



## BREATHING INNOVATIONS



# Continuous Positive Airway Pressure (CPAP)

implementation for sick newborns in Uttar Pradesh – A Journey

### SCENARIO

- Neonatal Mortality Rate (NMR) in Uttar Pradesh is 35/1000 live births (with a variation of 37 in Rural and 27 in Urban areas).
- The State is committed to achieving Sustainable Development Goal Target 3.2 of NMR < 12/1000 live births by 2030.
- Currently there are 98 functional Sick Newborn Care Units (SNCUs) across 75 Districts, 304 Newborn Stabilization Units (NBSUs) covering 806 blocks and nearly 3000 Newborn Care Corners at delivery points.

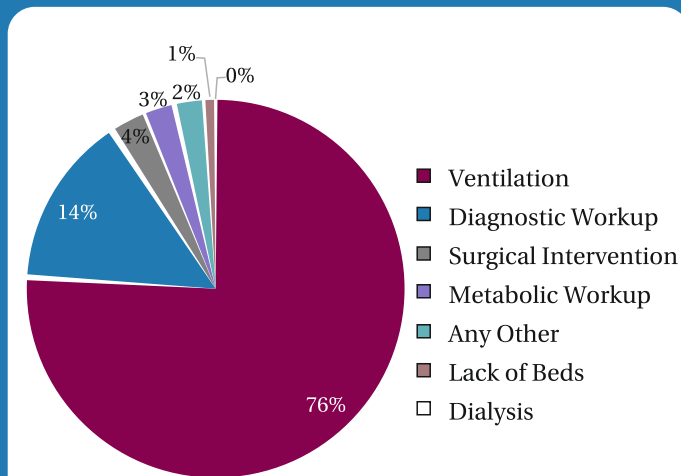


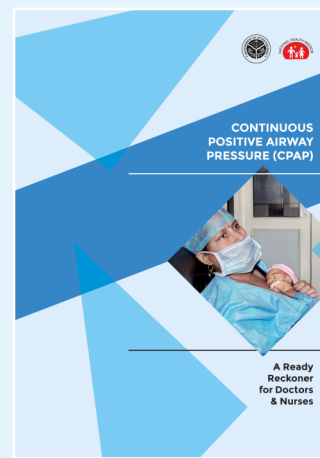
Figure 1: Indication of referral from SNCUs

- As per Facility-based Newborn Care (FBNC) MIS UP (2023-24), over 1 Lakh sick newborns were treated at SNCUs.
- Respiratory Distress Syndrome (RDS) accounted for 16% of Low Birth Weight admissions and contributed to one-fourth of all deaths in SNCUs.
- Need for ventilation accounts for more than 3/4<sup>th</sup> of the referral from SNCUs (Figure 1).
- Evidence suggests that the use of oxygen in combination with CPAP for the treatment of respiratory distress contributed to a 70% increase in the survival of preterm babies.

- The most basic respiratory support for neonates with respiratory distress is oxygen, followed by non-invasive support such as CPAP, and then by mechanical ventilation for cases progressing to critical severity.
- Bubble CPAP (b-CPAP), a non-invasive respiratory support, when used appropriately, is cost-effective, and has a lower risk of complications as compared to mechanical ventilation.
- Government of UP is committed to improve the quality of care in SNCUs for better neonatal outcomes. As a policy recommendation, budget has been approved under the Project Implementation Plan (PIP) of National Health Mission (NHM) for equipping SNCUs with b-CPAP.
- It was decided that the doctors and nurses shall be trained in the effective usage of b-CPAP. In addition, a mentoring mechanism would also be in place to connect both mentors and mentees to update the skills of the providers.

## Preparation and Planning

- Integrated action plan for effective implementation for CPAP has been developed with coordination of all stakeholders, which includes, Directorates of Medical Health and Family Welfare, National Health Mission (NHM), King George's Medical University (KGMU), other state medical colleges, and development partners (UNICEF and UP-TSU).
- State Task Force for reducing NMR, led by the Principal Secretary, Medical, Health & Family Welfare and Medical Education, reviews the progress of CPAP implementation.
- Phase-wise introduction of CPAP across all SNCUs has been planned. In 1<sup>st</sup> Phase, 32 SNCUs have been selected based on recommended criteria.
- Training package for the use of b-CPAP in the SNCUs has been developed. This user friendly package consists of: a) Ready reckoner, b) Facilitator Guide to assist facilitators in organizing trainings and setting up skill stations related to CPAP; c) Objective Structured Clinical Examination (OSCE) Checklists and d) Links for related Videos and Job-aids for ready use.



## Roll-Out

First State Training of Trainers (ToT) was held on June 7-8<sup>th</sup>, 2024 at King George's Medical University (KGMU), Lucknow, inaugurated by Mr. Partha Sarthi Sen Sharma, IAS, Principal Secretary, Medical, Health & Family Welfare and Medical Education, in presence of Vice Chancellor, KGMU; Director General, Medical & Health Services; Director General, Family Welfare; and lead representatives from Bill & Melinda Gates Foundation (BMGF)-India Country Office (ICO); UNICEF, Uttar Pradesh and Uttar Pradesh Technical Support Unit (UP-TSU).



- After 4 State-level ToTs, a pool of 76 Master Trainers from 15 medical colleges/institutes, 4 district hospitals, 3 All India Institute of Medical Sciences (AIIMS) and a private medical college, has been created. This included orientation in 2 batches under Regional Resource Training Centre (RRTC) programme on 8<sup>th</sup> and 9<sup>th</sup> August, 2024.





- A Technical Working Group (TWG) as a subgroup under State Task Force was formed to facilitate rapid roll-out of CPAP (e.g., procurement, installation, training, mentoring and use).
- 1<sup>st</sup> CPAP sub-group meeting was held on July 15<sup>th</sup>, 2024, at UP-TSU Office, Lucknow. For rapid roll out, district-level trainings are planned and expedited to equip providers with the skills needed to effectively use CPAP technology.
- A mentoring plan of phase-1 for 32 SNCUs (along with a mentoring tool and feedback form) has been developed in collaboration with KGMU, to facilitate mentors (from RRTC and State Newborn resource centre) for mentoring those who are yet to be trained and also the program officers to address the issues during the early stages of CPAP use.

## CPAP Tracker

A CPAP tracker was developed. The district teams were trained for collecting reliable information on availability, implementation and use of CPAP at SNCUs. This information was shared with the mentors to assist them in initial mentoring for CPAP initiation. A total of 32 Phase-1 SNCUs (at District Hospitals/District Women's Hospitals in 28 Districts) were visited in the month of July 2024 and information was collected on 66 CPAP units. The findings were:

- CPAP units procured by districts were from different manufacturers (at least 9 manufacturers), leading to different specifications, different accessories and non-uniform performance.
- Across 32 SNCUs, 54 CPAP units were functional, while units were not functional at 6 SNCUs.
- Among reported units, 60 Units were bubble-CPAP, 60 units were reported to be portable, 62 units had an inbuilt compressor, 56 units had a provision for blender and 42 units did not have battery backup.
- Several challenges, included the training of staff, oxygen related issues (oxygen port not compatible with CPAP, central oxygen supply not available and/or some issue with oxygen supply like no budget for separate oxygen cylinder), unit either not purchased or purchased but not installed, accessories not available on gem portal, were reported.



### ACTIONS

- To alleviate these challenges, technical specifications for b-CPAP was finalized by a committee.
- **Central procurement** of 146 bubble-CPAP units and accessories based on final technical specifications along with infrastructure strengthening for the remaining 73 SNCUs for 2<sup>nd</sup> Phase is ongoing
- An official indent received on May 15<sup>th</sup>, 2024, tender floated on June 18<sup>th</sup> 2024 (with an estimated budget of INR 3,00,000 per unit), and the process for finalizing bids is ongoing.
- In addition, rapid training of hitherto untrained staff at Phase-1 units is being taken up throughout the State, along with necessary infrastructure strengthening.

## Case Study: News for successful implementation

On August 11, 2024, a newborn weighing 2.7 kg, was referred from Rae Bareilly for the need of ventilation and was admitted at SNCU at VAB Mahila Hospital, Lucknow. The baby was comatose and struggling to breathe on arrival. The baby was revived with invasive ventilation but as soon as baby improved, transition to bubble- CPAP therapy (PEEP=6, FiO<sub>2</sub>=50%, flow=5 liters) was done.

Over next 7 days, the baby was stabilized with CPAP support with additional treatment for seizures and infections, transitioning off CPAP to nasal prongs and finally discharged successfully on August 23, 2024.



CPAP orientation of 16 Medical College faculty at KGMU Lucknow



CPAP Poster at SNCU of Awantibai Lucknow

## Way Forward

As the CPAP initiative progresses into its second phase, following actions are planned:

- Expediting the ongoing **procurement of CPAP** units for the remaining 73 SNCUs across Uttar Pradesh.
- Maintain high standards of care, **rapid skilling and continuous mentoring** of healthcare service providers is being ensured through existing mentoring mechanisms.
- **Referral pathways** are being strengthened to ensure timely and efficient transfers of sick newborns.
- A **Teleconsultation model**, linking King George's Medical University (KGMU) with district-level SNCUs, is also under development with the aim to bridge the gap between rural and urban healthcare facilities and ensure that newborns receive the best possible care, regardless of location.
- A set of **quality indicators** are being finalized to assess the effectiveness of CPAP implementation and neonatal outcomes.

