

# Immediate life-saving impacts of the Nigeria LNG neonatal respiratory support substation and staff training at Niger Delta University Teaching Hospital, Nigeria

## Abstract

Efficient management of neonates with respiratory problems has been a challenge at the Special Care Baby Unit (SCBU) of the Niger Delta University Teaching Hospital (NDUTH) Yenagwa, Nigeria owing to lack of appropriate technologies to improve care. A recent initiative of SCBU-substation specifically tasked for neonatal respiratory support was installed at NDUTH, possessing effective features against all factors that limited the SCBU success rate in the past. The substation commenced service immediately after installation, delivering over 95% success rate across 23 patients treated within the first eight weeks of usage. The initiative is proving to be the most robust and efficient response to the challenge of neonatal respiratory support in Nigeria which should be adopted to tackle this LMIC neonatal care problem.

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Mesiobi-Anene JN,<sup>1</sup> Kunle-Olowu O,<sup>1</sup> Evinson DT,<sup>1</sup> Ajoko TP,<sup>1</sup> Chinonyerem SN,<sup>1</sup> Amadi HO<sup>2</sup>

<sup>1</sup>Department of Paediatrics, Niger Delta University Teaching Hospital, Nigeria

<sup>2</sup>Department of Bioengineering, Imperial College London, United Kingdom

**Correspondence:** Dr. Njideka Mesiobi-Anene, Department of Paediatrics, Niger Delta University Teaching Hospital, Yenogwa, Nigeria, Tel +234 8036717974, Email mesiobianenenjideka@gmail.com

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## Introduction

Neonatal respiratory support system is essential in the management of unwell newborns.<sup>1</sup> The lack of effective respiratory support facilities results in poor outcomes across Nigerian neonatal care practices. High neonatal mortality may never be lowered without the empowerment of Nigerian facilities through the installation of quality devices. Therefore, donation of the politeheart neonatal respiratory support unit by the Nigeria Liquefied Natural Gas (NLNG) Limited has become the most essential intervention and support to Nigeria's newborn which, for a long time, had required urgent attention.

The Niger Delta University Teaching Hospital (NDUTH)'s newborn facility recently received 2 sets of NLNG respiratory support systems, which are currently functioning efficiently – being accessed by both the 'outborn' and 'inborn' sections of the Special Care Baby Unit (SCBU). This presentation is to highlight the immediate positive impact of this donation at SCBU of NDUTH, and the consequent high success rate experienced in the short run.

## Methods

The bulk NLNG-substation installations—comprising four service-ports 'polite-oxygen splitter system (PSS)',<sup>2</sup> two units of the politeheart CPAP machine,<sup>3</sup> two units of 10 LPM oxygen-concentrators, one automatic light point of the polite-light-bank (PLB),<sup>4</sup> and a standby six cubic meter oxygen cylinder with its flow control systems—were initially set up in the outborn section of the facility (Figure 1). The outborn section of the SCBU was chosen because this is where the facility receives more referral babies with respiratory problems.

However, after four weeks of successful operation, the NLNG implemented a further upgrade by the installation of a new set of the

substation in the 'in-born' section of the facility—comprising one more unit of oxygen-concentrator, one unit of the politeheart CPAP machine, one PLB lightpoint, and a second set of three oxygen-service-ports PSS. This makes an overall total of 7-oxygen service outlets, effectively extending respiratory support to the neonates in both the inborn and outborn sections.



**Figure 1** Two NDUTH Yenagwa Substations (left – outborn, right – inborn sections).

The NLNG Ambassador's team arrived NDUTH, on the 8<sup>th</sup> of September 2024 and immediately commenced work on the installation of the respiratory devices with the help of staff from the Works Department of NDUTH. The great ambassador worked tirelessly and meticulously. At the same time, he exhibited great leadership and managerial skills in the way he managed his team and our staff to complete the work without hitches. Staff training commenced immediately after the hardware installation was completed. The ambassador made the learning simple as an erudite and passionate teacher. The all-day theoretical and practical training was attended by all doctors in the department of Paediatrics and all nursing staff of SCBU. The Training, which comprised both theoretical and practical sessions, was conducted by the ambassador and members of his team. After the training, questions were asked, and the use of the device was demonstrated by placing a child who needed respiratory support on the device. Two newborns benefitted before the ambassador's team finally left on the 11<sup>th</sup> September 2024.

## Results

Since the installation of NLNG respiratory support systems at NDUTH, eight weeks to the time of this report, a total of twenty-three babies have been treated with the respiratory support system successfully. The SCBU staff have been doing great in managing them showing the in-depth knowledge passed down by the NLNG ambassador.

Out of 23 babies that were treated with NLNG respiratory support, 17 of them were successfully weaned off and discharged within one week except one neonate who remained on the machine for about 10 days—however, that was due to coexisting sepsis. Two were referred out due to coexisting surgical emergency. The other four mortality was not from respiratory problems.

## Discussion

Lack of constant power supply and finance to procure 100% oxygen or buy fuel to run generator constantly have posed a great problem in management of the newborn with respiratory disorders in Nigeria. However, all this has become a part of history with the invention of the politeheart respiratory unit, which has bridged all these gaps for the NDUTH Centre with constant solar power and oxygen supply, hence improving newborn survival rate. This will go a long way to reduce newborn mortality to the barest minimum in Bayelsa State and Nigeria at large. In the short term of its usage, we can boldly score the device 10/10 as respiratory management at the NDUTH Centre has never been this easy in the past 17 years of practice of the lead-author of this report as a medical doctor.

### Highlights of the NLNG respiratory support system

This unique equipment is indeed a groundbreaking innovative breakthrough in our medical practice in the sense that it has different functions in one machine thereby bridging the gaps in our nation's unique poor medical setting. This ranges from continuous oxygen supply, Continuous positive airway pressure, temperature control, vital signs monitoring and continuous power supply in a country with the most epileptic grid power system.

## Conclusion

Optimal respiratory support is essential in newborn survival. This introduction of the Polite newborn respiratory support system would ensure a high overall success rate as has been shown in our Centre in the last eight weeks of the NLNG substations. This has enhanced practice enthusiasm amongst the SCBU staff, and also reduced hospital stay for the neonates, which in turn improved the general outcome of newborns managed in our hospital. By our experience, the politeheart CPAP—with its associated technologies in the Substation—is the respiratory intervention that seems to comprehensively answer the Nigerian technology dilemma for neonatal respiratory support.

## Recommendation

We recommend the following:

1. Installation of at least one of this respiratory substation in all facility in Nigeria that are certified to deliver and treat newborns as this respiratory support is lifesaving.
2. That all teaching hospitals and federal medical centers should have at least two of this substation in their facility, each serving at 'inborn' and 'outborn' sections of their SCBU.
3. There should be qualified personnel handling this equipment to ensure durability
4. Training and retraining of the staff on the use of the equipment to ensure sustainability.

## Limitations

1. Some facilities might not have enough space to accommodate the substation installation, in which case SCBU renovation for extra space is recommended.
2. In time of internal rotation of residents, the new resident will not be as skilled as the resident who has been operating the machine previously and would lead to reduced positive outcomes for a while. Hence, caution must be applied during the mandatory rotation of resident doctors out of the SCBU.
3. Sometimes patients needing respiratory support might be more than the number of available politeheart CPAP machines.

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## Conflicts of interest

The authors declare that they have no conflict of interest.

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