

Assessment Of Follow Up Rate And Its Determinants Among Newborns Admitted In NICU In A Tertiary Care Hospital Of Coastal District Of Karnataka

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ABSTRACT:

High risk infants discharged from NICU are at risk of adverse neuro-developmental outcomes. Follow up (FU) rate in NICU ranges from 21% to 40%, the neuro-developmental impairment rates which ranges from 22% to 50% for the preterm and ELBW infants. This study is to assess the rate of NICU follow up and to determine the loss to follow up by educational intervention.

Objective and methodology: assess the follow up rates of neonates discharged from NICU, factors associated with follow up, effects of follow up after intervention. A non-randomised before and after comparative study, for a period of one year at a tertiary care centre at coastal district of Karnataka.

Results: 350 neonates admitted in the NICU for more than 72 hours were studied. Education intervention was used to assess the follow up rate after intervention.

49.72% visited the follow up clinic on day 8, 39.23% on day 30, 23.20% at 3 months and 14.92% at 6 months in the before intervention group. 44.38% came for follow up on day 8, 40.83% on day 30, 37.27% at 3 months and 16.57% at 6 months in after intervention group. After intervention the follow up rate improved significantly. The reasons for loss to follow up were asymptomatic baby, non-availability of convenient transportation, availability of local doctor, economic burden and working mothers.

Conclusion:

The follow up rate of new-born discharged from NICU was less than 50% both before and after intervention but the educational intervention was effective in improving the follow up.

Introduction:

Globally newborn health is now considered as high-level national priority. In spite of this, less is known about the course of common NICU diseases after discharge. The current neonatal mortality rate in India is 29 per 1000 live births. Due to advanced care, more and more extremely low birth weight infants are surviving, increasing the survival rate of these babies from 0 % in 1943–1945 to 34 % in 1987–1988 and 70 % in 1994. This in turn has increased the potential of having children with long term disabilities resulting in

better survival of high risk neonates but not decreasing the morbidity rate. [1-5]

High risk infants such as premature infants, very low birth weight (VLBW) infants and late preterm infants are associated with risks of adverse neuro-developmental outcomes including developmental delays, disability, cerebral palsy and are more prone to Cognitive, motor and functional impairments. The adverse impact of prematurity persists as children enter kindergarten, with former premature infants having lower scores on IQ tests and achievement tests compared with term

controls. Outcomes are worse for those with low socioeconomic status. [6,7]

Development of proper neonatal follow-up program can help in early identification of physical and developmental problems and hence helps in early intervention to prevent or minimize future handicaps and long term morbidity with expertise coordinated care of a multidisciplinary clinic. higher rates of neuro-developmental impairment were seen in those infants who were noncompliant with follow-up. [3,6,7]

The American Academy of Pediatrics in 2008, reaffirmed that “high risk infants should be enrolled in a follow-up clinic that specializes in the neuro-developmental assessment of high-risk infants” for standardized assessments at specific ages by specially trained Pediatric, psychologist and nurse practitioners in follow up clinics. [7]

Routine follow-up of high risk neonates discharged from neonatal intensive care unit (NICU), is now customarily followed at many centers. But recent large survey of directors of NICU FU clinics in the United States found that, despite the necessity of neonatal follow up, the most common FU rate in follow up clinic was only “21% to 40%.” This is particularly alarming given the high morbidity associated with poor follow up of high-risk babies. [7,8]

Very few studies were conducted on the ways to improve the follow up rates in NICU. This study was done to know the follow up rates of newborn admitted in NICU and also to know the effects of educational intervention by trained counselors on follow up.

Material and methodology:

A non-randomised before and after comparative study at Government Lady Goschen Hospital, Mangalore a tertiary care centre under PPP model in association with Kasturba Medical College Mangalore, for a period of one year.

- Inclusion criteria:
 - Neonates admitted in the NICU for more than 72 hours irrespective of the diagnosis after obtaining consent to participate in the study.
- Exclusion criteria:

- Major congenital anomalies including complex congenital heart diseases which are referred to higher center outside the district.

- Neonates that die in the hospital before discharge.

- Sample size- 160 (80+80) ⁽⁶⁾
 Formula used $N = \frac{[(Z\alpha/2PQ)+(Z\beta/P_1Q_1+P_2Q_2)]^2}{(P_1-P_2)^2}$
 $P = (P_1+P_2)/2$ $Q = (Q_1+Q_2)/2$
 $P_1 =$ Proportion of loss to follow up in control group (52)
 $P_2 =$ Proportion of loss to follow up in study group (27)
 $Q_1 = 100-P_1$, $Q_2 = 100-P_2$
- Study procedure: During the first six months of the study all the parents of neonates admitted in NICU were interviewed and the data was recorded in a pre-designed and pre-tested pro forma and follow up was done at 8days, 1, 3 and 6 months in neonatal follow up clinic once they are discharged as per the existing protocol. Neonates who did not turn up for follow up were called telephonically and asked for the reason and was noted.
- Further based on this data, after six months of the above pre intervention, parents were stressed on the importance of follow up of newborn admitted in NICU and their outcome. counselors of NICU were trained by the Investigator.
- Post intervention data was collected in a pre-designed and pre-tested proforma and follow up was done at 8days, 1, 3 and 6 months in neonatal follow up clinic once they are discharged.
- Neonates who did not turn up for follow up were called by the Investigator and telephonically asked the reason for poor follow up which was noted.

Statistical analysis: Descriptive statistics were calculated (means, std.deviation, and proportions). Further, chi square test was applied to compare two proportions. Statistical significance was set at 0.05% level of significance ($p < 0.05$).

Results:

Table 1: Follow up rate before and after intervention.

Follow up	Before intervention (n=181)	After intervention (n=169)	Total (%)
Day 8	90 (49.72)	75 (44.38)	157 (44.9)
Day 30	71 (39.23)	69 (40.83)	126 (36.0)
3 months	42 (23.20)	63 (37.27)	95 (27.1)
6 months	27 (14.92)	28 (16.57)	40 (11.4)

Of the 169 study participants in the after intervention group, 75 (44.38%) came for follow up on day 8 to follow up clinic, 69 (40.83%) of them visited the clinic on day 30, 63 (37.27%) at 3 months and 28 (16.57%) of them came at 6 months.

On analyzing the data with chi square it was seen that factors favoring follow up were, male baby,

those who had normal delivery, non-availability of local doctor, planned pregnancy, those satisfied with hospital services, whose parents had education of high school and above, whose mother was housewife and higher socio economic status and was statistically significant (p value <0.05).

Table 2: Follow up rate before and after intervention with respect to gender, mode of delivery, availability of health resources

Male gender	Before intervention (n=90)	After intervention (n=90)	P value
Day 8 (90)	44 (48.89)	50 (55.55)	0.37
Day 30 (71)	36 (40)	53 (58.88)	0.011
3 months (42)	21(23.33)	41(45.56)	0.0017
6 months (27)	15(16.67)	16 (17.78)	0.843
Normal delivery	Before intervention (n=71)	After intervention (n=68)	P value
Day 8 (90)	43 (60.56)	36 (52.94)	0.364
Day 30 (71)	36 (50.70)	37 (54.41)	0.66
3 months (42)	20 (28.17)	33 (48.53)	0.013
6 months (27)	10 (14.08)	14 (20.59)	0.31
Local doctor not available	Before intervention (n=37)	After intervention (n=25)	P value
Day 8 (90)	19 (51.35)	15 (60)	0.502
Day 30 (71)	18 (48.65)	16 (64)	0.233
3 months (42)	10 (27.02)	16 (64)	0.003
6 months (27)	4 (10.81)	12 (48)	0.0012

Table 3: Reasons for loss to follow up before intervention.

Reasons for loss to follow up before intervention	Day 8 (n=90)	Day 30 (n=71)	3 month (n=42)	6 months (n=27)
Parents felt the baby was doing well	56 (62.22%)	52 (73.24%)	31 (73.81%)	19 (70.37%)
Mother was not well/ lack of support from family	43 (47.78%)	30 (42.25%)	23 (54.76%)	13 (48.15%)
Hospital was far from their house and local doctor was available	32 (35.55%)	38 (53.52%)	36 (85.71%)	20 (74.07%)

Could not contact as the contact number changed	6 (6.67%)	8 (11.27%)	6 (14.29%)	4 (14.81%)
Economic burden	35 (38.89%)	39 (54.93%)	27 (64.29%)	15 (55.56%)
Convenient transportation was not available	18 (20%)	16 (22.53%)	13 (30.95%)	12 (44.44%)
Shifted the location	-	2 (2.82%)	5 (11.90%)	7 (25.92%)
Working mother	-	-	18 (42.86%)	11 (40.74%)

Table 04: Reasons for loss to follow up after intervention

Reasons for loss to follow up before intervention	Day 8 (n=75)	Day 30(n=69)	3 month(n=63)	6 months(n=28)
Parents felt the baby was doing well	41 (54.67%)	29 (42.03%)	19 (30.16%)	16 (57.14%)
Mother was not well/ lack of support from family	29 (38.67%)	21 (30.43%)	15 (23.81%)	9 (32.14%)
Hospital was far from their house and local doctor was available	35 (46.67%)	47 (68.12%)	49 (77.78%)	17 (60.71%)
Could not contact as the contact number changed	4 (5.33%)	6 (8.69%)	5 (7.94%)	6 (21.43%)
Economic burden	24 (32%)	22 (31.88%)	25 (39.68%)	11 (39.28%)
Convenient transportation was not available	15 (20%)	12 (17.39%)	9 (14.28%)	9 (32.14%)
Shifted the location	-	1 (1.45%)	2 (3.17%)	4 (14.28%)
Working mother	-	-	7 (11.11%)	10 (35.71%)
Doctor not available in NICU follow up clinic	30 (40%)	25 (36.23%)	21 (33.33%)	15 (53.57%)

Discussion:

In the present study there are 51.7% males and 48.3% females. 38.5% had normal delivery and 58.9% had cesarean section it's in concurrence with the study done by Patra et al in which 49 % were females and 51 % males. In their study cesarean sections were 59% and normal deliveries were 41%. It's also in concurrence with other Similar studies done by Fuller MG and Harmon SL et al[6,7,9].

In our study 59.1% of mothers were less than high school, 30.9% had high school education, 6.8% of them had pre university education and 1.2% had graduated and completed post-graduation. It's in discordant with the study done by Fuller MG, they had 15.5% mothers who had education less than high school, 27.8% had graduated high school, 24.6% had graduated college and 26.7% had a degree. Discordance may be due to higher literacy rate among developed countries. [6]

The follow up rate in our study before intervention on day 8 was 49.72%, day 30 was 39.23%, at 3 months was 23.30% and at 6 months was 14.92%. The rate after intervention was 44.38%, 40.83%, 37.27% and 16.57% on day 8, day 30, 3 months and 6 months respectively. In a similar study done in Chicago by Patra et al the follow up rate at 2-4 months before intervention was 67.75% and increased to 78% after intervention. Follow up rate in this study at 6-8 months before intervention was 57.25% and increased to 71.75% after intervention. In a study done by Harmon SL et al⁹ in University of Virginia of the 133 study families, 68.4% were compliant with follow up. This discordance may be due to more awareness in developed countries.

In the present study male gender, normal delivery, non-availability of local doctors, higher socioeconomic status, unemployed mother, higher maternal and paternal education were associated

with improved follow up rates after intervention. In the study by Fuller MG^{maternal} race of black, non-availability of health insurance, rural residence, household with single parent and weight <750g were associated with poor attendance for follow up. Another study done by Harmon SL in university of Virginia showed that the factors associated with noncompliance were maternal drug use, multiple gestation, female child, public insurance and distance of their residence from the hospital. [6]

A similar study done in Chicago by Patra et al⁷ showed Reasons for loss to follow up before and after intervention were refusal without reason 42% and 6.5%, change of contact 27 and 22%, transportation issue 9% and 5.5%, financial issues 3% and 25.5% and followed at other clinic 3% and 4% respectively. In their study reason for lost to follow up were low birth weight, multiple gestation, preterm gestation and elderly mothers. In the present study, the reasons for loss to follow up were parent's perception that the baby is healthy, mother's illness, economic burden, availability of local doctor, no convenient transportation, shift of location and working mother. It is in concurrence with the studies done by others like, Fuller MG et al Reason for missed follow up were 31.65% without any reason, 18.81% because they could not be contacted, 5.38% because the parents refused to come, 1.24% because of financial or insurance issues and 0.33% because of parental illness and also study done by Harmon SL in university of Virginia Reasons for not being compliant with follow up were distance from hospital (47.8%), travel expense (43.5%), working parent (43.4%) and insurance issue or the child looked healthy (78.3%).

Conclusion:

The present showed that the follow up rate improved in those who had male baby, those who had normal delivery, those who did not have a local doctor, those from higher socio economic status, babies whose father had higher education and whose mothers were housewives after intervention. The reasons like did not find the requirement, lack of family support and mother was working reduced after intervention and the follow up rate improved. This shows that the educational intervention was affective.

Recommendation:

- Educating the mother at the time of discharge from NICU should be made compulsory.
- NICU clinics should be opened in every city so that the follow up can be done at the nearby clinic.
- ASHA workers should also be educated so that they can mobilize those infants who have missed the NICU follow up during their house to house visit.
- Upgrading the primary health centers with availability of pediatricians.

Declaration:

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References:

1. Nagesh NK, Razak A. Current status of neonatal intensive care in India. *Global child health. Arch Dis Child Fetal Neonatal* Ed 2016;101:F260–F265. doi:10.1136/archdischild-2015-308169.
2. Andrews B, Pellerite M, Myers P, Hageman JR. NICU Follow-up: Medical and Developmental Management Age 0 to 3 Years. *Neoreviews* 2014;15:e123. DOI: 10.1542/neo.15-4-e123
3. Nair MKC, Jain N. Follow-up Studies – Beyond Survival. *Indian Pediatrics*. 2013; 50:830-831.
4. Gong A, Johnson YR, Livingston J, Matula K, Duncan AF. Newborn intensive care survivors: a review and a plan for collaboration in Texas. *Maternal Health, Neonatology, and Perinatology* (2015) 1:24. DOI 10.1186/s40748-015-0025-2
5. Follow-up Care of High-Risk Infants. *American Academy of Pediatrics*. 2004;114:1377. doi:10.1542/peds.2004-0866. Available at http://pediatrics.aappublications.org/content/114/Supplement_5/1377
6. Fuller M G. "Factors Associated with High Risk Infant Follow-Up Attendance" (2015). Dissertations. 22. <https://digital.sandiego.edu/dissertations/22>.

7. Patra K, Greene MM, Perez B, Silvestri JM. Neonatal High-Risk Follow-up Clinics: How to Improve Attendance in Very Low Birth Weight Infants. *e-Journal of Neonatology Research*. 2014;4 (1):3-13.
8. McCormick MC, Stewart JE, Cohen R, Joselow M, Osborne PS, Ware J. Follow-up of NICU graduates: why, what, and by whom. *J Intensive Care Med* 1995;10:213-225.
9. Harmon SL, Conaway M, Sinkin RA, Blackman JA. Factors Associated With Neonatal Intensive Care Follow-up Appointment Compliance. *Clinical Pediatrics*. 52(5) 389– 396. DOI: 10.1177/0009922813477237.