

Neonatal respiratory support: experience of a remotely located neoroom in Calabar, Nigeria

Abstract

Background: Prematurity is generally marred by respiratory challenges including respiratory distress syndrome (RDS). The more premature a baby is, the greater the risk for RDS and the poorer the survival rate, if no effective intervention geared towards the improvement of neonatal respiratory support is offered.

Methods: A simple consecutive recruitment of preterm babies who met the inclusion criteria was done, and each one received one form of neonatal respiratory support application or another available in the Neoroom.

Results: Twelve preterm babies have so far been recruited, with ten of them supported on the combination of the *politeheart* continuous positive airway pressure (CPAP) and the *politeoxygen* splitter system (PSS). There was 100% overall neonatal respiratory support success rate in the Neoroom.

Conclusion: There is an urgent need for scaling up of availability of neonatal respiratory support devices, particularly the combinations of *politeheart*CPAP systems across Nigeria facilities and the LMICs. This will ultimately improve neonatal survival.

Keywords: RDS, neonatal respiratory support, LMIC, neonatal hypothermia CPAP, oxygen

Volume 15 Issue 1 - 2025

Abdulrasheed Jimoh,^{1,2} Unwana-Abasi Ngine Asuquo,¹ Emmanuel Basse Adams,^{1,2} Hippolite Onyejiaka Amadi³

¹Calabar Women and Children Hospital, Nigeria

²Department of Paediatrics, University of Calabar Teaching Hospital, Nigeria

³Department of Bioengineering, Imperial College London, United Kingdom

Correspondence: Dr. Abdulrasheed Jimoh, Department of Paediatrics, University of Calabar Teaching Hospital, Calabar, Nigeria, Tel +234 7038098636, Email jimoh.abdulrasheed@yahoo.com

Received: December 3, 2024 | **Published:** February 3, 2025

Introduction

Respiratory Distress Syndrome (RDS) is a major challenge to the survival of preterm babies. Immediate respiratory support services in the form of an effective bubble continuous positive airway pressure (BCPAP), oxygen delivery system and surfactant administration have proven to be effective interventions that can enhance respiratory function and improve the survival of preterm newborn babies.^{1,2}

The installation of *politeheart* CPAP (*politeheart*CPAP) device³ and an oxygen multiple delivery system (*politeoxygen* splitter system, PSS)⁴ in the Neoroom of Calabar Women and Children Hospital, Calabar, since November 2022, was aimed to positively transform the neonatal respiratory support system service in this facility and to improve the survival of preterm and low birth weight newborn babies. This report presents an interim evaluation of the impact of this intervention on the survival of preterm and low birth weight newborn babies treated in this facility from December 2022 to October 2024.

Method

After the installation of the devices, a 1-week long training session was conducted for the clinical (Doctors, Nurses) and support staff of the hospital, who are directly involved in the handling and provision of care for the preterm babies. Subsequently, ongoing technical support from the developer/ Principal investigator (PI) via a robust tele-visual platform using video calls or Zoom interaction provided additional guidance on the application and usage of the devices for proper and better outcome of the recruited babies.

12 preterm babies have been recruited in almost two years since installation. The recruitment was done consecutively for preterm babies that required support regardless of whether the pregnancy was a singleton or multiple gestations. Deliveries were either through cesarean section or spontaneous vaginal delivery.

Indications for cesarean section included preterm labour with preterm rupture of membranes, placental abruption, unexplained intra-uterine growth retardation, cervical incompetence and hypertensive disorder in pregnancy, especially severe pre-eclampsia. The neonates received care with the *politeheart*CPAP device and the PSS in the Neoroom of this health facility.

Result

12 Preterm babies, comprising eight males and four females, have so far been nursed in the unit.

Gestational age at delivery ranged between 25 weeks+ and 34 weeks+. Birthweight ranged between 900 grams and 2200 grams. There were five singleton births, two twin births and one triplet birth.

Six had RDS, only one received surfactant at birth but all the 6 received CPAP. The birthweights of the six babies ranged between 900g and 1650grams.

Type of Neonatal respiratory support system (NRS) administered:

- CPAP - 6
- PSS - 4
- NIL - 2

Duration of administration of NRS:

	Treatment duration (days)/ total patients		
	0-7	8-28	> 28
<i>politeheart</i> CPAP	2	3	1
PSS	4	-	-

All the babies except one, survived (with 92% survival rate) without any immediate complications. Of the 12 preterm babies nursed so far, 90% received neonatal respiratory support and were successfully treated and discharged.

There was a mortality of one extremely-low birthweight preterm who weighed 900 grams and died on day 19 of age, having been successfully supported by the politeheartCPAP, surviving the perinatal period. The cause of death was Necrotizing enterocolitis complicated by disseminated intravascular coagulopathy. One preterm baby developed thrombophlebitis of the right hand at about the fifth week of age which progressed to dry gangrene and eventual auto-amputation of the right hand.

60% received bubble CPAP while the rest did very well on the PSS.

Of the 60% that received CPAP, 33% stayed an average of 0-7 days, 50% were on the device for an average of 8-28 days while 17% stayed beyond 28 days on the device.

All the preterm babies who received PSS did so within the first seven days of life and remained stable thereafter.

Discussion

The availability of these neonatal respiratory support facilities has come with a huge impact on the survival of preterm newborns managed in this hospital with efficient respiratory support success rate of 100%, and overall neonatal survival rate of 92%.

The establishment of the Neoroom equipped with politeheartCPAP device and politeoxygen splitter system (the PSS), which functioned to expand the utility of our single oxygen source by 500%, has substantially improved the knowledge and skills, and boost the confidence of healthcare providers involved in the use of these devices in the care of the preterm babies.

The ease of application of politeheartCPAP and the PSS system, the rapidity of resolution of respiratory distress in the babies and seamless weaning process of the politeheartCPAP device, all make for a huge game-changer impact of the device in improving the survival of these categories of newborn babies, who hitherto were barely surviving on direct supplemental oxygen delivery system and/or improvised

bubble CPAP with all the attendant adverse effects of oxygen toxicity.

Conclusion

There is a need for scaling up of availability of neonatal respiratory support devices like the politeheartCPAP and the PSS oxygen delivery system in secondary and tertiary health facilities across the length and breadth of Nigeria, and the LMICs. This ultimately will improve neonatal survival and outlook of the vital statistics with regards to neonatal mortality rate which is among the worst in world.

Acknowledgement

None.

Funding

None.

Conflicts of interest

The authors declare that they have no conflict of interest.

References

1. Rauschendorf P, Bou Saba G, Meara GK, et al. Effectiveness of a novel bubble CPAP system for neonatal respiratory support at a referral hospital in the Philippines. *Front Pediatr.* 2023;11:1323178.
2. Egesa WI, Waibi WM. Bubble nasal continuous positive airway pressure (bNCPAP): an effective low-cost intervention for resource-constrained settings. *Int J Pediatr.* 2020;2020:8871980.
3. Amadi HO, Okonkwo IR, Abioye IO, et al. A new low-cost commercial bubble CPAP (bCPAP) machine compared with a traditional bCPAP device in Nigeria. *Paediatr Int Child Health.* 2019;39(3):184–192.
4. Amadi HO. The Politeoxygen splitter system (PSS) – a frugal LMIC oxygen delivery technology that expands the utility by up to 700%. *J Pediatr Neonatal Care.* 2023;13(2):75–80.