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Research Article

Detection of Risk Jaundice during the Neonatal Screen. Change Something?

Adriana Jonguitud Aguilar[1]*, Noyola Salazar César Antonio[2], De Jesús Raya Esmeralda[3] and Montes Acuña Osmar Jesús[3]

[1]*Neonatologist Pediatrician, Attached to the Pediatric Department of the General Hospital of Rioverde, Rioverde, San Luis Potosí, Mexico*

[2]*Pediatrician, Assigned to the Pediatric Department of the General Hospital of Rioverde, Rioverde, San Luis Potosí, Mexico*

[3]*Undergraduate Internal Physician, Pediatric Department of the General Hospital of Rioverde, Rioverde, San Luis Potosí, Mexico*

***Corresponding Author:** Adriana Jonguitud Aguilar, Neonatologist Pediatrician, Attached to the Pediatric Department of the General Hospital of Rioverde, Rioverde, San Luis Potosí, Mexico.

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Abstract

Introduction: Neonatal hyperbilirubinemia and its timely detection has been the subject of debate for decades. The consequences of not detecting and treating these patients in a timely manner can lead to neurological damage, however, the short postpartum stay limits the observation window of the binomial. The return of patients to the metabolic and auditory screening offers an opportunity for detection and intervention.

Objective of the Study: Know the origin of the reference ("room in" area, neonatal screening, home, community health center, other institution/doctor) to the pediatric service of patients admitted for hyperbilirubinemia, as well as their clinical and epidemiological characteristics.

Methodology: It is an observational, retrospective study. We reviewed the records of newborns admitted for hyperbilirubinemia from 36 to 42 weeks of gestation. Their origin and clinical course were analyzed.

Results: 138 patients were admitted (15.5% of pediatric admissions). Of the 416 admissions to neonatology, it represents 33%, being 4.4% of all newborns. 20% had fever on admission. Regarding its origin, more than half of the patients were detected in preventive medicine (56%). 16% was detected in hospital and two cases when re-entering the binomial due to obstetric complications. 14% proceed from home. Only 7% were referred from primary health center. Hypernatremic dehydration was diagnosed in 35% of the admissions.

Conclusion: The detection of jaundice by visual method during the concerted interview to perform the metabolic screening allowed to discover patients in high-risk zone to develop severe jaundice, and therefore risk of neurological damage. It is proposed to carry out a visual examination using the Kramer method routinely and protocolized to detect jaundice in all patients who come to perform neonatal screening. Hypernatremic dehydration had an incidence higher than previously described.

Keywords: *Hyperbilirubinemia; Neonatal Readmissions; Jaundice; Kramer Visual Scale; Hypernatremic Dehydration; Neonatal Screening*

Introduction

About 60% of full-term babies, and 80% of premature babies, develop jaundice during their first week of life. 10% of breastfed babies remain jaundiced at one month of age. Rapid and effective differentiation between the majority of babies with jaundice who do not have

the underlying disease (physiological jaundice) and those with pathological causes is important to detect the disease and to avoid adverse sequelae such as bilirubin encephalopathy and nuclear jaundice. The recently modified Official Mexican NOM-007-SSA2-2016, as well as the American Academy of Pediatrics, recommend a postnatal consultation between the third and fifth day of life, which allows detecting patients at risk, however this visit is not carried out performed routinely [1,2].

Physiological jaundice has been defined as one that appears after 24 hours of life, has a maximum peak at 3 to 4 days and persists for less than two weeks. There is great controversy regarding normal values and there are racial differences in maximum values. Some authors establish a value of 12.5 mg/dl is the maximum accepted value, for exclusively breastfed newborns [3]. It is recommended to differentiate physiological from non-physiological jaundice, making a good semiology, correctly collecting family history, pregnancy and childbirth, the condition and characteristics of the newborn, the hours of onset of jaundice, the rate of ascent, gestational age and added diseases (co-morbidity) in order to identify newborns at risk of developing severe hyperbilirubinemia. Poor caloric intake with or without dehydration associated with inadequate breastfeeding can contribute to the development of hyperbilirubinemia, however it is recognized that the risk of developing hyperbilirubinemic encephalopathy is low. Factors such as cephalohematoma and ecchymoses as well as "room in" accommodation with the mother favor the presence of jaundice [4,5].

At the Rioverde General Hospital, the timing of the neonatal screening for congenital hypothyroidism was modified three years ago. The newborn is cited at 3 to 6 days after discharge of the binomial (before it was carried out before discharge) to the Preventive Medicine service where nursing personnel evaluate breastfeeding and the presence of jaundice. This has made it possible to detect "risk" hyperbilirubinemia based on the Kramer method and intervene in its management. When the patient is detected with grade 3 to 5, he is sent for pediatric evaluation and blood bilirubin collection. Later it is evaluated to receive outpatient management or hospitalization. The purpose of this study was to know the origin of the referral of newborns admitted to the pediatric service with hyperbilirubinemia as the main diagnosis, that is, if they are referred from "rooming in" area, preventive medicine service during the metabolic screening, home, community health center, other hospital/doctor, etc. as well as describe the influence of early detection (before 7 days of life) on the clinical characteristics of admissions for this cause. As a secondary objective, it was evaluated how many of these patients had hypernatremic dehydration associated with jaundice.

Methodology

Observational, retrospective study carried out at the Rioverde General Hospital, a second-level care hospital belonging to the Secretary of Health of the State of San Luis Potosí. It was based on the review of clinical records of patients admitted from January 1 to December 31, 2015 to the pediatric service. The criteria for admission and management of patients that are followed at the Rioverde General Hospital are those of the Cenetec IMSS_262_10 Clinical Practice Guide [6].

The origin of the patients ("rooming in" area, preventive medicine service during the metabolic screening, home, community health center, other hospital/doctor) was taken from the clinical record.

Inclusion criteria: All newborns older than 36 weeks of gestation, admitted to the pediatric service with hyperbilirubinemia as the first diagnosis and main cause of admission.

Exclusion criteria: Patients with major congenital malformations. Neonates who presented hyperbilirubinemia during their hospitalization stay but this was not the admission diagnosis.

Variables: Perinatal epidemiological data were analyzed, such as the mother's age, number of pregnancies, type of delivery, birth weight, Apgar, ABO group incompatibility, Rh incompatibility, breast feeding, formula or mixed. Characteristics upon admission: weight loss in relation to birth weight, frequency of hypernatremia greater than 150 meq/L, direct and indirect bilirubin upon admission, the use of

antibiotics, use of parenteral solutions, days of stay, the presence of abnormal neurological data (seizures, retrocollis, hypotonia) and whether exsanguineotransfusion was performed.

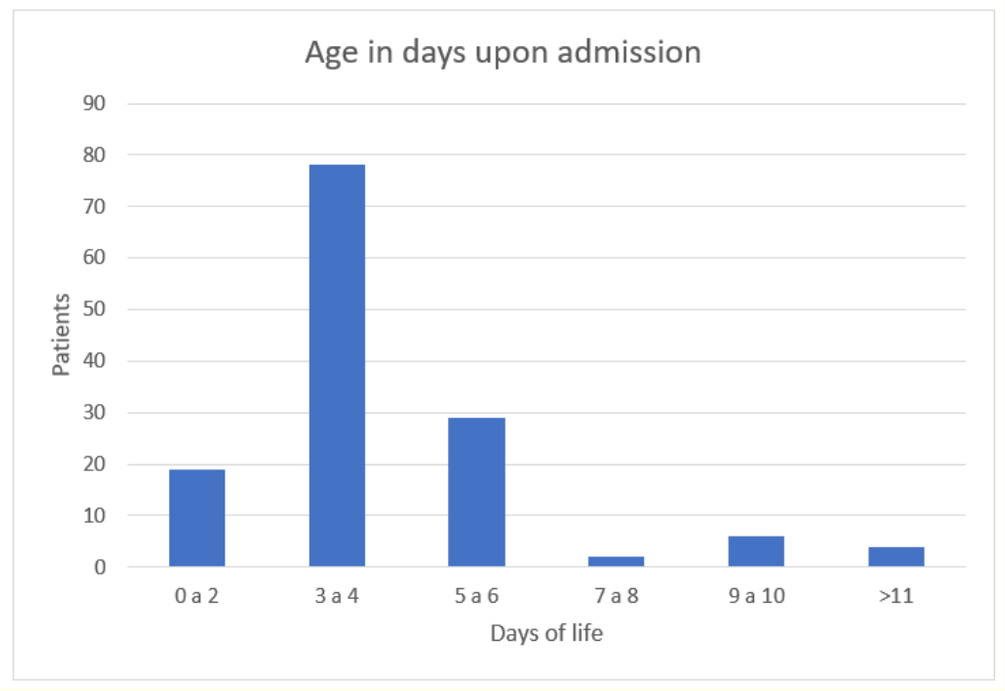
Statistical analysis: Descriptive statistics, measures of central tendency, percentages, graphics were performed with the Microsoft Excel program.

Results

During the study year, 3,090 deliveries were attended at the General Hospital of Rioverde. There were 889 admissions to the pediatric area and of those 416 (47%) were under 28 days. Admissions for hyperbilirubinemia as the primary cause were 138 patients, which corresponds to 15.5% of admissions to pediatrics. Of the 416 admissions to neonatology, it represents 33%. The 138 patients admitted for hyperbilirubinemia as the main cause correspond to 4.4% of all newborns. The average age of the mother was 24 years, with a range of 14 to 40 years, 38% of deliveries were resolved by cesarean section. There was no predominance of sex and 100% of the mothers reported having fed their children with an exclusive breast. (Table 1). 27% of admissions occurred before 72 hours of life and 70% (n = 97) were admitted before 5 days of life (Graph 1).

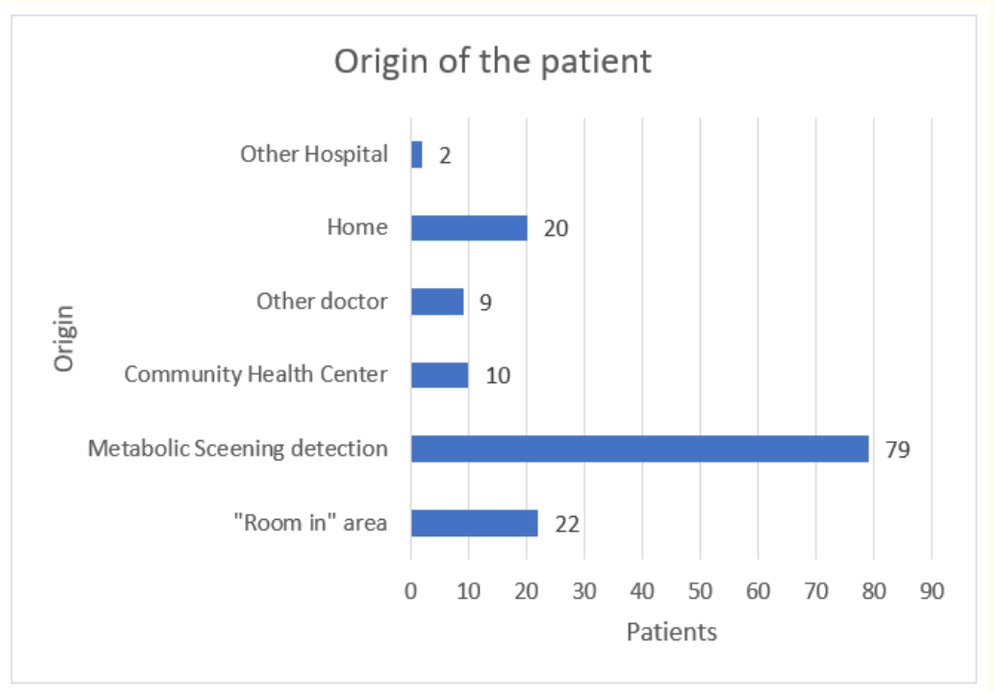
Variable	N = 138	
Mother age (X, rank)	24	(14-40)
Cesarean (N, %)	54	39%
Mother without pathology (n, %)	106	77%
Neonate less than 72 H (N, %)	38	28%
Male sex (N, %)	74	54%
Breastfeeding	138	100%

Table 1: *Perinatal characteristics.*



Graph 1: *Age in days upon admission.*

Regarding their origin, 56% of the patients were detected when they came to the preventive medicine for the neonatal metabolic screen, 16% were detected in "romming in" area, before the mother was discharged and two cases were detected when the binomial was readmitted due to obstetric complications. A smaller number of cases (14%) attended when the mother noticed icteric colour at home. Only 7% were referred from community health center (Graph 2).

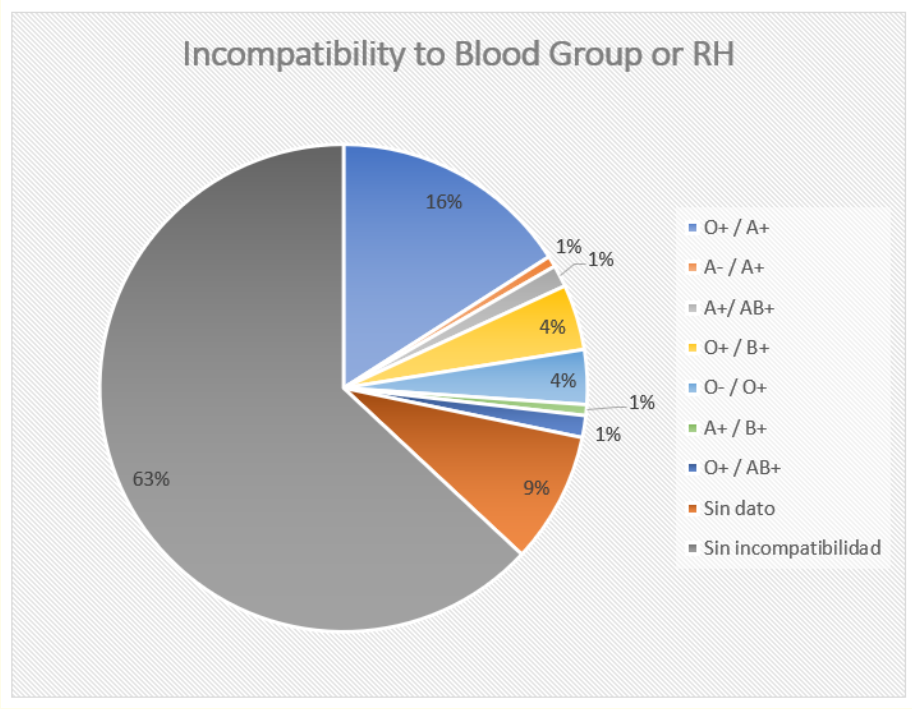


Graph 2: *Origin of the patient.*

Regarding the incompatibility of the group and HR of the binomial, 22% had ABO incompatibility and 8 patients (5.7%) had HR incompatibility (Graph 3). The average age at admission was 4.6 days. 25% of the patients lost more than 8% of their birth weight. 34% of all admissions had hypernatremia and 20% had fever on admission. One in 5 patients received antibiotics. All patients received parenteral fluids. The average days of stay were 2.6. An exsanguineotransfusion was performed with figures of 29mg%. There were no cases of Kernicterus (Table 2).

Variable	N = 138	
Age in days at admission (X, range)	4.6	(1-23)
Apgar (X) (range)	9	(8-9)
Birth weight (X, range)	3134	(2100-4500)
Weight at admission (X, range)	3059	(2100-5160)
Patients with weight loss > 8% (n, %)	36	26%
RH incompatibility (n, %)	4	3%
No Incompatibility (n, %)	80	58%
Serum sodium > 150meq / L (n, %)	48	35%
Fever on admission (n, %)	28	20%
Tx Antibiotics (n, %)	28	20%
Days stay (n, range)	2	1 a 5
Blood transfusion (n, %)	1	1%
Total bilirubin on admission (x, range)	19.5 mg/dl	(10.5-34)

Table 2: *Clinical characteristics.*



Graph 3: *Incompatibility to blood group or RH.*

Discussion

Jaundice, as we all know, occurs in 50 to 60% of newborns and hyperbilirubinemia is also the main cause of admission to neonatal wards of patients who had been discharged from "room in" area to their home (63% of admissions According to the Clinical Practice Guide for the management of hyperbilirubinemia, in 64% of the cases the level of bilirubin was considered critical in re-admitted neonates [5].

The possibility of predicting bilirubin levels from the first hours or days of life has been the subject of multiple studies in the last 20 years. This is especially important with the early discharge policy, which reduces the observation window of the mother-child binomial. The "Official Mexican STANDARD NOM-007-SSA2-2016, For the care of women during pregnancy, childbirth and puerperium, and of the newborn person" has just modified the time in which the newborn should be checked, (previously at 7 days) and currently establishes that "The care of the living newborn implies assistance at the time of birth, as well as the first check-up consultation between 3 and 5 days after birth, and the second at 28 days after birth. at birth" [7]. In a publication (2003) that studied the epidemiological aspects of neonatal jaundice in our hospital, it was found that 31 of the 40 readmissions were less than seven days; all were being breastfed, 23 had fever, the mean indirect bilirubin in those admitted before seven days was 19.5 mg/dL and in those older than seven days it was 24.3 mg/dL. All with "risk" bilirubin levels, so we recommended a clinical check-up (at least visual) at 3 - 5 days of life to timely detect patients with jaundice [8].

There were two options, go to the patients or attracting them to a hospital check-up between the third and sixth day of life. The home visit to evaluate and advise the mother-child binomial is the most common practice in other countries, however it requires personnel and transportation, especially in rural areas. Difficult to implement in low-resource areas. At that time, it was not considered to call all the

patients back to the hospital since it seemed unlikely that they would come. However, the modification of the norm in the metabolic and auditory screen timing, which changed from being before discharge to an appointment at 3 to 6 days of life, has made all the mother-child binomials return to the hospital or community health center. Surprisingly, 98% of the patients return to the Preventive Medicine department for the screening. They return from the most remote communities. This fact has given the nursing staff the opportunity to detect patients at risk of severe hyperbilirubinemia by the visual method of Kramer. Once detected, they are referred to pediatric staff for evaluation. Those patients in low or medium risk are sent home with alarm data and a follow-up appointment. Those in the risk zone are entered for management. This type of management is being studied with the same results in an Egyptian Maternity Hospital [9].

Current recommendations based on detailed evaluation and systematic review of available tests include visual examination of all babies for jaundice at every opportunity, especially in the first 72 hours. Because most babies are discharged from the hospital 12 to 48 hours after birth, it is particularly important in Mexico, as well as in other economies with limited access to follow up home visits, that parents and community physicians are alert to the possibility of pathological hyperbilirubinemia. However, in this study it is observed that almost 60% of the admissions were referred from preventive medicine. In other words, the detection of "risk" hyperbilirubinemia was a secondary event during the screening. The second origin were those who presented early jaundice came from "room in" area before the mother discharge. Detection and referral at the scheduled check-up at 7 days of life at community health center, only corresponded to 10% of admissions for jaundice. This "early" detection during screening has increased admissions for jaundice in our hospital by 150% [8].

In the Clinical Practice Guide GPC-IMSS-262-19, the suggestion is made to carry out a serum bilirubin determination per capillary in all newborns with a risk factor during metabolic screening to detect those patients with severe hyperbilirubinemia (20 - 24 mg bilirubin level/dl) without having reports that this is done systematically in the general hospitals of our health system [10]. The ideal would be detection by means of an electronic device, however visual detection by the Kramer method is what is available in all hospitals in Mexico. This assessment method has already been validated in other studies. Attempts are being made to involve parents in early detection through icterometers and even with a Smartphone application [11-14]. However more studies are required to analyze the clinical scope and legal implications of this practice [2,15].

It is very important to recognize the risk factors for severe hyperbilirubinemia: unsuccessful breastfeeding, excessive weight loss, dehydration, a history of siblings with hyperbilirubinemia, incompatibility with blood group or HR. In this study, 37% of the admissions had incompatibility to group and only 3% to RH, however, isoimmunized patients, with severe anemia or with a positive coombs test were not detected. Although it has been described that the newborn with a mother with blood group O presents an OR of 2.9 for severe hyperbilirubinemia, it seems that this factor did not influence this group of patients, at least notoriously, however this review does not have the statistical design to affirm it [2].

Hypernatremic dehydration occurred in at least 35% of the patients, a high figure not described in other series. In our hospital, all patients are requested blood gas and serum electrolytes upon admission when the diagnosis is hyperbilirubinemia, since the presence of dehydration modifies the management and offers us a panorama beyond the "multifactorial". Fever occurred in 1 in 5 patients. This may be indicative of infection or as part of the hypernatremic dehydration triad (fever, dehydration, and jaundice). In this series of patients, 35% of admissions had a serum Na > 150 meq/L and 26% of patients lost > 8% of their birth weight. That is, at least 1 in 5 patients had these three conditions (fever, hypernatremic dehydration, and jaundice) and 1 in 3 had two of them. Therefore, inadequate or decreased breastfeeding was associated with 35% of readmissions due to jaundice. The routine performance of serum Na, the quantification of the weight loss and the rectal temperature measurement in all the patients admitted with the diagnosis of "multifactorial" jaundice will allow to identify those who present with neonatal hypernatremic dehydration [16-18]. Exclusive breastfeeding associated with poor technique is a risk factor for severe jaundice and associated hypernatremic dehydration, as previously studied. On the other hand, antibiotics were used for suspected infection in 20% of the patients. The decision was made based on the perinatal history, the clinical condition (fever, poor feeding tolerance, appearance) and the laboratory results suggestive of an infectious process. Only one exsanguineotransfusion was

performed and there were no cases of bilirubin encephalopathy. We believe that earlier detection allowed for timely management. Most of these patients had a favorable evolution and were discharged in 24 to 48 hours.

Conclusion

The detection of hyperbilirubinemia at 3 to 6 days of age by the Kramer visual method during the neonatal screening interview allowed the detection of more than half of the admissions for hyperbilirubinemia during the study year. These patients, if not treated, were at high risk for severe jaundice and its potential neurological sequelae. Hypernatremic dehydration occurred in 1 out of 3 patients, so strategies for its prevention should be sought. It is proposed to carry out a visual examination using the Kramer method in a routine and protocolized manner in all patients who attend for a neonatal screening for the detection of jaundice. Hypernatremic dehydration had a higher incidence than previously described.

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