

Strategies in Management of Neonatal Jaundice during the Coronavirus Disease 2019 Outbreak in Districts of Hazaribagh, Jharkhand (India)

Dr. Vinay Bhushan¹, Dr. Vishal²

¹MBBS MD (Pediatrics), EX- Senior Resident UCMS & GTBH (New Delhi), Specialist Pediatrician at HMCH Hazaribagh Jharkhand (India)

²MBBS MD (Pediatrics) Assistant Professor (Paediatrics) HMCH Hazaribagh Jharkhand (India)

Abstract: *Corona virus disease 2019 (covid-19) formally known as 2019-nCoV has become a most challenging health emergency worldwide. Owing to rigorous isolation, quarantine and other control measures taken it become challenging for follow up of newborn diseases such as hyperbilirubinemia which later on may turn into bilirubin encephalopathy or to kernicterus. So monitoring of bilirubin level at home provides a useful way to alert hospital visits and to prevent hyperbilirubinemia. Therefore, we developed an online follow-up program for monitoring of bilirubin in level of newborns that is based on our practical experiences. The aim is to make our management strategies of neonatal jaundice owing to prevent spread of infection during the COVID-19 epidemic.*

Keywords: coronavirus disease, neonatal jaundice, quarantine, epidemic

1. Introduction

In December 2019, an outbreak of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) occurred in Wuhan, Hubei Province, China.¹ COVID-19 has spread rapidly to other provinces of China and now internationally. On January 30, 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern (PHEIC). In the beginning of the outbreak, COVID-19 was considered a zoonotic disease with limited human-to-human transmission. Initially, pneumonia cases were linked to the Huanan Seafood Wholesale Market. Soon after, this emerging coronavirus was found to be highly infectious. The basic reproductive number ranged from 2.2 to 3.58, with a mean serial interval of 7.5 days.^{1e3}

Children are more susceptible than adults to some infectious diseases, which may cause fatal outcomes. For instance, young children, especially infants aged less than 6 months, have higher mortality rates due to seasonal influenza infection than individuals in other age groups.⁴

Owing to rigorous quarantine and control measures taken in India including Hazaribagh district of Jharkhand routine neonatal health surveillance and follow-up have become challenging. Women and children are vulnerable to COVID-19 infection, so avoidance of routine hospital visits is recommended by the Indian council of medical research. However, delayed treatment of rapid and progressive newborn diseases can occur. Neonatal out-patient visits are of utmost importance to those with hyperbilirubinemia. For unrecognized and accelerated severe early neonatal hyperbilirubinemia, appropriate interventions are utmost important to reduce the risks of neurological dysfunction, kernicterus, or even death. An important finding of the study is that these patients presented with symptoms around ages of 3-5 days, and were mostly at home [5]. The characteristics of onset age of kernicterus suggest that monitoring of bilirubin level at home is a useful way to alert hospital visit and to

prevent the development of extreme hyperbilirubinemia.

Therefore, we developed an online follow-up program for convenient monitoring of bilirubin level of newborns that is based on our practical experiences. The aim is to make our management strategies of neonatal jaundice tailored to the infection prevention and control during the COVID-19 epidemic.

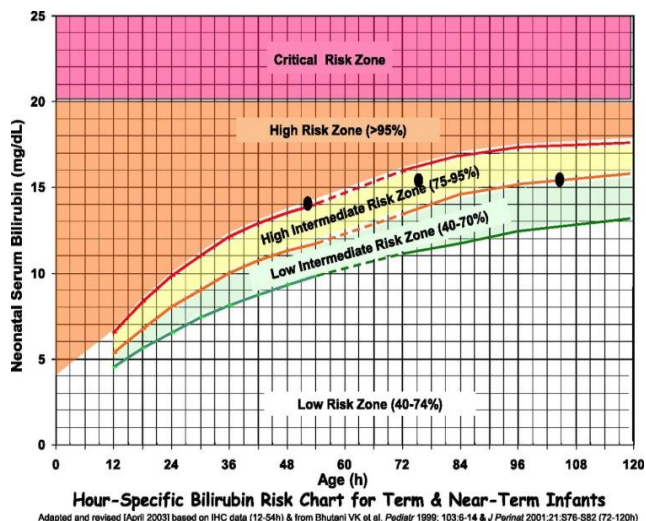
Management during hospitalization

Screening ;Risk factor of non physiological hyperbilirubinemia onset before 24 hour, Rise of serum bilirubin >0.2mg/dl/hr ,jaundice persisting after 8 days in term and 14 days in preterm, sepsis, cephalohematoma, bruising, perinatal asphyxia, Family history of glucose-6-phosphate dehydrogenase (G-6-PD) deficiency, Liver disease, sibling with jaundice with blood group incompatibility, Breast milk jaundice breast feeding with excessive weight loss].

Monitoring and management of hyperbilirubinemia

Jaundice is usually seen first in the face of the infant, and then progresses to the trunk and extremities. Since the visual estimation of the degree of jaundice is not reliable, we recommend transcutaneous bilirubin (TCB) measurement as the first choice. The interval between two measurements is 12–24h. The results should be recorded in the chart. TCB is correlated with total serum bilirubin (TSB) decreasing as serum bilirubin concentration higher than 255 µmol/L (15 mg/dL), so TSB should be checked to confirm when TCB>255µmol/L.

During the first days after birth, the bilirubin level is changing dynamically, so we use the hour-specific nomogram developed by Bhutani to predict the subsequent severe hyperbilirubinemia [7]. The bilirubin level below the 40th percentile is



labeled as a low-risk zone and that above the 95th is labeled as a high-risk zone. Bilirubin levels between 40 to 75th and 75th to 95th percentile are low-intermediate-risk zone and high-intermediate-risk zone, respectively. The management plan is developed based on the risk zones as follows:

- 1) TCB level < 75th percentile (low-risk or low-intermediate-risk zone): the risk of subsequent significant hyper-bilirubinemia is low; infants just need routine care and repeated TCB in 24 hours.
- 2) TCB level between 75 and 95th percentile (high-intermediate-risk zone) without any risk factors: the risk of subsequent significant hyperbilirubinemia is still low; infants just need routine care and repeat TCB in 24 hours.
- 3) TCB level between 75 and 95th percentile (high-intermediate-risk zone) with at least one of the risk factors: the risk of subsequent significant hyperbilirubinemia is high; infants need aggressive breast feeding, ensure adequate intake and reduce the enterohepatic circulation. TCB should be repeated in 12 hours. Evaluate the causes of jaundice.
- 4) TCB level > 95th percentile (high-risk zone): the risk of subsequent significant hyperbilirubinemia is very high; TSB should be checked. Infants need prompt intervention, start phototherapy, or exchange transfusion if the criteria met. Monitor the bilirubin level closely and evaluate the causes of jaundice.

Parent’s counseling and education

Every parents should be fully informed of the potential harm of hyperbilirubinemia, the importance of bilirubin monitoring, the availability of online resources, and methods for assessing a new born infant’s condition. In addition, detailed information about COVID-19 and prevention strategies should be provided. Parents thought how to use internet, smart phone by downloading APP, video call and to take help of health care worker nearby him.

2. Discharge

Indications of discharge

Healthy newborn infants with gestational age at 35 or more weeks are usually discharged on days 2 or 3 if the vital signs are stable, if feeding is good and daily weight loss is less than 3% of birth weight, and if the value of TCB on the day

of discharge is below the 75th percentile. For the new-born infants admitted to special care newborn unit, the indications of discharge include the following: (1) disease cured or significantly improved; (2) the vital signs are stable; (3) infants who had been treated with photo therapy and/or exchange transfusion should be observed for at least 24 to 48 hours to make sure of no obvious rebound of bilirubin; (4) the TCB value on the day of discharge is below the 75th percentile.

Follow-up strategy

The follow-up plan is made based on the gestational age of infants, days afterbirth, and the bilirubin level day. The time schedule of the first online follow-up is listed in Table 1, 2. (8). Parents should be advised to use the APP software for remote follow-up and online consultation. Table 3- Doctors will give the color calibration card for transcutaneous bilirubin measurement to parents. The remote follow-up route is mainly through Internet hospitals or other qualified Internet platforms. Under the guidance of health care workers, parents can make an appointment in Internet hospital before infants discharged home.

Follow-up after discharge

Table 1

Timing of follow-up of normal baby

Infant discharged	should be seen by age
Before 24 hr	72 hr
Between 24-47.9 hr	96 hr
Between 48-72 hr	120 hr

Table 2

Time schedule of online follow-up after discharge (hyperbilirubinemia). Age at discharge (h) Bilirubin level at dis-Timing for the first online follow up charge (percentile)

48-72	< 40th	2-3 d after discharge
	40th-75th	1-2 d after discharge
72-96	< 40th	3-5 d after discharge
	40th-75th	2-3 d after discharge
96-120 or more	< 40th	3-5 d after discharge
	40th-75th	2-3 d after discharge

Visual inspection of jaundice; (9)

Table 3

1. Examine the baby in bright natural light. Alternatively, the baby can be examined in bright white fluorescent light. Make sure there is no yellow or off-white background. You may have to move the baby from mother’s bed/OPD to a brightly lit area.
2. The baby should be naked.
3. Examine blanched skin and gums or sclerae
4. Note the extent of jaundice (Kramer’s rule)*
5. Depth of jaundice (degree of yellowness) should be carefully noted (light staining as lemon yellow; deep staining as orange yellow), as it is an important indicator of level of jaundice and it does not figure out in Kramer’s rule. A deep yellow staining (even in absence of yellow soles or palms) may be associated with severe jaundice and therefore TSB should be estimated in such circumstances.

Kramer zones	Approximate TSB level	
	Mild jaundice (Lemon yellow color)	Deep jaundice (Orange yellow color)
1 (Face and neck)	5 to 7 mg/dL	7 to 9 mg/dL
2 (Chest and upper abdomen)	7 to 9 mg/dL	9 to 11 mg/dL
3 (Lower abdomen and thighs)	9 to 11 mg/dL	11 to 13 mg/dL
4 (Legs and arms/ forearms)	11 to 13 mg/dL	14 to 16 mg/dL
5 (Palms and soles)	13 to 15 mg/dL	17 mg/dL or more

Vaccination recommendation

IAP (Indian academy of pediatrics) recommends continuation of immunization activities, Prioritization of certain vaccines, precautions taken while immunization during covid 19 pandemic.(10)

Table 4: Questionnaire for online follow-up evaluation

Contents	
General situations	<ol style="list-style-type: none"> 1. What is baby's temperature today? 2. The change of weight 3. How many wet diapers changing per day? 4. Less or very low crying 5. High or pitched crying 6. Color of lips (blue/purple/pale) 7. Any labored breathing? 8. Is there any abnormal movements?
Jaundice	<ol style="list-style-type: none"> 1. TCB level (via the smartphone APP) 2. Degree of jaundice assessed by observation (Involving the head, trunk, limbs, palm) in natural light^a
Feeding issues	<ol style="list-style-type: none"> 1. Breast feeding or formula feeding? 2. The frequency of feeding per day 3. Vomiting or not

3. Follow up visit

Indications

During the online follow-up, if any of the following criteria are met, the newborn infant should be taken to the hospital as soon as possible: (1) inadequate milk intake and lethargy; (2) the weight has not return to birth weight by 7–10 days of age; (3) presentation of any other symptoms, such as dyspnea, fever or hypothermia, frequent vomiting, seizure, etc.; (4) the bilirubin level >95th percentile in the first week after birth or more than 255 µmol/L (15 mg/dL) after 7 days of age, or the increment of bilirubin level is beyond 5 mg/dL within 24 h; (5) the doctors in charge of the online follow-up suggesting need of an out-patient visit.

Prevention strategies during visit to hospital

During visit to hospital we should collect the epidemiological history of the infant, the families, care givers, and visitors during the previous 14 days and we also should measure the body temperature routinely. Infants can be admitted to the special newborn care unit if no such history. If such history present then baby should be admitted to a single isolation room with protection. The infant should be settled in an incubator instead of a radiant warmer.

If the infant is critically ill and needs referral, emergency transport should be launched. The transport should be organized by the public health administrative department. The transport team should include a physician, nurse, and ambulance driver. All team members should be well trained with the knowledge and skills about COVID-19 infection prevention [11].

Ethical approval Not required.

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