

Correspondence

Ventilator settings for newborn infants

Sir,

For those not intimately involved in ventilating critically ill low birthweight babies, the excellent article by Ramsden *et al*¹ and the commentaries by South and Morley, and by Milner, could leave them feeling bemused.

In terms of getting babies with severe surfactant deficient respiratory distress syndrome through the first four to five days, it does not matter how you set the ventilator because there are many ways to oxygenate and blow off CO₂ in such patients. The best proof of this statement is the fact that it is now extremely rare for a baby to die from respiratory distress syndrome alone.

Babies with severe respiratory distress syndrome who die in the first few days do so from infection, some form of air leak, or from periventricular haemorrhage. I submit that there is little evidence that different ventilator settings have much impact on the morbidity or mortality from these complications. Paralysing babies may occasionally help; and at the mild end of the spectrum (unsatisfactory though the studies are) it is possible that faster rates, around 60 (but not 100-120), are associated with a lower incidence of air leak syndrome. If, however, a lot of babies in your unit are dying from respiratory distress syndrome, you should not be worrying about what rate to set your ventilator but whether you are in the right speciality!

The crucial question is the incidence of chronic lung disease. As the paper by Ramsden *et al* points out, the 'slow' rate techniques were introduced at University College Hospital in the late 1960s when they had a very high incidence of severe bronchopulmonary dysplasia. Despite the deficiencies in their data, which they freely acknowledge, their studies are the only ones that show that varying the ventilator settings can have any effect on the incidence of chronic lung disease, and that the slower rates with a high mean airway pressure are safest from this point of view.

As severe chronic lung disease is now one of the major clinical problems we are facing associated with the increased survival of infants of less than 1000 g birth weight, no study of neonatal ventilation is worth the paper it is published on unless it addresses this problem. I would submit that the protagonists of fast ventilator rates are merely advocating an experimental procedure until they can show conclusively that their methods of ventilating are not associated with the high incidence of chronic lung disease that was observed with similar techniques 20 years ago.

Reference

- ¹ Ramsden A, Reynolds EOR. Ventilator settings for newborn infants. *Arch Dis Child* 1987;62:529-36.

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Sir,

I read with interest the paper by Ramsden *et al* on ventilator settings for newborn infants.¹ The majority of babies who require ventilation suffer from respiratory distress associated with prematurity. When studies are carried out which include only such infants, meaningful conclusions from the results can be drawn. Recently, we have successfully answered the question of which ventilator rate is most beneficial in such a homogeneous group of infants—those with pneumonia, apnoea, and pulmonary hypoplasia; we excluded those with meconium aspiration.² We found that fast rates (greater than 100/minute) were associated with a significant increase in both oxygenation and carbon dioxide removal when compared to slower rates. The explanation for this was (as we subsequently showed³) that at such rates infants breathe in synchrony with their ventilator. We found that the spontaneous respiratory rate of ventilated infants during the first 24 hours of life was inversely proportional to their gestational age. Thus the faster ventilator frequency more closely mimicked the infant's spontaneous respiratory rate and induced synchronous respiration.

Increasing the ventilator rate can also, by inducing synchrony, reduce active expiration and hence the necessity for paralysis. Numerous although possibly not well designed studies have suggested that fast rates reduce the incidence of pneumothorax. When this evidence is considered with the improvement in gas exchange at increased ventilator frequencies,² it must suggest that fast rates are appropriate for preterm infants with respiratory distress. I agree, however, that fast rates are not the panacea for all ventilated infants. Relatively 'mature' infants with severe respiratory distress syndrome constitute a separate group and I would—and do—ventilate such infants at slower rates. Optimal types of artificial ventilation for other diagnoses such as pneumonia, pulmonary hypoplasia, and meconium aspiration remain untested.

References

- ¹ Ramsden CA, Reynolds EDR. Ventilator settings for newborn infants. *Arch Dis Child* 1987;62:529-38.
² Greenough A, Pool J, Greenall F, Morley CJ, Gamsu H. Comparison of different rates of artificial ventilation in preterm neonates with respiratory distress syndrome. *Acta Paediatr Scand* 1987 (in press).
³ Greenough A, Greenall F, Gamsu H. Synchronous respiration: which ventilator rate is best? *Acta Paediatr Scand* 1987 (in press).

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