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Establishing ventilation in the delivery room: T-piece resuscitator versus self-inflating bag

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Commentary

Establishing effective ventilation is the cornerstone of neonatal resuscitation (1). Positive pressure ventilation (PPV) can be delivered via a self-inflating bag, flow-inflating bag, or T-piece resuscitator. Although the T-piece is more effective at delivering targeted peak pressures and positive end expiratory pressure (PEEP) in manikins (2, 3) and in a small clinical study (4), no device has been shown to be superior with regards to clinical outcomes in the delivery room.

The Delivery Room Ventilation Devices trial was designed to determine whether the T-piece or SIB is more effective at establishing ventilation after birth, using the clinical indicator of HR \geq 100 bpm at 2 minutes of life. The primary outcome did not significantly differ between intervention groups. Yet in the T-piece group, peak inspiratory pressures were lower and less variable, and significantly fewer infants were intubated in the delivery room. Finally, in post-hoc analysis of very low birth weight infants (VLBW), a higher proportion of infants in the T piece group had HR \geq 100 bpm at 2 minutes while significantly fewer were intubated in the delivery room or developed BPD.

The study has limitations. Clinical providers' prior familiarity with a given device may have influenced the quality of PPV performed. The primary outcome, HR, was recorded from the pulse oximeter in only 69% of infants. The remaining HR assessments were made by auscultation, which is notoriously inaccurate (5). Next, providers followed international resuscitation guidelines, but the decision to intubate in the delivery room remains influenced by provider factors. Further, a study team member recorded peak inspiratory pressures from visual assessment of the manometer during PPV; this may have introduced imprecision and bias. Last, the analysis of VLBW infants was performed post-hoc and as authors themselves agree should be interpreted cautiously.

Despite these limitations, the study provides evidence that PPV performed with the T-piece resuscitator is less injurious to the lung. Positive end expiratory pressure (PEEP) helps facilitate clearance of fetal lung fluid and maintain the functional residual capacity (FRC)

URL to the full review on the EBNEO web site: <https://ebneo.org/2015/03/establishing-ventilation-in-the-delivery-room-t-piece-resuscitator-versus-self-inflating-bag/>

Conflicts of interest: None

(6). Pulmonary function measurements during PPV indicate that the T-piece delivers significantly more PEEP and less variable peak pressures than the SIB (4). The T-piece may better facilitate lung recruitment by improving PEEP delivery (reducing atelectrauma), delivering lower and less variable peak pressures (reducing volutrauma), and eventually decreasing the need for endotracheal intubation. The potential impact of delivery room management on long-term respiratory outcomes in preterm infants was reviewed as an accompanying editorial to this trial and the Breathings Outcomes Study (7).

Future clinical studies should define the relationship between the characteristics of PPV (such as measured PEEP, peak pressures, and tidal volumes) during neonatal transition and respiratory outcomes in preterm infants. Meanwhile, the Delivery Room Ventilation Devices trial results do not demonstrate either the SIB or T-piece to be more effective in establishing ventilation after birth for all comers, based on the surrogate measure of HR. However, the study findings do suggest the T-piece to be a safer device for ventilation, particularly for preterm infants.

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References

1. Kattwinkel J, Perlman JM, Aziz K, Colby C, Fairchild K, Gallagher J, et al. Neonatal resuscitation: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Pediatrics*. 2010; 126:e1400–13. [PubMed: 20956432]
2. Hawkes CP, Ryan CA, Dempsey EM. Comparison of the T-piece resuscitator with other neonatal manual ventilation devices: a qualitative review. *Resuscitation*. 2012; 83:797–802. [PubMed: 22227500]
3. Dawson JA, Gerber A, Kamlin COF, Davis PG, Morley CJ. Providing PEEP during neonatal resuscitation: which device is best? *J Paediatr Child Health*. 2011; 47:698–703. [PubMed: 21449898]
4. Dawson JA, Schmölzer GM, Kamlin COF, Te Pas AB, O'Donnell CPF, Donath SM, et al. Oxygenation with T-piece versus self-inflating bag for ventilation of extremely preterm infants at birth: a randomized controlled trial. *J Pediatr*. 2011; 158:912–8.e1-2. [PubMed: 21238983]
5. Kamlin COF, O'Donnell CPF, Everest NJ, Davis PG, Morley CJ. Accuracy of clinical assessment of infant heart rate in the delivery room. *Resuscitation*. 2006; 71:319–21. [PubMed: 16989935]
6. Hooper SB, Siew ML, Kitchen MJ, te Pas AB. Establishing functional residual capacity in the non-breathing infant. *Semin Fetal Neonatal Med*. 2013; 18:336–43. [PubMed: 24035400]
7. Foglia EE, Kirpalani H, DeMauro SB. J Pediatr. Long-term respiratory morbidity in preterm infants: is noninvasive support in the delivery room the solution? *J Pediatr*. 2014; 165:222–5. [PubMed: 24840755]