

Telemedicine as progressive treatment approach for neonatal jaundice due to the coronavirus disease 2019 pandemic

To the editor

Infection control is a priority in neonatal care during the pandemic, leading to isolation precautions, newer monitoring, and discharge protocols. Such a need paved the way for telehealth development in neonatal medicine to facilitate a lower risk of coronavirus disease 2019 (COVID-19) transmission while simultaneously easing the stress on new parents.

The novel advances suggested in this letter are based on a review of the recent literature that provides a qualitative analysis (Table 1).

Teleconsultations are the most efficient way to relay information between healthcare providers and parents without the risk of cross-infection. Online consultations have the potential to become a mainstay in the future, even after the pandemic. This method significantly reduces the risk of misinformation, saves travel time, is feasible, and most importantly helps ease the burden on already saturated hospital resources. While this is ideal, for maximum efficacy, clear and concise parental education of the methodology and ailment in general by healthcare workers is crucial.¹⁾ It should be emphasized to parents that, if they were to notice any of the signs mentioned in Table 2, they should take the neonate to the hospital immediately.

Parental education via virtual training provides information about the risk factors of jaundice, growth and nutrition, benefits of breastfeeding, monitoring of bilirubin levels, and assessment of their newborn while utilizing COVID-19 prevention strategies.²⁾

Mobile phone applications are useful for assessing bilirubin

levels in neonates, which would otherwise be done via biochemical screening or tests. One method is to correlate the neonate's skin color with a color calibration card, which is then uploaded onto the application for review by the care team through teleconsultation. However, discrepancies and false positives are likely to occur due to limited lighting availability and poor photo quality, which creates unnecessary anxiety among parents.^{3,4)} A novel mobile application that can be used primarily works by measuring the neonates' scleral chromaticity, showing 100% sensitivity and 61% and 54% specificity in infants with transcutaneous serum bilirubin levels above 2.82 mg/dL and 2.310 mg/dL, respectively.⁵⁾

Drive-through screening for hyperbilirubinemia in neonates was performed in a hospital in Malaysia. Parents and the neonate are required to stay in the car throughout the assessment while driving through an assigned path. After registration and triage, the healthcare worker places the bilirubin detection device on the baby's sternum. The results are reviewed and a follow-up plan is charted. Compared to conventional testing, the drive-through option has a reduced testing duration and is noninvasive. Additionally, this approach promotes the infection control required during the pandemic while managing to provide appropriate care.⁶⁾

Another ramification of routine treatment that is a worthy replacement is home phototherapy, which has many benefits such as convenience, mother-child bonding, and remote access.⁷⁾ A recent trial from Sweden monitored the use of fiber optic LED devices with an irradiance of 35 $\mu\text{W}/\text{cm}^2/\text{nm}$ provided to parents

Table 1. Summary of telemedicine studies in neonates

Drive-through testing ⁶⁾	Sample size: 1,842 babies were screened over a span of 4 months. None with severe jaundice were missed. The average test duration per neonate was less than 5 min, while conventional testing required an average of 1.5 hr per neonate. The cost of testing this way was approximately USD 5 per test, with an estimated cost savings of USD 7720.
Smart phone applications ⁵⁾	Sample size: 51 neonates Results: 37 subjects out of 51 were successfully tested and the results plotted with linear regression models comparing the scleral conjunctival bilirubin and TSB value with and without the surrounding background light of the pictures. The observations made showed with white light subtraction the correlation was 0.75 with $P \leq 0.01$.
Teleconsultation ¹⁾	During COVID: The consultations primarily became online and there was a surge in appointments from 18 visits in the first week to 36 visits every week. The average show rate for these teleconsultations were 72% and in some weeks, it went up to 95%.
Home phototherapy ⁷⁾	Sample size: 259 neonates were tested on Results: While there was no difference in duration, home-based photo therapy was a more effective treatment in reducing TSB levels, showing a standard mean difference of 0.32 with $P = 0.04$ in comparison to hospital-based treatment.

Findings of studies of telemedicine suggestions implemented to improve the treatment of neonatal jaundice. USD, United States dollar; TSB, Total Serum Bilirubin; COVID, coronavirus disease.

Received: 15 August, 2021, Revised: 5 December, 2021, Accepted: 8 December, 2021

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.
Copyright © 2022 by The Korean Pediatric Society

Table 2. Parameters for hospitalization of neonates with jaundice

Symptoms	Feeding difficulties Fatigue Irritability
Signs	Labored breathing Seizures Not gaining the weight lost in 2 weeks of life
Assessment	The transcutaneous bilirubin level is more than the 95th percentile in the first week of life. The variance is more than 5 mg/dL in the bilirubin readings over 24 hr If the doctors deem it necessary for the parents to bring in the neonate.

If the neonates with jaundice exhibit any of the following parameters after discharge, they must be taken to the hospital immediately for further treatment.

of neonates undergoing home phototherapy sessions.⁸⁾ The results showed a similar average decrease in serum bilirubin levels for home and standard phototherapy. Therefore, the authors concluded that implementing this practice could be a safer alternative that eliminates the need for parent-infant separation. Although promising, home phototherapy requires large-scale research, especially studies that consider risk assessment and implications for hemolytic jaundice. Several considerations, such as the cost of implementation and parental capacity to follow therapies, require further exploration. Moreover, drive-through methods and mobile screening applications require further exploration involving the collation of more data, and verification of the replicability of the results is required before wide-scale implementation. The early assessment and management of the condition using various modalities have significantly improved outcomes. However, Table 1 reiterates that while neonatal jaundice management has remained standardized in recent years and been optimized to maximize cost-benefit ratios in neonatal care units across institutions, it is time to redirect focus to remote management and prevention strategies, especially in times of high prioritization and resource limitations, such as during pandemics.

Sukanya Sudhir Joshi, MBChB, Bithiah Roy Benroy, Isabell Nelson Lawrence, Thanuja Jayasri Suresh

School of Medicine, Royal College of Surgeons in Ireland, Al Sayh Muharrag Governorate, Bahrain

Corresponding author: Sukanya Sudhir Joshi, MBChB
School of Medicine, Royal College of Surgeons in Ireland, Al Sayh Muharrag Governorate, Bahrain
✉Email: 15006727@rcsi.com
<https://orcid.org/0000-0002-4822-0788>

Key message

Question: How can the management of neonatal jaundice (NJ) be enhanced through telemedicine?

Finding: Teleconsultations, drive-through testing, and the use of an application to assess neonatal jaundice at home are being successfully used, but they must be further researched before being implemented on a larger scale.

Meaning: Recent technology allows for the treatment of NJ at home with an application that helps reduce hospital burden.

Footnotes

Conflicts of interest: No potential conflict of interest relevant to this article was reported.

Funding: This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgment: We thank Dr. Emad Shatla and Dr. Jemila James of King Hamad University Hospital, Bahrain, for their valuable guidance.

ORCID:

Sukanya Sudhir Joshi  <https://orcid.org/0000-0002-4822-0788>

Bithiah Roy Benroy  <https://orcid.org/0000-0002-6398-2246>

Isabell Nelson Lawrence  <https://orcid.org/0000-0002-5269-2788>

Thanuja Jayasri Suresh  <https://orcid.org/0000-0003-2705-460X>

References

- DeMauro SB, Duncan AF, Hurt H. Telemedicine use in neonatal follow-up programs - What can we do and what we can't - Lessons learned from COVID-19. *Semin Perinatol* 2021;45:151430.
- Ma XL, Chen Z, Zhu JJ, Shen XX, Wu MY, Shi LP, et al. Management strategies of neonatal jaundice during the coronavirus disease 2019 outbreak. *World J Pediatr* 2020;16:247-50.
- Taylor JA, Stout JW, De Greef L, Geol M, Patel S, Jung EK, et al. Use of a smartphone app to assess neonatal jaundice. *Pediatrics* 2017;140:e20170312.
- Rong ZH, Luo F, Ma LY, Chen L, Wu L, Liu W, et al. Evaluation of an automatic image-based screening technique for neonatal hyperbilirubinemia. *Zhonghua Er Ke Za Zhi* 2016;54:597-600.
- Outlaw F, Nixon M, Odeyemi O, MacDonald LW, Meek J, Leung TS. Smartphone screening for neonatal jaundice via ambient-subtracted sclera chromaticity. *PLoS One* 2020;15:e0216970.
- Chua BS, Song LH, Chang CT, Lim XJ, Nachiappan J. Drive-through transcutaneous bilirubin screening for neonatal jaundice: a safe and efficient system during the COVID-19 pandemic. *J Paediatr Child Health* 2021;57:12-4.
- Chu L, Qiao J, Xu C. Home-based phototherapy versus hospital-based phototherapy for treatment of neonatal hyperbilirubinemia: a systematic review and meta-analysis. *Clin Pediatr* 2020;59:588-95.
- Pettersson M, Eriksson M, Albinsson E, Ohlin A. Home phototherapy for hyperbilirubinemia in term neonates—an unblinded multicentre randomized controlled trial. *Eur J Pediatr* 2021;180:1603-10.

How to cite this article: Joshi SS, Benroy BR, Lawrence IN, Suresh TJ. Telemedicine as progressive treatment approach for neonatal jaundice due to the COVID-19 pandemic. *Clin Exp Pediatr* 2022;65:269-71. <https://doi.org/10.3345/cep.2021.01235>