RCPCH

Guidelines for Good Practice

Royal College of Paediatrics and Child Health

Management of Neonatal Respiratory Distress Syndrome

These recommendations have been derived from an original guideline document produced by the British Association of Perinatal Medicine.[1] The full guideline may be obtained at the following website: http://www.bapm-london.org/ This publication presents evidence-based recommendations for the management of neonatal respiratory distress syndrome (RDS) in preterm infants. Please note that the original guideline also contains recommendations for obstetric management to prevent RDS. It contains extensive advice in addition to that summarised here, and it is strongly recommended that the full guideline is accessed. The guideline states that a review of the guideline to take into account any new evidence will take place in 2002.

Aim

The aim of the original recommendations is to suggest a rational approach to the management of respiratory distress syndrome in preterm infants. Guidelines are 'systematically developed statements to assist decisions about appropriate care for specific clinical circumstances' based on systematic reviews of the research literature. Guidelines are not intended to restrict clinical freedom, but practitioners are expected to use the recommendations as a basis for their practice. Local resources and the circumstances and preferences of individual patients will need to be taken into account. Where possible, recommendations are based on, and explicitly linked to, the evidence that supports them. Areas lacking evidence are highlighted and may form a basis for future research.

Background

The original guideline contains both evidence-based recommendations on the obstetric and neonatal prevention and the neonatal management of respiratory distress syndrome in preterm infants, the guidance on neonatal management being described in considerable detail. The guideline does not describe literature for parents and no audit standards are outlined. It was written in 1998 and there have subsequently been further important publications on aspects of management in peer reviewed journals. The British Association of Perinatal Medicine's Executive will be keeping their recommendations under review.

The Role of the Royal College of Paediatrics and Child Health

In order to raise awareness about the existence of the original guideline and to ensure its relevance for children's health, the College (through its Quality of Practice Committee) assessed the original guideline against the checklist laid out in its 'standards' document.[2] Having established the quality of the guideline's methodology in this way, the College recruited independent reviewers to examine the neonatal recommendations presented in the guideline document in the context of the original research papers from which they were derived. These reviewers were expert in both the clinical area under examination and in critically appraising research literature. The findings of the reviewers are presented here. Where discrepancies between their findings and the originals exist, both recommendations have been included. These areas of discrepancy are indicated by the shaded boxes.

The levels of evidence used throughout are those derived from the US Agency for Health Care Policy and Research, 1993 (see page 5).[3] The College's appraisal should not be considered valid beyond the end of 2001, and new evidence at any time could invalidate these recommendations. ***Please note that those recommendations originally ascribed a Grade C have not been appraised by the College.***

Contact details

Victoria Thomas
Clinical Effectiveness Co-ordinator
Research Division
Royal College of Paediatrics and Child Health
50 Hallam Street
London W1W 6DE

Tel: 020 7307 5674
Fax: 020 7307 5690
E-mail: victoria.thomas@rcpch.ac.uk

Registered Charity 1057744

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Recommendations for Good Practice

	GRADE	Endorsed by College
Personnel		
● All maternity units should have their own guidelines about who should be called to the delivery of preterm infants, and a training programme should be in place for these individuals	C	
● Those without training and expertise, who may be faced with an unexpected emergency, should have a clear action plan to use to call help	C	
Resuscitation		
● There is insufficient evidence to support routine intubation of all preterm infants	C	
● It is good practice to intubate at birth all infants of less than 29 weeks gestation	C	
● *Inadequate resuscitation and poor early care makes RDS worse* [4] Grade B **The reviewers were not able to endorse the wording of this recommendation on the basis of the available evidence**		✘
Respiratory support during resuscitation		
● The ability to give sufficient inflation pressure and inflation time are especially important during the resuscitation of preterm infants [5,6]	B	✔
● Inflation times of up to 5 seconds on the first breath after delivery may be required to achieve an adequate FRC [7,8]	B	✔
● Preterm infants who require anything other than minimal resuscitation should be intubated to ensure full lung expansion and for the administration of prophylactic surfactant	C	
● Preterm infants who have required intubation should be transported to the neonatal unit with continued ventilatory support	C	
● Inflation pressures of 30cm water may be required on occasion [9] (**Original statement**: *Inflation pressures of 30-40cm water may also be required on occasion* Grade B)	C	
● If a self-inflating bag is used, the bag must have a capacity of at least 500mls [10,11] (**Original statement**: *If a self-inflating bag is used, the reservoir must have a capacity of at least 500mls* Grade B)	C	
Use of drugs in resuscitation		
● *Base*: Treat with sodium bicarbonate if the heart rate remains less than 60 beats per minute despite ventilation, chest compression and adrenaline	C	
● *Adrenaline:* A dose of 10 micrograms/kg (0.1 mls/kg 1:10,000 dilution) should be used if there is persisting bradycardia despite adequate ventilation and chest compression	C	
● *Adrenaline:* In very preterm infants there may have been a prior decision, taken in conjunction with the baby's parents, not to offer more than basic resuscitation and this is appropriate in some cases	C	
● *Adrenaline:* The first dose of adrenaline can be given via the trachea but there is no certainty that this route is effective although adrenaline is absorbed this way	C	
● *Naloxone*: Naloxone has no role in immediate care of the preterm infant except in the very unusual situation in which the mother has received opiate analgesia a few hours before delivery. In any case a preterm infant who is not breathing requires immediate respiratory support	C	

Recommendations for Good Practice

	GRADE	*Endorsed by College*
Surfactant therapy		
• The administration of exogenous surfactant at, or soon after birth should be considered for infants infants judged to be at high risk of developing RDS [12-16] **(Original statements:** *The treatment of RDS with surfactant is effective* Grade A *Treatment with surfactant at birth was more effective than when given a few hours later* Grade A)	A	✔
• All babies born at less than 30 weeks gestation, thought to be at significant risk of developing RDS, should be given surfactant at birth if they need intubation as this has been shown to be associated with improved survival and morbidity outcomes [17] **(Original statement:** *All babies born at less than 32 weeks gestation should be given surfactant at birth if they need intubation* Grade B)	A	✔
Surfactant preparations		
• There is evidence that no extra benefit is derived from administering more than 2 doses of artifical sufactant [18] (**Original statement:** *There is no evidence that 4 doses [of sufactant therapy] are better than 2)*	A	✔
• There is a better outcome with 2 doses of surfactant than with 1 [19-23]	A	✔
• In rescue therapy, on clinical grounds, natural sufactant extracts are the more desirable choice [24]	A	✔
• The benefits of sufactant treatment for babies as small as 500g is thought to outweigh the risks	C	
Continuous positive airway pressure (CPAP)		
• CPAP is indicated in babies with RDS who have a PaO_2 persistently below 7 kPa (50-60 mmHg) despite an increase in their inspired oxygen to 50% or above	C	
• Institution of artificial ventilation should be considered if the PaO_2 is not maintained above 7 kPa in an inspired oxygen concentration of more than 50% (particularly in a baby below 32 weeks); and/or the $PaCO_2$ is rising to levels around 7 kPa particularly with a pH below 7.25	C	
• The ventilator rate can be increased to 'capture' the respiratory rate of the baby or patient-triggered venitlation (PTV) may be tried. There is no evidence to suggest that the use of ventilation rates above 150bpm or oscillatory ventilation techniques are of benefit in this respect	C	
Rate of ventilation		
• Randomised controlled trials have shown a lower pneumothorax rate in infants [with RDS] ventilated at fast rates [25] (**Original** Grade A: *revised Grade* B)	B	✔
Infant's own respiratory activity		
• Routine muscle relaxants for all ventilated babies are not advisable [26]	A/B	✔
Blood gas monitoring		
• There is agreement on the following blood gas values:		
pH: Avoid arterial pH levels of less than 7.25. Cellular metabolic function is likely to be compromised at levels below this	C	
PaO_2: The recommended range is 6 - 10 kPa. The lower acceptable limit of PaO_2 in an infant with RDS may be lower than this (around 5.6 kPa, 40 mmHg) provided oxygen delivery to the tissues is adequate as judged by haematocrit, peripheral perfusion, and base excess	C	
$PaCO_2$: More important than the $PaCO_2$ level is the pH and in general terms if this is maintained above 7.25 then the $PaCO_2$ is probably acceptable. Unless there is a specific reason for including hypocarbia the lower limit of $PaCO_2$ should be maintained above 5 kPa (37.5 mmHg)	C	

Recommendations for Good Practice

	GRADE	Endorsed by College
Endotracheal suction		
• Suctioning the endotracheal tube in babies with RDS should be instituted only when secretions begin, usually after 48 hours of age, and should be kept to a minimum. Further studies are needed to establish the real benefit or otherwise of regular suctioning (**Original** Grade B; *revised Grade C*)	C	✔
Physiotherapy		
• Routine physiotherapy is not recommended in neonatal RDS	C	
Blood pressure		
• Saline is as effective as plasma in increasing the blood pressure [27] (**Original statement:** *Saline is as effective as plasma in increasing the circulating volume* Grade A)	A	✔
• Dopamine is more effective than dobutamine at increasing the mean blood pressure [28-30] (**Original** Grade B; *revised Grade A*)	A	✔
• Good clinical practice includes measurement of the blood pressure in neonates with RDS, with prompt treatment of hypotension when it is accompanied by evidence of poor tissue perfusion	C	
• Routinely administered volume expansion is not effective in reducing the incidence of intracranial haemorrhage [31-34]	A	✔
Nutrition		
• Adequate nutrition is an important part of the management of RDS	C	
• Facilities for total parenteral nutrition must be available, but minimal enteral feeding should be considered in infants with stable or improving RDS	C	
• Raw maternal breast milk protects against necrotising enterocolitis and other outcomes and is the best choice for minimal enteral feeding [35] (**Original statement:** *Raw maternal breast milk protects against necrotising enterocolitis and is the best choice for minimal enteral feeding* Grade B)	B	✔
Postnatal steroids		
• Exogenously administered steriod (usually dexamethasone) has been slow to reduce the duration of mechanical ventilation in some preterm infants when administered during the first month of life. The long-term effects of this treatment are not yet clear and its considered use should be confined to those infants in whom conventional management is failing eg those with persisting lung disease at 2 weeks of age [36-42] (**Original statement:** *Exogenously administered steroid (usually dexamethasone has been shown to reduce the duration of mechanical ventilation in preterm infants and should be considered in babies with persisting lung disease at 2 weeks of age* Grade A)	A	✔
• *There is some evidence to support continuing treatment with a tapering regimen in babies who respond* [43] Grade B **The reviewers were not able to endorse the wording of this recommendation on the basis of the available evidence**		✘

Clinical Audit

The original published guideline document did not contain clinical audit standards.

Grades of Evidence/Derivation of Recommendations

Grade A Evidence: Requires at least one randomised controlled trial as part of the body of overall good quality and consistency addressing the specific recommendation.

Grade B Evidence: Requires availability of well-conducted clinical trials but no randomised clinical trials on the topic of the recommendation.

Grade C Evidence: Requires evidence from expert committee reports or opinions and/or clinical experience of respected authorities. Indicates absence of directly applicable studies of good quality.

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