

Title: A survey of the use of continuous positive airway pressure in newborn care in Kenya (preliminary results)

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Background

Most of the 2.6 million annual neonatal deaths, occur in low- and middle-income countries (LMICs). Severe respiratory distress is a serious complication common to the three major causes of neonatal death. Continuous Positive Airway Pressure (CPAP) is a relatively simple and cheap intervention that saves lives. In Kenya, the Ministry of Health recommends the use of CPAP in neonatal care only in level 4 or 5 hospitals (**Figure 1**). This study aimed to describe the operational aspects of CPAP use in newborn care in Kenya and explore barriers and enablers of implementation.



Figure 1: Newborn on commercial bubble CPAP

Methods

From September 2017 to February 2018, we undertook a survey of all health facilities using CPAP in newborn care in Kenya (**Figure 2**). A mixed methods approach was employed. Stata version 15.0 (StataCorp, Texas, USA) was used to analyse the quantitative data. A thematic framework is used to analyse the qualitative data.

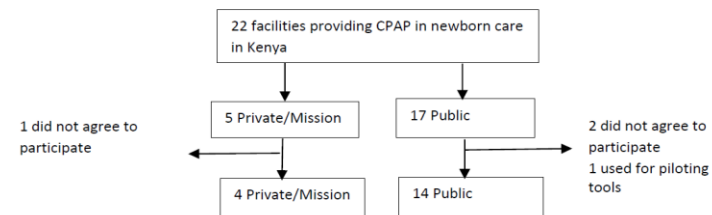


Figure 2: Summary of hospitals included in the study

Results

Quantitative: The majority of newborn units had no formal training programmes for CPAP use, therefore most of the staff on a shift were not competent to use it. However, most of the nurses on a shift were reported to be competent in newborn resuscitation (Table 1).

Table 1: Health care provider capacity and CPAP use

| | Public (N=14) | Private/mission (N=4) | Overall (N=18) |
|---|---------------|-----------------------|----------------|
| Number of nurses per, median (IQR) | 2 (2,2) | 4 (4,4) | 2 (2,2) |
| Cot capacity, median (IQR) | 32 (14,60) | 14 (7,28) | 31 (12,48) |
| Number of babies on CPAP per nurse, median (IQR) | 1 (1,2) | 2 (2,2) | 2 (1,2) |
| Pre-defined CPAP training plan for medical staff, n (%) | 6 (43) | 1 (25) | 7 (39) |
| CPAP trained nurse on every shift, n (%) | 4 (29) | 1 (25) | 5 (28) |
| CPAP trained doctor/ clinical officer on 24hour shift, n (%) | 4 (29) | 1 (25) | 5 (2) |
| Nurse reported to be competent in neonatal resuscitation per shift, n (%) | 12 (86) | 4 (100) | 16 (89) |

- CPAP in newborn care had been used of a median of 2 years overall, but private/ mission hospitals had been using it for longer than the public hospitals.
- Majority of public hospitals use commercial bubble CPAP acquired predominantly through donor funding.
- The recommended infrastructure for CPAP was inadequate public hospitals (Table 2).
- From March to May 2017, more newborns were admitted to public hospitals median 227 (IQR: 151, 368) vs private/mission 164 (IQR: 101, 242), but more of those admitted to private/mission hospitals median 19 (IQR: 15, 23) received CPAP vs public median 8 (IQR: 2, 13).



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Table 2: CPAP infrastructure

| | Public (N=14) | Private/Mission (N=4) | Overall (N=18) |
|--|---------------|-----------------------|----------------|
| Number of years of CPAP use in newborn care, median (IQR) | 2 (2, 2) | 9 (6,12) | 2 (2,4) |
| Number of CPAP machines per newborn care unit, median (IQR) | 2 (1,2) | 6 (4,7) | 2(1,3) |
| Emergency power supply available all the time, n (%) | 10 (71) | 4 (100) | 13 (72) |
| Commercial bubble CPAP, n (%) | 13 (93) | 0 | 13 (72) |
| Use of humidifier, n (%) | 6 (43) | 4 (100) | 10 (56) |
| Availability of oxygen and air to generate pressure, n (%) | 13 (93) | 2 (50) | 15 (83) |
| Availability of CPAP specific nasal cannula, n (%) | 14 (100) | 2 (50) | 16 (89) |
| Availability of neonatal suction machine and catheter, n (%) | 8 (57) | 4 (100) | 12 (67) |

Qualitative: Key facilitators to implementation were prioritisation of newborn care by facility/unit leadership and benefits of lives saved by CPAP use in newborn care.

“... if you put CPAP and a child passes on, nobody will now accept CPAP, no one will accept. If that one improves, the next one also wants it.”(FGD_Facility 003)

Key barriers were inadequate infrastructure and training of medical staff on the use of CPAP in newborn care as well as staff shortages on newborn care units.

“It is easier to put baby on oxygen on a busy shift that initiate CPAP to avoid blame when adverse events occur”. FGD_Facility 001

Conclusion

The scale-up of CPAP use in newborn care is well-accepted by health care providers in Kenya. Future implementation strategies should incorporate sustainability measures for CPAP infrastructure, staff training and retention, as well as monitoring and evaluation.