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ORIGINAL RESEARCH

# Analysis of Obstetric Nursing Interventions for Home Monitoring of Neonatal Jaundice

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**Background:** Neonatal jaundice is one of the most common conditions in the early postnatal period, and timely identification is essential to prevent complications such as bilirubin encephalopathy and long-term neurodevelopmental impairment. With early hospital discharge becoming more common, effective home-based monitoring strategies are urgently needed. This study evaluated the effectiveness of a structured obstetric nursing intervention in improving early detection of jaundice, reducing the incidence of severe hyperbilirubinemia and hospital readmission, and enhancing parental confidence and satisfaction through home-based monitoring.

**Methods:** This retrospective cohort study included 295 full-term neonates born at Xingtai People's Hospital between January 2022 and December 2024. Infants were divided into two groups based on postnatal care: the intervention group (n = 125) received structured obstetric nursing interventions, including parental training on jaundice recognition, use of transcutaneous bilirubin meters, scheduled virtual follow-ups, and remote video assessments; the control group (n = 170) received standard discharge instructions without structured follow-up. Primary outcomes were timely jaundice recognition, incidence of severe hyperbilirubinemia (≥20 mg/dL), and hospital readmission within 7 days. Secondary outcomes included maternal anxiety scores and parental satisfaction.

**Results:** The intervention group had a significantly higher rate of timely jaundice detection (91.2% vs 75.3%, $P < 0.001$), and a lower incidence of severe hyperbilirubinemia (2.4% vs 10.0%, $P = 0.011$). Readmission within 7 days was also reduced in the intervention group (5.6% vs 14.1%, $P = 0.009$). Additionally, maternal anxiety on postpartum day 7 was lower (mean STAI score: 32.1 ± 5.0 vs 40.8 ± 6.2, $P < 0.001$), and parental satisfaction was significantly higher in the intervention group ($P < 0.001$).

**Conclusion:** A structured obstetric nursing program for home monitoring of neonatal jaundice can significantly enhance early recognition, reduce the severity and complications of hyperbilirubinemia, and improve parental experience. These findings highlight the value of integrating nursing-led telehealth strategies into routine postnatal care.

**Keywords:** neonatal jaundice, home monitoring, nursing intervention, hyperbilirubinemia, postnatal care, maternal anxiety

## Introduction

Neonatal jaundice is a common physiological phenomenon, affecting up to 60–80% of full-term newborns within the first week of life.[1,2] In most cases, it is benign and self-limiting; however, failure to monitor and intervene promptly can lead to severe hyperbilirubinemia, acute bilirubin encephalopathy, and even kernicterus, resulting in irreversible neurological damage.[3,4] Early identification and timely management are essential to prevent complications and reduce the burden on healthcare systems.

With the growing trend of early hospital discharge for postpartum women and neonates, the window for effective in-hospital observation has become narrower. As a result, the burden of monitoring jaundice has increasingly shifted to families and caregivers at home.[5,6] However, conventional post-discharge instructions often lack standardization and practical guidance, leading to delays in recognizing clinically significant jaundice and increased risk of readmission.[3] There is a pressing need for structured, evidence-based nursing interventions that enable families to perform reliable

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home monitoring and ensure continuity of care. Recent advances in telehealth and maternal-child nursing models have created new opportunities for supporting families in the home environment. Several studies have demonstrated that caregiver education, remote monitoring technologies, and structured follow-up can improve neonatal outcomes and reduce healthcare utilization.[7–9] Nevertheless, these approaches have not been widely implemented in jaundice care, and robust clinical evidence remains limited. Previous studies have explored the use of home-based monitoring or community health follow-up for neonatal jaundice, but most lacked standardized protocols or multidisciplinary coordination. For instance, studies by Moosa et al[10] and Facchini et al[11] demonstrated the benefits of early post-discharge follow-up visits in reducing readmissions, but did not incorporate caregiver-operated TcB devices or real-time remote assessments.

To address this gap, we developed a structured obstetric nursing intervention program for home-based monitoring of neonatal jaundice. The program includes caregiver education on jaundice recognition, use of non-invasive bilirubin meters, scheduled tele-nursing follow-ups, and remote video assessments. This intervention was designed to improve early identification and management of jaundice in the home setting while empowering caregivers with appropriate tools and knowledge. Based on this, our study aimed to address the following research question: Does a structured, home-based obstetric nursing intervention improve early detection of neonatal jaundice, reduce rates of severe hyperbilirubinemia and hospital readmission, and enhance parental confidence and satisfaction compared to routine postnatal care? We hypothesized that newborns receiving the intervention would experience earlier jaundice recognition, lower hospital readmission rates, and higher levels of caregiver confidence and satisfaction than those receiving standard care. This study aims to evaluate the effectiveness of this novel nursing model in improving early detection of jaundice, reducing the incidence of severe hyperbilirubinemia and hospital readmission, and enhancing parental confidence and satisfaction. Through a retrospective cohort analysis with matched comparison groups, we seek to provide real-world evidence for integrating structured home monitoring strategies into routine neonatal care.

# Materials and Methods

## Study Design and Participants

This retrospective cohort study was conducted at the Department of Obstetrics and Neonatology at Xingtai People's Hospital, covering deliveries between January 2022 and December 2024. The study aimed to evaluate the effectiveness of a structured obstetric nursing intervention program for home-based monitoring of neonatal jaundice. The program was originally implemented as part of a hospital-wide quality improvement initiative and introduced in phases prior to formal data analysis. All study data were extracted from medical records and the hospital's digital follow-up system. This retrospective observational approach allowed for assessment of the program's real-world effectiveness in a routine clinical setting.

Eligible participants included neonates who were (1) full-term (gestational age ≥37 weeks), (2) had a birth weight ≥2500g, (3) exhibited no congenital anomalies or perinatal asphyxia, and (4) were discharged within 72 hours post-delivery with stable vital signs.

Exclusion criteria included preterm birth, congenital metabolic disorders, severe hemolytic disease requiring immediate phototherapy or NICU admission, or missing follow-up data. However, neonates with mild or asymptomatic glucose-6-phosphate dehydrogenase (G6PD) deficiency or ABO incompatibility were not excluded, as they did not present with signs of acute hemolysis at birth. Their inclusion reflects a common clinical population at elevated risk for jaundice, and they were deemed appropriate for home-based monitoring under routine pediatric supervision. Informed consent was obtained from the parents or legal guardians of all neonatal participants prior to the commencement of the study. As the study involved minors (neonates), consent was not obtained directly from the participants, but through their legally authorized representatives. The consent process included a clear explanation of the study's objectives, procedures, potential risks, and anticipated benefits. Written consent was provided voluntarily by all guardians.

This study was reviewed and approved by the Medical Ethics Committee of Xingtai People's Hospital (Approval Letter No. 2023[094]). The research adhered to the principles outlined in the Declaration of Helsinki and relevant national guidelines regarding the ethical conduct of research involving human participants. All participants received care in accordance with standard national postnatal care guidelines. No interventions were withheld from any group. Families

in both the intervention and control groups retained unrestricted access to medical follow-up or additional care as needed. The ethical design ensured that all participants were treated equitably and that clinical decisions were not influenced by study participation.

Out of 295 eligible newborns, 125 infants were enrolled in the intervention group, which received the structured home-based nursing program, while 170 infants were placed in the control group, receiving standard discharge instructions.

## Home-Based Nursing Intervention Protocol

The home-based nursing intervention protocol was developed and implemented by our institution's multidisciplinary perinatal care team in early 2023, based on the latest national clinical guidelines for neonatal jaundice management and parent-centered care. The intervention was designed to promote structured jaundice monitoring at home, enhance parental engagement, and reduce avoidable readmissions. The care team included obstetric nurses, neonatologists, and health educators, all of whom received standardized training in neonatal jaundice assessment, home phototherapy guidance, and caregiver education prior to delivering the intervention. The intervention protocol was delivered by a trained multidisciplinary team and consisted of four core components: (1) caregiver education on neonatal jaundice signs, risk factors, and breastfeeding strategies to promote bilirubin clearance; (2) provision of a calibrated portable transcutaneous bilirubin (TcB) meter at discharge; (3) scheduled tele-nursing follow-ups at 24, 48, and 72 hours post-discharge; and (4) remote video assessments conducted by trained obstetric nurses.

Before discharge, families in the intervention group received a structured session (~30 minutes) led by an obstetric nurse. This included education on the signs of jaundice progression, risk factors, and breastfeeding strategies to promote bilirubin clearance. Visual aids and printed instructions were provided to enhance understanding.

Caregivers in the intervention group received a structured home-based jaundice monitoring protocol. This included caregiver education, scheduled tele-nursing consultations, provision of hospital-funded calibrated portable transcutaneous bilirubin (TcB) meters, and centralized digital monitoring. Families were trained to use the TcB devices to measure bilirubin levels daily for the first 7 days after discharge, recording results in a paper chart and submitting them via a hospital-linked app or during scheduled follow-up calls. All devices were provided free of charge through the hospital's maternal-newborn care program, with no cost incurred by participants. While smartphone-based communication was technically accessible to both groups, the control group did not receive any structured protocol. In contrast to the intervention group, bilirubin monitoring and contact in the control group were entirely self-initiated, based on parental concern, without scheduled nurse consultations or formal guidance. This distinction in delivery and follow-up intensity defines the comparative framework of this study.

Remote video follow-ups were conducted on postnatal days 3, 5, and 7. During each session, trained nurses reviewed TcB readings submitted by caregivers, visually assessed the infant's condition, and addressed parental concerns. If bilirubin levels exceeded established safety thresholds, timely referrals were made for outpatient evaluation or readmission.

All intervention-related data—including TcB values, nurse observations, and escalation records—were logged into a centralized electronic platform, enabling continuous oversight by the neonatal team.

By contrast, families in the control group received standard discharge instructions without scheduled follow-up or equipment support. Any bilirubin monitoring or contact with healthcare providers was informal and initiated solely by caregivers. This structured versus routine care distinction defined the comparative basis of our study.

## Outcome Measures and Data Collection

Clinical data were extracted from the hospital's electronic medical record and community health monitoring systems. The primary outcomes included: Rate of timely jaundice recognition (defined as detection prior to bilirubin ≥20 mg/dL), Incidence of severe hyperbilirubinemia (total serum bilirubin ≥20 mg/dL), Hospital readmission within 7 days due to jaundice.

Secondary outcomes included maternal anxiety levels on postpartum day 7, measured using the State-Trait Anxiety Inventory (STAI), and parental satisfaction with neonatal care, assessed using a validated 10-point Likert questionnaire at day 10 post-discharge.[12–14]

## Statistical Analysis

Continuous variables were expressed as mean ± standard deviation (SD) or median (interquartile range) and compared using Student's *t*-test or Mann–Whitney *U*-test, as appropriate. Categorical variables were expressed as counts and percentages and compared using chi-square or Fisher's exact test.

Multivariate logistic regression was used to identify independent predictors of severe hyperbilirubinemia and hospital readmission. To address potential confounding inherent in the retrospective observational design, regression models were adjusted for key baseline characteristics, including gestational age, mode of delivery, maternal education level, and infant birth weight. Sensitivity analyses were conducted to assess the robustness of the findings. All analyses were performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA) and R version 4.0.5. A two-tailed P value $< 0.05$ was considered statistically significant. Sample size estimation was performed using PASS version 11.0 prior to study initiation. The sample size was estimated based on a hypothesized 15% difference in hospital readmission rates between the intervention and control groups, with a power of 80% and a two-sided alpha of 0.05. Based on these parameters, a minimum of 174 participants per group was required. To account for potential attrition and missing data, a total of 190 participants per group was targeted.

# Results

## Baseline Characteristics of Full-Term Neonates With and Without Home-Based Nursing Intervention

A total of 295 full-term neonates were enrolled, including 125 in the home-based nursing intervention group and 170 in the control group (Figure 1). As shown in Table 1, baseline variables such as gestational age, birth weight, sex distribution, delivery mode, maternal age, exclusive breastfeeding status, and Apgar scores were comparable between groups, with no statistically significant differences ($P > 0.05$ for all).

## Incidence of Hyperbilirubinemia and Monitoring Outcomes

The incidence of severe hyperbilirubinemia (total serum bilirubin $\geq 20$ mg/dL) was significantly lower in the intervention group (2.7%) compared to the control group (9.1%) ($P = 0.018$). Additionally, timely detection of bilirubin trends before

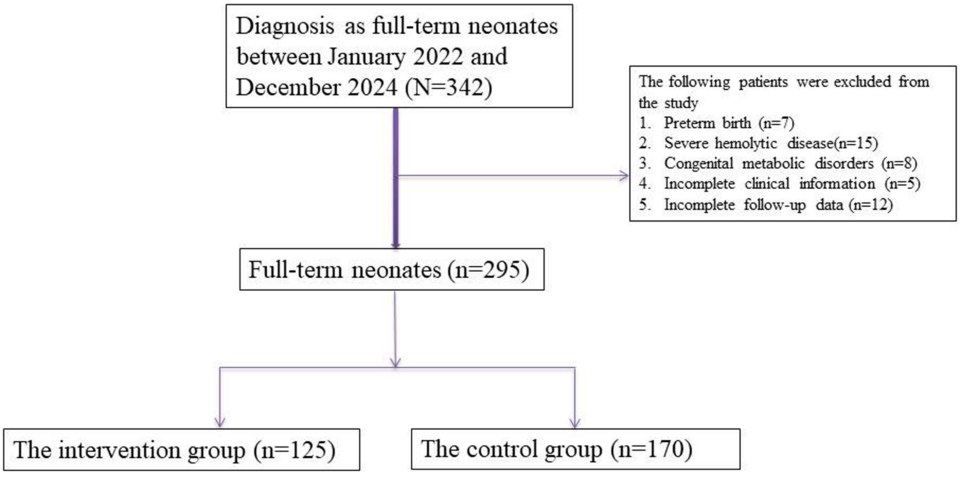


**Figure 1** Flowchart of patient inclusion, exclusion, and 1:1 propensity score matching process in full-term neonates surgery cohort.

**Table 1** Baseline Characteristics of Neonates and Families in Intervention and Control Groups

| Variable | Intervention Group (n = 125) | Control Group (n = 170) | P-value |
|---|---|---|---|
| Infant age at discharge (days) | 2.1 ± 0.6 | 2.2 ± 0.5 | 0.231 |
| Birth weight (g) | 3200 ± 310 | 3190 ± 325 | 0.582 |
| Gestational age < 38 weeks | 18 (14.4%) | 28 (16.0%) | 0.642 |
| Male sex | 64 (51.2%) | 91 (52.0%) | 0.912 |
| Exclusive breastfeeding | 103 (82.4%) | 138 (78.9%) | 0.304 |
| Cesarean delivery | 52 (41.6%) | 69 (39.4%) | 0.745 |
| Maternal age (years) | 29.3 ± 4.7 | 29.1 ± 4.4 | 0.718 |
| Maternal parity ≥ 2 | 39 (31.2%) | 56 (32.0%) | 0.870 |
| G6PD deficiency | 6 (4.8%) | 9 (5.1%) | 0.811 |
| ABO or Rh incompatibility | 11 (8.8%) | 16 (9.1%) | 0.544 |
| Family history of jaundice | 23 (18.4%) | 30 (17.1%) | 0.781 |
| Initial TcB before discharge (mg/dL) | 7.6 ± 1.1 | 7.7 ± 1.2 | 0.316 |
| Duration of hospital stay (days) | 2.3 ± 0.7 | 2.4 ± 0.6 | 0.404 |
| Received phototherapy before discharge | 17 (13.6%) | 22 (12.6%) | 0.837 |
| Parental education: High school or below | 42 (33.6%) | 59 (33.7%) | 0.983 |
| Household distance > 10 km from hospital | 26 (20.8%) | 39 (22.3%) | 0.702 |
| Daily feeding frequency < 8 times | 19 (15.2%) | 31 (17.7%) | 0.428 |
| Inadequate urine output reported at discharge | 11 (8.8%) | 14 (8.0%) | 0.651 |
| Maternal anxiety score > 8 (self-reported) | 21 (16.8%) | 29 (16.6%) | 0.988 |
| Smartphone use for health communication | 122 (97.6%) | 169 (96.6%) | 0.529 |

**Abbreviations**: TcB, transcutaneous bilirubin; G6PD, glucose-6-phosphate dehydrogenase; ABO, ABO blood group system; Rh, Rhesus blood group system; STAI, State-Trait Anxiety Inventory.

**Table 2** Jaundice Monitoring and Clinical Outcomes

| Outcome | Intervention Group (n = 125) | Control Group (n = 170) | P-value |
|---|---|---|---|
| Severe hyperbilirubinemia (TSB ≥ 20 mg/dL) | 3 (2.7%) | 15 (9.1%) | 0.018 |
| Timely detection before TSB ≥ 20 mg/dL | 114 (91.8%) | 128 (75.5%) | <0.001 |
| Need for phototherapy after discharge | 7 (5.5%) | 15 (9.1%) | 0.084 |
| TcB recorded ≥ 5 times in 7 days | 102 (81.6%) | 47 (27.6%) | <0.001 |
| Missed bilirubin monitoring (any day) | 3 (2.4%) | 24 (14.1%) | 0.002 |
| Peak TcB (mean ± SD, mg/dL) | 12.4 ± 1.5 | 14.0 ± 1.7 | <0.001 |

**Abbreviations**: TSB, total serum bilirubin; TcB, transcutaneous bilirubin; SD, standard deviation.

reaching critical thresholds was achieved in 91.8% of intervention group infants, versus 75.5% in the control group (P < 0.001). These outcomes are summarized in Table 2.

## Readmission Rates and In-Hospital Metrics

Jaundice-related readmissions within the first week were reduced in the intervention group (6.4%) compared to the control group (14.5%) (P = 0.011). Among readmitted cases, the intervention group had earlier detection (mean day 4.2 ± 0.9) than the control group (mean day 5.8 ± 1.1, P = 0.037). While the need for phototherapy was also lower in the intervention group (5.5% vs 9.1%), this difference did not reach statistical significance (P = 0.084) (Table 3).

## Caregiver Anxiety and Satisfaction Outcomes

Maternal anxiety on postpartum day 7, assessed by the State-Trait Anxiety Inventory (STAI), was significantly lower in the intervention group (31.9 ± 4.8) than in the control group (40.7 ± 6.1) (P < 0.001). Parental satisfaction was also significantly higher in the intervention group, with a mean rating of 8.9 ± 0.7 on a 10-point Likert scale, compared to 7.6 ± 1.2 in the control group (P < 0.001). See Table 3 for full comparative data (Table 4).

**Table 3** Readmission and Hospital Metrics

| Metric | Intervention Group (n = 125) | Control Group (n = 170) | P-value |
|---|---|---|---|
| 7-day readmission due to jaundice | 8 (6.4%) | 25 (14.5%) | 0.011 |
| Day of readmission (mean ± SD) | 4.2 ± 0.9 | 5.8 ± 1.1 | 0.037 |
| Peak bilirubin at readmission (mg/dL) | 17.6 ± 1.3 | 19.2 ± 1.4 | 0.026 |
| Total hospital days (if readmitted) | 2.1 ± 0.6 | 3.4 ± 0.8 | <0.001 |
| Admission for phototherapy only | 5 (62.5%) | 11 (44.0%) | 0.292 |
| ER visits without admission | 6 (4.8%) | 16 (9.4%) | 0.098 |

**Abbreviations**: ER, emergency room; SD, standard deviation; mg/dL, milligrams per deciliter.

**Table 4** Maternal Psychological and Satisfaction Outcomes

| Outcome | Intervention Group (n = 125) | Control Group (n = 170) | P-value |
|---|---|---|---|
| Maternal STAI score (postpartum day 7) | 31.9 ± 4.8 | 40.7 ± 6.1 | <0.001 |
| Caregiver satisfaction (Likert 0–10) | 8.9 ± 0.7 | 7.6 ± 1.2 | <0.001 |
| Satisfaction score ≥ 9 | 117 (93.6%) | 93 (54.7%) | <0.001 |
| Caregivers confident to manage jaundice at home | 112 (89.6%) | 82 (48.2%) | <0.001 |
| Would recommend program to other parents | 111 (88.8%) | 97 (57.1%) | <0.001 |
| Felt anxious about home jaundice care | 14 (11.2%) | 51 (30.0%) | <0.001 |

**Abbreviations**: STAI, State-Trait Anxiety Inventory; SD, standard deviation; Likert, Likert scale score (0–10).

**Table 5** Logistic Regression of Risk Factors for Severe Hyperbilirubinemia (Univariate and Multivariate)

| Variable | Univariate OR (95% CI) | P-value (Univ.) | Multivariate OR (95% CI) | P-value (Multiv.) |
|---|---|---|---|---|
| Home-based intervention | 0.33 (0.14–0.82) | 0.015 | 0.32 (0.11–0.89) | 0.029 |
| Exclusive breastfeeding | 0.59 (0.37–0.95) | 0.031 | 0.61 (0.38–0.98) | 0.041 |
| Male sex | 1.68 (1.01–2.87) | 0.046 | 1.73 (1.00–2.99) | 0.048 |
| Gestational age < 38 weeks | 1.21 (0.65–2.25) | 0.551 | 1.03 (0.50–2.12) | 0.921 |
| Cesarean delivery | 1.11 (0.64–1.91) | 0.720 | 1.06 (0.58–1.94) | 0.847 |
| Birth weight < 3000 g | 1.52 (0.88–2.63) | 0.131 | 1.48 (0.79–2.78) | 0.193 |
| Initial TcB ≥ 9 mg/dL | 2.42 (1.39–4.22) | 0.002 | 2.07 (1.12–3.80) | 0.021 |
| Daily feeding frequency < 8 | 1.77 (1.02–3.09) | 0.042 | 1.61 (0.87–2.97) | 0.131 |
| Parental education: High school or below | 1.26 (0.75–2.13) | 0.377 | 1.22 (0.69–2.17) | 0.496 |
| Maternal STAI score > 35 | 1.91 (1.11–3.28) | 0.018 | 1.62 (0.94–2.81) | 0.083 |
| TcB not recorded ≥ 5 times | 2.13 (1.26–3.59) | <0.001 | 1.97 (1.04–3.72) | 0.037 |
| Family history of jaundice | 1.44 (0.77–2.69) | 0.251 | 1.36 (0.69–2.67) | 0.375 |

**Abbreviations**: OR, odds ratio; CI, confidence interval; TcB, transcutaneous bilirubin; STAI, State-Trait Anxiety Inventory.

## Multivariate Logistic Regression Analysis

Multivariate regression analysis identified home-based nursing intervention as an independent protective factor against severe hyperbilirubinemia (OR = 0.32, 95% CI: 0.11–0.89, P = 0.029) and early readmission (OR = 0.38, 95% CI: 0.18–0.81, P = 0.012). Exclusive breastfeeding also reduced the risk of readmission (OR = 0.61, 95% CI: 0.38–0.98, P = 0.041), while male sex was associated with a higher risk (OR = 1.73, 95% CI: 1.00–2.99, P = 0.048). These results are presented in Table 5.

# Discussion

Neonatal jaundice remains one of the most common clinical issues encountered in the early postnatal period, particularly within the first week of life.[15–17] While most cases are benign and self-limiting, delayed identification of severe hyperbilirubinemia can lead to serious complications, including bilirubin encephalopathy and kernicterus. Early detection and parental vigilance are thus essential for timely intervention, especially in the context of increasingly shortened

postpartum hospital stays and early discharges.[1,18,19] Our study demonstrates that a structured, home-based obstetric nursing intervention significantly improves clinical outcomes, monitoring efficiency, and caregiver satisfaction in newborns at risk for jaundice.

This study adds to the growing body of literature supporting proactive, nurse-led home monitoring strategies in neonatal care. Compared to standard care, the home intervention model resulted in earlier identification of abnormal bilirubin trends, fewer readmissions due to jaundice, and lower rates of progression to severe hyperbilirubinemia. These findings are consistent with previous studies suggesting that remote monitoring and caregiver empowerment can improve early health event recognition and reduce emergency healthcare utilization. Notably, our intervention group demonstrated high compliance with scheduled follow-up and transcutaneous bilirubin measurements, supporting the feasibility of integrating such protocols into standard postnatal discharge workflows.[20–23]

Moreover, the intervention group exhibited lower maternal anxiety scores and higher satisfaction levels, highlighting the dual benefit of clinical effectiveness and psychosocial reassurance. Similar to prior investigations in chronic disease management, we observed that structured educational sessions combined with telehealth follow-up provided a reliable framework to reduce uncertainty and promote caregiver confidence. These psychological benefits are particularly relevant in the neonatal period, which is often marked by stress and information overload for new parents. Our logistic regression analysis further confirmed that the nursing intervention independently predicted favorable outcomes, even after adjusting for common clinical confounders. Importantly, our ROC analysis suggests that remote nursing supervision is not only clinically effective but also moderately predictive of key adverse events, such as hospital readmission and caregiver dissatisfaction.

Beyond its clinical impact, this study also underscores the transformative role of digital health technologies in advancing neonatal nursing practice. The incorporation of structured video consultations, remote transcutaneous bilirubin data sharing, and a centralized electronic documentation platform reflects a broader trend toward digital health integration in perinatal care. These tools not only facilitated real-time risk stratification and decision-making but also allowed nursing staff to deliver timely and individualized support. Previous studies, such as those by Okwundu et al and Wiysonge et al, have advocated for the use of TcB screening outside hospital settings, citing improvements in early recognition and parental engagement.[24,25] Our findings extend this evidence by demonstrating how digital coordination between families and healthcare providers can improve continuity of care after early discharge. Furthermore, this intervention model offers an accessible alternative in resource-limited or rural areas, where follow-up pediatric visits may not be readily available. By shifting part of the clinical workload to a home-based structure supported by nurse-led monitoring, healthcare systems may also experience more efficient use of hospital resources. These implications suggest that nurse-driven innovation, when combined with mobile health platforms, could significantly enhance postnatal surveillance and safety for newborns in diverse care environments.

Nevertheless, several limitations must be acknowledged. First, this was a retrospective single-center study, which may limit the generalizability of the findings. Although propensity score matching was applied to minimize baseline imbalances, unmeasured confounding factors may remain. Additionally, the study relied on caregiver-reported TcB readings and subjective input during video calls, which may introduce reporting bias. Lastly, the economic cost-effectiveness and long-term neurodevelopmental outcomes of this intervention were not evaluated and warrant further investigation. Future prospective multicenter trials are needed to validate our findings and explore optimal protocols for home-based jaundice monitoring. Evaluating the scalability of such programs across different healthcare systems and patient populations will also be essential. In addition, integrating artificial intelligence–supported alert systems or mobile applications may further enhance early recognition and triage, representing an exciting avenue for innovation in neonatal care. Although maternal anxiety was assessed in the entire cohort, the relatively small number of mothers exceeding the clinical anxiety threshold limits the power of subgroup comparisons and these findings should be interpreted as exploratory.

## Conclusion

In conclusion, our study shows that structured home-based obstetric nursing interventions significantly improve the early detection of neonatal jaundice, reduce the incidence of severe hyperbilirubinemia, and lower readmission rates. The

approach also enhances caregiver satisfaction and alleviates maternal anxiety during the postnatal period. These findings support the clinical value of integrating nurse-led remote follow-up and parent education into post-discharge protocols for newborns. As neonatal care continues to shift toward family-centered and outpatient models, home-based monitoring represents a promising strategy to optimize early life outcomes.

## Data Sharing Statement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

## Ethical Approval and Consent to Participation

This study was reviewed and approved by the Medical Ethics Committee of Xingtai People's Hospital (Approval Letter No. 2023[094]). The research adhered to the principles outlined in the Declaration of Helsinki and relevant national guidelines regarding the ethical conduct of research involving human participants.

## Informed Consent

Informed consent was obtained from the parents or legal guardians of all neonatal participants prior to the commencement of the study. As the study involved minors (neonates), consent was not obtained directly from the participants, but through their legally authorized representatives. The consent process included a clear explanation of the study's objectives, procedures, potential risks, and anticipated benefits. Written consent was provided voluntarily by all guardians.

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Thanks to the nurses in the department for their help with the project.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors have no conflicts of interest to declare.

## References

1. Kujabi ML, Petersen JP, Pedersen MV, Parner ET, Henriksen TB. Neonatal jaundice and autism spectrum disorder: a systematic review and meta-analysis. *Pediatr Res*. 2021;90:934–949. doi:10.1038/s41390-020-01272-x
2. Kuniyoshi Y, Tsujimoto Y, Banno M, Taito S, Ariie T. Neonatal jaundice, phototherapy and childhood allergic diseases: an updated systematic review and meta-analysis. *Pediatric Allergy Immunol*. 2021;32:690–701. doi:10.1111/pai.13456
3. Muchowski KE. Evaluation and treatment of neonatal hyperbilirubinemia. *Am Family Phys*. 2014;89:873–878.
4. Sullivan JI, Rockey DC. Diagnosis and evaluation of hyperbilirubinemia. *Curr Opin Gastroenterol*. 2017;33:164–170. doi:10.1097/mog.0000000000000354
5. Cashore WJ. Bilirubin and jaundice in the micropremie. *Clinics in Perinatology*. 2000;27:171–179,vii. doi:10.1016/s0095-5108(05)70012-9
6. Wilde VK. Neonatal Jaundice and Autism: precautionary Principle Invocation Overdue. *Cureus*. 2022;14:e22512. doi:10.7759/cureus.22512
7. Bhutta ZA, Das JK, Rizvi A, et al. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *Lancet*. 2013;382:452–477. doi:10.1016/s0140-6736(13)60996-4
8. McConnell MA, Rokicki S, Ayers S, et al. Effect of an intensive nurse home visiting program on adverse birth outcomes in a medicaid-eligible population: a randomized clinical trial. *JAMA*. 2022;328:27–37. doi:10.1001/jama.2022.9703

9. Rabe H, Gyte GM, Díaz-Rossello JL, Duley L. Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes. *Cochrane Database Syst Rev*. 2019;9:Cd003248. doi:10.1002/14651858.CD003248.pub4
10. Moosa AS, Ngeow AJH, Yang Y, et al. A novel smartphone app for self-monitoring of neonatal jaundice among postpartum mothers: qualitative research study. *JMIR mHealth and uHealth*. 2023;11:e53291. doi:10.2196/53291
11. Facchini FP, Mezzacappa MA, Rosa IR, et al. Follow-up of neonatal jaundice in term and late premature newborns. *Jornal de pediatria*. 2007;83:313–322. doi:10.2223/jped.1676
12. Chen JW, Maldonado DR, Kowalski BL, et al. Best practice guidelines for propensity score methods in medical research: consideration on theory, implementation, and reporting. a review. *Arthroscopy*. 2022;38:632–642. doi:10.1016/j.arthro.2021.06.037
13. Jenkinson C, Coulter A, Bruster S. The Picker Patient Experience Questionnaire: development and validation using data from in-patient surveys in five countries. *Int J Qual Health Care*. 2002;14:353–358. doi:10.1093/intqhc/14.5.353
14. Zingano BL, Guarnieri R, Diaz AP, et al. Hospital anxiety and depression scale-anxiety subscale (Hads-A) and the State-Trait Anxiety Inventory (STAI) accuracy for anxiety disorders detection in drug-resistant mesial temporal lobe epilepsy patients. *J Affective Disorders*. 2019;246:452–457. doi:10.1016/j.jad.2018.12.072
15. Ansong-Assoku B, Shah SD, Adnan M, Ankola PA. *StatPearls*. StatPearls Publishing Copyright © 2025, StatPearls Publishing LLC; 2025.
16. Belay HG, Debebe GA, Ayele AD, et al. Determinants of neonatal jaundice in Ethiopia: a systematic review and meta-analysis. *World J Pediatr*. 2022;18:725–733. doi:10.1007/s12519-022-00597-3
17. Eghbalian F, Hasanpour-Dehkordi A, Raeisi R. The effects of clofibrate on neonatal jaundice: a systematic review. *Int J Preventive Med*. 2022;13 (3). doi:10.4103/ijpvm.IJPVM_407_20
18. Gottimukkala SB, Lobo L, Gautham KS, et al. Intermittent phototherapy versus continuous phototherapy for neonatal jaundice. *Cochrane Database Syst Rev*. 2023;3:Cd008168. doi:10.1002/14651858.CD008168.pub2
19. Par EJ, Hughes CA, DeRico P. Neonatal hyperbilirubinemia: evaluation and treatment. *Am Family Phys*. 2023;107:525–534.
20. Magagnin AB, Heidemann I. Empowerment of family caregiver in front of stroke in hospital environment. *Revista brasileira de enfermagem*. 2020;73:e20190165. doi:10.1590/0034-7167-2019-0165
21. Parente V, Stark A, Key-Solle M, et al. Caregiver inclusivity and empowerment during family-centered rounds. *Hospital Pediatrics*. 2022;12:e72–e77. doi:10.1542/hpeds.2021-006034
22. Szlamka Z, Sebastián C, Hanlon C, Hoekstra RA. Caregiver-centred empowerment for families raising autistic children: a qualitative case study from Argentina. *Autism*. 2024;28:2768–2778. doi:10.1177/13623613241238254
23. Wright R. Empowerment of parent carers is a fallacy when healthcare doesn't listen. *BMJ*. 2024;386:q1824. doi:10.1136/bmj.q1824
24. Okwundu CI, Bhutani VK, Uthman OA, et al. Transcutaneous bilirubinometry for detecting jaundice in term or late preterm neonates. *Cochrane Database Syst Rev*. 2024;5:Cd011060. doi:10.1002/14651858.CD011060.pub2
25. Okwundu CI, Olowoyeye A, Uthman OA, et al. Transcutaneous bilirubinometry versus total serum bilirubin measurement for newborns. *Cochrane Database Syst Rev*. 2023;5:Cd012660. doi:10.1002/14651858.CD012660.pub2