



Newborn Stabilization Units (NBSUs) Developing Implementation Models

PROCESS DOCUMENT

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Acronyms

AD	Aspirational District
CHC	Community Health Center
DTC	District Technical Consultants
FBNC	Facility Based Newborn Care
F-IMNCI	Facility Based Integrated Management of Neonatal and Childhood Illnesses
FPC	Family Participatory Care
FRU	First Referral Unit
GOI	Government of India
HR	Human Resource
I/C	In Charge
IEC	Information, Education and Communication
IMNCI	Integrated Management of Neonatal and Childhood Illnesses
INAP	India Newborn Action Plan
LAMA	Left Against Medical Advice
LBW	Low Birth Weight
MNHRC	Maternal Newborn Health Resource Center
MO	Medical Officer
MOHFW	Ministry of Health & Family Welfare
MOIC	Medical Officer In-charge
NBCC	Newborn Care Corners
NBSU	Newborn Stabilizing Unit
NHM	National Health Mission
NSSK	Navjat Shishu Suraksha Karyakram
OT	Operation Theatre
PIP	Program Implementation Plan
RW	Radiant Warmer
SDH	Sub Divisional Hospital
SN	Staff Nurse
SNCU	Special Newborn Care Unit
TOT	Training of Trainers
USAID	United States Agency for International Development

Executive Summary

Newborn Stabilization Unit (NBSU) is a vital public health facility for newborn care, at the sub-district (CHC/FRU) level. Envisaged as intermediary care units nearer to the community, NBSUs can play a major role in improving newborn survival and decongesting Special Newborn Care Units at district hospitals by freeing up for the more severe cases. NBSUs remained poorly operational due to lack of training guidelines, human resource and equipment.

Vridhhi project demonstrated an implementation model to revitalize NBSUs in aspirational districts of 4 states; Jharkhand, Uttarakhand, Punjab and Haryana. In consultation with the state governments, a rapid gap assessment of NBSUs was done in first quarter of 2018. This formed the basis of selecting 15 NBSUs for the intervention and moving the state to provision HR, equipment and infrastructure as per Gol operational guidelines.

A three-day training package was developed for NBSU staff by the project in collaboration with Ministry of Health and Family Welfare, Government of India including manuals for participants and facilitators. *Vridhhi* and national experts trained the state teams. Staff from the selected 15 NBSUs received three-day training consisting of interactive lectures, skill stations and clinical visits to newborn units in third quarter of 2019. As the NBSUs became operational they started admitting newborns for phototherapy and graduated to admitting newborns for feeding and warmer support over time. Importantly the NBSUs began stabilizing newborns before referral to higher centers/SNCUs. *Vridhhi* District Technical Officers followed up and handheld

NBSUs staff. In Jharkhand state mentors of Maternal and Newborn Health Resource Center established at RIMS, Ranchi supported NBSUs to improve their performance. During the COVID-19 pandemic digital platforms Zoom and WhatsApp were used to continue providing support to the NBSUs.

State governments of Jharkhand and Haryana requested *Vridhhi's* technical support for scaling up NBSUs to other FRUs. *Vridhhi's* support mainly included trainings and documentation. Responding to request from the NHM - Government of Assam, *Vridhhi* conducted a rapid assessment of NBSUs in the state in last quarter of 2020 and the trainings are planned in first quarter of 2021.

Increasing awareness of newborn care resulted in a rise in newborn hospitalization. Often SNCUs are filled with sick but stable newborns who could be managed at NBSUs. Thus, it is imperative to operationalize NBSUs in all the districts to decongest SNCUs; assess, triage and stabilize newborns before referral, and thereby improve survival of newborns.

Gol has adopted *Vridhhi's* training package for NBSUs with minor modifications. Most of the state's plan to operationalize their NBSUs and have started mobilizing resources through the PIPs.

Background

Newborn care - a national priority, is reflected in Government India's (GoI) efforts to strengthen newborn care and accelerate pace of reducing Newborn Mortality Rate (NMR). The Facility Based Newborn Care (FBNC) guidelines introduced by GoI in the year 2011 provided directions on appropriate management of small and sick newborns at District Hospitals (DH) and all delivery points. A three-tier structure was proposed; the first level of care called Newborn Care Corner (NBCCs) is located in every Labor Rooms (LR) and maternity Operation Theatres (OTs) and aims to provide immediate care to all newborns who require basic resuscitation and thermal care. The second level of care called Newborn Stabilization Units (NBSU) is located at the block level facilities to manage newborns who are sick but stable. NBSUs are responsible to stabilize a sick baby before referring to a higher care center and being located at block level brings care nearer to homes/villages of sick babies. The third level of care, the Special Newborn Care Units (SNCUs) located in district hospitals, targets the Very Low Birth Weight (VLBW) newborns below 1800 grams and/or those suffering from other serious conditions.

In India, NBSUs have remained the weak link in the continuum of facility based newborn care from NBCCs at delivery points to the SNCUs at district hospitals¹. Various assessments by the GoI and others have shown that while operationalizing NBCCs and SNCUs was prioritized, NBSUs were neglected during planning and thus poorly implemented. SB Neogi et al concluded that the strengthening of level I &



Low birth weight baby placed in Radiant Warmer at NBSU

II units can impact the survival of Low Birth Weight (LBW)/VLBW babies².

The challenges in strengthening NBSUs were inadequate and untrained Human Resource (HR), equipment, and monitoring & review mechanisms, further complicated by a lack of understanding of the significance of NBSUs in a scenario where both NBCCs and SNCUs are functioning properly. The launch of the India Newborn Action Plan (INAP) and subsequent state specific newborn action plans has changed this by emphasizing the importance of strengthening the NBSUs. States now include NBSUs in their annual Program Implementation Plans (PIP) and have identi-

¹ https://www.newbornwhocc.org/SOIN_PRINTED%2014-9-2014.pdf

² <https://www.nature.com/articles/jp2016183>

fied separate space for NBSU and have installed essential equipment. To achieve a fully functional status NBSUs will need adequate numbers of trained HR, functional equipment, linkages with delivery points & community and referral facilities. A critical challenge in the operationalization of NBSU has been the non-availability of a training package addressing the needs and functions of NBSU. General-

ly staff posted in NBSUs have been trained for SNCU or F-IMNCI.

States struggling to achieve their FBNC goals vis-à-vis NBSUs requested for technical assistance. The USAID supported *Vridhhi* project responded with a plan to demonstrate an implementation model to revitalize NBSUs and help states to translate policy into action.

Process for Operationalization of NBSUs

The implementation models for operationalizing NBSUs were initiated in Aspirational Districts (AD) of states; Jharkhand, Uttarakhand, Punjab and Haryana as part of the support to the aspirational districts program.

NBSUs deliver first level of care under the FBNC framework. According to the FBNC guidelines the essential requirements for an NBSU to be considered functional are:

- Should be in proximity of the maternity ward to provide care to sick and low birth weight

newborns for short periods.

- Would manage low birth weight infants ≥ 1800 grams - provide phototherapy, thermal care using radiant warmer and feeding assistance as needed; stabilize and refer sick or VLBW infants; and offer referral services.
- Should have a staff of one Medical Officer (MO) and four Staff Nurses (SN); four beds, at least four radiant warmer units and two phototherapy units.

Steps in Operationalization of NBSUs

The key steps in the process for revitalizing the NBSUs were identified as follows:

- Baseline gap assessment of NBSUs
- Selection of NBSUs for operationalization
- Filling the gaps - HR, Equipment & Infrastructure
- Capacity building
- Strengthening documentation in NBSUs
- Mentoring of NBSUs
- Monitoring and feedback



Figure 2: Steps to Operationalize NBSU

Baseline Gap Assessment of NBSUs

The project undertook a baseline assessment of 48 NBSUs in 21 aspirational districts of four states in consultation with the states in the first quarter of 2019. The assessments were

done in 16 districts of Jharkhand (Out of 19 aspirational districts), 2 aspirational districts of Uttarakhand & Punjab and one of Haryana, state wise details mentioned in Table 1.

Table 1. State Wise Number of NBSUs in which Gap Assessment Conducted

STATE	NBSUs IN AD	GAP ASSESSMENT CONDUCTED	SELECTED FOR IMPLEMENTATION
Jharkhand	32	16	05
Uttarakhand	10	2	04
Haryana	3	2	03
Punjab	3	1	03
Total	48	21	15

Assessment tools

Vridhhi developed a checklist for gap assessment in NBSUs and agreed on this with respective state officials.

In addition to the essential requirements of human resource, infrastructure and drugs & supplies, the gap assessment study checklist also included certain desirable elements as, resources required for giving Kangaroo Mother Care (KMC) and Family Participatory Care (FPC). The checklist was pretested in 5 NBSUs and finalized for use.

District Technical Consultants (DTCs) of project team with support of the program managers and facility in-charges gathered information using the checklist. A simple excel tool was developed for data entry from the checklist. The project team used this to analyze the data and prepare a report for each state.

SELECTION OF NBSUs

Vridhhi in consultation with respective state governments selected 15 NBSUs for the inter-



Mothers at NBSU being trained on Family Participatory Care practices

vention guided by the gap assessment findings. The main considerations were – availability of adequate staff (4 staff nurses and 1 MO) or potential to fill the vacancy within a given timeline and allocate space for NBSU, because addressing these gaps required multiple levels of inputs and decisions.

Jharkhand

In Jharkhand 32 NBSUs in its 19 aspirational districts were assessed for baseline. Two of these 32 facilities (FRU Manoharpur in West Singhbhum and CHC Kathikund in Dumka) were selected as they had the requisite human resource - 1 MO and 4 SN. The remaining NBSUs were selected considering local leadership's commitment for strengthening NBSUs, and responsiveness to advocacy. For instance, the NBSU in Thakurgangti in Godda had no MO and only one SN but the MOIC of the facility demonstrated a strong commitment to start the NBSU by deputing MO and SNs for the facility. In Garwah the project's district team supported civil surgeons to nominate - one MO for Nagaruttari. Thus, 5 NBSUs were identified for the intervention.

Uttarakhand

In Uttarakhand, 2 NBSUs were selected from each of the 2 aspirational districts; Haridwar & Udham Singh Nagar. NBSUs in Community Health Center (CHC) Laksar & CHC Bhadara-bad, in Haridwar had 3 SNs each but no MO. NBSUs in Sub Divisional Hospital (SDH) Kashipur & CHC Kitcha in Udham Singh Nagar had 4 SNs each. Only CHC Kitcha had a MO. However, before training commenced MOs were posted at CHC Laksar, CHC Bhadrabad & SDH Kashipur.

Punjab

In Punjab, the assessment findings revealed that there was no separate space for NBSUs in any of the CHCs visited. The Government was very keen to start 3 NBSUs- in CHC Guru Harsahai, and SDH Zira in Ferozepur district and CHC Kot Ise Khan in Moga district. NHM fulfilled the criteria of separate space for NBSU, purchased equipment and placed staff to manage the NBSUs.



Newborn at NBSU Punhana CHC, Mewat District in Haryana

Haryana

The state of Haryana has only one aspirational district, Mewat with 3 NBSUs - CHC Nuh, CHC Punhana and CHC Ferozepur Jhirka. These three were selected for implementation. At baseline these facilities did not have any designated medical officer. The district filled up all the vacancies and purchased the required equipment for the 3 NBSUs before the training started in October 2019.

A total of 15 NBSUs in aspirational districts were selected 5/32 in Jharkhand, 4/10 in Uttarakhand, 3/3 in Haryana and 3/3 in Punjab.

FILLING THE GAPS: HR, EQUIPMENT AND INFRASTRUCTURE

The NBSU guidelines have defined the essential requirements of human resources, infrastructure and equipment for an NBSU to be considered operational.

Human resource – 4 staff nurses and 1 medical officer.

Infrastructure – a minimum space of 200 sq ft to accommodate at least 4 radiant warmers/ beds.

Equipment, supplies and drugs per newborn cases have also been defined.

The gaps identified in the baseline assessment were discussed with the selected facilities and district authorities. Human resources and essential infrastructure/space gaps were addressed even before the capacity building started. During trainings; Information, Education and Communication (IEC) materials and record keeping tools were distributed to all the selected 15 NBSUs. Equipment and supply gaps were filled up after the training. Gaps identified and action taken to address them have been detailed in Annexure 1.

Advocacy at local level was effective for mobilizing human resources for NBSU: For instance in Thakurgangti 2 of the 3 staff nurses posted at NBSU were deputed to the district hospital. Sustained advocacy with district health officials yielded results and the 2 staff nurses were brought back to the NBSU. Similarly, Nagar Uttari NBSU had 3 staff nurses but no medical officer, *Vridhhi* team convinced the MOIC of the facility to take charge of the NBSU.

CAPACITY BUILDING

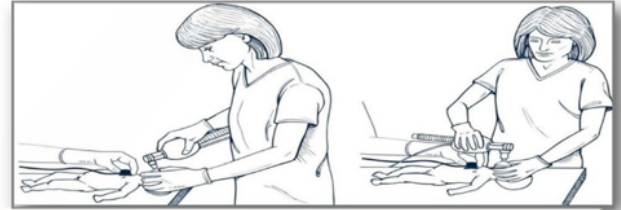
Capacity building was central to the intervention and encompassed a range of activities discussed below:

Developing NBSU Training Package

The biggest bottleneck in capacity building of NBSU staff was non-availability of any training



NAVJAAT SHISHU SURAKSHA KARYAKRAM (NSSK)
2020



BASIC NEWBORN CARE AND RESUSCITATION

Ministry of Health & Family Welfare
Government of India
New Delhi

Navjaat Shishu Suraksha Karyakram (NSSK) 2020

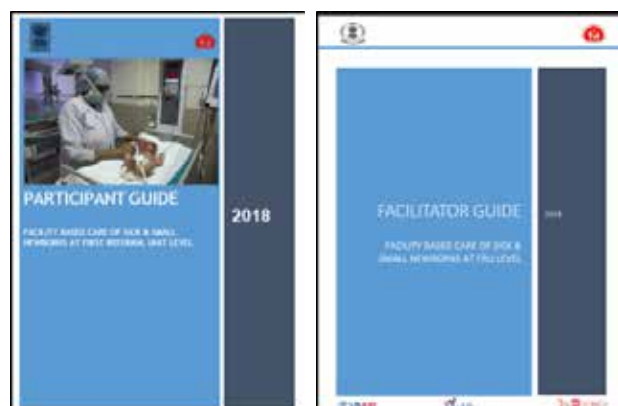
module and guideline addressing their needs and functions. The Navjat Shishu Suraksha Karyakram (NSSK), includes two-day training on essential newborn care and newborn resuscitation for operationalizing NBCCs; and Facility Based Newborn Care, recommends a four-day training followed by one week observer-ship for operationalizing SNCUs. The eleven-day F-IMNCI training developed for the medical officers at CHCs to manage newborn and childhood illnesses was being used for NBSUs in the absence of a specific training package. This longer duration training along with its comprehensive course material was difficult to organize and included content for older children which was not relevant to the functions of NBSU.

As the focus shifted on operationalization of NBSU, the lack of guidance for NBSUs were highlighted. Ministry of Health and Family Welfare (MoHFW), GoI requested *Vridhhi* national technical team to address this gap and develop a training package for NBSUs.

Vridhhi proposed a three-days skill-based training that included classroom teaching, hands-on practice on mannequins and clinical practice in facility for practical experience. Once

the training curriculum and design was agreed upon with Gol, Vriddhi national technical team developed the training package for NBSU. The training package included participant module, facilitator's manual and protocol posters.

Using the new training package, Vriddhi facilitated and trained 127 staff from 15 targeted NBSUs of 4 states between May - November 2019. State-wise training output is summarized in table 2.



Participant Guide & Facilitator Guide for FBNC at FRU level

Table 2. State Wise Training Participants

STATE	DATE OF TRAINING	NUMBER OF PARTICIPANTS			
		STAFF NURSES	MEDICAL OFFICERS	PEDIATRICIANS	OTHERS
Haryana	9-11 Oct. 2019	16	12	1	1
Punjab	10-12 Sept. 2019	12	16	0	0
Uttarakhand	16-18 July 2019	10	1	11	0
Jharkhand (Batch 1 & Batch 2)	Batch 1 (21-23 May 2019) Batch 2 (23-25 Nov 2019)	34	10	3	0
Total		72	39	15	1

Training Methodology

The training methodology was based on adult learning principles, and aimed to help participants put their knowledge to practice through the following:

- Using a “newborn centric approach” instead of disease centered training
- Simulating NBSU setting to create a real life scenario for action
- Simplifying complex science to doable steps without losing accuracy
- Building confidence by allowing hands on clinical practice
- Sustaining interest by complementary audio-visual training modules
- Promoting incremental learning by building on previous knowledge

A variety of training methods were used - mini

lectures, module reading, drills and exercises, videos, skills stations for demonstration & practice as well as clinical practice. For skill stations, the participants were divided in smaller groups of 4-6 participants with one facilitator.

Developing IEC

A set of 4 protocol posters were developed (Annexure 3) to be used as job aids. These were used during the training. The protocol posters for the facility covered; admission criteria, drug dosage schedules, phototherapy guidelines, breast feeding and assisted feeding guidelines, fluid therapy guidelines. These posters were to be displayed in the facility for easy reference at the time of need. Table 3 lists the protocol posters developed.

Table 3. List of Protocol Posters Developed

LIST OF PROTOCOL POSTERS	
1	Criteria for Admission to NBSU
2	Clinical Assessment and Emergency Management
3	Treating Small and Sick Newborns - Drugs and Dosages
4	Fluids and Feeds for Small and Sick Newborns

The training emphasized referral protocols and stabilizing the neonate before referral. Standard referral slips were also provided during the training. Videos on Family Participatory Care were distributed for use in the NBSUs.



Staff nurse Geeta participates in the first training of trainers in Ranchi, Jharkhand

Strengthening Documentation in NBSUs

Except for the GoI monthly reporting format for NBSUs, there were no other standard registers and records for the NBSUs. As a result the NBSUs created different formats for recording at their level.

Vridhhi addressed this gap by developing simple user-friendly set of documentation tools including - case sheets, referral slips and dis-

charge slips for NBSU; daily monitoring sheets to record nursing care during hospital stay (Annexures 4-7), prototype for admission register to capture basic details of the newborns admitted, diagnosis, and duration of stay and outcome for the newborn (Annexure 8). The admission register is aligned with the monthly reporting format to facilitate the compiling of the monthly report.

Mentoring and Additional Support to NBSUs

Post training, *Vridhhi* state and district team mentored the selected NBSUs staff during follow up visits. They used these visits to reinforce skills, and examine records, case sheets and support services like infection prevention etc. The monthly report was jointly reviewed with the NBSU facility team to assess the indicators that were doing well and develop plans for quality improvement of indicators that were lagging.

Support was multi-layered - staff were encouraged to use equipment; program managers were supported to provision equipment; additional need-based training sessions were organized.

Building staff confidence to practice newly learned skills

Initially the admission rates were very low and staff nurses were hesitant to manage sick/

LBW newborns at NBSU. They were encouraged to start phototherapy and stabilize newborns before referral and generally to practice skills acquired during training. Gradually, the number of admissions started improving. Thereafter, the challenge was to improve the quality of care to address issues of duration of stay and their outcome.

Advocacy for Gap filling

In Punjab admissions in NBSUs did not improve after training and remained low. During follow up site visit *Vridhhi* team observed that the staff deputed in NBSUs had additional duties in pediatric ward and labor room. Sustained advocacy at all levels -facility, district and state bore results and the staff nurses were allowed to work only in NBSUs. As a result the admissions in NBSUs gradually picked up.

In Jharkhand, the admissions picked up and the NBSUs started reporting from July 2019 onwards, but supply and equipment gaps were filled slowly over the time. Advocacy and review at state and district helped to overcome these challenges.

Observer-ship posting of NBSU staff in SNCU

In Mewat district of Haryana, after recognizing that the staff needed more clinical hand holding assistance to become confident for admitting and managing sick newborns, *Vridhhi* team convinced the district authorities for observer-ship posting of NBSU staff in the SNCU. The staff of 3 NBSUs were posted in the district SNCU on rotation basis for 2 weeks, this helped to build their skills and confidence.

Introducing Family Participatory Care in NBSUs



Staff nurse at NBSU encourages mother to provide care to her newborn

District Mewat proactively strengthened NBSUs and wanted to do more, therefore NBSU staff of the district participated in the district level training for Family Participatory Care. The district equipped the three NBSUs for FPC, installed television for video sessions and met requirements for Kangaroo Mother Care. Since November 2019 all 3 NBSUs have been implementing and reporting on FPC to the state.

Haryana is the first state to scale up FPC in NBSUs and presented their experience and learnings as best practice in National Innovation workshop 2019.

Whatsapp group for sharing information and handholding support

In addition to mentoring visits, each state has formed a NBSU Whatsapp group. The Whatsapp group has become a platform for sharing knowledge, case studies of managing small and sick newborns, pictures of improvements in infrastructure of NBSUs and giving feedback on practices in NBSUs. This is also used to share monthly feedback on reporting.

Monitoring and Feedback

Vridhhi developed a monitoring framework for NBSUs. This included developing standard recording and reporting formats, which were introduced to the NBSUs during the trainings. Joint supportive supervision visits by the state and *Vridhhi* district team helped to improve the quality of care and recording practices in NBSUs. *Vridhhi* district team also followed up with the NBSUs for streamlining reporting and documentation.

Monthly reports were submitted to district with a copy to Child Health (CH) division of state NHM. The analyzed NBSU data has been regularly shared with the states to facilitate state level actions/support.

NBSU MONITORING INDICATORS

Process Indicators

- Proportion of NBSUs with adequate staff (4 SNs and 1 medical officer)
- Proportion of staff trained on NBSU package
- Percentage of NBSUs with 4 functional radiant warmers

Output indicators

- Number of admissions per month in the NBSU
- Proportion of out-born admissions
- Proportion of Low Birth Weight admissions

Quality output Indicators

- Proportion of admissions with stay > 24 hours

Outcome Indicators

- Outcome of newborns admitted –
 - Number of deaths
 - Percentage of newborns discharged successfully
 - Percentage of newborns referred
 - Percentage of newborns Left Against Medical Advice (LAMA)

The output of regular review and monitoring is reflected as changes in the 15 intervention NBSUs:

- 15 NBSUs in four states have trained medical officers and staff nurses.
- 15 NBSUs equipped with- radiant warmers, phototherapy units, digital clinical thermometers, oxygen hood with nasal prongs, suction/syringe pump, neonatal laryngoscope, pulse oximeters, glucometers, multipara monitors as per need.
- 15 NBSUs report monthly to their respective states. The reports are also complete and on time.

During pandemic monitoring support was continued using digital platforms. The state teams sensitized the NBSU staff on Infection Prevention Practices and COVID-19 Prevention measures to be followed strictly. Also, the FPC sessions which were discontinued due to restriction on gatherings were resumed with social distancing and other precautionary measures being followed.



Mentoring visit being conducted at NBSU of CHC Bahadrabad in Haridwar, Uttarakhand

Results and Achievements

CLINICAL ACHIEVEMENT

The trained health providers implemented the learnings in clinical care and started reporting as per the new format. Newborns stabiliza-

tion and the referral was in between 16 to 28 percent of total newborn admitted in these NBSUs. The output indicators are presented in Table 4.

Table 4. State Wise Output Indicators

RESULTS (START TO DECEMBER 2020)	JHARKHAND	UTTARAKHAND	PUNJAB	HARYANA
No. of NBSUs	5	4	3	3
Total number of admissions	915	453	57	539
Low birth Weight (< 2.5 kg)	71%	41%	66%	60 %
Preterm newborns Admissions	20%	19%	19%	9%
Phototherapy admissions (Jaundice)	1%	09%	12%	1%
Referred after stabilization	27%	28%	21%	16%
Successfully Treated	72 %	71%	78%	83%

STATE HIGHLIGHTS

Jharkhand: Buoyed by the success of the 5 NBSUs, the state requested *Vridhhi* team to conduct training of additional 4 NBSUs. Six medical officers and 18 staff nurses from these NBSUs were provided training in December 2019.

Haryana

Haryana has gone one step ahead and all the 3 NBSUs have implemented Family Participatory Care. All the staff nurses of NBSUs were posted in the district SNCU to learn skills for FPC and they have been reporting for FPC since November 2019.

Punjab

The major achievement for Punjab has been operationalizing of the NBSUs which were non-operational to begin with. After advocacy all 3 NBSUs have dedicated rooms with majority of essential equipment. The staff nurses were given additional charge of pediatric IPD



Newborn receives essential care at birth in NBSU CHC Punhana, Haryana

initially. However, with advocacy and follow up they were given to work only in NBSUs.

Uttarakhand

In Uttarakhand 4 NBSUs were recommended by state for improvement under *Vridhhi* project. After the capacity building and display of IEC materials, they started admitting newborns as per guidelines. Now they are stabilizing the newborns before referrals however, due to hilly terrains the admissions are less in numbers in the two NBSUs. Efforts are ongoing to improve the footfall. The state has requested *Vridhhi's* technical support for scale up of NBSUs to other districts of the state.

POLICY LEVEL ACHIEVEMENTS

Vridhhi's role in NBSUs operationalization has been recognized and acknowledged by states and national government. GoI has adopted the training module as national level document with minimal modification.

Scaling up NBSUs

All project states and Uttar Pradesh NHM have requested for technical support from *Vridhhi* to help with capacity building of their NBSU staff.

In Jharkhand Maternal and Newborn Health Resource Center faculty have been established and trained as for NBSU so that they can continue to provide mentoring and training support in the state. During the COVID-19 pandemic, the MNHRC faculty used digital platforms such as Zoom to interact with staff nurses and medical officers and mentor them.

In Haryana, after request from the NHM, *Vridhhi* prepared an E-NBSU module to scale



Staff nurse holding newborn after wrapping in fresh cloth

up trainings. As due to pandemic, conducting physical trainings were not possible. The digital training module was inaugurated by senior officials of state NHM as well as from child health cell of national NHM. The training module consists of 4 online sessions of 3 hours each incorporating the care for small and sick newborns, audio-visual module developed by *Vridhhi* project and Maternity Foundation as part of Safe Delivery App and follow up self-learning using participant module and online knowledge assessment exercises. During the COVID-19 pandemic, digital trainings were conducted for staff from 5 NBSUs and selected Master Trainers (6 pediatricians). *Vridhhi* trainers along with SNCUs in-charge from medical colleges delivered the online training. The skill stations were facilitated by the block MOs and pediatricians in the remote locations.

Vridhhi project also received request from government of Odisha to organize trainings for their NBSUs to make them more efficient in saving newborns and decongest the overcrowding SNCUs.

Challenges and Learnings

CHALLENGES

While the process of operationalization has involved many steps, there have been challenges at various steps. The key challenges across the states were as follows:

- At present, NBSUs admissions were from the same facility (FRU) only. More effort needed to connect with nearby delivery points so that they can send their cases to NBSU.
- In NBSUs of Uttarakhand, due to remote locations, timely referrals were a challenge and deaths have been reported in the NBSUs. This was due to difficult terrain, challenging weather conditions, and a dearth of reliable transportation.
- Leaving Against Medical Advice (LAMA) to the extent of 30% was observed in NBSUs of Haryana. This practice was not observed in other intervention states. The efforts for family counselling by frontline workers and NBSU staff was regularly being done. At present the facility has been facing challenge to know prognosis of LAMA newborns.
- Trained staff rotation, transfer to other department from NBSUs was observed as a challenge in Punjab, Jharkhand and Uttarakhand. With continuous advocacy, things have improved to some extent and states has given advisories to districts.
- Procurement of all essential equipment for the NBSUs – In some districts, the time taken for procurement hampered the provision of care despite having trained staff. Uninterrupted supply of consumables and drugs has been observed as challenge at times in Uttarakhand.

LEARNINGS

The implementation of NBSU operationalization has shown that there are certain key



Staff nurse receiving skill building NBSU training with clinical practice on mannequin in RIMS, Ranchi, Jharkhand

steps that need to be taken for effective functioning of NBSUs. These learnings from the 15 NBSUs could be utilized for operationalizing and scaling up the program to uncovered districts/blocks.

- **Fulfill key essential requirements:** Availability of optimum human resource and adequate space as per the operational guidelines. This is the starting point for ensuring operationalization. The facility needs to have adequate space for at least 4 radiant warmers (ideally plus 2 beds for rooming in mother) and at least 4 dedicated staff nurses and 1 medical officer for providing 24 x 7 service.
- **Health systems approach to strengthening NBSUs** – The implementation model provided inputs for all requirements and pillars of health system. This holistic approach of strengthening HR, equipment, procurement and logistics supplies along with skill building and mentoring resulted in better uptake and visible improvements in the functioning of NBSUs.

- **Skill building of staff using NBSU specific package** – The NBSU training package focused on defining the admission criteria, triage, pre referral stabilization and management of admitted babies. The focus on inculcating practical skills clinical management of newborns was much awaited step for staff nurses and medical officers. Capacity building, IEC for facility and provision of guidelines resulted in NBSU becoming functional immediately after training.
- **Post-training support for staff nurses** – For developing confidence and proficiency of skills, post training support is essential. District hospital pediatricians were mobilized for supportive supervision visits as were done by *Vridhhi* team in Jharkhand and Punjab. Haryana NHM posted the NBSU staff to two weeks observation duty at the Mewat district SNCU which improved confidence of staff nurses to manage newborns in their NBSUs.
- **Mentoring of NBSUs** – The mentoring of NBSUs is required for regular discussion and institutionalization of quality improvement process. The mentoring includes supportive supervision of inputs (equipment and supplies), clinical case management and support processes and operations in the NBSU (infection prevention, housekeeping, documentation, indenting and storage etc.). Mentoring visits were done by experts in the state of Haryana.
- **Leadership** – both locally at facility and higher up in district/ state – The vision of the leadership in guiding their team and ensuring provision of quality services by providing an enabling environment is important. Involvement of the leadership in design, implementation and regular review helped in ensuring a multi-level team approach for actions at appropriate level.
- **Accountability** – Using data/ evidence for regular analysis, feedback, discussion and follow up on action points at all levels ensures accountability and improvement.

The systems approach adopted by the project teams for the 15 NBSUs can be replicated across all the NBSUs in the country. A structured step-wise approach is essential for smooth operations and to avoid reactive, stop-gap actions.

Sustainability and Scale up

The implementation model demonstrated by USAID *Vridhhi* was designed for sustainability at every step from conceptualization to implementation. The government counterparts were important stakeholders at every step of the process. The design ensured that existing funds available for NBSUs were utilized for printing, training and filling gaps and no additional financial liabilities are incurred.

The implementation model is easy to replicate provided the recommended human resource (1

medical officer and 4 staff nurses) have been posted to the NBSU. To ensure sustainability and ease of scale up, master trainers from the state were involved in the trainings from the beginning. *Vridhhi* has ensured development of a pool of state and district level trainers (Drawn from existing staff pool) to continue trainings. To enable sustainability of mentoring process post *Vridhhi's* support, the project teams facilitated joint visits with district nodal officer/ pediatricians. The Whatsapp group is also being used as a platform for mentoring

where pediatricians are able to provide guidance to NBSUs.

SUSTAINABILITY AND SCALE UP EFFORTS

Given the results of operationalization model of NBSUs in selected Aspirational Districts, the states requested for technical support from *Vridhhi* to scale up. States like Jharkhand, Haryana, and Uttarakhand have proposed budget for NBSU training in their PIP 2021-22.

Jharkhand decided to scale up and conducted second batch of training for additional 4 NBSUs in November 2019. Haryana state was very keen to do NBSU training for his selected NBSU during COVID-19 Pandemic,

On their repeated requests *Vridhhi* project developed the E-NBSU version and conducted the first digital training in Haryana for 5 NBSUs. With this successful training, there is requests from Assam and Jharkhand NHM to organize digital training for their staff.

The readiness of the targeted states to scale up the NBSU support model of USAID-*Vridhhi* provides credence to the model's feasibility and scalability across other states and districts of the country.



NBSU Dumri at Giridih District, Jharkhand

Annexures

Annexure 1 - Gap Filling in NBSUs Selected for the Intervention

STATE	NBSU NAME	AREA OF CONCERN	GAPS IDENTIFIED	GAPS FILLED UP
JHARKHAND	Manoharpur, West Singhbhum	HR	All posted staff (1 MO & 4 SN) are untrained	All HR (1 MO & 4 SN) trained in 3 day NBSU training
		EQUIPMENT	Following Equipment were available: • 1 Radiant Warmer (RW) Following Equipment were not available • Digital clinical thermometer • Oxygen hood and nasal prongs	Equipment made available: • 1 more RW made available (Total 2 RW functional) • 1 Digital clinical thermometer • 1 Oxygen hood and nasal prong
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Recording & Reporting not standardized. No regular reporting	Standardized and regular recording and reporting system started
		INFRA.		
		OTHERS		
	Chakradharpur, West Singhbhum	HR	• 1 SN required • All posted staff (1 MO & 3 SN) are untrained	• 1 SN posted • All HR (1 MO & 4 SN) trained in 3 day NBSU training
		EQUIPMENT	Following Equipment not available: • Phototherapy unit • Oxygen hood and nasal prongs	Equipment made available: • 1 Phototherapy unit • 1 nasal prong
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Recording & Reporting not standardized. No regular reporting	Standardized and regular recording and reporting system started
		INFRA.		
		OTHERS		
	Kathikund, Dumka	HR	All posted staff (1 MO & 4 SN) are untrained	All staff (1 MO & 4 SN) trained in 3 day NBSU training
		EQUIPMENT	Following Equipment not available: • Digital clinical thermometer, • Suction pump, • Oxygen hood and nasal prongs	Equipment made available: • 1 Digital clinical thermometer, • 1 Suction pump (Mechanical), • 1 Oxygen hood and nasal prong
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Recording & Reporting not standardized. No regular reporting	Standardized and regular recording and reporting system started
		INFRA.		
		OTHERS		

STATE	NBSU NAME	AREA OF CONCERN	GAPS IDENTIFIED	GAPS FILLED UP
Punjab	Thakurgangti, Godda	HR	<ul style="list-style-type: none"> • Only one untrained SN posted in NBSU. 1 MO & 3 SN required. • All staff need to be trained 	<ul style="list-style-type: none"> • 1 MO & 3 SN posted in the NBSU • All HR (1 MO and 4 SNs) trained in 3-days NBSU package
		EQUIPMENT	Following Equipment not available: <ul style="list-style-type: none"> • Radiant Warmer, • Phototherapy Unit, • Neonatal Laryngoscope, • Digital clinical thermometer, • Suction pump, • Oxygen hood and nasal prongs 	Equipment made available: <ul style="list-style-type: none"> • 4 Radiant Warmers. • 1 Phototherapy Unit • 1 Neonatal Laryngoscope, • 1 Digital clinical thermometer, • 1 Suction pump (Mechanical), • 1 Oxygen hood and nasal prong
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Recording & Reporting not standardized. No regular reporting	Standardized and regular recording and reporting system started
		INFRA.		
		OTHERS		
		Nagar Uttari, Garhwa	HR	<ul style="list-style-type: none"> • 1 MO & 1 SN needed • 3 SN already posted need to be trained
	EQUIPMENT		No Neonatal Laryngoscope	1 Neonatal Laryngoscope available
	IEC		Protocol posters not available	Protocol posters displayed
	RECORDS		Recording & Reporting not standardized. No regular reporting	Standardized and regular recording and reporting system started
	INFRA.			
	OTHERS			
	NBSU Guru Har sahai, Ferozepur	HR	Untrained staff of labor room providing services in NBSU	1 MO & staff of labor room trained in 3 days NBSU package
		EQUIPMENT	Following Equipment not available: <ul style="list-style-type: none"> • Radiant Warmer • Photo therapy unit 	Equipment made available: <ul style="list-style-type: none"> • 1 functional RW • Photo therapy unit
		IEC		
		RECORDS	No Regular Reporting to state office	Reporting is regular now.
		INFRA.	No Dedicated Room for NBSU	Dedicated Room for NBSU
		OTHERS		
		SDH Zira, Ferozepur	HR	Untrained staff of labor room providing services in NBSU
	EQUIPMENT		Following Equipment not available: <ul style="list-style-type: none"> • Radiant Warmer • Photo therapy unit • Digital Clinical Thermometer • Functional Bag and Mask 	Equipment made available: <ul style="list-style-type: none"> • 1 functional RW • Photo therapy unit • Digital Clinical Thermometer • Functional Bag and Mask
	IEC		Protocol posters not available	Protocol posters displayed
RECORDS	No Regular Reporting to state office		Reporting is regular now.	
INFRA.	No Dedicated Room for NBSU		Dedicated Room for NBSU	
OTHERS				

STATE	NBSU NAME	AREA OF CONCERN	GAPS IDENTIFIED	GAPS FILLED UP
Haryana	NBSU Kot Ise Khan, Moga	HR	Untrained staff of labor room providing services in NBSU	1 MO & staff of labor room trained in 3 days NBSU package
		EQUIPMENT	Following Equipment not available: <ul style="list-style-type: none"> • Radiant Warmer (RW) • Photo therapy unit • Digital Clinical Thermometer & • Foot Operated Suction Pump 	Equipment made available: <ul style="list-style-type: none"> • 1 functional RW • Photo therapy unit • Digital Clinical Thermometer • Foot Operated Suction Pump
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	No Regular Reporting to state office	Reporting is regular now.
		INFRA.	No Dedicated Room for NBSU	Dedicated Room for NBSU
		OTHERS		
	NBSU Nuh	HR	No medical officer posted. No pediatrician posted in the entire district of Mewat in 2019 April. The 2 staff nurses posted were untrained	MO designated and trained along with 2 staff nurses
		EQUIPMENT	Following Equipment not available: <ul style="list-style-type: none"> • Glucometer • Pulse Oximeter • Syringe Pump • Multipara monitors 	Equipment made available: <ul style="list-style-type: none"> • Glucometer • Pulse Oximeter • Syringe Pump • Multipara monitors
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Documentation - Registers and case sheets not available	Documentation - Standardized Registers and case sheets available
		INFRA.	Small room with inadequate space	NBSU shifted to a bigger room
		OTHERS	LCD TV not available	LCD TV made available
	NBSU Punhana	HR	No medical officer (MO). All 4 posted staff nurses are untrained.	MO designated and trained along with 4 staff nurses
		EQUIPMENT	Following Equipment not available: <ul style="list-style-type: none"> • Glucometer • Pulse Oximeter • Syringe Pump • Multipara monitors 	Equipment made available: <ul style="list-style-type: none"> • Glucometer • Pulse Oximeter • Syringe Pump • Multipara monitors
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Documentation - Registers and case sheets not available	Documentation - Standardized Registers and case sheets available
		INFRA.		
		OTHERS	LCD TV not available	LCD TV available and used for FPC
	NBSU Ferozepur Jhirka	HR	No medical officer (MO). All 4 posted staff nurses are untrained.	MO designated and trained along with 4 staff nurses
		EQUIPMENT	Following Equipment not available: <ul style="list-style-type: none"> • Glucometer • Pulse Oximeter • Syringe Pump • Multipara monitors 	Equipment made available: <ul style="list-style-type: none"> • Glucometer • Pulse Oximeter • Syringe Pump • Multipara monitors
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Documentation - Registers and case sheets not available	Documentation - Standardized Registers and case sheets available
		INFRA.		
		OTHERS	LCD TV not available	LCD TV available and used for FPC






STATE	NBSU NAME	AREA OF CONCERN	GAPS IDENTIFIED	GAPS FILLED UP
Uttarakhand	CHC Laksar	HR	No Medical Officer designated for NBSU No Medical Officer Trained in F-IMNCI / FBNC package	Medical Officer designated for NBSU and one MO trained in NBSU package along with two staff nurses from the facility.
		EQUIPMENT	No functional photo therapy	Phototherapy unit available
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Recording & Reporting not Standardized	Recording & Reporting Standardized
		INFRA.		
		OTHERS		
	CHC Bhadarabad	HR	No Medical Officer designated for NBSU; No Medical Officer and Staff Nurses Trained in F-IMNCI / FBNC package	Medical Officer designated for NBSU and one MO trained in NBSU package along with two staff nurses from the facility
		EQUIPMENT		
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Recording & Reporting not Standardized	Recording & Reporting Standardized
		INFRA.	Gaps related to Infrastructure existed: <ul style="list-style-type: none"> • Two radiant warmers were non functional • Glucometer and pulse oximeter was not available • NBSU Room was damp • Shoe rack not available outside the NBSU room • Nursing Station was inside in the NBSU) 	Infrastructure related gaps address: <ul style="list-style-type: none"> • Radiant warmer repaired and made functional • Glucometer and pulse oximeter procured after advocacy • NBSU room refurbished with damp proof • Shoe Rack arranged outside the NBSU • Nursing Station shifted to outside of NBSU
		OTHERS		
	CHC Kitcha	HR	No Medical Officer Trained in F-IMNCI / FBNC package	MO trained in NBSU package along with staff nurses from the facility
		EQUIPMENT		
		IEC	Protocol posters not available	Protocol posters displayed
		RECORDS	Recording & Reporting not Standardized	Recording & Reporting Standardized
		INFRA.		
		OTHERS		
	SDH Kashipur	HR	No Medical Officer Trained in F-IMNCI / FBNC package	MO trained in NBSU package along with staff nurses from the facility
		EQUIPMENT		
		IEC	Protocol posters not available	Protocol posters displayed
RECORDS		Recording & Reporting not Standardized	Recording & Reporting Standardized	
INFRA.				
OTHERS				



Annexure 2 - Agenda: NBSU Training of Trainers

THREE DAY AGENDA			
Objective: Strengthen facility-based care of the sick and small babies at NBSUs			
Day 1			
Time			
From	To	Theme	Methods
10:15	10:45	Registration	Government Representative
10:45	10:50	Welcome	Govt. Representative
10:50	11:00	Introduction of participants	
11:00	11:20	Newborn Health Scenario & Goals	Government Representative
11:20	11:40	Overview of <i>Vridhhi</i> Project	
11:40	11:55	Objectives of NBSU Training & Expectations	
11:55	12:10	Key-note address	Government Representative
12:10	12:25	Inaugural Address	Govt. Representative
12:25	13:30	Chapter 1: Assessment & management of newborns with emergency signs	Introduce the chapter > Reading of module > Group discussion > Drills > Summarization
13:30	14:15	LUNCH	
14:15	15:00	Continue Chapter -1	
15:00	17:30	Skills Stations	In groups by rotation <ul style="list-style-type: none"> • Demonstration & Hands on practice : BLS for newborns on mannikin • Demonstration & practice : Umbilical Vein Access
Day 2		Venue- SIHF, Panchkula Haryana	
09:00	10:00	Chapter 2: Referral and transport; communication	Introduce the chapter > Reading of module > Role play > summarization
10:00	11:00	Chapter 3: Assessment of newborns for admission in NBSU	Introduce the chapter > Reading of module > DRILL > Summarization
11:00	13:00	Chapter 4: Supportive care and Introduction to Family Participatory Care (FPC)	Introduce the chapter > Reading of module > Case studies > Summarization
13:00	14:00	LUNCH	
14:00	17:00	Skills stations	Two groups by rotation <ul style="list-style-type: none"> • KMC • Assisted Feeding; (EBM, Cup and spoon feeding/ paladai feeding; OG tube feeding)
Day 3		Venue- SIHF, Panchkula Haryana	
09:00	09:45	Chapter 5.1: Management of jaundice	Introduce the chapter > Reading of module > Case studies > Summarization
09:45	10:30	Chapter 5.2: Management of sepsis In newborns	Introduce the chapter > Reading of module > Case studies > Summarization
10:30	11:00	Tea Break & Transfer to Hospital / SNCU	

THREE DAY AGENDA			
11:00	13:00	Clinical sessions	<p>Participants divided into three groups. One group visits the postnatal ward to practice the skills in assessment of newborns (history & examination) & general care</p> <p>Second group visits the SNCU and are assigned cases (sick & small newborns) to assess and discuss the management protocols.</p> <p>Third group attends skills station on equipment: Radiant warmer, Pulse oximeter, Phototherapy machine; Disinfection of equipment & housekeeping protocols</p>
13:00	13:45	LUNCH	
13:45	14:20	Documentation- recording and reporting	
14:20	14:50	Feedback by the participants , closing remarks & Way forward- Open discussions and Queries	Govt. Representative
14:50	15:00	Vote of Thanks	Govt. Representative

Annexure 3 - Protocol Posters

		
Criteria for Admission to NBSU		
<ol style="list-style-type: none"> 1. Newborns presenting to FRU/NBSU with emergency signs 2. Newborns not having emergency signs, weight above 1800 gm and any of the following signs of sickness <ul style="list-style-type: none"> ➤ Feeding problem ➤ Breathing Rate 60-70/min. ➤ Hyperthermia (axillary temperature >37.5°C) ➤ Hypothermia (35.5°C-36.4°C) ➤ Jaundice requiring only phototherapy. ➤ Newborns with suspected sepsis 3. Weight 1500-1800 grams with no sign of sickness. 4. Newborns who cannot be transferred to SNCU or referral facility due to any reason 5. Newborns back-referred (from SNCU) to NBSU for completion of treatment 		
		

Fluid and Feeds in Sick and Small Newborns

Feeding initiation and protocol for stable babies			Volumes of enteral feeds to be given in newborns		
Birth weight (gm)	1200-1800 (gm)	>1800 (gm)	Day of life	Feed Volume every 3 hours (ml/feed)	
Initial	Orogastric	Breastfeeding, if unsatisfactory give cup feeds		Weight 1.5 upto 1.8 Kg	Weight 1.2 upto 1.5 Kg
After 1-3 days	Cup feeding	Breastfeeding	1	11	10
1-3 weeks	Breastfeeding	Breastfeeding	2	18	15
4-6 weeks	Breastfeeding	Breastfeeding	3	22	18
			4	26	22
			5	30	26
			6	33	28
			7	35	30

Breast feeding is ideal for all newborns and should be supported. Breast milk is the ideal feed for all infants, including LBW infants. Anything other than breast milk is less than optimal.

When the newborn is not able to suckle, expressed breast milk should be given through cup or orogastric tube. Feed the newborn mother's own expressed breast milk.

In exceptional situations, when own mother's milk is not available, donor human milk can be given, only when safe milk banking facilities are available. Standard infant formula should be given if neither of the above is possible.

- If the baby weighs 1.2 to 2.5 kg, feed the baby at least eight times in 24 hours (i.e. every three hours).
- If the baby weighs less than 1.2 kg, feed the baby at least 12 times in 24 hours (i.e. every two hours).




Day of life	Daily Fluid requirement of newborns (ml/per kg body weight)		Nutritional supplements for LBW babies				
	Birth Weight >1.5 Kg	Birth Weight <1.5 Kg	Supplement	Indicated in which babies	When to start	Dose	Till when to administer
1	60	60	Vitamin D	All LBW babies (<1.5kg) who are exclusively breastfed	When baby starts accepting full feeds	<1.5 kg: 400 IU <1.5kg: 400-1000 IU / day	Till 6 months of age
2	75	95	Multivitamin drops	All LBW babies (<2.5 kg)	From 2 weeks of age	6.3 ml/day	
3	90	110	Calcium & phosphorus	LBW babies <1.5 kg	Whenever starts accepting full feeds	120-160 mg/kg/day elemental calcium, 60-80 mg elemental phosphorus	Till 40 weeks post conception age (same as corrected age)
4	105	125	Iron	LBW babies <1.5 kg	From 2 weeks of age	2 mg/kg/day	Till 6 months of age, followed by routine FA supplementation as in all children
5	120	140					
6	135	150					
7	150	150					

• Give more fluid if the infant is under a radiant warmer or heater (1.2-1.5 times).



• Type of fluid.

• During the first 2 days of life give 10% dextrose as IV infusion. After the first 2 days of life, use IV dextrose with low sodium such as half normal saline with 3% dextrose (3% N2) (1 to 200 ml of normal saline with 200 ml of 10% dextrose to make 3% N2).

Newborns below 1.2 Kg, are generally given IV fluids (10% dextrose) in first 24 hours of life.

Treating Sick and Small Newborns - Drugs - Dosages

Dose of pre-referral antibiotics

Give First Dose of Antibiotics
Give first dose of Ampicillin (or Oral Amoxicillin*) and Gentamicin intramuscularly.

WEIGHT	AMPICILLIN		GENTAMICIN Dose	
	Dose 20 mg per kg	APICOLIN (20 mg/1.5ml)	Unfilled 1 ml containing 20 mg/1 ml or 10 mg/ml	1 ml containing 80 mg/8 ml or 10 mg/ml
< 1.5 kg	0.4 ml	3.0 ml	0.5 ml*	1.0 ml*
1.5-2.0 kg	0.5 ml	2.0 ml	1.0 ml*	1.5 ml
2.0-3.0 kg	0.5 ml	3.0 ml	1.0 ml	1.5 ml
3.0-4.0 kg	1.0 ml	3.0 ml	1.5 ml*	2.0 ml*
4.0-5.0 kg	1.25 ml	4.0 ml	2.0 ml*	3.0 ml

*Determine if the child is able to take orally.

Antibiotic schedule and dosage in neonatal sepsis

Antibiotic	Dosage	Frequency*		Route	Duration
		(a) 0-14 days of life	(b) >14 days of life		
Ampicillin	50 mg/kg/dose	12 hourly	8 hourly	IV	7-10 days
Cloxacillin	50 mg/kg/dose	12 hourly	8 hourly	IV	7-10 days
And					
Gentamicin	5 mg/kg/dose	24 hourly	24 hourly	IV	7-10 days

*This frequency of antibiotics is valid in babies weighing < 2kg. In baby weighing >2kg, the frequency remains as (a) from 0-7 days of life and (b) from >7 days of life.
Any baby who is being treated with antibiotics but fails to improve by 48-72 hours of admission needs to be referred.

Antibiotic for meningitis

Antibiotic	Dosage	Frequency*		Route	Duration
		0-7 days age	> 7 days age		
Birth wt < 2 kg					
Inj. Cefotaxime [†]	50 mg/kg/dose	12 hourly	8 hourly	IV	3 weeks
Inj. Amikacin ^{††}	15 mg/kg/dose	24 hourly	24 hourly	IV	3 weeks
Birth wt > 2 kg					
Inj. Cefotaxime [†]	50 mg/kg/dose	8 hourly	6 hourly	IV	3 weeks
Inj. Amikacin ^{††}	15 mg/kg/dose	24 hourly	24 hourly	IV	3 weeks

Treatment of jaundice based on serum bilirubin level

Age	Phototherapy		Exchange transfusions [†]	
	Healthy infant >35 weeks	Preterm infant < 35 weeks' gestation or any risk factors	Healthy infant >35 weeks	Preterm infant < 35 weeks' gestation or any risk factors
Day 1	Any visible jaundice [‡]		15	10
Day 2	15	10	25	15
Day 3 onward	18	15	25	20

[†] Exchange transfusion is not described in this scoring package. The serum bilirubin needs are selected to use exchange transfusion is possible > 15 the when can be considered early and when to consider further when exchange transfusion can be performed.

[‡] Visible jaundice is defined as follows: (a) Visible jaundice is present before 72 hours of gestation, (b) jaundice is present.

^{††} Visible jaundice is defined as follows: (a) Visible jaundice is present before 72 hours of gestation, (b) jaundice is present.

^{‡‡} Exchange transfusion is described in this scoring package. The baby will require admission. The baby will be discharged with a written consent form including written advice to follow within 48 hours of discharge.




Treatment of Convulsions for Newborns



Inj. Phenobarbitone	Intravenous (200 mg/ml)		Intravenous 0.1 ml diluted with 0.9 ml saline (20 mg/ml)	
	Weight of Infant	Initial	Repeat dose	
2 kg or less	0.3ml	0.1ml	3ml	1ml
2 to 4 kg	0.3ml	0.15ml	3ml	1.5ml

Caution- Do not use Inj. Diazepam for control of convulsions in Neonates < 2 weeks

If seizures persist after initial Phenobarbitone infusion, administer further boluses of 5-10 mg/kg up to a total of 40 mg/kg.

Phenytoin is used as a second line drug when full dose of phenobarbitone fails to resolve seizures. If used it should only be mixed with saline and not with dextrose as it precipitates in dextrose.

Clinical Assessment And Emergency Management




Perform Following 3 steps (RED) as soon as a baby arrives.

- ✓ Place the newborn on a warm surface under a Radiant warmer and under good light and record temperature.
- ✓ Check for the Emergency signs and institute appropriate treatment while planning for referral to SHCU/higher facility.
- ✓ If there is an emergency sign perform bedside Diagnostics (Check blood glucose & oxygen saturation).

Give priority to stabilizing the sick or small baby before assessing and treating the underlying cause of the problem.

Assessment & Management of emergency conditions

Assessment	Emergency Signs	Actions (Bold italic for all cases)
<ul style="list-style-type: none"> - Record temperature - Look at breathing & count respiratory rate Not breathing at all, even when stimulated or gasping; or <ul style="list-style-type: none"> • Respiratory Rate <20/min • Slow breathing with prolonged intermittent pauses (lasting >20 seconds) associated with central cyanosis or bradycardia means newborn has apnoea. - Check for severe respiratory Distress <ul style="list-style-type: none"> • Respiratory Rate >70/min • Severe chest in-drawing/ • Grunting - Check for central cyanosis Blue skin/ tongue and lips - Assess circulation (If newborn has cold hands/ peripheries with capillary refill longer than 3 seconds and weak and fast pulse (>160/ minute), then classified as shock). - Check for abnormal movements Repetitive/jerking movements of limbs or face, continuous extension or flexion of arms and legs; may be generalised, focal or multifocal convulsions. Many a times, convulsions in newborns are subtle (eg staring, repetitive blinking of eyes, or repetitive movement of mouth or tongue etc.) - Check for consciousness level Assess whether the baby is sleeping, lethargic or unconscious - Perform bedside DIAGNOSTICS A) Check blood glucose levels B) Check oxygen saturation 	<ul style="list-style-type: none"> • Low Body temperature (temperature <35.5°C). Not breathing at all or gasping respiration • Severe respiratory distress • Central cyanosis • Shock • Convulsions/ Unconsciousness 	<ul style="list-style-type: none"> • If temperature = 35.5° C, rewarm under radiant warmer preferably in manual mode with temperature setting at 36.5°C. Assess temperature every half hour. When temperature reaches 36° C, switch to servo controlled mode. If warmer not available, put in skin to skin contact. • If not breathing at all (gaping, administer positive pressure ventilation with bag & mask. Clear airway, position head correctly by placing shoulder roll • Give oxygen, attach pulse oximeter and monitor oxygen saturation. • Prevent and treat hypoglycaemia. If not possible to check blood glucose levels, Give 10% Dextrose bolus @ 2ml/kg slowly over 1 minute • If in shock, give IV fluid bolus 10 mL/kg normal saline over 20-30 minutes. Repeat bolus if circulation does not improve. • If convulsing, give IV 10% Calcium gluconate at 2ml/kg in equal dilution with distilled water, slowly under cardiac monitoring. If seizure persists start injection Phenobarbitone 20mg/kg loading dose (mixed with normal saline). • Dress the newborn in warm clothes and a cap, and cover with a warm blanket. • Refer after pre-referral dose of anti-biotics and on iv fluids and oxygen support • Give iv, Vit KI if not given earlier





Annexure 4 - NBSU Case Sheet

Neonatal Case Sheet for NBSU					
Hospital Reg. No.		Other Information			
Baby of (mother's name):		Father's Name:			
Date & Time of Birth		Complete address:			
Date & Time of Admission		Contact Number			
Age at admission (days):		Category (Gen/OBC/SC/ST/Others):			
Birth Weight (grams):					
Weight on admission (grams):					
Sex of the baby (M/F/A):					
Place of delivery (Encircle): Home/Pvt. Hospital/Govt. Hospital (Name): _____					
Type of admission: Inborn / Outborn		Referred from (Encircle):		Other Govt. health facility/ Sahiya/ Pvt. Fac./Self	
Mode of Transport: Self arranged / Government Provided					
Baby's Information					
Baby's information: At Birth					
Term	Term/Preterm/ Post term	Gestational Age:	Inj Vit K1 given	Y	N
			Breastfeed within 1 hr of birth: Y N		
Cried Immediately at Birth: Y N		If No then cried after (Encircle Appropriate option) Initial Steps/ Bag & mask/ Bag & mask with oxygen/ chest compression/ Intubation/ medication			
Baby's information: On admission					
Presenting Complaints					

Systemic examination					

Investigations					

Mother's Information (Encircle whichever applicable)					
Personal information		Medical History		Investigations	
Weight:		Present History: PIH/ Eclampsia/ fever/rash/UTI		CBC: _____ VDRL: _____	
Age:		Past History: Malaria/ TB/Heart Disease/ Thyroid		Bld Group: _____ HBsAg: _____	
LMP: _____ EDD: _____		History of Obstetric complications :		Bld Sugar: _____ HIV: _____	
Gravida:		Obstructed Labour/ Prev LSCS		Urine: _____ Thyroid: _____	
Para:		History of Drug/ radiation exposure/Substance		USO- (mention significant finding)	
Birth Spacing: 1yr/2yr/3yr/>3yr					
ANC: 1/2/3/4/					
TT 1/2					
Labour related Information					
PROM/ APH/ Foul Smelling Discharge/Fever>100F/meconium stained Liquor/ Uterine tenderness					
Labour – Eventful/Uneventful/H/o Foetal distress/ LSCS /vaginal delivery/assisted vaginal delivery					
If preterm labour <34 weeks then ANCS given Y/N.					
If Yes then No of doses 1/2/3/4.					
Indication for Admission to NBSU (Tick the appropriate option)					
1. Newborns presenting to FRU / NBSU with emergency signs: Yes / No					
2. Other conditions (Provide details):					

   					
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Provisional Diagnosis			
(Encircle the most likely and mention more than one if multiple conditions exists)			
Babies with emergency signs: - Apnea (Not breathing at all) or gasping respiration - Severe respiratory distress - Central Cyanosis Shock - Convulsions/Unconsciousness - Hypothermia (Temp.<35.5 ^o C)	Babies with: Weight - V less than 1800gm V ELBW<1499gm V VLBW<999gm V SGA V more than 4kg Age less than 32 weeks	Babies with diagnosis of: Perinatal Asphyxia Neonatal Jaundice Major congenital malformations Meconium Aspiration Hyperthermia> 37 Degree C Hypoglycemia<40mg/dl	Other symptoms: Refusal to feed Oliguria Baby of Diabetic mother Abdominal distension Diarrhea Bleeding Any other
Treatment advised			
Phototherapy (Y/N): Duration if Yes:	Y N	Duration: IV Fluids	KMC Given Y N
Drugs / Antibiotics	Name:	Dosage:	Duration:
Final Diagnosis			
Outcome (Encircle one):	Discharge / Death / LAMA / Referral	Date & Time:	
If referred, mention place referred to:	Weight on Outcome:		
If LAMA (Reason):	Age at the time of Outcome:		
If Death (Cause of Death): (Encircle)	HIE/ Perinatal Asphyxia/MAS /Prematurity/ RDS Neonatal Sepsis- Pneumonia/Meningitis/ Tetanus Weighing less than 1800gm/ Major congenital Malformation/Any other		
Signature of attending Doctor: _____ (Name & Designation): _____			

Annexure 5 - Discharge Slip

DISCHARGE CARD - NBSU									
Hospital Reg. No.:			Baby of (mother's name):						
Date/ Time of Adm.:			Father's Name & Address:						
Date/Time of Discharge:			Contact Number:						
Sex of the baby (M/F/A):			Category: Gen/OBC/SC/ST/Other						
Date & Time of Birth:			Age at discharge:						
Age at admission:			Weight on discharge:						
Weight on admission:			Name and address of the place of delivery:						
			Name and address of the facility referred from:						
Provisional diagnosis:			Final Diagnosis:						
Baby's Information									
Presenting Complaints									

Relevant Examination Findings									

Investigations & Findings									

Treatment given									
Phototherapy (Y/N):	Y	N	Duration:	IV fluids		RMC Given	Y	N	
Duration if Yes:									
Drug / Antibiotic:	Name:			Dosage:			Duration:		
Course during stay:					Condition at the time of Discharge:				
_____					_____				
Advise at the time of Discharge									
General Advise:	Exclusively breast feed the baby till six months of age								
	Wash hands before feeding the baby								
	Attend follow up clinic as advised								
	Consult a doctor in case of danger signs								
	Immunize the baby as per the schedule								
Continue RMC at home									
Name & Signature of on duty incharge: _____					Specific Advise:				











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Annexure 6 - Referral Slip

REFERRAL FORM - NBSU			
Hospital Reg. No.		Referred from: (Facility Name)	
Baby of (mother's name):		Contact no.:	
Date & Time of Birth		Referred to: (Facility Name)	
Birth Weight (in grams)		Contact no.:	
Gestational Age (in weeks)			
Referred on			
Date:		Time:	
Major findings (clinical):			
<div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div>			
Investigations:			
<div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div>			
Treatment given before referral:			
<div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div>			
Treatment during transfer:			
<div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div>			
Mother's condition			
<div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div>			
Signature of referring doctor: _____ Name & Designation: _____			

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Annexure 8 - NBSU Admission Register



The header form contains the following elements:

- Logos of the Government of India, Ministry of Health & Family Welfare, USAID, Vriddhi, and IPE Global.
- Large central text: **NBSU ADMISSION REGISTER**
- Fields for: **NBSU NAME:** _____
- Fields for: **DISTRICT:** _____

NBSU Admission Register																
S N	Labour Room Registration No. (If Outborn, then write NA)	Date & Time of Admission in NBSU	Name of Baby / Mother (Baby of.)	Newborn's Father Name	Name of ASHA / Mobile No	Gender (M/F)	Weight at Admission (In grams)	Inborn / Outborn	If outborn, then mention referred from / place of delivery	Provisional Diagnosis during Admission (Mention CODE from	Treatment / Give / Management of complication (Mention CODE from options	Final Diagnosis during Admission (Mention CODE from options below)		Outcome	Duration of stay in NBSU	Signature of Doctor / Incharge
												CODES: Refered-1 Discharged-2 LAMA - 3 Died - 4	Date & Time	CODES:- Less than 24 hrs - 1 (1-2 days); 2 More than 2 days- 3		

***CODES: DIAGNOSIS (PROVISIONAL / FINAL), if multiple, write multiple codes**

1. Pre-eclampsia	5. Hypertensive
2. Eclampsia/Pre-eclampsia/Headache	6. Hypertensive
3. Placental abruption/obstruction	7. Haemorrhage if any other
4. Cord prolapse/obstruction/infarction	

***CODES: TREATMENT / MANAGEMENT**

11. Immunology
12. Antibiotics
13. Oxygen
14. Bag & Mask
15. ZMC
16. Other



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