Background and aims Disturbed cerebral oxygenation during the neonatal period might pose preterm infants at risk for neurological deficits. Our aim was to determine whether regional cerebral tissue oxygen saturation ($r_{SO_2}$) and fractional tissue oxygen extraction (FTOE), measured by near-infrared spectroscopy, were associated with neurodevelopmental outcome of preterm infants at 2–3 years of age.

Methods We included 83 preterm infants (gestational age < 32 weeks) and measured $r_{SO_2}$ and calculated FTOE on days 1, 2, 3, 4, 5, 8, and 15 after birth: $(tcsA_{O_2} - r_{SO_2})/tcsA_{O_2}$. Additionally, we determined the area under the curve (AUC) of $r_{SO_2}$ and FTOE during the first 2 weeks. Cognitive, motor, neurological and behavioural outcome was determined at 2–3 years of age. Multiple linear regression analyses were used to determine whether $r_{SO_2}$ and FTOE contributed to outcome.

Results We included 67 infants for follow-up. Lower quartile ($P_{25-50}$) and highest quartile ($P_{75-100}$) of $r_{SO_2}$ values on day 1 were associated with poorer cognitive outcome ($p=0.044$ and $p=0.008$, respectively). Lower AUC of $r_{SO_2}$ was associated with poorer cognitive outcome ($p=0.014$). Lower quartile ($P_{25-50}$) AUC of $r_{SO_2}$ was associated with poorer fine motor outcome ($p=0.004$). The amount of time $r_{SO_2} < 50\%$ on day 1 was negatively associated with gross motor outcome ($p=0.002$). The highest quartile of FTOE values on day 1 was associated with poorer total motor outcome ($p=0.041$).

Conclusions Neurodevelopmental outcome at 2–3 years of age was associated with cerebral oxygen saturation during the first 2 weeks after birth in preterm infants. Both high and low $r_{SO_2}$ values had a negative influence on neurodevelopmental outcome.

Background and aims Low flow oxygen can be delivered either as a dry or heated humidified gas. Little evidence exists about which is most beneficial to the paediatric patient. The aim of this study is to investigate whether children aged < 2 years with acute respiratory illness requiring low flow oxygen (< 2 litres) would benefit from humidified oxygen when compared to dry oxygen therapy.

Methods A prospective randomised controlled pilot study of 117 children aged < 2 years with an acute respiratory illness requiring low flow oxygen therapy. 54 participants were randomised to receive dry oxygen and 63 participants were randomised to receive humidified oxygen. Hours on oxygen therapy, hours to ready to discharge and hours to hospital discharge were recorded.

Results Median hours on dry oxygen therapy totalled 43 hours versus 39 hours in the heated humidified oxygen group. Wilcoxon rank test ($p=0.05$) returned $P$ value 0.77. Hours from randomisation to ready to discharge equated to 66 hours dry oxygen and 52 hours heated humidified oxygen. Wilcoxon rank test ($p=0.05$) calculated $p=0.36$. The total median length of hospital stay was 53 hours in the dry oxygen group and 47 hours in the heated humidified oxygen group. Wilcoxon rank test ($p=0.05$) determined $p=0.70$.

Conclusion No statistically significant difference in hours on oxygen therapy, time to ready to discharge and length of hospital stay between the dry oxygen and heated humidified group. No significant benefit to the administration of heated humidified oxygen at low flows was found.