Neonatal respiratory distress syndrome

EDITOR.—Professor Souttall and colleagues raised the question of the working group on the management of neonatal respiratory distress syndrome regarding parameters of oxygenation. We write in support of the provisional and practical suggestion of an arterial oxygen saturation (Sao2) range of 85–93% and suggest that much of the data quoted by Souttall et al is not applicable to this clinical setting.

Professor Souttall and colleagues suggest an upper limit for Sao2 of 96% and quote four studies in support of this choice. In two of these papers, the majority of the patients were neonates unfit to maintain the Sao2 for other conditions, mainly congenital heart disease. These infants constitute a very different population from those suffering from respiratory distress syndrome. Our own studies (47) demonstrated made in clinical practice using Ohmeda Biox oximeters on a population under 33 weeks' gestation found that if the saturation value was 93% or below the arterial oxygen tension (PaO2) was never greater than 12 kPa. To maintain the PaO2 below 10 kPa, which is the upper limit suggested by the working party, requires a saturation of 92% or less. Certainly, when using an Ohmeda oximeter, an upper limit of 93% seems very reasonable.

When discussing a lower limit for Sao2, Professor Souttall recommends 95%, based on a study of well preterm infants. These infants bear little relation to the sick, low birthweight infants who, until very recently, had experienced a physiological, umbilical venous oxygen tension (Po2) approximately 4.5–6 kPa.

With regard to the adverse effects of hyperoxia, there is no firm evidence which defines the optimal range for any of the indices of oxygenation. There are almost no modern data relating levels of oxygenation to outcomes; it is the measurements made in clinical practice using Ohmeda Biox oximeters on a population under 33 weeks' gestation found that if the saturation value was 93% or below the arterial oxygen tension (PaO2) was never greater than 12 kPa. To maintain the PaO2 below 10 kPa, which is the upper limit suggested by the working party, requires a saturation of 92% or less. Certainly, when using an Ohmeda oximeter, an upper limit of 93% seems very reasonable.

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Thus, we have not confirmed the third order polynomial relationship described by Bauer et al. This may be for a number of reasons, but it may be of note that the majority of the data used by the working party from Bauer's group were by a non-invasive method, that has been previously criticised in the sick very low birthweight infant. We would agree with the conclusion of Bauer et al that blood pressure assessment by pulse oximetry is not alone a poor measure of absolute hypoxaemia in very low birthweight infants. It is important that more than one cardiovascular parameter is considered in the assessment of the hypoxic infant so that different results are looked for.

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Dr Bauer, Professor Linderkamp, and Professor Vermond comment:

Dr Wright and Goodall present blood volume and mean arterial blood pressure (MAPB) measured in 31 very low birthweight infants. No relationship was found between MAPB and preterm in infants with a blood volume range of 46–131 ml/kg. The authors measured MAPB by an invasive method, whereas we determined systolic blood pressure (SBP) by an invasive method in 14 infants. We observed a significant positive correlation between SBP and blood volume (r²=0.54; p<0.001) due to increased SBP in infants with blood volume >100 ml/kg (95 (9) mm Hg) when compared with infants with blood volume <100 ml/kg (48 (7) mm Hg). Drs Wright and Goodall suggest that the different results of the two studies may be due to the use of oscillometry in the majority of SBP measurements. It appears unlikely that infants with two out of 10 infants with blood volume >100 ml/kg had their SBP measured by an invasive method. Moreover, separate analysis of the relationship between blood pressure and blood volume showed a significant relationship only for SBP measured by oscillometry. It may, therefore, be argued that SBP was overestimated in the infants with high blood volume.

Despite the importance of oscillometry, there have been concerns about its reliability. Some studies have suggested that results from oscillometry alone are questionable. The technique is based on the principle that oscillations in blood pressure are caused by changes in blood volume. These oscillations are detected by a cuff placed around the arm, and the mean arterial pressure (MAP) is calculated from the peak-to-peak oscillations. However, this technique has been shown to be inaccurate in certain situations, such as when the infant is hypervolaemic or hypoollened. In addition, the technique is not suitable for infants with low blood volume, as the oscillations may be too small to detect.

It is important to stress that both studies agree that arterial blood pressure alone is a poor indicator of hypovolaemia in very low birthweight infants.


Purpont ductus arteriosus in the newborn

EDITOR,—We read Nick Archer’s recent paper with interest.1 We thought that it was a helpful paper but feel that we must comment on some of Dr Archer’s recommendations relating to the ductus arteriosus in the newborn.

Dr Archer suggests that ‘fluid intakes greater than 140 ml/kg/24 hours ... are inadvisable’ without distinguishing between sodium and water. The evidence linking fluid volumes with certain neonatal problems is incomplete and does not separate sodium and water. Coulthur and Hey have shown that preterm babies are able to cope with widely varying water intakes provided that their sodium intake is kept constant.2 The recommendation to treat preterm babies who have symmetric patent ductus arteriosus (PDA) with ‘fluid restriction’ is based on retrospective studies that failed to take into account sodium input and as far as we are aware there have been no prospective randomised trials to show that it is an effective treatment.

Advise to limit fluid intake without further qualification may be harmful in certain circumstances. Nutritional intake is reduced to a significant degree and prolonged restriction of fluid volumes is a serious cause of suboptimal nutrition in neonatal intensive care units. Many extremely immature babies have high insensible water losses, and failure to keep up with water loss will lead to hypernatremic dehydration. Further, when treating a PDA, dehydration will exacerbate indomethacin toxicity.

The age of the baby at the time of discovery of the PDA is also important. There is a postnatal maturation in the ability to handle a sodium load and clinical management should take this into account.3 Dr Archer suggests that a symptomatic PDA would rarely be missed if clinical signs are looked for regularly. However, evidence suggests that clinical assessment is insensitivel4 to make a diagnosis of Dr Archer’s position is therefore based on having done so much to introduce echocardiography into the neonatal intensive care unit but we suggest that we should look to echocardiography progress into an essential tool for all competent neonatologists in much the same way that cranial ultrasound scanning has progressed from a specialised to a generalised skill.

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Clinical trials and neonatal intensive care

EDITOR,—The Department of Health now acknowledges that randomised clinical trials are an essential part of routine practice and will lead to improved medical care for patients.1 The observation has also been made that participation in a clinical trial will bring better outcomes than non-participants, regardless of the arm of the trial to which they are assigned.2 Randomised clinical trials therefore confer benefit upon both populations, and the obligation upon clinicians to advise their patients to enter randomised trials.

In neonatal intensive care, consent to enter a baby into a trial is sought from the parents. They have just had a baby and their baby is critically ill. They are asked to listen to complex medical arguments which spell out the uncertainties of treatment and they are asked to make a positive decision to consent that may have consequences for their baby. In academic units, it is likely that, given the relatively small numbers of babies receiving intensive care, each infant may be suitable for entry into more than one trial, for each of which consent must be sought. Many parents in this situation find it easier to make no decision and so their baby is not entered.

There are a number of issues here that deserve further scrutiny. Parents clearly have a right to know about a proposed trial. It is cruel to present them with a mass of complex medical information at a time when they are already frightened and confused. The neonatal paediatrician also has an obligation to act in the best interests of the baby’s patent and so it must be unethical to reduce the chances of a baby’s entry into a randomised trial, given the advantages it is accepted that this will bring. Is there a way out of these dilemmas?

Education of the public in the concept and importance of randomised clinical trials has been advocated.3 Other options might also be considered. For example, if a trial sets out to compare two treatment strategies, each of which is regarded as acceptable clinical practice and each of which individually might be implemented without parental consent, then it might be possible to carry out the trial without parental consent. An example might be a trial comparing antibiotic policies, each of which might be used as treatment without parental consent. Such an approach would clearly be inappropriate in, for example, a trial comparing conventional versus operative treatment, as operative treatment may only be given with parental consent. This approach would avoid having to force parents to grapple with issues that would not normally be presented to them and the equally morally questionable practice of forcing parents to