

How Cost-Effective is Facility-Based Newborn Care in India?

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Facility-based newborn care is a key strategy to improve neonatal health. Investment in neonatal care units is a resource-intensive exercise. Besides the one-time establishment cost, the operational costs of equipment, personnel, ancillary services, drugs, consumables, investigations, and care with or without ventilators, are huge investments. It, however, varies with the setting and type of unit (level II vs level III) and so do the benefits for neonates with different needs. In India, the establishment cost of a 12-bedded level II unit (Special Newborn Care unit - SNCU) in a district hospital is around 41,00,000 INR. This does not include the cost of training. The running cost (excluding salaries of staff) comes to 10,00,000 INR (20,000 USD) per year [1]. This is much less compared to what is incurred in developed nations.

The annual health system cost of operating SNCU at the district level is INR 6.3 million. The average cost of treatment per neonate is INR 4581, while per bed-day treatment is INR 818, as reported from a study of four SNCUs [2]. However, there needs to be a careful cost estimation before generalization, as both the capital and recurrent cost will vary according to Gross Domestic State Product of states. The analysis suggests that the overall costs of neonatal intensive care for all those who require level II care would be around INR 20.4 billion. This comprises 0.8% of India's health care spending [2]. While cost has important implications at the national level, its effectiveness on the outcome of admission emerges as the key indicator to promote SNCUs at the district level. To improve the cost effectiveness, the outcome of admissions needs to be analyzed. The outcome depends heavily on the input costs and profile of babies admitted [3]. The bulk of admissions in India are because of birth asphyxia, low birth weight and sepsis. Birth asphyxia can very well be prevented by strengthening Newborn Care Corners (NBCC) at every delivery point. Regionalization of neonatal care is known to be an effective way to reduce costs and improve effectiveness [4]. Unfortunately, in India, the emphasis on setting up of SNCUs at district level has not been

translated into development of an integrated system of facility based newborn care [5]. Strengthening of an integrated model with SNCU at the district hospital and having a good linkage with Neonatal Stabilization Units (NSU) at 24x7 Primary Health centers and Community Health centres and NBCCs at each delivery point has not been accorded an importance.

As the definition of a viable fetus has been changed to include babies with lower gestational age, the cost of care of such neonates has increased drastically [6]. But in a situation where most of the neonates admitted to SNCUs have normal birth weight, these vulnerable newborns are likely to suffer the most. Laxity of admission and discharge criteria resulting in over admissions and high bed occupancy rates often results in lack of attention and care of this category of neonates [2,5]. This may affect the performance of such units in an adverse way.

To benefit the families, due consideration should be given for inclusion of neonatal care at SNCUs under the benefit package of "Rashtriya Swasthya Bima Yojana (RSBY)", the cashless health insurance scheme for informal and below poverty line households in India. The estimates given by Prinja, *et al.* [2] can be used as a base to set up the payment rates. High cost of neonatal care may increase the overall ceiling of benefit package and should be a point of discourse under RSBY. National Rural Health Mission (NRHM) should focus on interventions that yield the maximum levels of health gain across population with judicious use of resources. Previous studies from India have either analyzed the outcomes or have given an estimate of approximate costs [4,5]. Cost effectiveness studies are reported from other countries [6]. There is a paucity of data on cost effectiveness and cost utility analysis for facility based care in India including regionalization. Such evaluations along with cost minimization analysis should be undertaken before further scaling up SNCUs in the country.

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Follow-up Studies – Beyond Survival

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Advances in antenatal medicine and neonatal intensive care, including antenatal corticosteroids, delivery room resuscitation, surfactant use, improved ventilation techniques, and nutritional management, have resulted in improved survival rates of preterm infants. The need to report follow up outcomes of babies who are born very low birth weight (VLBW) is being increasingly recognized over the last two decades [1,2]. Similar to many developed countries, survival of Indian VLBW babies is also improving. Therefore, there is a paucity of prospectively recorded developmental outcomes from India. The paper by Modi, *et al.* [3] published in this issue is a pioneering effort in this direction. The strengths of the study are detailed descriptions of care process that make it possible to compare with other centers. It would have been ideal to compare the outcomes of VLBW babies from different centers with differences in care process. Comparison with normal birth weight (NBW) babies has limited novelty. Most studies on outcomes like this one, are based on single-hospital, small cohorts and short duration of follow up. A few population cohorts with longer follow up are published [4,5] but there are very few studies from India [6]. Different authors have used different developmental assessment tools and reported normal or abnormal at varied ages thus making the comparisons difficult, hence, the fundamental interest of identifying modifiable risk factors in care process has not been served.

THE IDEAL WAY TO FOLLOW VLBW INFANTS?

An expert panel of the American Academy of Pediatrics,

National Institute of Child Health and Human Development, Vermont Oxford Network, and California Children's Service, has jointly put forward an evidence-based recommendation to assess quality of follow-up for VLBW infants [1]. The panel recommends post-discharge assessment in a total of 70 indicators in the following areas: general care, physical health, vision, hearing, speech, and language, developmental and behavioral assessment; and psychosocial issues. The panel describes in detail the areas of assessment, timing of tests and what intervention should be planned in case of a deviation from normal. National Neonatology Forum (NNF), has also outlined follow-up guidelines for neonatal intensive care unit (NICU) graduates.

IMPORTANT OUTCOME INDICATORS

Most published reports of neurodevelopmental outcome in infancy focus primarily on the incidence of severe disability, often defined as mental retardation, cerebral palsy, epilepsy, blindness, and/or moderate to severe hearing impairment. This has historically been the neurodevelopmental outcome of interest owing to the severity of the developmental impact of these severe and often combined morbidities. But, interest has shifted to the larger proportion of VLBW infants who are not severely brain injured, and their outcomes [7]. The most common impairment seen in VLBW and ELBW infants at 18 and 30 months is cognitive impairment [4]. Bayley scores of less than 70 (more than 2 standard deviations below the mean) are considered severely impaired. Reported rates of cognitive impairment throughout