DIFFERENCES IN DETECTION RATES FOR SERIOUS NEONATAL DISEASES BEFORE AND AFTER INSTITUTION OF NEWBORN ROUNDS BY PAEDIATRICIANS IN A PRIVATE SECTOR HOSPITAL

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Background: Perinatal and infant mortality are two major contributors to child mortality in developing world. It is widely recognised that synergistic efforts by paediatric and obstetric healthcare providers result in improvement of neonatal and infant survival. Close working relationship between the 2 disciplines with attendance of all high risk births by paediatric healthcare providers and routine examination of all neonates is required for this purpose. Objectives were to compare 2 continuums of 100 neonatal cases for detection of serious neonatal disease. One set of neonates being examined by neonatal/paediatric service and other without this service in place. **Methods**: One hundred Neonatal Exam sheets were selected randomly from records of 2007–2008 and compared with 100 Neonatal Exam Sheets of 2006–2007. Records were analysed for detection of serious neonatal conditions at 24 hours age. Data was analysed using MS EXCEL. Odds ratio was calculated for each disease with Haldane correction. **Results:** Odds ratio was significantly higher for detection of serious neonatal diseases in 2007–2008 group when neonatal service was actively involved in newborn examinations of all neonates. Highest odds ratios were obtained for detection of Heart Murmur and neonatal sepsis. **Conclusions:** Newborn Examination within 24–48 hours of birth by trained neonatal healthcare provider is paramount for adequate detection of serious neonatal diseases. Such services should be instituted in all obstetric units for better neonatal outcome.

Keywords: Neonatal Exam, High risk neonates, neonatal outcomes

INTRODUCTION

'Baby Friendly' hospitals is a UNICEF-WHO initiative, introduced in 1991, proven to improve newborn outcomes, the world over,[1] Essential components of this program include the following elements[1]:

1. Close physical proximity of Newborn Care units with obstetric units
2. Close working relationship between paediatricians and obstetric care personnel
3. Involvement of midwives and lactation nurses, both in care of mothers and newborns
4. 'Exclusive Breast Feeding' programs in obstetric and paediatric units
5. †Physical exam of every neonate at time of birth and then at 24 hours age prior to discharge

†Added upon recommendation from ACOG and AAP.[2]

All of the above are proven strategies in improving newborn survival and well being in countries that adopted them. This initiative was felt to be so critical to ethical and beneficial obstetric practice that ACOG, (American College of Gynaecology), marked it as an essential component required for accreditation and recognition of post graduate residency programs in obstetrics,[2] Similarly, AAP, (American Academy of Paediatrics) requires that 'Baby Friendly Initiative' be in place for a post graduate training program in paediatrics to be accredited,[2] IPA, (Indian Paediatrics Association) has followed this lead as well. Although this issue is recognized as vital on several levels, Pakistan lacks a concrete policy regarding this 'Baby Friendliness'. Not surprisingly therefore, Pakistani doctors have to sit and endure embarrassment in international health forums where our Infant Mortality Rate, >95 / 1000 live births,[3] and poor newborn care services are pointed at as examples of failure to implement "Baby Friendly" initiative.

It was for the first time in 1967 that Battaglia *et al* devised a system for classification of newborn infants based on body weight according to gestational age.[4] A massive accumulation of international research evidence followed highlighting the importance of early neonatal examination by qualified personnel to recognise and refer newborns with serious illnesses. Neonatal outcomes after premature births, intraventricular haemorrhage and vertically transmitted diseases became a separate area of specialty for paediatricians and behavioural specialists the world over.[5–7]

Perinatal Mortality Rate (PMR) 50–60/1000 and Neonatal Mortality Rate (NMR) 50/1000 of our country is one of the highest in the world.[3] The causes include home deliveries, poor maternal health, low socioeconomic status, high fertility rate and high incidence of low birth weight (LBW).[10] While individual efforts in field of neonatology in Pakistan

may be commendable, we are faced with lack of a uniform policy for neonatal care provision in Pakistan. Hospitals with capacity to deliver neonates may have no neonatal care services and continue to deliver babies, nonetheless.[11]

MATERIAL AND METHODS

This study was designed to compile newborn physical exam data from a continuum of 100 cases from Kuwait Teaching Hospital, Peshawar with arrangements for paediatricians examining every newborn at 24 hours and then compare it with another continuum of 100 cases at the same hospital when no such system (Newborn Rounds) was in place. Physical exam records of neonates who were discharged from obstetric service under the labels, 'Satisfactory' or 'Live Newborn' were included in the study. A total of 676 records from 2008 and 552 records from 2009 were analysed for completion for data. Two hundred and forty-seven neonatal exam records from 2008 and 423 neonatal exam records from 2009 were deemed 'adequately documented' for inclusion. One hundred cases were selected from each set arranged month-wise and entered in study database. The desired outcome, under consideration was detection of a serious or potentially serious neonatal disease at 24 hours of life through early neonatal Exam by a health care provider.

Study protocol was presented and cleared by PMC Institutional Ethical Committee. Co-Investigators met with the Principal Investigator regularly during data extraction and data entry phase to clarify issues on the spot.

This data was entered in MS excel 2007 and analysed for detection of serious or potentially serious neonatal diseases. The two study groups were compared with each other for successful detection of selected neonatal conditions by calculating the Odds Ratio for each condition. Haldane Correction was applied to avoid values equal to 0 for Odds ratio calculation. For example, if Heart murmur was not detected in any case in Data Set A in Table-1, it is shown as 0. However, in Table-2, Heart Murmur in Data set A is shown as 0.5. This is done in order to avoid a value of 0 for Odds Ratio calculation.

RESULTS

We included 100 Newborn Exam records in Group A for neonates born in 2008, and 100 records in Group B for neonates born in 2009. A set of pre-selected neonatal diagnoses was shared among the investigators, searched for in the exam sheets and entered in the study database.

Table-1 shows results of this part of the study. Data set A shows number of cases identified at birth for each neonatal disease when no system for Early Neonatal Exam was in place. Data set B shows number of cases identified by paediatric team members who performed daily Early Neonatal Exam rounds. Last column shows percent increase in detection rate for selected neonatal conditions after Early Neonatal Exam by paediatric team was instituted in the Obstetric ward. Highest percent increase in detection rates is seen for Hypoxic Ischemic Encephalopathy, Heart Murmur and Neonatal Sepsis. There is an increase of 51%, (from 33% to 84%) in detection rates for all neonatal diseases, combined, under consideration in our study.

Table-2 shows Odds Ratio calculation results for data shown in Table-1. Haldane correction was applied to individual results that were 0 in Table-1. Odds of detection for neonatal disease with and without Early Neonatal Exam are given in the 4th and 5th column, respectively. Odds ratio for each condition is given in the last column. Odds for detection of Heart murmur and Neonatal Sepsis are seen to increase by 27 and 29 times respectively showing the highest increase.

Table-1: Serious or potentially serious neonatal diseases detected at 24 hour early neonatal examination

Neonatal Diagnoses	Data set A	Data set B	% increase in detection
Hypoxic Ischemic Encephalopathy	3/100	18/100	15.0%
Cleft lip/palate	4/100	6/100	2.0%
Heart murmur	0/100	16/100	16.0%
Poor feeding	16/100	27/100	11.0%
Neonatal Sepsis	0/100	17/100	17.0%
Un-descended testis	0/100	2/100	2.0%
Imperforate Anus	0/100	1/100	1.0 %
Total neonatal disease identified at 24 hours	33/100	84/100	51.0%

Table-2: Odds Ratio for neonatal diseases detected at 24 hours age through Early Neonatal Exam

Neonatal Disease	Group A	Group B	Odds of detection Group A	Odds of detection Group B	Odds Ratio
Hypoxic Ischemic Encephalopathy	3	18	0.029	0.148	0.14*
Cleft lip/palate	4	6	0.038	0.056	0.65
Heart murmur	0.5	16.5	0.005	0.138	0.05*
Poor feeding	16	27	0.134	0.197	0.51
Neonatal Sepsis	0.5	17.5	0.005	0.144	0.05*
Un-descended testis	0.5	2.5	0.005	0.024	0.33
Imperforate Anus	0.5	1.5	0.005	0.015	0.49

DISCUSSION

Our results indicate that odds of detection for selected neonatal conditions go up significantly with Early Neonatal Examination performed by healthcare providers trained in neonatal care. We found that the most dramatic difference occurred in cases of detection

of a heart murmur and neonatal sepsis. We searched for similar data in Pakistan but were unable to find studies similar to our study. However, Janota *et al* have given strong recommendation for performance of 24 hour neonatal exam in their study based on their findings in the NEOMOD study.[9] They found the most significant change in detection of heart murmurs. It can be explained easily if the differences between paediatricians and obstetricians regarding their respective indices of suspicion and background knowledge about congenital heart disease are taken into consideration. Neonatal exam at 24 hours dramatically increases the chances of detection of life threatening illnesses like neonatal sepsis and congenital cardiac disease.

A similar change is seen in odds of detection of Neonatal sepsis. Neonatal sepsis usually presents in a subtle way with reluctance to feed with or without fever, changes in sleeping pattern and excessive crying or lethargy. Although as neonatologists we train our staff to be vigilant towards these findings, however, it may be difficult for just any healthcare provider to be sensitive towards these signs and symptoms. Prevention and detection of neonatal sepsis is pinpointed as a major deficiency by Bimtta in their study of deficiencies in maternal and child health in South East Asia.[11]

The odds of detection of Hypoxic Ischemic Encephalopathy, HIE, went up by several times in our study. HIE remains the leading cause of preventable mental retardation in east as well as west.[5] These children are difficult to manage once spasticity sets in. It is extremely important to counsel families appropriately in time to prepare them for dealing with a possibly mentally retarded child.

We found a moderate increase in odds of detection for congenital anomalies like un-descended testis and imperforate anus. It may look like a modest change in comparison with other neonatal conditions included in the study but Odd's Ratios of 0.33 and 0.49 are significantly less than 1 indicating significantly higher chances of detection in the group of neonates that underwent Early Neonatal Exam. It is easy, therefore to imagine the consequences of missing even a single case of such problems. It is paramount that both these problems are detected promptly and referred for surgical correction as early as possible. Spot recognition and timely referral are of essence in such situations. A general consensus exists about the leading causes of infant mortality in Pakistan. As healthcare providers we know that intrauterine growth retardation, IUGR, early and late neonatal sepsis and preterm births are responsible for 60% of infant mortality seen in our country.[10]

We found a total of 84 cases with life threatening or potentially serious neonatal disease at 24 hours in Group B, [Table-1]. This proportion of abnormalities appears high compared to routine rates of detection in international literature. Reason being co-existent morbidities in neonates for whom paediatric team was called. 13 cases of sepsis out of total of 17 that were detected by the team were co-existing with a heart murmur, HIE and/or poor feeding. Similarly, poor feeding was present in all cases of cleft lip palate. While our results indicate a total of 84 cases detected through early neonatal exam, it is actually a detection of 84 abnormalities in a total of 48 neonates out of the 100 neonates selected for the study.

Early detection is the essence of correct management in medical care in general and in neonatal care in particular. Early neonatal exam by paediatric healthcare providers has been advocated since recognition of Paediatrics as a specialty separate from adult medicine.[5,7] WHO has comprehensive guidelines for prevention of several health disorders resulting in long term disabilities. Prevention of hearing loss is one such example that embodies the main idea behind several preventive strategies by WHO. World Health Assembly (WHA) passed a resolution in 1995 on the Prevention of Hearing Impairment urging member states to

> *"Prepare national plans for the prevention and control of major causes of avoidable hearing loss, and for early detection in babies, toddlers and children, as well as in the elderly, within the framework of primary health care."*

It is clear from the above resolution that the main crux of prevention of a life long disability such as hearing loss rests upon its detection in early childhood, even infancy. Neonatal exam at 24 hours of life conducted by trained paediatric healthcare providers is a recognized standard of care not only in developed world but in our fellow SARRC countries including Bangladesh, India and Sri Lanka, as well. Special scores are available and many early and late childhood outcomes are now based upon the initial 24 hour neonatal examination.[9]

Neonatal morbidity and mortality is influenced by prenatal, maternal, and foetal conditions and by circumstances surrounding delivery. Some of these conditions are preventable while some are not. It goes without saying that the obstetrician-neonatologist team has the most critical role to play in area of preventable neonatal morbidity and mortality.

CONCLUSION

Correct recognition and timely referral of all 'at risk' neonates is paramount for improving neonatal outcomes in any Mother and Child care centre. Close working relationship with and on call notification of paediatric services by Obstetrics Department is vital for any

hospital claiming to be 'Safe' for its patients especially the tiniest of patients.

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