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Audit of Neonatal Jaundice as Experienced at a Mission Hospital in Western Nigeria

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Abstract

Introduction: Neonatal jaundice (NNJ) is a common disorder in neonates that can impact negatively on the brain and cause death. The peculiarities in aetiology and solutions for different settings are a knowledge gap. This informed the desire to determine local aetiology and solutions for neonatal jaundice in a missionary hospital in Abeokuta, Southwestern Nigeria. **Methods**: Consecutive consenting babies diagnosed with significant neonatal jaundice were studied between July 2016 and June 2019. Institutional ethical consent was obtained. A proforma was used to obtain socio-demographic data and other relevant information such as age, sex, birthweight, gestational age and history regarding the jaundice. All the information obtained was inputted into a computer and analysed with SPSS version 16. **Results**: A total of 179 babies with neonatal jaundice comprising of 120 (67.0%) boys and 59 (33.0%) girls with ages ranging between 1 and 12 days (mean 2.7 ± 2.9) were studied. Prematurity, ABO incompatibility, neonatal sepsis and glucose-6-phosphate enzyme deficiency accounted for over 80% of the causes of significant NNJ. Sixty (33.5%) of the 179 babies studied developed acute bilirubin encephalopathy and 11 (6.1%) mortalities were recorded. Higher proportions of babies that were out-born with spontaneous vaginal delivery modes had acute bilirubin encephalopathy ($p < 0.05$). Mothers with formal education had better outcome compared to mothers without, in terms of mortalities ($p < 0.05$). **Conclusion**: Neonatal jaundice is still a significant cause of morbidity and mortality in the neonatal age group. Maternal education is key to good outcome in neonatal jaundice.

Keywords

Jaundice, Neonates, Bilirubinaemia, Encephalopathy and Outcomes

1. Introduction

Neonatal jaundice is a significant cause of morbidity and mortality in the neo-

natal age group in developing countries [1] [2]. It is a significant disorder in the neonates because it is quite common in term and pre-term infants affecting as much as 60 and 80 percent of these groups of infants respectively [3] [4]. It is a common reason for admission and readmission in neonates [3]. Accumulation of excessive bilirubin in the blood leads to jaundice and when severe, it can lead to ill health with the neonate presenting with lethargy and poor feeding [4]. Increasing and excessive amounts of unconjugated bilirubin in the blood can lead to bilirubin crossing the blood brain barrier to stain the globuspallidus, basal ganglia, substantianigra and cause acute bilirubin encephalopathy [5]. This is however a preventable and treatable cause of morbidity and mortality [6].

Most of the available studies on neonatal jaundice in Nigerian neonates emanate from teaching hospitals [7] [8] [9] [10]. There is paucity of report on neonatal jaundice outside tertiary and teaching hospitals in Nigeria. Experience at our mission hospital suggests that neonatal jaundice is a commonly managed condition, thus leading to my desire to conduct this study to compare our experiences with tertiary teaching facilities and other health facilities in Nigeria.

The Sacred Heart Hospital, Lantoro, Abeokuta, where this study was carried out is the first Nigerian hospital which was established in 1895 by the Catholic Church Mission. It is a 300 bedded secondary level hospital that offers level 2 care; general and specialist services in medicine, surgery, paediatrics, obstetrics and gynaecology. The Paediatric department has Special care baby's (Neonatal) unit manned by a Senior Registrar in Family Medicine and 2 Junior Medical Officers. The unit is supervised by 2 Visiting Consultant Paediatricians. The Neonatal unit is equipped to manage significant NNJ. It has 6 baby incubators, 3 radiant warmers, 10 phototherapy lamps (fluorescent blue lights), other equipment and well trained personnel's for appropriate management of neonatal jaundice, including exchanged blood transfusion (EBT). However, the Neonatal Unit does not have transcutaneous bilirubinometer nor intensive phototherapy lamps.

2. Methodology

The study was conducted between July, 2016 and June, 2019 at Sacred Heart Hospital, Lantoro, Abeokuta. Institutional ethics clearance was obtained from the Ethical Review Board of the hospital. Informed consent was obtained from the parents/care givers of the studied babies before they were selected into the study. All principles of good ethical practice were adhered to in the conduct of this study.

Babies diagnosed with neonatal jaundice were managed according to the hospital protocol.

Consecutive consenting mothers whose babies were admitted and diagnosed with significant neonatal jaundice were co-opted into the study. Criteria for selection were clinically detectable jaundice with bilirubin levels at or above either phototherapy or exchange blood transfusion reference value. All sick babies with

clinical detectable jaundice were also selected. Clinically significant jaundice (hyperbilirubinaemia) for this study is defined as jaundice in which immediate treatment with phototherapy or exchange blood transfusion is indicated [11]. Information was obtained from the patients through the use of a proforma specially designed by the researcher for the study (Appendix). The questionnaire was pre-tested at a pilot study at a Catholic Hospital Ibadan, and the information obtained from the study was vetted and analyzed and validated by other paediatricians in the Southwest region of Nigeria. The information obtained from the patients included socio-demographic data of the neonates and their parents or care givers, information on the birth weights, gestational age at delivery, place and mode of delivery. Additional information obtained include details on when the jaundice was first noted, who observed the jaundice, history of exposure to known icterogenic substances (such as menthol containing substances e.g. dusting powder, mentholatum and robb balms; naphthalene/camphor balls) as possible aetiology of the jaundice and other presenting features such as fever, ability to suck and general status of the baby.

The babies were also examined generally to determine their admission weights, extent of jaundice, pallor, signs of perinatal asphyxia and/or hypoxic ischaemic encephalopathy (HIE), especially in babies with the history of failure to cry spontaneously at delivery, and acute bilirubin encephalopathy (ABE). Other systemic examinations were done to confirm health status or detect any other abnormality.

Blood samples were taken for investigations like serum total, conjugated and unconjugated bilirubin, Glucose-6-phosphate dehydrogenase levels, full blood count, blood groups, direct Coomb's test, random blood sugar, and blood culture for babies with suspected sepsis.

The data obtained were inputted into the IBM SPSS version 16 software program and analysed. Categorical variables were expressed as frequency and proportions, Ordinal data was described as descriptive and inferential statistics with frequency distribution, percentage, range, means and standard deviation. The association between two categorical variables was tested by the Chi-square. A p value less than 0.05 was accepted as significant.

3. Results

3.1. Gestational Age, Birthweight and Their Gender Distribution of the Babies Studied

A total of 1512 neonates were admitted between July, 2016 and June, 2019 in the special care baby's unit. The 179 babies who presented with significant jaundice form the subjects and were studied; making prevalence of significant jaundice at admission 11.8%. The subjects presented between 2 hours of life and 12 days of life while the gestational age at delivery of the studied babies ranged from 28 - 43 weeks with a mean of 30.0 ± 1.5 weeks. Of 179, 114 (63.7%) were term; while birth weights ranged from 900 grams to 4.85 kg. One hundred and twenty

(87.0%) were males and 59 females with M:F ratio 2:1.

Details of the general characteristics of the subjects are shown in Table 1. These include age at presentation, gestational age at delivery, birth weights and sex distribution.

3.2. Mode and Place of Delivery

Of the 179 babies, 119 (66.5%) had a spontaneous vaginal delivery (SVD), while 60 (33.5%) were delivered by caesarean section. Of the 119 delivered per vagina, two had assisted ventouse delivery. Eighty nine (49.7%) were in-born while 90 (50.3%) were out-born. Of the 90 outborn, 36 (40.0%) were born in the PHC, 27 (30.0%) in the State hospital, 8 (8.9%) at Home, 6 (6.7%) at the Church Mission Homes, 4 (4.4%) in the Private Hospital and 9 (10.0%) with the Traditional birth attendants (TBA).

3.3. Age at Which Jaundice Was Noticed

The age at which jaundice was noticed ranged from first day of life or a few hours after birth to 22 days of life. The mean age of noticing the jaundice was 2.9 ± 2.3 days. Majority of the babies were noticed to be jaundiced on day 2 and 3. Of the 179, 57 (31.8%) babies were noticed to be jaundiced on day 2 and 46 (25.7%) on day 3. The mean age at which the different causes of jaundice presented is shown in Table 2.

Table 1. General characteristics of studied neonates.

Age at presentation	
<5 days	144 (80.4%)
5 - <10 days	28 (15.6%)
10 - < 15 days	7 (3.9%)
Mean age of presentation	2.7 ± 2.9
Gestational age at delivery	
Preterm < 37 weeks	61 (34.1%)
Term 37 - 42 completed weeks	114 (63.7%)
Post-term > 42 completed weeks	4 (2.2%)
Birth weights	
Extremely low birth weight	1 (0.6%)
Very low birth weight	31 (17.3%)
Low birth weight	26 (14.5%)
Normal birth weight	110 (51.5%)
Macrosomia	11 (6.1%)
Gender	
Male	120 (87.0%)
Female	59 (33.0%)

Table 2. Aetiology of Neonatal Jaundice and mean age of presentation of different aetiology in the studied cases.

Aetiology	Frequency (%)*	Mean age of presentation mean age ± SD (days)
Prematurity	60 (33.5%)	1.5 ± 2.1
ABO incompatibility	58 (32.4%)	2.5 ± 2.3
Neonatal Sepsis	47 (26.3%)	4.7 ± 2.8
Low birth weight	46 (25.7%)	2.3 ± 3.1
Rhesus incompatibility	6 (3.4%)	1.8 ± 2.1

* - Can have more than one aetiology.

3.4. Who Noticed the Jaundice First?

Most of the jaundice was first noted by the doctors accounting for 96 (53.6%) of the 179 babies. The mothers, a nurse, paternal grandmother, the father, maternal grandmother and the sister-in-law that first noticed the jaundice in 52 (29.1%), 9 (5.0%), 9 (5.0%), 3 (1.7%), 3 (1.7%) and 1 (0.6%) respective cases. The person who first noticed was not known in 6 (3.4%) of cases.

3.5. Aetiology of Neonatal Jaundice and Mean Age of Presentation

The commonest cause of significant NNJ in the study is prematurity, accounting for 60%. Some of the babies had more than 1 cause of neonatal jaundice with 262 causes of neonatal jaundice identified in 179 babies. Babies presenting with prematurity and Rhesus incompatibility presented at a lower mean age of first day of life while babies with neonatal sepsis presented at a higher mean age of the fourth day of life.

3.6. Serum Bilirubin Concentration at Admission

Among the 179 babies studied, the total serum bilirubin concentration ranged from 0.8 - 74.3 mg/dl with a mean of 19.2 ± 15.8 mg/dl, while conjugated serum bilirubin ranged from 0.05 - 34.0 mg/dl with a mean of 4.0 ± 5.6. The total serum bilirubin concentration at admission of the out-born babies with ABE ranged from 18.0 mg/dl to 74.3 mg/dl mean 39.94 mg/dl ± 13.61 and the conjugated bilirubin ranged from 1.9 mg/dl to 38.2 mg/dl mean 10.32 mg/dl ± 8.72; the age of the babies at maximum serum bilirubin concentration ranged from 3.0 to 15.0 days mean 6.7 days. The interval between the day when jaundice was noticed and the day of presentation at the hospital ranged from 1 to 8 days.

3.7. Presence or Absence of Asphyxia

Of the 179 jaundiced babies, 32 had comorbidity of perinatal asphyxia.

127 were not asphyxiated; (Apgar score of more than 7 at 5 minutes).

3.8. Babies That Developed Acute Bilirubin Encephalopathy

Of the 179 babies 60 (33.5%) had acute bilirubin encephalopathy (ABE) while

the remaining 119 (66.5%) were apparently normal. Forty eight (80.0%) of the out-born babies had ABE at presentation while 12 (20.0%) of the babies with ABE were in-born.

3.9. Interventions Used to Treat Neonatal Jaundice

All the 179 neonates diagnosed with significant jaundice were managed with phototherapy. Of these, 116 (64.8%) had EBT in addition to phototherapy. Of the babies who had EBT, 93 (80.2%) had EBT once, 22 (19.0%) had EBT twice and 1 (0.8%) baby was exchanged 5 times. Sixty three (35.2%) babies had only phototherapy.

3.10. Number of Days of Hospitalization and Outcome

The range of the admission duration was between 3 - 59 days with a mean of 14.2 ± 8.9 days. One hundred (55.9%) were discharged well with no obvious sequalae at the time of discharge while 62 (34.6%) had complications at discharge, 11 (6.1%) died and 6 (3.4%) discharged against medical advice. Of the 62 babies that had complications 60 (96.8%) were among the babies that had ABE and other co-morbidities while 2 (3.2%) had HIE stage III with NNJ as the primary diagnosis.

The clinical features identified among the 62 babies with early complications at discharge include: poor sucking/feeding 62 (100 percent), "sun-setting" of eyes 44 (71.0 percent), high-pitched cry 42 (67.7 percent), bizarre limb movements 40 (64.5 percent), muscle tone abnormalities 28 (45.2 percent) and seizures 14 (22.6 percent).

3.11. Association between Ante-Natal Care Attendance and Outcome

Table 3 shows the association between ANC attendance, place, mode of birth and educational attainments of parents with development of acute bilirubin encephalopathy. One hundred and sixty nine (94.4%) mothers had ante-natal care (ANC) while 10 (5.6%) mothers did not attend ANC. No significant difference on development of ABE in the babies among mothers who attended ANC and those who did not and educational attainment of parents. $p = 0.52$. However, significant higher proportion of babies with ABE were SVD and out-born.

The association between maternal ante-natal care attendance and outcome of care of the neonates is shown in Table 4. While there were higher proportions of babies who died among those whose mother had no ANC than those who had, the difference was not statistically significant. Similarly, no significant difference in relation to mode of delivery, place of birth and educational attainment of fathers. p at least 0.09.

Slightly more than half of the babies were out-born and 9.0 percent of them ended up as mortalities while the remaining close to the half of the in-borns recorded less than half of the mortalities in the out-born category. The differences in the admissions and mortalities were not significant. Of the 118 babies that were delivered spontaneously through the birth canal, 9 (7.6%) deaths were rec-

orded compared with the 2 (3.3%) deaths recoded amongst 60 babies born by Caesarean section. There was no statistically significant difference recorded in this group. Full details are shown in Table 4.

Table 3. Association between ANC attendance, place, mode of birth and educational attainments of parents with development of acute bilirubin encephalopathy.

	Normal neonates N = 119	Neonates with Acute bilirubin encephalopathy N = 60	χ^2	p-value
Ante-natal clinic attendance				
Yes	112	57	1.26	0.52
No	7	3		
Place of delivery				
In-born	77	12	31.99	<0.01
Out-born	42	48		
Mode of delivery				
Spontaneous vertex delivery	71	48	7.96	<0.01
Caesarean section	48	12		
Fathers educational attainment				
No formal education	5	3	0.06	0.81
Formal education	114	57		
Mothers educational attainment				
No formal education	3	2	0.10	1.00
Formal education	115	59		

Table 4. Association between ANC attendance, place, mode of birth, educational attainments of parents and mortality.

Ante-natal clinic attendance	**Babies who survived.** N =	**Babies who died N =**	χ^2	**p-value**
Yes	160	9	8.15	0.09
No	8	2		
Place of delivery				
In-born	86	3	2.36	0.21
Out-born	82	8		
Mode of delivery				
Spontaneous vertex delivery	109	9	1.31	0.33
Caesarean section	58	2		
Fathers educational attainment				
No formal education	6	2	5.16	0.08
Formal education	162	9		
Mothers educational attainment				
No formal education	3	2	10.22	0.03
Formal education	165	9		

4. Discussion

The present study has shown that neonatal jaundice is a common disorder in our setting and a common cause of morbidity and mortality in the neonatal age group. This finding is consistent with reports from available studies which show that neonatal jaundice is one of the leading causes of neonatal morbidity and mortality in special care baby unit in Nigerian teaching hospitals [12] [13] [14]. A study of sick newborns in a cottage hospital in the southern Nigeria, also shows that neonatal jaundice is a common cause of admission in the neonatal age group.

Neonatal sepsis, and low birth weight were some of the identified causes of neonatal jaundice in the present study. Interestingly, neonatal sepsis and low birth weight were also found to be leading causes of admission in Nigerian newborn units [12] [13] [14]. Other identified important cause of neonatal jaundice in the present study is glucose-6-phosphate dehydrogenase deficiency. Previous studies on glucose-6-phospate dehydrogenase deficiency in Niqeria when SYMPTOMATIC and a significant contributor to disease burden predisposing 1 percent of annual births to morbidity and mortality [15] [16].

The new born mothers were the most common group of people to first notice jaundice in the community. Our study showed that doctors were the most common set of professionals to diagnose neonatal jaundice in the hospital setting and this is quite understandable. Identification of jaundice by the mothers may also have influenced the health seeking pattern for the affected neonates as most of the neonates presented within 2 days of life. However the co-existing complexities imposed by co-existing conditions such as prematurity, low birth weight, very low birth weight and neonatal sepsis can also contribute to early health seeking practice [17]. The educational attainment of the mother may also be a determinant of her health seeking habit. The present study assumes this position based on our findings of better health outcomes amongst mothers who had a formal education.

Our findings of acute bilirubin encephalopathy in the study were inevitable considering the range of the estimated serum total, conjugated and free bilirubin of the population studied. This would also explain the unacceptably high exchange blood transfusions conducted in this study. A previous study has shown that our exchange blood transfusion rates are very high [10]. The use of effective phototherapy equipment may have a role in reversing the high exchange blood transfusion rates.

Co-existing morbidities with neonatal jaundice such as asphyxia, neonatal sepsis and prematurity, low and very low birth weight babies may also be contributory to the very high serum bilirubin levels recorded in the study. Sadly, this comorbidities and neonatal jaundice, may be preventable. Previous studies have shown the relationship between serum bilirubin and morbidity and mortality as well as the influence of associated comorbidities [4] [18] [19] [20].

The factors contributing to the development of acute bilirubin encephalopa-

thy among the inborn babies in this study include: The parents of 3 babies refused to give their consent for their babies to have blood transfusion (EBT) because of their religious belief (Jehovah Witness) when the serum bilirubin concentrations rose to the critical level for EBT, Two babies were discharged against medical advice after they have been diagnosed to have significant jaundice only for the babies to be brought back for readmission after they had developed ABE, Inability/failure to cannulate 4 of the affected babies for EBT due to technical problems and the presence of comorbidities like extreme low birth weight, severe perinatal asphyxia and severe sepsis in the affected babies.

5. Conclusion

It is concluded that the causes and pattern of neonatal jaundice at our mission hospital are similar to that of the Nigerian tertiary hospitals and other similar settings. Emphasis on improved health care services, viz a viz curative therapy and provision of effective equipment such as Transcutaneous bilirubinometer, and intensive and total body phototherapy lamps with irradiance of >30 μWcm^2 per nm that can cause rapid reduction of serum bilirubin concentration may go a long way to reduce the morbidity and mortality associated with NNJ in Nigeria. In addition, maternal or female education, with regards to improve health seeking behaviour with the aim to prevent neonatal jaundice or associated neonatal jaundice complications should give the desired results that will reverse the unacceptable high morbidities and mortality associated with neonatal jaundice, since most of the underlying or associated conditions with neonatal jaundice are largely preventable.

6. Limitations of the Study

All the babies could not be extensively investigated to determine all possible aetiologies of Neonatal Jaundice. The research was self funded, limiting the ability to do a post mortem for babies that died as the parents were not willing to pay for this service.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix

Audit of Neonatal Jaundice as experienced at a Mission Hospital in Western Nigeria (1331415)

Questionnaire

SIGNIFICANT NEONATAL JAUNDICE STUDY

NAME OF HOSPITAL _____HOSP NUMBER _____

BABY STUDY NUMBER _____ DATE OF BIRTH

PARENT'S HOME ADDRESS _____

SEX (1 = MALE, 2 = FEMALE) _____ GESTATIONAL AGE BY DATE _____ Ballard Score ..... (weeks)

MODE OF DELIVERY (1 = SVD, 2 = CS, 3 = FORCEPS, 4 = VENTOUSE) _____

PLACE OF DELIVERY (1 = INBORN, 2 = OUTBORN) _____

IF OUTBORN, 1 = PHC, 2 = STATE HOSP, 3 = PRIVATE HOSP, 4 = HOME, 5 = MISSION HOUSE, 6 = TBA _____

CONDITION AT BIRTH (APGAR SCORE): 1 Min _____ 5 Min _____

BIRTH WEIGHT _____

DATE OF ADMISSION _____ AGE ON ADMISSION _____ WEIGHT ON ADMISSION _____

AGE WHEN JAUNDICE FIRST NOTICED _____(Hours/Days)

WHO NOTICED THE JAUNDICE: 1 = MOTHER, 2 = FATHER, 3 = DOCTOR, 4 = NURSE, 5 = OTHERS Specify.....

DIAGNOSIS ON ADMISSION_____

AGE OF PARENTS: FATHER _____ MOTHER _____

FATHER'S EDUCATIONAL STATUS: 1 = NO FORMAL EDUCATION, 2 = PRIMARY 2 SECONDARY 3 TERTIARY

MOTHER'S EDUCATIONAL STATUS: 1 = NO FORMAL EDUCATION, 2 = PRIMARY (3) SECONDARY, 3 = TERTIARY

FATHER'S OCCUPATION_____

MOTHER'S OCCUPATION_____

PARENT'S RELIGION: 1 = XTIANITY, 2 = ISLAM, 3 = OTHERS, please state…._____

PARENT'S MARITAL STATUS (1 = LEGALLY MARRIED, 2 = CO-HABITING, 3 = CASUAL AFFAIR, 4 = OTHERS, please state…._____

ANTENATAL CARE RECEIVED? 1 = YES, 2 = NO

STATE PLACE OF ANC 1 = Mission Home, 2 = TBA, 3 = Government Hospital, 4 = Private Hospital, 5 = SHH Lantoro

TETANUS TOXOID GIVEN, 1 = YES, 2 = NO, 3 = Don't Know IF YES, HOW MANY DOSES?_____

MOTHER'S BLOOD GROUP: ABO…….. Rhesus 1 = Positive, 2 = Negative

BABY'S BLOOD GROUP: ABO…….. Rhesus 1 = Positive, 2 = Negative

MOTHER & BABY ABO SETUP: 1 = YES 2 = NO

SERUM BILIRUBIN (SBR) ON ADMISSION: Total…. mg/dl Conj …. mg/dl

ADMISSION PCV.....(%), FULL BLOOD COUNT.....

BABY G6PD STATUS 1 = NORMAL, 2 = DEFICIENT, 3 = NOT DONE

DIRECT COOMB'S TEST: 1 = +VE, 2 = −VE _____

ABO Antibodies Coating Baby's Red Cell (1 = Yes, 2 = No) _____

BLOOD SUGAR ON ADMISSION……..(mg/dl).

BLOOD CULTURE (IF INDICATED) 1 = YES, 2 = NO

IF YES, RESULT.....

EXCHANGE BLOOD TRANSFUSION (EBT) DONE? 1 = YES, 2 = NO. HOW MANY EBT …….

IF NO, STATE REASON: _____

PRE-EBT BILIRUBIN: Total…….mg/dl Conj ……..mg/dl

POST-EBT BILIRUBIN: Total…….mg/dl Conj ……..mg/dl

MAX. SERUM BILIRUBIN: Total_____mg/dl Conj._____ mg/dl Age _____(DAYS)

SIGN OF KERNICTERUS/BILIRUBIN ENCEPHALOPHATHY? 1 = YES, 2 = NO

IF YES, WHEN FIRST MOTICED? 1 = PRE-ADMISSION, 2 = ON ADMSSION, 3 = DURING ADMISSION

SYMPTOMS: INABILITY / REFUSAL TO SUCK ☐, WEAKNESS ☐, ABNORMAL POSTURE ☐ CONVULSION / TWITCHING ☐ OTHERS; SPECIFY……. ☐

PHOTOTHERAPY GIVEN: 1 = YES, 2 = NO

IF YES, WHEN WAS PHOTOTHERAPY COMMENCED? 1 = PRE-EBT, 2 = POST-EBT

FURTHER BLOOD TRANSFUSION: 1 = YES, 2 = NO

IF YES, STATE INDICATION 1 = ANAEMIA, 2 = OTHERS; Specify.....

TYPE OF TRANSFUSION 1 = WHOLE BLOOD, 2 = PACKED CELLS, 3 = FF PLASMA, 4 = OTHERS,

PLEASE STATE _____

DATE OF DISCHARGE: _____ NO. OF DAYS ON ADMISSION _____

DIAGNOSIS AT DISCHARGE - SAME AS AT ADMISSION (0) No (1) Yes

NEONATE CONDITION AT DISCHARGE: 1 = WELL, 2 = OBVIOUS COMPLICATION, STATE TYPE…….

_____, 3 = DISCHARGED AGAINST MEDICAL ADVICE, 4 = DECEASED

PRE ADMISSION MEDICATIONS; SPECIFY.....

EXPOSURE TO ICTEROGENIC SUBSTANCES; 1 = Robb/Mentholated balm, 2 = Naphthalene balls, 3 = Others; Specify.....

RESULTS OF FOLLOW UP SBR:

DATE TOTAL CONJUGATED PCV