LETTERS TO THE EDITOR

Oxygen saturation and retinopathy of prematurity

EDITOR,—The observations of Tin et al have led them to suggest that babies may have better overall outcomes when unit policies aim at oxygen levels of 70–90%, much lower than current practice in most NICUs. While I would support their call for further well designed research into this question, I have major concerns that this concept of beneficial hypoxia might creep into clinical practice, and even be extended to the older survivors. The authors are clearly aware of the limitations of their study. There are obviously many possible alternative reasons for the differences in outcome between the nurseries; table 2 of the study suggests widely divergent policies on a number of issues apart from oximetry levels. There are no data supplied regarding the actual oximetry levels maintained in the nurseries, which makes conclusions about the safety of a saturation of 70% rather speculative.

My main concern is the potential risk to older babies with chronic lung disease who might once again be subjected to chronic hypoxia. Since the more widespread acceptance that babies with chronic lung disease require similar oxygen levels to their more fortunate brethren we have largely abolished the high first year mortality in these babies, and the pulmonary hypertension which was previously seen. One observational study of differing oximetry levels within a single unit confirmed the high risk of even mild chronic hypoxia in this group of infants, showing a high risk of apparently life threatening events in the hypoxic infants.

While there is continued uncertainty about the optimum oximetry levels in the early life of a preterm baby, there is no justification for maintaining subnormal levels of oxygen in babies beyond 34–36 weeks of age with chronic lung disease, and I trust that this paper will not encourage such practice.

ROB PRIMHAK
Senior Lecturer in Respiratory Paediatrics, Sheffield Children’s Hospital, r.a.primhak@sheffield.ac.uk


Oxygen saturation and retinopathy of prematurity—Authors’ response

EDITOR,—We are happy to make it clear that we have never suggested that hypoxia is “beneficial” to babies with chronic lung disease. Indeed in describing our own practice we said, quite specifically, that “babies who were at least 8 weeks old (and it should be remembered that all our babies were born more than 12 weeks early), and whose retinal vasculature was mature, received liberal oximetry supplementation.” We would, however, remind Dr Primhak that those babies in the recent STOP-ROP trial who were given enough supplemental oxygen to maintain a saturation of 90–94% (to see if this reduced the severity of the retinopathy they had already developed) developed significantly more pulmonary problems than those only given enough oxygen to maintain a saturation of 80–84%. The idea that oxygen is always a “good thing” dies hard. Iles and Edmunds showed that babies with a saturation below 90% in air at discharge were more likely to have a frightening colour change, apnoeic episode and/or sudden change in muscle tone during the subsequent three month study period, but they did not show that that this risk was reduced by giving oxygen. There is equally little objective evidence that offering sustained supplemental oxygen actually does reduce the incidence of troublesome pulmonary hypertension.

WIN TIN
Department of Paediatrics, South Cleveland Hospital, Middlesbrough TS4 3BW, UK
r.tin@sen.net.co.uk

DAVID MILLIGAN
PHILIPPA PENNEFATHER
Royal Victoria Infrmary, Newcastle upon Tyne NE1 4LP, UK


Two sacred cows of neonatal intensive care

EDITOR,—I read the descriptive study of Tin et al with considerable interest. In essence it challenges two sacred cows of neonatal intensive care, whether intra-arterial monitoring is necessary, and what is the appropriate PaO2 at which to nurse critically ill babies.

ARTERIAL MONITORING
They do not give us accurate details of arterial catheter use. There is a hint that they are used for less than a day, more resorting to SpO2 and capillary measurements. Nor do they tell us what analgesia is used for multiple capillary samples.

A fundamental principle of neonatal intensive care is minimal harm, and inducing arterial catheters allow all samples to be taken with no or minimal disturbance, and if the catheters are umbilical, they can also be used safely for virtually all infusions including TPN. Furthermore, with the use of oscilometric techniques, they allow accurate blood pressure recordings.

Surprisingly, the literature, and my own clinical experience, shows numerous complications of UAC are much more common in term infants, and within 48–72 hours of insertion, so that 28/32 babies leaving UAC in situ for many days is unlikely to have a major impact on the putative complication rate of this procedure that induces anxiety in neonatologists.

Local analgesia for heel pricks is surpris- ingly ineffective even if applied for (imprac- tically) long periods prior to puncture. If general anaesthesia with, say, morphine is being used the manipulation involved in capillary sampling is still likely to result in the changes in oxygenation (and thus intracellular haemodynamics with potentially damaging sequelae), that were so graphically illustrated in many papers in the 1970s and 1980s with continuous PaO2 and tcPO2 monitoring became available.

To inflict frequent painful capillary sampling procedures on an unstable 25/52 800 G neonate in the first week of life where blood gas sampling may be necessary at least 2–3 hourly could at best be described as ill judged, at worst negligent.

APPROPRIATE Pao2
As they rightly say, running babies at SpO2 levels of 70–90 (PaO2 approximately 250mm Hg, 3.3–6 kPa) is absurd. I remember spirited arguments about it with the late great Sir Peter Tizzard during my training in the mid 1960s.

It is interesting, but not new, that if you keep babies cyanosed, ROP is rare. Many anecdotal papers from the late 1950s during the panic over oxygen therapy showed that rigid restriction of oxygen dramatically reduced ROP, but probably increased mortality. Although the validity of papers reporting on an association between oxygen restriction in the late 1950s and 1960s and mortality have been challenged, it remains an anxiety.

It remains in this study with an overall mortality of 52%. We do not know the proportion of babies off 23/24 weeks in the study, but it is likely to be relatively small. Contemporary studies reported by Lorenz from the USA give an overall mortality of 38% in babies of compatible gestation and year of birth, falling to 26% in those of 25, 26, and 27 weeks. The figures for Cambridge were virtually identical. Therefore, unless the Newcastle units are overloaded with 23/24 week babies the overall mortality rate with “physiological oxygenation” (has Blairane spin even penetrated neonatology?) is worryingly high.

Reporting their cerebral palsy rate is irrelevant. Improved neonatal care has in general (depressingly) little effect on cerebral palsy rates; what changes is the number of survivors and the numbers dying.

Importantly, cerebral palsy is only one part of the problem of surviving ELBW. Equally worrying is their under performance at school in childhood and adolescence. In the past, when children with cyanotic congenital heart disease were either inoperable or operated on only in early childhood, prolonged early hypoxaemia of the level used by Tin et al was associated with subsequent cognitive defects. The Newcastle group has a distinguished track record of long term follow up studies, and hopefully the babies in this study will be followed until adolescence. However, until such data show that babies kept at 3.3–6.0kPa for days and weeks during a vulnerable period for brain development do as well as those kept adequately oxygenated, I would regard the practice as described by Tin et al as of unproven benefit and possibly dangerous.

Finally, the marked restriction of oxygen therapy was, at best, experimental. Was a protocol for this study peer reviewed by the local research ethics committee? If not, why not?

NRC ROBERTON
Neonatologist, Larue Harrop


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Two sacred cows of neonatal intensive care—Authors’ response

EDITOR,—I am glad to have a chance to respond to Dr Roberton’s assertion that the care of the babies nursed using oximeter settings of 70–90% was “negligent”, since I was responsible for those children, but time and space does not allow a full response. Neither does space allow me to respond to the criticism implicit in your own introductory statement that such care “breaches BAPM guidelines.”

Dr Roberton says the cerebral palsy rate is “irrelevant”, but parents might not agree. Parents might also be glad that, while 4 children monitored using an oximeter alarm set at 80–90% went blind, no child in the other group went blind. They might also be glad that half were off the ventilator in 7 rather than 22 days, and out of oxygen in 4 rather than 10 weeks. The NHS might be equally grateful for the reduction in cost such an approach delivers. Post delivery growth in the conservatively managed group was only retarded half as much as in the comparator group, even though only a quarter ever received any parenteral nutrition. I am happy to leave parents to be the judge of whether this was “negligent” care.

Babies were not “kept at 3.3–6.0 kPa for days and days”: target saturation delivered an arterial partial pressure of 5–11 kPa, but alarm settings were more generous than this to discourage staff from adjusting the ventilator every time saturation transiently fell below 80%. Nor was blood pressure monitored by oscilometry (a technique that is known to be unreliable), as a proper reading of the paper would reveal. Dr Roberton mistakenly calls our survival rate our mortality rate, compares survival for mostly black American with that of our white English children, compares survival to discharge with survival to one year, and says nothing about the reliability with which gestation was documented. The same issue of your journal contains a better review of survival. We have every intention of following these children, but felt it would be wrong to wait ten years before reporting the above findings.

Dr Roberton mentions the outcome of a study of 38 children offered corrective surgery for transposition 6 months to 5 years after birth. Those operated on early had a better outcome, but Dr Roberton does not mention the fact that these children had a mean saturation of 68% before operation, and that 8 had a history of acquired central nervous system damage. However, the main thrust of Dr Roberton’s letter is that lack of an arterial line subject these babies to unnecessary pain. This overlooks the fact that morphine was given during early care, while early extubation greatly reduced the total number of blood samples eventually taken (as the differing transfusion needs confirm). Samples were not taken every 2–3 hours initially, but every 6–8 hours. In fact, Dr Roberton and I are at one in agreeing that minimising pain is a very valid reason for inserting an umbilical arterial line in babies as immature as this; the limited use of lines was only mentioned because these have been considered necessary in the past to minimise the risk of severe retinopathy—a belief for which there is absolutely no controlled trial evidence.

Finally, Dr Roberton asks if this approach ever had ethics committee approval. It did not, because it was merely a continuation of the non-invasive approach initiated by my predecessor Dr Neligan in the mid 1970s, aided by the arrival of transcutaneous gas monitoring. Neither was the introduction of pancuronium in Dr Roberton’s own unit placed before an ethics committee.

I can only conclude that someone ought to call the two sacred cows Dr Roberton has been worshipping (along with all the other animals recently culled in the UK). In the absence of any other evidence based information, we need a proper controlled trial to address these issues.

EDMUND HEY
Retired Consultant Paediatrician, Newcastle, UK
shey@easynet.co.uk

Figure 1 The modified nasopharyngeal airway in place.

Using a modified nasopharyngeal airway in Pierre Robin syndrome

EDITOR,—Masters et al describe how a modified endotracheal tube can be used as a nasopharyngeal airway in infants with Pierre Robin syndrome. We describe further modifications made to overcome some problems which we encountered in using the technique in one of our patients.

In the original description the protruding part of the airway is cut into four strands and the upper one cut off. We found the remaining strands rather thick, so cut them to half the width. We found that leucoplast tape was the only tape that held the strands in place with no additional benefit resulting from the use of Tinc Benz. The strands rubbed badly where they curved over the edge of the nostril. To overcome this a piece of suction catheter (9F) of just sufficient length to extend over the lateral and medial walls of the nostril is tied transversely across the tube with a 3/0 silk tie (fig 1). This lifts the three strands off the edge of the nostril and prevents any rubbing.

In our patient blockage of the airway occurred after formula but not breast milk feeds. It is therefore advisable to suction the airway after each feed. We used a suction catheter with graduation marks enabling insertion no further than the tip of the airway. If inserted further the pharyngeal stimulation usually caused vomiting.

If a nasogastric tube is also required this can be taped to one of the strands rather than the face. The airway was changed every four to six days, immediately before a feed and alternating between nostrils. Using 1% lignocaine drops and smearing the tube with lignocaine jelly reduced crying time after insertion.

Figure 1

Figure 1

As Masters et al is far superior as it enables the child to lie prone and is less liable to get knocked or blocked through kinking. We suggest that the modifications we have described will further improve the acceptability of the technique.

MAGALOGAVROU KEITH FOOTE
Department of Paediatrics, Royal Hampshire County Hospital, Winchester, Hampshire SO22 5DG, UK
mariaalexieou@hotmail.com

Sta

tionary pain on a neonatal intensive care unit

EDITOR,—It is now widely accepted that even the most preterm babies experience pain. This is difficult to measure and a number of clinical scales have been developed to make this assessment as objective as possible. Whole numbers of objective scales, the assessment of pain can become very subjec-
tive. We have measured staff perceptions of pain experienced by babies in different clin-
ical situations in a neonatal intensive care unit. Clinical scenarios were presented to the
nursing and medical staff of the Exeter Neo-
natal Unit, and they were asked to score on a visual analogue scale the severity of pain they
felt a baby experienced in these situations. The scale ranged from no pain to extreme pain
on a 10 cm line and staff were asked to mark a point on the line that represented their
assessment of the likely level of pain, and they were also asked whether they thought analge-
sia was necessary for the baby. There were six clinical scenarios:

- a Guthrie test on an awake term baby using a spring loaded Autolet device;
- a ventilated baby of 28 weeks gestation in no obvious distress with normal blood
gases;
- a 35 week gestation baby of a diabetic mother who had four attempts at intr-
dromonecannula insertion;
- a term baby with respiratory distress syndrome who developed a pneumothorax
needing chest drain insertion;
- a 37 week gestation baby who had grazing the questionnaire was
anonymised. Sixty six questionnaires were
distributed to 21 doctors and 45 nurses. Fifty
six (85%) responded, of whom 18 were doc-
tors (eight men, 10 women) and 38 were
nurses (eight men, 30 women). The doctors
comprised senior house officers, specialist
registrars, staff grade, consultants, and nurs-
ing staff of sisters, senior nurses, staff, and
nursery nurses. The overall scenario score
calculating the score for each scenario)
was significantly higher for nurses
(mean (SD) = 28.5 (6.8)) than for doctors
(mean (SD) = 35.8 (6.8); p < 0.01). The scen-
nario score was significantly higher either
(p < 0.01) for nurses in four of the six clinical
scenarios. The two scenarios in which the
difference was not significant were the 28
week gestation ventilated baby and the baby
with a grazed scalp, although in both
situations the mean score was higher for
nurses than doctors. In all scenarios, more
nurses than doctors thought that analgesia
was necessary but this was only statistically
significant for the baby needing lumbar
puncture (97% vs 77%; p = 0.03).

We feel this questionnaire study of our unit
highlights important differences in percep-
tion of pain between doctors and nurses.
Does it reflect a sex difference in the com-
oposition of the two groups? Are doctors distanc-
ing themselves from the pain that often they
infect when performing practical procedures
or are they more aware of potential side
effects of the analgesics used? It would be
interesting to explore the reasons for these
differences.

M W QUINN
Consultant Paediatrician
Senior Lecturer in Child Health

Use of the black area on the tubetip for rapid estimation of insertional depth of endotracheal tubes in neonates: a potential hazard

EDITOR,—I would like to report on a premature neonate who was intubated unilater-
ally as a result of improper use of the black area at the endotracheal tubetip.
At 29 weeks gestational age, a 1020 g boy was born by emergency caesarean section to a mother who presented with preeclampsia. He was intubated immediately for signs of severe respiratory distress with a 3.0 mm ID tube via the nasotracheal route by the resident on call. The black area of the tube
was inserted full length through the vocal cords with the upper rim positioned at the level of the vocal cords. Breath sounds were equally distributed over auscultation. The tube was fixated with adhesive tape at the 10 cm
mark at the nose. A thoracic x ray revealed that the tubetip was located in the
entrance of the right main stem bronchus. The tube was reinserted at a length of 3.5 cm and refixated at 8.5 cm at the nose, after which exogenous surfactant was instilled for treat-
ment of grade 3 idiopathic respiratory distress syndrome. The ensuing clinical
course was uneventful and the infant was discharged with signs of mild bronchopul-
monary dysplasia several weeks later.

During the evaluation of this incident it was found that the resident who intubated
had been taught at another institution that a particular tube size is indicated. The oth-
ers added a black area 3.5 cm at the level of the vocal cords to the carina of a neonate of 1000 g, and subsequently the infant was intubated and refixated at 70 cm at the nose, which when exogenous surfactant was instilled for treat-
ment in neonates.

The scale ranged from no pain to extreme pain
(mean (SD) = 35.8 (6.8); p < 0.01). The sce-
nario score was significantly higher for nurses
(mean (SD) = 28.5 (6.8)) than for doctors
(mean (SD) = 35.8 (6.8); p < 0.01) for nurses in four of the six clinical
scenarios.

In conclusion, this report illustrates that
care is required in the use of the black area at
the tubetip for rapid estimation of inser-
tional depth of endotracheal tubes in neonates.

H MOLENDIJK
Neonatologist,
Department of Pediatrics,
Diakonessen Hospital,
University Hospital Groningen,
PO Box 30001, 9700 RB Groningen,
Netherlands
h.molendijk@hkgazu.nl

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Respiratory distress syndrome and antenatal corticosteroid treatment in premature twins

EDITOR,—Randomised, placebo controlled trials of antenatal corticosteroid administra-
tion have not shown a significant reduction in the incidence of respiratory distress syn-
drome (RDS) in premature twins. 1 Subse-
quent retrospective studies examining the effect of steroids on twin pregnancies have
shown conflicting results. 2

Further to our recent article,3 we have investigated the relation between respiratory
distress and antenatal corticosteroid treat-
ment in premature twins from the same
historical cohort selected from the Australia and 
New Zealand Neonatal Network (ANZNN) 1995 database. To reflect best
possible clinical practice, the analysis was
restricted to the effects of an optimal steroid
course (two doses of corticosteroids given, the first dose of which was received more than
24 hours and less than eight days before the
infant’s birth) compared with no steroid
treatment.

As shown in table 1, treatment with antenatal steroids resulted in a significantly
lower incidence of RDS and surfactant use.
The reduction from 18% to 11% in the risk of mortality was not significant (p = 0.08).
Recent advances in obstetrics and neonatol-
ology could explain the absence of an antenatal
steroid associated reduction in mortality. 4
There was no statistically significant associ-
atation between optimal steroid use and the outcome measures of days of intermit-
tent positive pressure ventilation, days of oxygen, oxygen at 36 weeks corrected gestational age, 
slow intraventricular haemorrhage, or the number of proven infection episodes. Gesta-
tion, sex, and birth weight did not modify the association between antenatal steroid
treatment and RDS incidence.

The sample examined in this study is over
three times the size of the most recent retrospective analysis, which reported no antenatal
corticosteroid associated reduction of RDS in twins. 1 How-
ever, the reduction in RDS incidence ob-
served in our study is less than that seen in
singleton infants (odds ratio 0.38, 95% confi-
dence interval 0.26 to 0.46). 5 Optimal steroid
treatment may be less effective in multiple
gestation pregnancies because the increased
volume of distribution in these mothers may
reduce the plasma level of steroids to which the fetuses are exposed.

Table 1 Length of black area at the tubetip of endotracheal tubes for neonatal use as produced by four major manufacturers

<table>
<thead>
<tr>
<th>Tube (ID)</th>
<th>2.5</th>
<th>3.0</th>
<th>3.5</th>
<th>4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rusch</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Portex</td>
<td>20</td>
<td>24</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>Vygon (st)</td>
<td>17</td>
<td>19</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Vygon</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Mallinckrodt</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

Table ID and length of black area expressed in mm. +, surfactant tube.

M W QUINN
Consultant Paediatrician
School of Postgraduate Medicine and Health Sciences,
Church Lane, Heavitree
Exeter EX2 5SQ, UK

J BAKER
Department of Child Health,
School of Postgraduate Medicine and Health Sciences,
Church Lane, Heavitree
Exeter EX2 5SQ, UK

F77

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Table 1: Effect of antenatal steroids on respiratory distress syndrome (RDS) in premature twins

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Optimal antenatal steroids</th>
<th>No antenatal steroids</th>
<th>Odds ratio (95% CI)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDS</td>
<td>184/310</td>
<td>59%</td>
<td>79/106</td>
<td>75%</td>
</tr>
<tr>
<td>Surfactant use</td>
<td>162/333</td>
<td>49%</td>
<td>67/108</td>
<td>62%</td>
</tr>
<tr>
<td>Mortality</td>
<td>39/334</td>
<td>11%</td>
<td>20/110</td>
<td>18%</td>
</tr>
</tbody>
</table>

Results are number of twin infants affected over number of infants at risk, also expressed as a percentage. Odds ratio and p values were produced by logistic regression with standard errors adjusted for within pair correlation.

Data used for this study came from the Australia and New Zealand Neonatal Network.

DOUG HACKING ANDREW WATKINS SIMON FRASER
Department of Paediatrics, Mercy Hospital for Women
Clarendon Street, East Melbourne
Victoria 3002, Australia

RORY WOLFE TERRY NOLAN
Clinical Epidemiology and Biostatistics Unit
Murdoch Children’s Research Institute, Royal Children’s Hospital and
Department of Paediatrics, University of Melbourne
Melbourne, Victoria 3052, Australia


BOOK REVIEW


Progress in the management of disease in the newborn has carried with it a recognition of the substantial risk of injury to the immature nervous system. The aspiration to localise and prognosticate from neurological signs in the early newborn period is easily understood. The problem is that the signs available to be discerned are in themselves usually insufficient to allow precision. In addition, the child grows and develops, the range and complexity of skills are constantly changing, and the manifestations of the lesion(s) alters, or may become silent, often to reappear later as a different but nevertheless highly significant impairment.

The evaluation of the newborn nervous system was originally based upon concepts learnt from adult neurology. The baby was seen as demonstrating little or no cortical or cerebellar activity and the study of primary reflexes predominated. The approach of adult neurology, with emphasis on localisation of the lesion, becomes less applicable in the younger child. In the newborn period, focal insults to the brain will often give rise to generalised disturbances and, contrarily, generalised disturbances may show focal deviations. Recognition of these phenomena has led to a progression from the concept of a localisation based neurology to one which sees the infant displaying a neurological/behavioural repertoire. Over the past several decades Saint Anne Dargassies, Prechtl, Amiel Tison, Brazelton, Dubowitz, and others have, through meticulous study, done much to illuminate this area. Through these studies, awareness of the importance of the behavioural state of the baby, as well as the more detailed neurological items has evolved.

A second problem in this area, particularly in relation to research studies, has been the development of a systematic newborn neurological examination which is reliable and repeatable. This has been the subject of the two editions of this work. The first, published in 1981, gave a detailed, easily understood and applied system for the neonatal neurological examination. The current edition brings that work up to date. New material is present, a refinement of the scheme has occurred, and the examination is described. Items which were less discriminatory of pathology from the 1981 version have been withdrawn and, following the work of Préchtl, more emphasis is placed on the analysis of general movements. There is a further post neonatal to two year old infant neurological examination proforma presented briefly at the end of the text.

The text is essentially a manual on the application of this neurological examination scheme. It is easy to follow and the segments of the examination are presented clearly with excellent photographs and line drawings of each manoeuvre. There is also a useful addendum (“cautionary tales”) to each section of the examination, giving guidance on possible pitfalls and sources of error. There is a lot of very useful information on the variations in findings in term and preterm infants, and particularly the changes in the neurological features of preterm infants as they grow towards term. There follows a section on the evolution of the scheme and optimality scores) were computed. This provides quantification of the assessment, a sense of the range of findings to be expected, and can be useful in correlating lesions observed on neuro imaging with clinical findings. Chapter six deals with the scheme in relation to findings in infants with recognised brain lesions.

The book is not designed to be a text of neonatal neurology and readers looking for discussion of neurological disease states will be disappointed. As a description of a comprehensive and easily applied system of neonatal neurological examination the new edition succeeds admirably.

MICHAEL F SMITH
Neonatal Intensive Care Unit, Jessop Hospital for Women, Leaegreave Road, Sheffield S7 1RB, UK

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Using a modified nasopharyngeal airway in Pierre Robin syndrome

MARIA GALOGAVROU and KEITH FOOTE

Arch Dis Child Fetal Neonatal Ed 2001 85: F75
doi: 10.1136/fn.85.1.F75d

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