

Current Practices Regarding Treatment of Neonatal Jaundice by Neonatal Care Practitioners in Nigeria

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ABSTRACT

Background: Neonatal jaundice is a common medical condition encountered in the neonatal period in Nigerian hospitals. Its management is not homogenous among healthcare providers. Therefore, this study aimed at evaluating current practices related to the treatment of neonatal jaundice among doctors and nurses caring for neonates in Nigeria.

Methods: Healthcare providers managing neonates in Nigeria were surveyed during annual general and scientific meetings of the Nigerian Society of Neonatal Medicine in 2017. In addition, the Paediatric Association of Nigeria's mailing list was utilized to disseminate a self-administered, pretested and structured questionnaire to doctors and nurses involved in taking care of newborns in Nigeria.

Results: The results of the study showed that local guidelines / protocols were highly applied by the respondents. The majority of the health care providers would screen newborns for neonatal jaundice before discharge. The practice of early discharge within 24 hours was rampant with a high frequency of late follow up at 6 weeks.

Conclusion: The practices regarding management of neonatal jaundice among healthcare professionals in Nigeria vary with better practices observed in specialist cadres. Newborn discharge and follow-up practices also vary and are sub-optimal. Therefore, there is a need for more awareness creation on neonatal jaundice treatment among cadres of health care practitioners. This should be complimented with the development of a national guideline on the management of neonatal jaundice in Nigeria.

Keywords: Health care practitioners, Neonatal Jaundice, Nigeria

Introduction

Neonatal jaundice (NNJ) is a leading cause of admission in the neonatal period (1, 2). It occurs in 64% of term (3) and >80% of preterm newborns (4). The majority of these neonatal jaundice cases are physiologic, however, a significant number can progress to severe hyperbilirubinaemia. Severe hyperbilirubinaemia should be properly managed, otherwise, it may lead to severe neurodevelopmental consequences with long term brain damage or kernicterus (5). Severe neonatal jaundice is accompanied with typical clinical features (6) and the presence or absence of some of these features are used in scoring systems to determine the severity of the jaundice. These may also serve to prognosticate for short and long term

outcomes of neonatal jaundice. The immediate or acute neurological features seen in severe hyperbilirubinaemia characterizes Acute Bilirubin Encephalopathy (ABE) (7).

In Nigeria, neonatal jaundice is a common indication for neonatal admission in most hospitals (8, 11). It's estimated that the prevalence of NNJ is between 23% and 60% of Nigerian newborns (12) and accounts for 10 to 35% of neonatal admissions (8, 13). Jaundice is usually a manifestation of an underlying pathology. In Nigeria, the most common causes of significant neonatal jaundice had been identified as prematurity, ABO incompatibility, infections, and Glucose 6 Phosphate Dehydrogenase deficiencies

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(14). The magnitude of disability and mortality sustained from neonatal jaundice is not known.

While it is expected that the majority of neonates would develop NNJ in the first week of life, less than 10% of those with jaundice, will eventually have significant hyperbilirubinaemia and rarely, mortality in most developed countries.

The lower levels of morbidity and mortality is due to the use of well-defined guidelines, the identification of high-risk neonates before hospital discharge, and early treatment of NNJ (15). The burden of NNJ is substantially higher in Nigeria where more than 10% of the cases of NNJ not only have significant hyperbilirubinaemia but also develop kernicterus with up to 21% mortality (16). This can be attributed to the late presentation and difficulty in recognizing jaundice by caregivers and subsequent delay in instituting appropriate treatment (14, 17).

The effects and magnitude of severe neonatal jaundice may have been underestimated especially in developing countries due to the rarity of severe neonatal jaundice and acute bilirubin encephalopathy (ABE) in developed countries, (18) coupled with the paucity of accurate data from developing countries. Neonatal jaundice rarely features in the pie chart of the major causes of neonatal morbidity and mortality. Olusanya et al. (19) in one nationwide survey of Paediatricians in Nigeria, documented neonatal jaundice as a priority neonatal illness that requires global health intervention.

The management practices for neonatal jaundice is not satisfactory and homogenous among healthcare providers in Nigeria. Moreover, there is no national guideline regarding the treatment of NNJ in Nigeria and many centres use different guidelines and protocols. The American Academy of Paediatrics (AAP) (20) and National Institute for Health and Care Excellence (NICE) (21) clinical guidelines for NNJ management are the most popular and widely used international guidelines which seek to provide guidance regarding the recognition, assessment, and treatment of neonatal jaundice. It is not known whether any of these guidelines is routinely used in any centre in Nigeria. Olusanya et al. (22) noted that lack of relevant guidelines frequently leads to ineffective treatments with adverse consequences. The Nigerian Society of Neonatal Medicine (NISONM) has started the process of developing a national guideline for treating NNJ in Nigeria. Once this is available, it is hoped that progress will be made toward minimizing the risk of morbidity and mortality attributed to severe NNJ.

In this regard, the present study aimed to investigate and evaluate current practices related to treatment of NNJ in Neonatal Intensive Care Units and Special Care Baby Units (NICUs/SCBUs, respectively) across Nigeria. It is expected that the findings of this study will boost awareness of the health care providers to implement appropriate management practices for neonatal jaundice and help policy makers develop guidelines and institute interventions that will promote early detection and effective management for neonatal jaundice.

Methods

The participants in this study included neonatal consultants, paediatricians, paediatric residents, nurses, and general medical practitioners (medical officers) managing neonates in Nigeria. A pretested structured questionnaire was used to collect data during the 2017 NISONM annual general meeting.

NISONM is an umbrella body for all healthcare practitioners (doctors and nurses) managing neonates in Nigeria. It usually organizes annual gathering and trains the members and other health care practitioners on newborn care. For the purpose of this study, the neonatal society was chosen to ensure only primary neonatal caregivers were included.

The questionnaires were distributed during the 2017 annual gathering. They were also sent to doctors and nurses involved with neonatal care in Nigeria by email using the mailing list of the Paediatric Association of Nigeria (PAN) to capture those who were absent at the meeting. The questionnaires consisted of 21 open and closed-ended questions. To determine the clarity and ease of the questionnaire, in the pilot test phase, 20 doctors and nurses comprising of 10 resident doctors in paediatrics, a fellow, four medical officers, and five nurses were asked to answer the questions.

The questions noted as not being clear were modified for better clarity. The final questionnaire was administered to healthcare practitioners who were willing to participate in the survey. Those who completed the online questionnaires returned it to the researchers' email address provided. The study rationale was included as a cover letter with the questionnaires. Each respondent was required to state the basic demographic and work-related personal information as gender, age, years in practice since primary medical qualification, current position/status in place of work, and type of health facility (tertiary, general or private hospital).

Table 1. Scoring table for the indices of good practice

Parameter	Scores 3	Scores 2	Score 1	Score 0
Use of guidelines	Yes	-	-	No
Regarding the length of hospital stay, which is considered the best?	After 72 hours	After 48 hours	< 24 hours	-
Check bilirubin pre-discharge	Yes	-	-	No
When is the best time to screen?	24 to 72 hours	After 72 hours	First 24 hours	-
When is the best time for post discharge follow-up?	Within one week	Two weeks	Six weeks	-
Support starting phototherapy in healthy term neonates at $\geq 12\text{mg/dl}$	Yes	-	-	No
Considers serum bilirubin of $\geq 20\text{mg/dl}$ as indication for exchange blood transfusion	Yes	-	-	No

The essential information on the range of jaundice treatment practices was also collected. This included use of guidelines, length of hospital stay after birth, pre-discharge bilirubin check, screening period, bilirubin level for phototherapy and exchange blood transfusion among others.

Data were cross-checked for completeness and analyzed using SPSS, 22.0 software. Moreover, descriptive statistics was employed in the analysis and the comparison of categorical responses was evaluated using chi-square test or Fisher's exact test. The scores with the range of 0 to 3 were assigned to the seven practice questions chosen as indices of good practice. A maximum score of 3 was awarded to each parameter with the best practice while the lowest score of 0 was assigned to parameter with the worst practice. A maximum total score of 21 was obtainable. Good practices regarding NNJ was classified as a score of ≥ 15 on the ranking scale for each respondent (Table 1). Statistical significance was set at 0.05 with 95% confidence interval.

Results

A total of 150 neonatal practitioners registered with the Nigerian Society of Neonatal Medicine during the study period. Out of 91 questionnaires distributed amongst healthcare workers involved in new-born care during the NISONM conferences, 88 were retrieved. Each questionnaire was scanned immediately for completeness of responses and those found to be incomplete were returned to the interviewee to be completed. In addition, ten online completed questionnaires were received via email and a total of 98 questionnaires were analysed. There were more female respondents (58.2%) and the mean number of respondent practice years was obtained as 13.43 (SD \pm 7.71). Table 2 shows the baseline characteristics of the respondents. The practice pattern of the healthcare practitioners is

Table 2. Characteristics of respondents

Parameter	Frequency N=98	Percentage (%)
Age Group		
<30	5	5
30-39	42	43
40-49	34	35
50-59	15	15
≥ 60	2	2
Designation of respondents		
Consultant	42	43
Medical officer	8	8
Nurse	16	16
Resident	32	33
Years in practice of respondents		
<10	28	29
10-19	51	52
≥ 20	19	19
Type of institution		
General hospital	25	26
Private hospital	64	65
Teaching hospital	9	9

illustrated in table 3. Approximately three fourths of respondents used one form of written guidelines or the other. The proportion not differing by much from one category of health workers to another (P=0.97). No significant difference was also observed in duration of parturient admission post-delivery. Nearly one quarter of respondents would keep parturients less than 24 h; however, 15.3% of the participants considered hospital stay for more than 72 h.

Medical officers were the most likely to screen babies for jaundice within 24 hours of birth; however, they were the least likely to check serum bilirubin prior to discharge. Other respondents tended to check and screen the neonates between 24 and 72 h after delivery. Half of the consultants conducted post discharge follow-up within the first week in contrast to other respondents who favoured follow-up visit at two or six weeks after birth. All the respondents except 50% of the

Table 3. Practice pattern of different cadres of healthcare practitioners with respect to term neonates

Practice	Consultants	Residents	M/officers	Nurses	All cadres	p-Value
	n = 42	n = 32	n = 8	n = 16	n = 98	
Uses written guidelines/protocols	30 (71.4)	24 (75.0)	6 (75.0)	11 (68.8)	71 (72.4)	0.97
Length of hospital stay after birth*						
Less than 24 hours	11 (26.2)	8 (25.0)	3 (37.5)	4 (25.0)	26 (26.5)	0.99
More than 48 hours	24 (57.1)	18 (56.3)	5 (62.5)	10 (62.5)	57 (58.1)	
More than 72 hours	7 (16.7)	6 (18.8)	0 (0.0)	2 (12.5)	15 (15.3)	
Check bilirubin pre-discharge	38 (90.5)	27 (84.4)	5 (62.5)	15 (93.7)	85 (86.7)	0.14
Screening period						
First 24 hours	10 (23.8)	6 (18.8)	5 (62.5)	5 (31.1)	26 (26.5)	0.08
24 to 72 hours	29 (69.0)	26 (81.3)	3 (37.5)	9 (56.3)	67 (68.4)	
After 72 hours	3 (7.1)	0 (0.0)	0 (0.0)	2 (12.5)	5 (5.1)	
Post-discharge follow-up						
Within first week	21 (50.0)	6 (18.8)	2 (25.0)	6 (37.5)	35 (35.7)	0.00
At 2 weeks	6 (14.3)	3 (9.4)	4 (50.0)	2 (12.5)	15 (15.3)	
At 6 weeks	15 (35.7)	23 (71.9)	2 (25.0)	8 (50.0)	48 (48.9)	
Start phototherapy at $\geq 12\text{mg/dl}$ #	21 (50.0)	32 (100.0)	8 (100.0)	16 (100.0)	77 (78.6)	0.20
EBT for SB $\geq 20\text{mg/dl}$	40 (95.2)	32 (100.0)	8 (100)	15 (93.8)	95 (96.9)	0.25

P-values were generated from χ^2 test of association: EBT = Exchange blood transfusion: SB = serum bilirubin: * for healthy, term neonates: # for presumed non-pathologic jaundice in term neonates within the first week of life, excluding jaundice on the first day of life: Figures in brackets are percentages of "n"

consultants, would commence phototherapy in well full-term neonates at serum bilirubin of 12mg/dl. All but three respondents considered serum bilirubin of 20mg/dl or more to be an indication for exchange blood transfusion.

For preterm neonates, the majority of the respondents (68.4%) indicated that they practiced prophylactic phototherapy while 14.3% of the participants commenced phototherapy once a preterm neonate was noticed to be jaundiced. Altogether, consultants, residents, medical officers, and nurses were in favor of early phototherapy either prophylactic or early commencement (78.6%, 78.1%, 42.9% and 37.5%), respectively. The reason proffered for the early phototherapy consisted of preterm birth as a risk factor for NNJ, delay in recognition of significant jaundice in preterm neonates, and delay in accessing serum bilirubin results.

The overall mean scores for indices of good practice for all cadres was 15.8 ± 0.43 (range: 6-21) Figure 1 shows the mean scores according to practitioner cadre. Consultants rated highest in the indices of good practice (range, 9 to 21) while medical officers ranked lowest. This difference among cadres was not, however, statistically significant, $P = 0.77$.

Nearly all the respondents (85.7%) employed conventional phototherapy lamps in the treatment of NNJ; 3.1% used fibre-optic equipment, 10.2% used both conventional and fibre-optic phototherapy units and 1% used sunlight.

The judgment of NNJ severity was indicated by the majority of the respondents (71.4%) to be

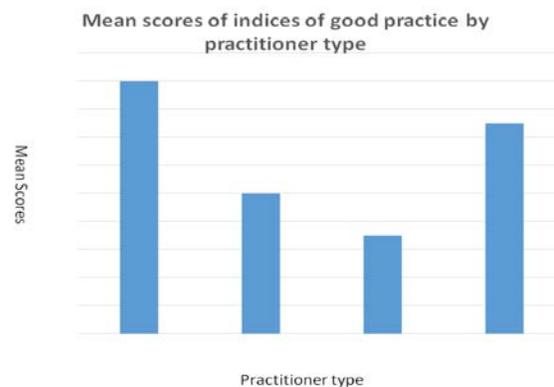


Figure 1. Mean scores of indices of good practice according to practitioner type

based on both visual inspection and total serum bilirubin levels. All respondents approved carrying out investigations for NNJ. According to the different healthcare designations, routine investigations done for NNJ were serum bilirubin and investigations for comorbidities or risk factors by 50% of consultants and 71.9% of residents; serum bilirubin only by 42.9% of medical officers and 25% of nurses ($P = 0.04$).

The most common causes of NNJ reported by the respondents were ABO incompatibility (25.5%), Prematurity (21.4%), Sepsis (18.4%), G6PD (9.2%), and others (e.g., physiologic, surgical conditions, 25.5%).

Discussion

In this survey of current practices regarding treatment of NNJ by neonatal health care

practitioners in Nigeria, there were substantial variations in treatment protocols and guidelines used by different practitioners. The current study findings are in line with similar surveys conducted by other researchers in developed countries (15, 18, 23). The use of local guidelines/ protocols was reported by the majority of respondents. The high frequency of guideline use was similar to the findings reported by Mateo et al. (15) in Canada where 65% of all practitioners used one guideline or the other for treatment of NNJ.

On the other hand, Nigeria does not have any official guideline developed for the treatment of NNJ. This means that these reported local protocols were developed individually in each center. Non-uniformity of practice guidelines regarding neonatal jaundice in Nigeria was also noted in the study by Olusanya et al. (14). The guidance provided by a well-structured reference protocol for treating hyperbilirubinaemia in neonates cannot be over-emphasized. Therefore, there is an urgent need for intensification of efforts by stakeholders in Nigeria to bring out an official document on the treatment of NNJ in Nigeria to be used by all healthcare providers.

The present study noted that nearly all the respondents routinely screen newborns for NNJ before discharging which emphasizes the high awareness of the potential consequences of severe hyperbilirubinaemia. The majority of respondents also indicated the first 72 hours after birth as the most important period for screening. Medical specialists, such as paediatricians and paediatric residents, were more likely to screen neonates for hyperbilirubinaemia than general practitioners. This was in line with Mateo et al. (15) findings who found that these tests were ordered before discharge by 63% of paediatricians as opposed to 42% of family physicians. The present survey targeted practitioners that work daily in neonatal units.

It is worthwhile to note that more than one quarter of the respondents indicated discharging new-borns within the first 24 h after birth. This is of particular concern especially in Nigeria where clinic follow up is sub-optimal and home visit by healthcare providers is non-existent. The National Demographic and Health Survey had documented that one third of hospital deliveries in Nigeria were discharged early with inadequate postnatal follow up. (24) The reasons for the early discharges are not very clear. In a review by Benahmed et al. (25), it was noted that in western countries, the trend to shorten the

postpartum length of stay in hospital were driven by cost containment and hospital bed availability. In Nigeria the reasons had not been well defined but may mirror the same trend or may be more complex. The majority of our respondents would schedule follow up clinic visit at six weeks. Only 36% would schedule it within the first week of life. The dangers of early discharge and its contribution to severe hyperbilirubinemia had been highlighted by several authors in developed countries too (26, 31). Lain et al. (31) noted that term neonates discharged within 48 h after birth are 9 times more likely to be readmitted for jaundice compared to those discharged after 3-4 days.

Phototherapy has emerged as the evidence-based gold standard for non-invasive treatment of significant neonatal hyperbilirubinemia. The majority of the respondents indicated commencing phototherapy at 12mg/dl after 24 h of life (20). The severity of NNJ as rightly indicated by the majority of the respondents should be based on visual inspection, serum bilirubin levels, and the clinical status of the baby.

All these will determine the appropriate treatment given. Almeida (32) reported that the patient's clinical status determines the point of commencement of phototherapy in most neonatal units. This also applies to preterm newborns as most of our respondents (82.7%) indicated commencing early phototherapy in preterm neonates; with 68.4% of the respondents practicing prophylactic phototherapy. The reason offered for this practice included 1) preterm birth as a risk factor for NNJ, 2) delay in recognition of significant jaundice in preterm neonates and 3) delay in assessing SB results.

These are cogent reasons which should not be discountenanced especially in resource poor settings. Preterm neonates are usually assumed to be clinically unstable and vulnerable with high risks of brain injury associated with hyperbilirubinemia even at lower bilirubin levels (32). Other studies had noted that clinical examination with visual assessment for jaundice is neither reliable nor accurate (33, 34) and may be of special importance in dark-skinned individuals where recognition of jaundice discoloration of skin is very difficult. In this scenario, prophylactic phototherapy in the very preterm newborn may be justified; however, this has to be guided by balance of evidence as phototherapy is not without risks.

Nearly all the cadres of healthcare practitioners

agreed that exchange blood transfusion (EBT) should be done for severe neonatal hyperbilirubinaemia defined as serum bilirubin $\geq 20\text{mg/dl}$ (35). This consensus clearly showed that most of the respondents were aware of the seriousness of severely elevated bilirubin levels; they may have witnessed or managed a newborn discharged with debilitating effects of NNJ. Therefore, it is mandatory to institute correct treatment practices as early as possible.

The majority of the respondents in the current study indicated the need for carrying out investigations to determine the cause of the jaundice. In Nigeria, common causes and risk factors for neonatal jaundice had been previously reported as sepsis, G6PD deficiency, ABO incompatibility, and prematurity (1,11,13,36). The participants' responses mirrored these previous findings as majority reported routine NNJ investigations to include serum bilirubin levels and investigations for co-morbidities and risk factors for NNJ. ABO incompatibility, prematurity, sepsis and G6PD were reported as the most prevalent causes of NNJ by the respondents in the present survey which are consistent with the findings of previous studies in Nigeria regarding the same conditions as major causes of NNJ. In a study conducted by Onyearugha et al. in southeast Nigeria in 2011 (13), the causes of NNJ among NICU admissions were determined as septicaemia (42.5%), prematurity (32.5%), cephalhaematoma (10%), and ABO incompatibility (7.5%). While Kolawole et al (37) identified sepsis (66.7%), prematurity (15.2%), lack of breast feeding (9.0%), and ABO incompatibility (5.2%) as major causes of NNJ.

The results of the present study showed varied but moderate good practices regarding management of neonatal jaundice among various cadres of healthcare practitioners responsible for neonatal care in Nigeria. As it was expected, specialist cadres showed higher levels of implementing management practices. However, there is a need for the development and dissemination of evidence-based Nigerian national guidelines on NNJ. The guidelines should be to foster knowledge and standardize practice in the management of NNJ among all cadres of health care workers. There should also be guidelines and well described protocols for newborn discharge and follow-up especially in the first week of life which all neonatal health care practitioners should follow. Neonatologists should be at the forefront of this movement to provide an acceptable and evidence based practice guideline.

The implementation of this guideline once released would ultimately lead to a reduction in morbidity and mortality ascribed to this easily treatable neonatal condition.

The limitations of this study include the small sample size of the respondents. Moreover, the respondents were a select group with declared interest in neonatal practice. Therefore, the results may not be generalized to the rest of the health workforce. Furthermore, the results represent self-reports of practices rather than an objective assessment of actual practices. Respondents might report what they believe to be acceptable or recommended practices rather than what they actually do; consequently, the results might be more representative of their knowledge than their practices.

Conclusion

The practices regarding management of neonatal jaundice among healthcare practitioners in Nigeria vary with better practices observed in specialist cadres. Newborn discharge and follow-up practices also vary and are sub-optimal. There is need for more concerted efforts on awareness creation on neonatal jaundice treatment among cadres of health care practitioners. This should be complimented with the development and implementation of an evidence-based Nigerian national practice guideline for NNJ adapted to Nigerian population in order to foster knowledge and standard practice in the management of NNJ among all cadres of health care professionals looking after neonates in Nigeria.

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Conflicts of interests

None declared.

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