ORIGINAL ARTICLE

LINKING HOME BASED NEW BORN CARE TO THE EXISTING GOVERNMENT HEALTH SYSTEM IN TAMIL NADU - PILOT STUDY

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Abstract

National Rural Health Mission (NRHM) of India is taking various steps both at the community and institutional level to reduce neonatal mortality rate (NMR). Despite the various programs, provision of continuum of care for the neonates is a major challenge. To address the issue of care of neonates at home, the Gadcharoli study by Bang et al is a major breakthrough and paved the way for reducing NMR in developing countries. The feasibility of incorporating home based neonatal care (HBNC) in the health system without disturbing Integrated Management of Neonatal and Childhood Illness (IMNCI) is studied.

Aim: To develop HBNC package to suit the existing health care system of Tamil Nadu with referral linkage to neonatal intensive care unit (NICU).

Methods: The HBNC module was proposed by a team of experts considering the existing health care system in the intervention area. Two blocks in the Kanchipuram district of Tamil Nadu, South India were selected for the intervention from January – December 2011. HBNC volunteers were trained in the IMNCI based module. The HBNC team was linked to the NICU through separate phone line and neonates were transported by the neonatal ambulance team. Through private public partnership the EKAM Non-Governmental Organization (NGO) supported NICU facilities and hand in hand assisted the HBNC care in the villages.

Results: A population of 93,467 was covered and a cohort of 740 neonates were followed up in the community. Twenty one mothers who delivered low-birth weight babies were given Kangaroo Mother Care (KMC) in the villages under the supervision of HBNC volunteers. Twenty two neonates with danger signs were identified and transported by neonatal ambulance to the NICU facility. HBNC team supported the Primary Health Centre (PHC) activities and 883 children benefited.

Introduction

India has shown improvement in child survival over the past decades. The infant mortality rate (IMR) has declined from 159.3 in 1960 to 44/1000 in 2011. (2.2 points average annual decline). The reduction in neonatal mortality rate (NMR) contributed to almost half the rate of reduction in IMR. Neonatal mortality has declined from 47/1000 in 1990 to 32/1000 in 2010 (0.8 points reduction in the average annualized decline. (1) The child survival and safe motherhood program (CSSM) incorporated "Essential Newborn Care" as one of the main components in 1992. Later, the CSSM program got integrated into the Reproductive Child Health Program (RCH). (2) National Rural Health Mission (NRHM) of India is taking various steps both at the community and institutional level to reduce neonatal mortality. Janani Suraksha Yogna (JSY) a cash transfer initiative to promote institutional deliveries was initiated in 2005. Janani Sishu Suraksha Karyakram (JSSK) where maternity and newborn services are provided free of cost is being implemented from 2011. (3) Despite the various programs, provision of continuum of care for the neonates is a major challenge. Throughout Tamil Nadu there are a high number of institutional deliveries, the mother and baby dyad is at home after 48 hours of birth and the next contact is only during the next immunization visit. To address the issue of care of neonates at home, the Gadcharoli study by Bang et al is a major breakthrough and paved the way for reducing NMR in developing countries. (4) Community based interventions in resource poor settings were not supported by neonatal transport or neonatal intensive care facilities. (5, 6). The World Health Organization (WHO) model of Integrated Management of Neonatal and Childhood Illness (IMNCI) had been implemented in various states in India. The feasibility of incorporating Home Based New Born Care (HBNC) model in the health system without disturbing IMNCI has to be studied. (7) A pilot study was done in two blocks of Kanchipuram district, Tamil Nadu, South India to study the feasibility of adapting HBNC in the existing health system with referral linkage to neonatal intensive care unit (NICU).

Methods & Materials

This observational feasibility study (pilot study) was undertaken in two blocks in the Kanchipuram district, Tamil Nadu (TN), India. Manampathy block has a population of 60,813 and agriculture is the main source of income. Salavakam block has a population of 36,188 and the people work as agriculture laborers and factory workers in the nearby towns. The intervention period was from January -December 2011. The baseline data was collected by Village Health Nurse (VHN) along with the HBNC staff under the supervision of the Senior Health Nurse (SHN) in 57 villages. The Hand In Hand Non-Government Organization (NGO), already working in Kanchipuram district in the field of maternal and child care assisted and supervised the implementation of HBNC package. The minimum qualification of HNBC volunteer was 10th standard and they were recruited after consulting the local NGO. Ekam Oneness NGO supported newborn care by filling up the gaps in the health facility, mainly in the recruitment of nurses to NICU and maintenance of equipment through the Private Public Partnership of National rural Health Mission. Live birth, neonatal death and infant death were defined according to the international classification of diseases. (8) A team of experts consisting of public health specialists, NGO representatives and a nodal officer of the NICU at Chengalpattu medical College Hospital (CMCH) visited the Gadcharoli area to study the HBNC activities. The HBNC module was proposed by a team of experts considering the existing health care system in the intervention area (Table 1).

Table 1: Modifications of Home Based New Born Care (HBNC) (Gadcharoli) to Suit the Tamil Nadu Health System

	HBNC PROJECT (Gadcharoli)	**HBNC PROJECT Facility linked with Neonatal Transport –Chengalpattu**
Population	Tribal	Rural and Tribal
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Training module	HBNC module- Gadcharoli	IMNCI
Training	At SEARCH, Gadcharoli	Initial three days at CMCH. Follow up training and review at PHC / NGO center in the community – one day every month.
Medications	Gentamycin injection & cotrimoxazole given by the volunteer	No medications
Predominant Delivery	Home delivery	Institutional delivery
Birth asphyxia management.	Resuscitation	Nil
Minor illness	Managed by HBNC volunteer	Referral to PHC
Management of Newborn with danger signs	Advised referral or treated by HBNC Volunteer.	Referred to Health facility - Kanchipuram GH or NICU in CMCH.
Co-ordination with PHC activities	-	Vital statistics Vitamin –A campaign De-worming campaign. Health education for the mother and family.
Transport of Newborn from community to Health facility.	-	Neonatal ambulance with transport team.
Coordination with the Referral unit – NICU at CMCH.	-	To contact the HBNC coordinator at the referral unit regarding transport of newborn by phone. HBNC volunteer to visit the NICU and comfort the mother when the newborn is admitted at CMCH. Review of performance, problem solving and reinforcement of the training every month by the CMCH team.
Follow Up of High Risk Newborn Discharged from the NICU	-	Follow up of LBW newborns in the community, KMC carer Follow up clinic, ROP screening, Hearing evaluation etc.
INCENTIVE	Performance based incentive and discentive.	Performance based incentive. No discentive.

Note: NICU = Neonatal Intensive Care Unit, PHC = Primary Health Center, LBW = Low birth weight, KMC = kangaroo mother care, ROP = retinopathy of prematurity, CMCH = Chengalpattu medical College Hospital, IMNCI = Integrated Management of Neonatal and Childhood Illness, GH = Government hospital, NGO = Non-Governmental Organization

Modifications to the HBNC package were suggested by the expert panel

1. Training module : The TN health system cadres were trained in IMNCI module at Primary Health Centre (PHC) and Integrated Child Development Services (ICDS) centers. The referral units were trained in Facility Based Management of Neonatal and Childhood Illness (FMNCI). Hence, it was decided to adapt the IMNCI module. The NICU team at CMCH was to prepare the module in Tamil with modifications as suggested by the experts. This was to maintain uniformity of training to make communication easier between the HBNC volunteers in the community and the referral centers.

2. Management of neonatal illness : The team unanimously agreed that no injection or drug will be dispensed by the HBNC volunteers as in the Gadcharoli trial. (4,5) The HBNC volunteers will examine the newborn as per the IMNCI guidelines. For minor ailments, the newborns will be referred to the PHC/ Sub-center. Newborns with danger signs will be referred to the NICU in Government Hospital (GH) /

Chengalpattu Medical College Hospital. (CMCH).

3. Incentives : Incentives will be based on the performance of the HBNC volunteers, but no dis-incentives.

4. Incorporation of HBNC with the existing primary health care system: HBNC volunteers will refer to sub-center/PHC for minor illnesses. The volunteer will assist the VHN's activities during her visit to the villages i.e., immunization clinics, vitamin-A administration, de-worming, health education sessions, etc.

5. Neonatal transport to link the HBNC in the community to the referral unit at CMCH : To maximize the use of the transport team and to strengthen the referral linkages a separate out born unit was created at CMCH with support from NRHM to cater to the newborns referred from the community. Two neonatal ambulances supplied through the Tsunami Rehabilitation scheme to the Kanchipuram district were shifted to CMCH. The ambulance personnel were trained in neonatal transport at the Institute of Child Health, Chennai.

To overcome the manpower shortage, seven transport staff nurses from the PHCs were posted to care for newborns in the out born unit at CMCH.

A separate phone line was installed in the out born unit for the HBNC volunteers to contact whenever they identified any danger sign.

6. The referral process from the community (Fig1) : The HBNC volunteers were informed about the HBNC phone number in the out born unit. The HBNC volunteers were encouraged to contact the HBNC coordinator at CMCH out born unit. After receiving the phone call from the HBNC volunteer, the coordinator would inform the NICU doctor who would advise regarding the transport either to GH or to CMCH. The transport team would communicate with the NICU team at CMCH and they would be guided regarding the treatment during transport. The NICU team kept the bed/ventilator ready to receive the newborn being transported from the community. After treating the neonate in NICU, the HBNC coordinator would contact the volunteer at the time of discharge and inform about the follow up.

Figure 1: The referral process from the community

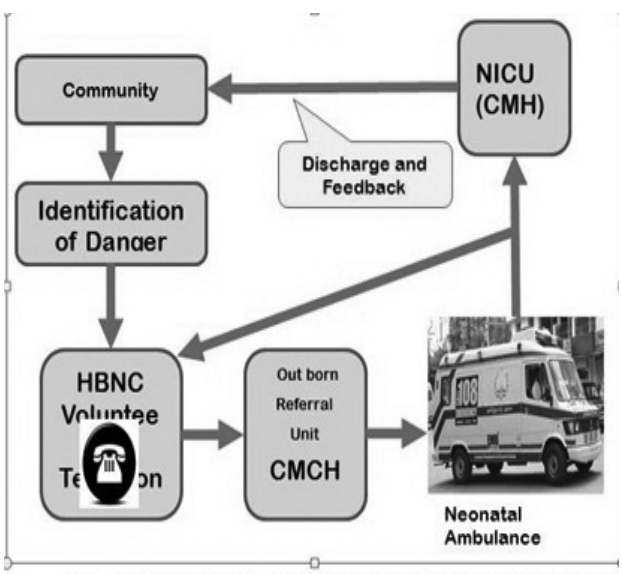

Fig1 LINKING HBNC VOLUNTEER (COMMUNITY) TO NICU AT CMCH

7. Follow up of high-risk newborns by HBNC volunteers in the community : Whenever a newborn treated at NICU was discharged, the HBNC coordinator at CMCH informed the HBNC volunteer about the newborn and the follow up advice was given as per the protocol. The HBNC volunteers visited the high-risk newborns in the community and advised regarding breast feeding and KMC. The HBNC volunteers motivated the mothers to bring the newborns for the follow up clinic for screening for retinopathy of prematurity (ROP), hearing evaluation, etc. When danger signs were identified they were referred to the health facility.

Data Collection and Analysis: The HBNC volunteers assisted the VHNs in collecting the data. The data regarding delivery, transport, referral and death were collected every month. The Hand in Hand NGO maintained a separate Vital Events Registry and they monitored the data collection. Any discrepancy in reporting was brought to the notice of HBNC coordinator at CMCH and was cross-verified at the community by the supervisors of the Hand in Hand NGO. The cause for mortality was ascertained from the death certificates from the health facility and by verbal autopsy.

A descriptive analysis was performed by calculating the proportions using STATA version 7.

Results

A population of 93,467 was covered. HBNC volunteers visited the homes after institutional delivery and followed a cohort of 740 neonates in the intervention area. Twenty one mothers who delivered low-birth weight babies were cared in the villages. KMC was given under the supervision of HBNC team. To sensitize the community regarding child care, the HBNC volunteers assisted the VHNs from PHCs and 883 infants benefitted by Vitamin A campaign and de-worming sessions. In the Manampathy block, 302 health education meetings were conducted and 4,477 participants attended the meetings. In the Salavakam block, 222 meetings were conducted with 3,105 participants. The volunteers identified 22 newborns with danger signs and contacted the HBNC coordinator in CMCH. The neonates were transported by neonatal ambulance to the NICU. Diagnosis was pneumonia in 7 (32%), diarrhea in 4 (18%), convulsion in 3 (14%), jaundice in 3 (14%), asphyxia in 1 (4%), congenital heart disease in 1 (4%) and 3 (14%) had miscellaneous problems at the referral centers. Twenty infants (91%) of the referred neonates were treated and followed up in the community and 2 infants (9%) died in the health facility. Analysis of the place of delivery and IMR reveals that none were delivered at home, all were at the health facility. In the Manampathy block there were 814 live births and 40 Infant deaths during the base line period (2010).

During the intervention period (2011) there were 711 live births and 18 infant deaths. The Infant mortality showed a statistically significant reduction from 49/1000 live births (base line) to 25/ 1000 live births intervention period. (p.015). In the Salavakam block there were 542 live births and 18 infant deaths during the base line period (2010). During the intervention period there were 389 live births and 13 infant deaths. The IMR showed statistically significant reduction from 37/1000 live births from the base line to 33/1000 during the intervention period (p=.001). The causes of death in both the blocks are depicted in table 2.

Table 2: Causes of infant mortality

2011	MANAMPATHY n (%)	SALAVAKKAM n (%)
Cause of death		
Pre-term birth complication	11 (61%)	5 (38%)
Asphyxia	2 (11%)	0
Congenital Abnormalities	1 (6%)	4 (31%)
Pneumonia /Respiratory distress syndrome	4 (22%)	2 (15%)
Others	0	1 (8%)
Place of Birth and Infant Mortality		
Medical College	9 (50%)	4 (31%)
District Hospital	4 (22%)	0
Primary Health center (PHC)	3 (17%)	4 (31%)
Private hospital	2 (11%)	5 (38%)
Home	0	0
Place of death & Infant Mortality Rate (IMR)		
Medical college	14 (78%)	7 (54%)
District Hospital	0	0
PHC	0	0
Private Hospital	1 (5.5%)	1 (8%)
Home	2 (11%)	5 (38%)
Transport	1 (5.5%)	0
Time of death & IMR		
Early Neonatal Death	13 (72%)	5 (39%)
Late Neonatal Death	2 (11%)	6 (46%)
More than 28 days	3 (17%)	2 (15%)
Gender Wise Mortality		
Female	11	3
Male	7	10
Birth weight and IMR		
Very low birth weight	5 (28%)	1 (8)
Low birth weight	9 (50%)	4 (31)
>2500 grams	4 (22%)	8 (61)

Discussion

The Millennium Development Goals (MDG)-4 for India aims for a two thirds reduction in IMR from 1990 level of 84/1000 live births to 28/1000 live births by 2015. (1) Community based interventions have shown to play a major role in resource limited settings. (5-7,9-12). The work in Gadcharoli paved the way for community care of the newborn by trained community health workers through regular home visits and they were also trained to treat infection under supervision. (4-7) Systematic review by Gogia et al supports the role of health care by the community workers in reducing neonatal mortality in areas with high neonatal mortality. (13) It shows that in India after the advent of the cash incentive scheme for institutional delivery (Janani Suraksha Yojana) maternal parameters like institutional delivery, safe delivery by skilled attendance has increased but 46% of the mother stay for less than or equal to one day at the health facility after child birth. (14) The mother baby pair is sent home early, majority of neonatal deaths occur at home due to lack of health personal in the village to identify danger signs, unskilled neonatal care and absent or sub optimal transport system. Only 22.2% of neonates die after getting treatment from the health facility. (13) During the study period the interventional areas in the feasibility trial of Chengalpattu had 98% institutional deliveries. The mother baby pair was discharged after 48 hours in case of normal delivery and after 8 days after caesarean section.

The community based interventions were in the form of mobilization of community support, home visitation by the community health workers and Home Based Newborn care and treatment. (5-7,9-12,15-18)Community mobilization was implemented by Jaiko, Manandhar and Bhutta. (9,10,18) Along with community mobilization, home visitation and treatment of the newborn was by Bang, Bhutta (Pakistan) and Baqui. (4-7,15,19) The review of community based newborn care shows that the relative risk for reduction of neonatal mortality is similar in both interventions i.e. home visits with or without community mobilization vs community participation and learning. The community based trials covered a population ranging from 45,000-1,300,000: with the baseline neonatal mortality ranging from 24.8 to 57.7 per 1000 live births. (7,13,15) The Chengalpattu feasibility trial covered a population of 60,813 in Manampathy and 36,188 in the Salavakkam blocks. The Base line NMR was 49 per 1000 live births in Manampathy and 39/1000 live births in Salavakkam. For a population of 5000 one village health nurse was posted and one HBNC volunteer was appointed to assist taking into account the area covered. Ratio of health worker to the population varied between 680 to 3,700 in the Chengalpattu trial.

Number of home visits by the health workers influence the difference in neonatal mortality reduction. The number of postnatal visits varied between 1-5 in all trials, the Bang trial with the most number (9-14) of home visits had a great reduction NMR and the trail by Baqui et al with the least number of visits show less effect on NMR (4-7,9-12,15-17,19) The trial at Chengalpattu had community mobilization meetings once in a month and home visitation as per IMNCI guidelines.

The Gadcharoli trial by Bang treated neonates with clinical signs of sepsis with syrup co-trimoxazole twice a day for seven days and injection gentamycin (5mg twice daily for preterm babies with birth weight <2500gms; 7.5 mg twice daily for 7 days for full term babies or those with weight > 2500gms). (7). Baqui et al used daily dose of injection procaine penicillin and gentamycin once a day for ten days. (19) The Gadcharoli trial documented reduction in cause specific neonatal mortality (CSNMR), due to sepsis was very striking 24.7 points or 90% explaining 67% of the total reductions in NMR. The management of sick newborns prevented 25 deaths per 1000 live births in preterm neonates, 15 in sepsis and 12.5 in asphyxia and 7.2 in IUGR. (4-7) The HBNC package at Chengalpattu did not use any medication for neonates, the HBNC volunteers were advised to consult the Sick Newborn Care Unit (SNCU) over phone when a danger sign was identified and refer through 108 ambulance. During the intervention period 98% of the referred neonates to health facility survived. The high survival rate of the neonates is mainly due to the good transport system and the upgradation of the sick newborn care facilities at the government health system.

Limitations of the study

The duration of the pilot project was one year. The project could not be continued due to lack of funds. Accredited Social Health Activist (ASHA) recruitment has not taken place in the Kanchipuram district, hence HBNC volunteers could not get intergrated into the government health system. Private care providers were not involved in the study. They did not use the neonatal ambulance which was detrimental to the health of newborns in the Salavakkam block. The minimum qualification of HNBC volunteer was 10th standard, hence the nomodic tribes were excluded during the recruitment process. The tribe refused to accept any form of treatment from the health system.

Conclusion

Home Based Newborn Care (HBNC) is feasible in places with high institutional deliveries, where the mother baby dyad can be followed up after discharge. HBNC can be integrated into the existing health care system where the volunteers can play a pivotal role in linking the community to the Sick Neonatal Care units (SNCU) at the referral units. Follow up of the discharged neonates from the SNCU can also be achieved by the HBNC volunteers. Coordination between the community and facility based workers and the transport team can enable sharing of the work load and optimal service utilization.

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