiratory or neurological clinical signs, and the fact of being referred by a physician, the Advanced maternal age and low birth weight, male infants and, the consultation delay.

**DISCUSSION**

The attendance of newborns in PMED follows the national and global trend of increased use of emergency departments. [1,2].

**Table 4** Analytical study

Variables	Univariate analysis			multivariate analysis		
	OR	IC 95%	P	OR	IC 95%	P
Newborn's age	0,90	[0,87-0 ,92]	<0,001	0,91	[0,87-0,94]	<0,001
Gender	0,57	[0,4-0,75]	<0,001	0,54	[0,34-0,9]	0,013
Day's consultation	0,85	[0,59-1,22]	0,373			
Time consultation			0,013			0,16
8H to 15H	1					
15H to 18H	0,95	[0,64-1,42]	0,8	0,72	[0,4-1,33]	0,292
18H to 00H	0,98	[0,67-1,44]	0,9	0,73	[0,41-1,32]	0,301
From 00H	3	[1,5-6,14]	0,002	2,3	[0,77-6]	0,138
Mother's age	1,05	[1,03-1,08]	<0,001	1,07	[1,02-1,12]	0,011
Parity	1,54	[1,13-2,09]	0,06	1 ,15	[0,66-2,02]	0,625
Consanguinity	0,76	[0,40-1,42]	0,39			
Residence	1,12	[0,71-1,75]	0,64			
Scolarity			0,02			0,388
University	1					
Unschoolled	7,4	[2,6-20,9]	< 0,001		[-]	
Primary	1,76	[0,86-3,6]	0,12			
Middle school	1,44	[0,72-2,86]	0,3			
High school	1,71	[0,84-3,45]	1,14			
Mode of delivrey	1,36	[1,08-1,71]	0,08	1,37	[0,96-1,98]	0,082
Pregnancy follow-up	0,92	[0,84-1,02]	0,01			
Medicalization	1,06	[0,89-1,28]	0,5			
Birth weight	1	[0,99-1]	0,011			
Terme			<0,001			
At term						
Post-term	1,75		0,99			
Preterm	3	[1,65-5,26]	<0,001		[-]	
Delay consultation	0,91	[0,85-0,96]	0,002	1,16	[1,06-1,26]	<0,001
Self-referred	9,31	[6,16-14]	<0,001	6,43	[3,53-11,7]	<0,001
Fever	10,7	[6-19]	<0,001	17	[8-35,66]	<0,001
DigestivesSymptoms	0,16	[0,10-0,26]	<0,001	0,56	[0,26-1,01]	0,054
Cutaneous S.	0,74	[0,53-1,02]	0,064			
respiratory S.	1,87	[1,23-2,83]	0,003	2	[0,98-4,05]	0,058
Neurological S.	6,73	[3,56-12,7]	<0,001	13,9	[5,46-35,44]	<0,001

In 2015, there were 6343 hospitalizations through emergency services at the children’s Hospital of Rabat (CHR) for a total of 72636 urgent consultations, thus CHR contributes of 32.4% to Emergency hospitalizations of the Ibn Sina University’s Hospital Center (IUHC) [3]. The reduction of the length of stay in maternity after birth to less than 48 hours has long been blamed for increasing number of newborns attending emergencies departments [4,5,6,7,8,9]. However, this trend is still increasing despite a regulation in force imposing a minimum stay of 48 hours; the latter is often not respected given the high number of deliveries and the limited capacity of reception. In our study, more than 16% of mothers have stayed less than 24 hours. And a Newborns under 14 days account for 58.3% of neonatal consultations. The neonatal population in this age group is vulnerable and has a greater risk of hospitalization. In this study, this age group represented approximately 75% of hospital admissions.

The analysis of geographical origin showed more frequent use of newborns from maternity Souissi or close maternities, while the latter had pediatric departments. This geographical gradient had also been noted by other teams [10,11]. The reasons for newborns consultations were predominantly medical in more than 97% of cases, we noticed that 67.7% of the consultations were solicited directly by parents with less frequency at night and at weekends. Approximately 50% of newborns were managed on an outpatient basis, the same result found in other studies [12]. The symptoms were dominated by colic and jaundice. (Table 5)

**Table 5** Reasons for outpatient treatment

Symptoms	n	Percentage%
Infantil Colic	68	21.9
Jaundice	59	19
Nappy Rash	26	8.4
Rhinorrhoea	21	6.7
Skin Rash	19	6.1
Regurgitations	16	5.1
Constipation	16	5.1
Genital crisis	10	2.2

Newborns who had consulted for these different reasons were provided with medical prescriptions and childcare advice and some were referred for follow-up at the local health facilities. The maternal age and the parity were analyzed, the more the mothers are young, primipara the more the recourse for non-urgent reasons was frequent. (Table 4). We found an unschooled mothers constitute a factor associated with more frequent emergencies use. This finding was consistent with the results of other studies [13, 14, 15]. Also 50% of the consultants were hospitalized, and fever accounted for 18.6% of the reasons for consultations, which led to fear of neonatal infection, which explains why 88.5% of newborn infants were hospitalized, which resulted in 32.7% of all hospital admissions.

**Table 6**

Reasons for consultation	n	Hospitalization rate %
Fever	122	88,5
Digestives symptoms	134	18,6
Cutaneous symptoms	216	45,3
Respiratory symptoms	114	63,1
Neurological symptoms	80	85

The analytical study found that newborns referred by a physician had a 6-fold increased risk of hospitalization. The respiratory, cutaneous and digestive patterns represented

respectively 20.6%, 29.7% and 7.5% of admissions. (Table 5) In our research, a multiparity multiplies the risk of hospitalization of newborns by 1.54, and a Delay in consultation multiplies the risk of hospitalization by 1.1.

**CONCLUSION**

The increasing newborns use of PMED is multi-factorial [16]; it follows a national trend of emergency services attending. The main goal of our study was to identify these factors and to inquire if this use is justified. According to our study, 50% of newborns who consulted were hospitalized.

The risk of hospitalization was strongly related to the presence of fever, neurological, cutaneous, respiratory and neurological symptoms. Otherwise, the study showed a high rate of consultation for non-urgent reasons by often young, primiparous and unschooled mothers expressing parental concern without prior medical advice. This finding was exacerbated by reducing the length of hospital stay after birth and the absence of advice after leaving maternities. These reasons judged non-urgent were managed more than 45% on an outpatient basis by medical prescriptions and childcare advice.

The decline in the use of emergencies by newborns requires the implementation of a set of measures such as the development of the activity of nurses, the strengthening of advice and information provided to young mothers, facilities for the care of young parents and the creation of circuits dedicated to newborns. These measures will help to reduce the rate of newborn use in emergencies and thus minimize the infectious risk to which they are exposed, especially during the epidemic.

**Abbreviations**

CHR: Children’s hospital of Rabat  
 PMED: Pediatric Medical Emergency Department  
 IUHC: The Ibn Sina University’s Hospital Center

**Declarations**

Ethics approval and consent to participate  
 All parents consented to participate in this study voluntarily without any counterpart or influence, the data were recorded anonymously in the registers.

Consent to publish:

All authors have given final approval of the version to be published

Availability of data and materials:

All data generated or analyzed during this study are included in this published article

Competing interests

The authors declare that they have no conflicts of interest in relation to this article.

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NAC: corresponding author, acquisition of data and drafting the article

BSDB and LK: have made a substantial contribution to the concept and design, acquisition of data, they have conducted the work, drafted the article and have given their approval of this version to be published.

LL and RR have made a substantial contribution to the analysis of data and have been involved in drafting the article. The work was a product of contributions of the whole team.

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