Original Article

Maternal and Fetal Determinants of Morbidities in Term Neonates Admitted to SCBU

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Abstract

Objective: To determine the morbidity and mortality patterns of patients admitted into the Special Care Baby Unit (SCBU) of district hospital.

Study Design: Retrospective study.

Place and Duration: From 2011 to 2013 at East Sussex Healthcare NHS Trust

Methodology: One hundred and five women and neonates record with gestational age ≥37 weeks admitted into the Special baby unit of the Conquest and Eastbourne hospital.

Main outcome measures: Neonatal outcome encompassing ethnicity , age of women, antenatal and intrapartum risk factors, mode and timing of delivery, Apgar score , reasons for admission ,outcome and length of stay and readmissions.

Results: Admissions were related to pregnancy and delivery complications like smoking 35%, associated medical problems 27%, prelabour rupture of membrane >24hrs 11.4% ,BMI >30 was 8.5%, small for dates 8.5%, vaginal bleeding in early pregnancy 5.7%, babies above 95 centile 4.7%, pre-eclampsia 3.8%, cardiotocographic abnormality (CTG) 46.6%, caesarean deliveries 46% and 54% vaginal. Birth of the first child born was associated with increased likelihood for admission (45%). The leading contributors to SCBU admission were hypoxia 40.9%, respiratory complications 31.4% and neonatal sepsis 29.5% .In 21% neonates Apgar score were less than 7 at 5 mins. Nearly one third of babies were admitted for 24-48 hours. 85% had good outcome. 13% had readmissions.

Conclusion: Term infant's admissions are major contributors to workload. Neonatal admissions can be reduced through enhancement of good antenatal and delivery care

Keyword: Adverse maternal and neonatal outcomes, Intrapartum interventions, Obstetric risk factors, SCBU.

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Introduction

SCBUs were an established part of hospitals in the developed world by the 1970s.[1] The development of special care baby unit has reduced mortality and improved long-term outcomes of sick new-borns. The number of SCBUs and neonatologists has risen dramatically in the past 30 years.[2] Approximately 10% of all babies born require admission to the neonatal unit .[3] The SCBU admission rate for term babies in the UK was 6% in 2011.[4] The admission of term babies to SCBU are major contributors to workload. At birth all neonates have immature immune system. Full-term neonates are less susceptible to adverse birth

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outcomes compared to preterm as they usually have a more mature immune system with additional protection by passive immunity from trans placental transfer of antibodies which enhance their ability to survive. [5] The majority of full-term neonates require special care as a result of intrapartum complications, infections, birth asphyxia as well as sub-optimal obstetric care.[6,7,8] Many studies have shown that full-term neonates in SCBU are at increased risk of adverse short and long-term outcomes including high rates of rehospitalisation.[7,9,10]

Mothers of full-term infants admitted into SCBU are also likely to face emotional trauma and anxiety compared with mothers of preterm and low birth weight infants who are more likely to accept the need for special care for their babies.[11]

There are many factors that can place a neonate at high risk and increase chance of admission to neonatal care unit .These factors are either related to the maternal age, parity, low educational level, poor socioeconomic status, smoking, associated medical disorder or complications related to pregnancy and delivery like vaginal bleeding, multiple gestation, preeclampsia, premature rupture of membrane, inadequate antenatal care and poor weight gain during pregnancy, while the delivery factors including forceps delivery, caesarean section and breech presentation.

The knowledge of the factors associated with the admission of neonates into SCBU would be helpful for their proper management. This retrospective study was set out to determine the morbidity and mortality patterns of patients admitted into the SCBU of district hospital .Maternal and neonate admissions were audited to identify potentially avoidable admissions and common avoidable factors to facilitate improved services and better outcomes for such neonates.

Methodology

A retrospective analysis of women and of new-borns with gestational age ≥37 weeks admitted into the Special baby unit of the Conquest and Eastbourne hospital. Ethic approval was not required as this study looked at routinely collected data, retrospectively.

The retrospective data were collected from medical records of full term neonates and mothers on ethnicity, age, antenatal and intrapartum risk factors and postnatal management including delivery mode and time, complications, Apgar score ,diagnosis, treatment, outcome, length of stay and readmissions . Maternal and obstetric factors were reviewed to identify potential predictors of admission to the Special care baby unit.

Results

A total of 105 women with neonates were reviewed. 92% of the mothers were Caucasian, 4% Black, 2% Bangladeshi and 2% Caribbean. The majority of the mothers(67%) were between the ages of 20-35 year, 18% were of ages 36-40 yrs. 11% were 16-19 yrs. and 4% were of age greater than 40 yrs. Majority of the mothers were prim parous(45%) while 3.8% were grand multiparous . 86% of the mothers had antenatal and 75% intrapartum risk factor . The most common antenatal risk factor was smoking 35 %(37). The second common cause was associated medical problems 27%(29).The other risk factors were prelabour rupture of membrane >24hrs 11.4% (12) ,BMI >30 was 8.5%(9), small for dates 8.5%(9), vaginal bleeding in early pregnancy 5.7%(6), diabetes 4.7%(5) ,babies above 95 centile 4.7%(5), pre-eclampsia 3.8%(4), drug abuse 3.8%(4),in vitro fertilization (IVF) 1.9%(2), placenta previa1.9%(2). Intrapartum risks were present in 75% of women .The leading risk was cardiotocographic abnormality (CTG) 46.6 %(49), of which 28.5 %(30) were suspicious and 18.1 %(19) were pathological trace. The findings were confirmed by fetal blood sampling in 22%(11) of the cases .The other risks were prolonged labour 13.3%(14), abruption 7.6%(8), shoulder dystocia 4.7%(5), fever >38 2.8%(3). 54 % (57) babies delivered vaginally and 46 %(48) delivered by caesarean section. Labour was induced in 33% (35), 19 delivered by emergency caesarean section, 10 by instrument (5 forceps and kiwi 5) and 6 delivered spontaneously. Out of vaginal deliveries, 54 %(31) babies were spontaneously born and 46 %(26) by instrument. The majority of instrumental deliveries were by kiwi 62% .35% babies were delivered by Neville Barnes forceps and 3% delivered by wriggly. 77% (37) babies were delivered by emergency caesarean delivery, whereas 23 %(11) were delivered by elective caesarean section. Emergency caesarean delivery was significantly associated with admission to the special care unit. Majority of the emergency caesarean section (61%) were grade 2. Babies delivered by grade 1 caesarean section were 16%. Out of elective 4% were grade 3 and 19% were grade 4. Majority (54%) of the deliveries were during the day and 46% were during the night. The common causes of admissions to SCBU seen from the study were hypoxia 40.9 %(43), respiratory complications 31.4 %(33) and neonatal sepsis 29.5% (31). The other reasons for admissions were congenital abnormalities 15.2%(16), low birth weight 13.3%(14), hypoglycaemia 13.3%(14),

neonatal jaundice 4.7%(5), hypothermia 3.8% (4) and injury 0.95%(1). Half of the babies were admitted to special care with more than one reason (53%, 56).Nearly one fourth of the babies had Apgar score at 1 min of 0 to 3(24.7%, 26). Apgar score 4 to 6 was in 29.5% (31) and 7 to10 in 45.7% (48). Apgar score at 5 min was 0 to 3 in 2.8%(3), 4 to 6 in 18%(19) and 7 to10 is 73% (77). The Apgar score in 5.7% cases (6) were not documented.14% (15)neonates were admitted for observation for less than 4 hrs. Majority (31%, 33) stayed in SCBU for 24 to 48hrs. 26 %(27) stayed for more than 48 hrs to 72 hrs, and 29 %(30) were admitted for more than a week. External transfer was done in 7 (6.6) cases, mainly for surgery. 13. %(14) neonates were readmitted to SCBU. 29% (4) were readmitted within a week. Half (50%, 7) of these neonates were readmitted at 2 to 3 weeks. 21% (3) were readmitted after a month. Out of 105 babies, 3 (2.8%) babies died, 3(2.8%) had disability and 9 (8.5%) were under surveillance. All the babies that died had congenital abnormalities. 85 %(90) neonates had good outcome.

Discussion

This study has highlighted the potential impact of maternal health on adverse neonatal outcomes as 86% of the mothers had antenatal and 75% intrapartum risk factor . The findings of hypoxia, respiratory complications and early-onset sepsis.[12] are consistent with several studies that have established these conditions as leading causes of SCBU admission and risk factors for early neonatal deaths. [13-16]

Apgar score is required for diagnosis of birth asphyxia. However, studies have shown that low five-minute Apgar scores (<7) have good correlation with birth asphyxia and are associated with several adverse outcomes. Many recent studies in term babies have found a strong association between low Apgar score and malformations .[12,16,17,18,19,20] In this study 21% had an Apgar score of less than 7 at 5 mins. Maternal age primiparity, smoking, intrapartum complications and being born at night, were significant risk factors for Apgar below 7 at 5 minutes.

Elective caesarean delivery was significantly associated with admission to the special care unit for respiratory complications (8 out of 11)as observed in other studies.[21.22] It was also not surprising babies requiring SCBU admission with emergency caesarean delivery.

World Health Organization (WHO) stated that malformed neonates were major causes of neonatal morbidity and mortality.[23] Congenital malformations were an important contributor to neonatal mortality in our study and comparable with other studies in literature.[24-29] Consanguineous marriage, extreme maternal age (over 40 years or very young mothers), smoking, IVF and chronic maternal disease were all factors associated with a higher incidence of congenital anomalies, though the consanguinity rate in this study was not known.

The new born period is a vulnerable time as physiological adjustments are needed by the neonates. It was observed that majority of the neonate were admitted within 24 hours of birth. Therefore, skilled personnel presence at delivery would decrease the morbidity and mortality that could arise from severe asphyxia, respiratory complications and congenital anomaly.

The high rate of hypoxia indicates deficiencies in the antenatal care and intrapartum management Therefore priority need to be given to strengthening obstetric care. It indicates the need to adequately train the trainees, proper intrapartum monitoring, the correct mode of delivery and the availability of trained personnel. These actions would identify and reduce the risks. Good quality of care requires appropriate use of effective clinical and non-clinical interventions.

Strength: The data was obtained from two different hospitals.

Interpretation: The study was done in the most deprived area, where one in 5 mothers smoke in pregnancy. It was not surprising that most common antenatal risk factor was smoking 35%. Women who smoke during pregnancy are at increased risk of obstetric complications and of fetal compromise during labour, leading to increased rates of operative delivery [30,31] which has been observed in this study as well.

Mothers of new-borns admitted into SCBU were significantly primiparous (45%) whereas multiparas were 3.8%, indicating that first child is at higher risk for admission to SCBU. This result is comparable with a retrospective cohort study in Nigeria[5] where 52.6%of the mothers were primiparous while 3.6% were multiparous .Our result were different from the finding of the a population-based study in Australia[32], in which the overall rate of admission of term babies was 8.9 percent for primiparas and 6.3 percent for multiparas but that study was done in a low risk women.

Hypoxia nearly 41%, respiratory complications 31% and neonatal sepsis 30% were the leading causes of admission. The other reasons for admissions were congenital abnormalities, low birth weight,

hypoglycaemia, neonatal jaundice, hypothermia and injury to the neonate. The congenital abnormality (15.2%) was the commonest cause of non-preventable conditions. In a study in Birmingham on 109 full term neonates[4] causes of admission were respiratory distress (50), hypoglycaemia (12), hypothermia (6), malformations (11) and poor condition at birth (19). Our study showed respiratory distress (33), hypoglycaemia (14), hypothermia (4) and malformations 16). The results are comparable. In a study done by Baba Usman Ahmadu et al [25] neonatal sepsis and severe perinatal asphyxia were the leading causes of morbidity. In the same study congenital anomaly was found to be important morbidity associated with neonatal death which was seen in our study as well. In a two year study of neonates admitted to a Singapore neonatal intensive care unit[7] the main reasons for admissions were respiratory disorders (61.3%), congenital anomalies (15.3%) and asphyxia neonatorum (11.7%). It is obvious from these studies that birth asphyxia and sepsis are among the leading cause of neonatal admission, which are largely consistent with the global pattern of neonatal mortality.[5,33]

In an audit done by A Ram Mohan et al[3] 55% of babies stayed 3 to 5 days in SCBU. Readmissions were needed in 4 cases. External transfer was done in 8% (9) cases 70% of the mothers were without any obstetric or medical risk factors. In our study 86% of the mothers had antenatal and 75% intrapartum risk factor and 57% babies stayed in from 1 to 3 days in SCBU. External transfer was done in 6% (7) cases and 13 %(14) neonates were readmitted to SCBU and the reason for readmission was mainly jaundice and infection.

SCBU admission of neonates comprised of 3% of birth in our trust whereas in a study done in Singapore[7] it was 1.8% and in an Australia [21] was 10.6%.

Limitation: This work was conducted in the trust ,which provided services to the most deprived area of all the counties in the South East of England , therefore there is the need to be cautious in generalizing the data of this study. It was a retrospective study which lacks individual current information. The study predominantly involved the Caucasian, so unaware if the outcome equally applies to other ethnicity. We also were unaware of the outcome of the neonates under surveillance.

Conclusion

The majority of full-term neonates require special care as a result of intrapartum complications, infections, birth asphyxia. The causes of neonatal morbidity and mortality are similar to those reported from other studies. The morbidity profile observed is attributable to preventable causes. They could be prevented through effective antenatal care, supervised delivery and appropriate care.

Term neonates' admissions account for a significant proportion of the workload in neonatal units. Reducing the admissions would reduce cost. Post-partum admission of a healthy full-term neonate to the SCBU is a serious matter, and warrants further investigation. Greater attention needs to be paid to long-term outcomes of term SCBU admissions. Quality improvement projects need to focus on the areas to reduce unnecessary admissions. Improved quality of care can be achieved through drills and audit. Addressing the nearly missed events would also improve the outcome.

In this study the percentage of survivors in SCBU though encouraging could be further improved by adequate treatment and timely intervention.

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