# Early CPAP : Management of Respiratory Distress Syndrome (RDS) in Preterm Infants < 32 weeks

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## Background

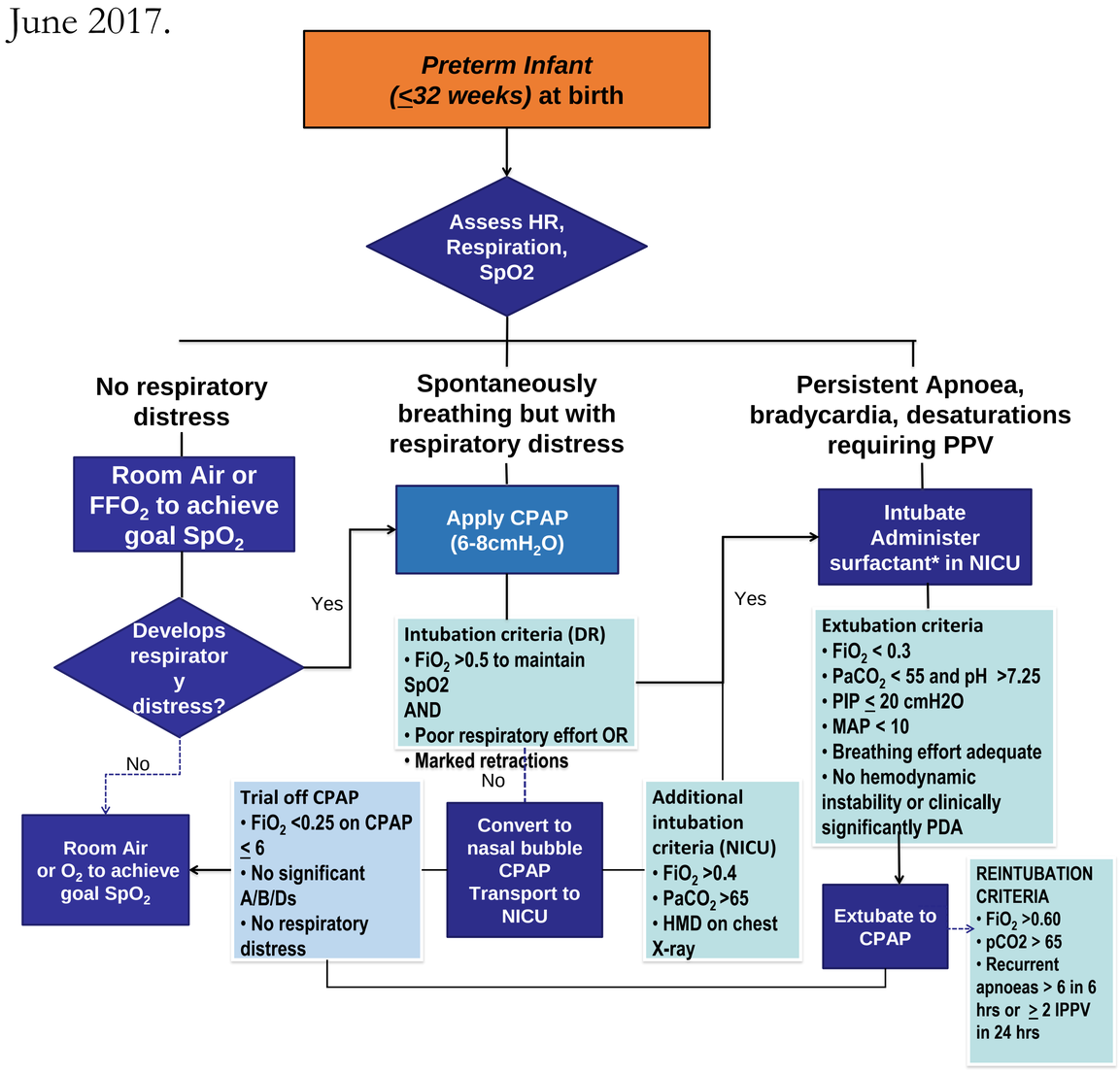
Respiratory distress syndrome (RDS) occurs commonly in preterm infants due to surfactant deficiency. These premature infants are at high risk of developing bronchopulmonary dysplasia (BPD) which clinically manifests as oxygen requirement at post menstrual age of 36 weeks. Recent studies have suggested early CPAP as an alternative to intubation and surfactant administration in management of RDS.

## Aims

To compare respiratory outcomes, morbidity and mortality rates after introduction of early continuous positive airway pressure (CPAP) protocol in the management of RDS in preterm infants.

## Methodology

A quality improvement strategy advocating early CPAP use and early extubation in the management of RDS in infants ≤ 32 weeks was implemented in KK Hospital Neonatal Intensive Care Unit (NICU) in June 2017.




Infants from 2 separate cohorts, 6 months before (Dec 2016 – May 2017) and after implementation of protocol (July 2017 – Dec 2017) were compared focusing on demographic data, respiratory outcomes, incidence of BPD and death.

Infants with antenatally diagnosed major anomalies, suspected pulmonary hypoplasia, labour ward death or early comfort care were excluded.

*Figure 1 (top) : "Super hero" growing premature infant receiving nasal prong CPAP in KKH NICU (picture taken in conjunction with World Prematurity Day)*

*Figure 2 (right) : Bubble CPAP set up on a manikin during transport from delivery suite to NICU.*

## Results and Discussion

| | ≤32 weeks | | | ≤28 weeks | | |
|---|---|---|---|---|---|---|
| | Pre Cohort (N= 109) | Post Cohort (N= 110) | P value | Pre Cohort (N= 33) | Post Cohort (N= 34) | P value |
| Birth weight, mean | 1242.64 ± 468g | 1218.47 + 357g | 0.67 | 797.03 ± 234g | 882.5 ± 191g | 0.11 |
| Gestational age, mean | 29.3 ± 2.5 wks | 29.1 + 2.2 wks | 0.51 | 25.9 ± 1.3 wks | 26.3 ± 1.2 wks | 0.20 |
| Vaginal delivery, n(%) | 40 (36.7%) | 39 (35.5%) | 0.85 | 11 (33.3%) | 17 (50.0%) | 0.17 |
| Multiple gestation, n(%) | 23 (21.1%) | 16 (14.5%) | 0.21 | 11 (33.3%) | 5 (14.7%) | 0.07 |
| Gender (Male) | 58 (53.2%) | 63 (57.3%) | 0.55 | 18 (54.5%) | 15 (44.1%) | 0.39 |
| Antenatal steroids, n(%) | 102 (93.6%) | 98 (89.1%) | 0.24 | 31 (93.9%) | 29 (85.3%) | 0.25 |
| 5 min Apgar score, median | 9 (2-9) | 8 (1-9) | NS | 7 (2-9) | 7 (1-9) | 0.91 |
| Overall intubation, n(%) | 64 (58.7%) | 59 (53.6%) | 0.45 | 30 (90.9%) | 27 (79.4%) | 0.19 |
| - At delivery, n(%) | 39 (35.8%) | 33 (30.0%) | 0.35 | 27 (81.8%) | 20 (58.8%) | 0.04 |
| Ventilation duration >24hours,n(%) | 36 (33.0%) | 33 (30.0%) | 0.63 | 25 (75.8%) | 17 (50.0%) | 0.03 |
| Ventilation days, median (if ventilated >24 hrs) | 15 (2-76) | 8 (2-116) | 0.39 | 23 (3-76) | 23 (2-116) | 0.84 |
| Postnatal steroids, n(%) | 12 (11.0%) | 6 (5.5%) | 0.14 | 12 (36.4%) | 6 (17.6%) | 0.08 |
| Pneumothorax, n(%) | 5 (4.6%) | 3 (2.7%) | 0.46 | 4 (12.1%) | 2 (5.9%) | 0.37 |
| BPD at 36 weeks, n(%) | 32 (29.4%) | 32 (29.1%) | 0.96 | 23 (69.7%) | 17 (50.0%) | 0.10 |
| Death, n(%) | 9 (8.3%) | 6 (5.5%) | 0.41 | 7 (21.2%) | 6 (17.6%) | 0.71 |
| Death or BPD, n(%) | 38 (34.9%) | 37 (33.6%) | 0.85 | 27 (81.8%) | 22 (64.7%) | 0.11 |

*Table 1: Comparison of infants demographic data and respiratory outcomes*

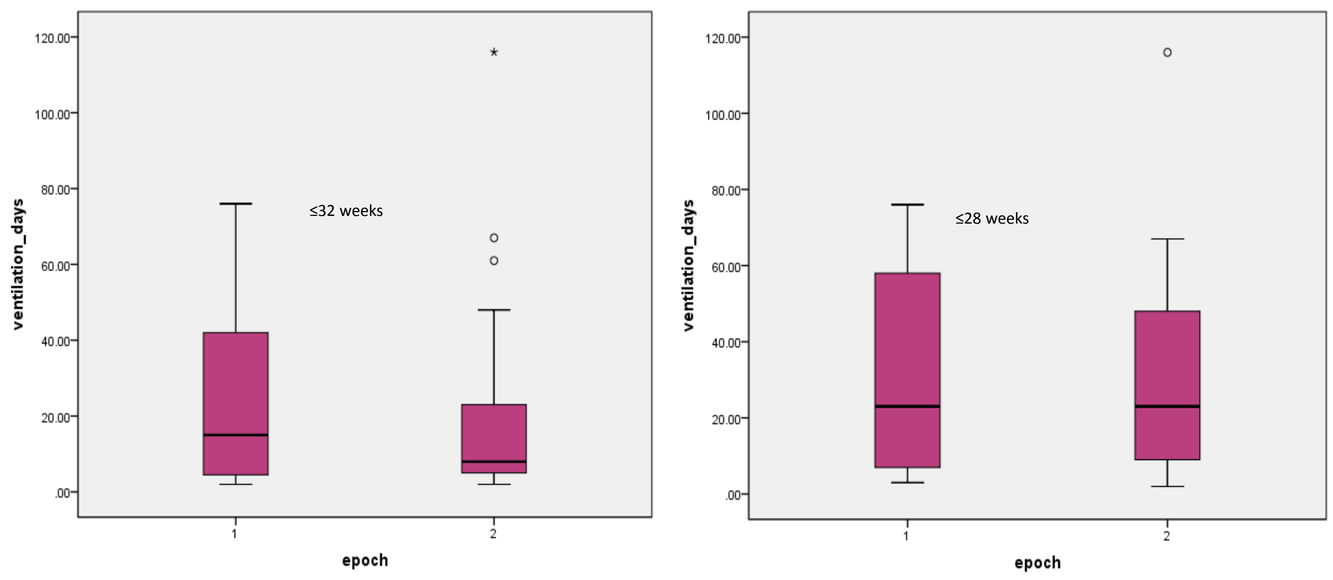



*Figure 3: Boxplots comparing ventilation days before and after implementation of protocol*

- Overall intubation rates were not significantly different but significantly less delivery room intubations observed in the ≤28 weeks early CPAP cohort
- Overall rates of BPD and BPD/death were not significantly different, however, a non-significant reduction was observed in infants ≤28 weeks gestation early CPAP group. This group of infant also needed significantly shorter duration of invasive ventilation when compared to previous cohort.
- Incidence of pneumothorax and postnatal steroids use were not significantly different between both cohorts.
- The lack of statistical significance in the difference while comparing the major outcomes may be explained by the small sample size and the short study period.

## Conclusion

The implementation of the early CPAP protocol in our hospital has shown a non-significant reduction in the incidence of BPD and BPD/death, especially for the more premature infants ≤28 weeks of age. A decrease in the duration of mechanical ventilation was also observed in the post CPAP cohort. Further analysis on potential cost reduction and length of hospital stay could be explored.

## References

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