East of England Neonatal ODN

(Hosted by Cambridge University Hospitals)

Clinical Guideline

Surfactant Therapy for Neonatal Respiratory Distress Syndrome

Integrated Clinical Guideline for Surfactant Administration including Less Invasive Surfactant Administration (LISA)

East of England Neonatal Operational Delivery Network (EoE ODN)

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INTRODUCTION

Neonatal Respiratory Distress Syndrome (RDS) is the commonest cause of respiratory failure in preterm infants and continues to contribute significantly to mortality and long-term morbidity including bronchopulmonary dysplasia (BPD), intraventricular haemorrhage (IVH), and adverse neurodevelopmental outcome.[1] In preterm infants, RDS results primarily from pulmonary surfactant deficiency combined with structural lung immaturity, reduced functional residual capacity, and increased work of breathing.

Historically, management of RDS was based on early intubation, prophylactic surfactant administration and mechanical ventilation. While this approach improved survival, mechanical ventilation itself contributes to lung injury through volutrauma, barotrauma, atelectrauma and oxygen toxicity.[2] Over the last decade, neonatal respiratory care has therefore shifted toward strategies that preserve spontaneous breathing and minimise invasive ventilation.[1,3]

Continuous Positive Airway Pressure (CPAP) at birth followed by selective surfactant administration is now considered standard of care. Multiple randomised trials and meta-analyses have demonstrated that avoiding intubation where possible reduces the incidence of BPD and severe brain injury without increasing mortality.[4,5] Consequently, surfactant delivery techniques have evolved from routine intubation and intra-tracheal administration to minimally invasive approaches.

Less Invasive Surfactant Administration (LISA), also referred to as Minimally Invasive Surfactant Therapy (MIST), involves administration of surfactant via a thin catheter during spontaneous breathing on CPAP. Compared with traditional intubation techniques, LISA reduces exposure to positive pressure ventilation and is associated with lower rates of mechanical ventilation, BPD and severe IVH.[6-9] It is therefore regarded as the preferred method of surfactant delivery in spontaneously breathing preterm infants.

Despite strong international evidence, variation in practice persists with United Kingdom slow to adapt minimally invasive approaches to respiratory care.[10-14] Differences in staffing, training, equipment availability and transfer responsibilities can influence the choice of surfactant delivery technique.

SCOPE

Less **I**nvasive **S**urfactant **A**dministration **(LISA)** using a thin catheter through vocal cords using a video or Conventional laryngoscope.

Surfactant **A**dministration through **L**aryngeal or **S**upraglottic **A**irways **(SALSA)** is an emerging less invasive intervention with similar principles but different technical guidance and out of scope of this guideline. If your unit practices SALSA please ensure you operate within your unit guideline. Network guideline on this topic will be available in due course.

PURPOSE

The purpose of this guideline is to standardise surfactant administration across the East of England Neonatal Network by:

Promote CPAP as the default initial respiratory strategy for most preterm infants

Define objective thresholds for surfactant treatment

Establish LISA as the preferred method for surfactant treatment

Clarify role of INSURE and mechanical ventilation

Support safe decision making in extremely preterm infants requiring transfer

Provide meaningful audit standards across all units to aid service evaluation and improvement This document aligns with current evidence including United Kingdom guidelines for Surfactant therapy[15], European Consensus Guidelines for the Management of RDS (2023 update)[1], American Academy of Pediatrics recommendations.[16] It is intended to support, not replace, clinical judgement. Individual patient factors, operator competence and local resources must always be considered when applying these recommendations.

TARGET AUDIENCE

This guideline is intended for the use of neonatal medical and nursing staff in birthing environments and neonatal units. Very rarely for a preterm neonate presenting to Children's Emergency department following an out of hospital birth.

SURFACTANT PREPARATION & DOSE

Natural surfactant preparations derived from animal lung extracts that contain phospholipids together with surfactant associated proteins improve spreading and stability within the alveoli and are preferred to synthetic surfactant preparations.

Poractant alfa (porcine derived) is widely used in the United Kingdom. Doses mentioned below are for Curosurf, if your unit uses another preparation please refer to manufacturer guidance.

Poractant alfa (Curosurf®, 120 mg / 1.5 mL & 240 mg / 3 mL, Chiesi Pharmaceuticals), a natural surfactant preparation of porcine origin **Initial dose:** 200 mg/kg (≈ 2.5 mL/kg)

Repeat doses: 100 mg/kg (≈ 1.25 mL/kg)

Interval: Usually, ≥12 hours if ongoing RDS

Maximum: Up to 2 repeat doses (total 300–400 mg/kg depending on practice)

The guideline specifically recommends the **higher initial dose of 200 mg/kg**, as it reduces the need for redosing and is associated with improved outcomes compared with 100 mg/kg dosing.[1,15,16]

SURFACTANT INDICATIONS

Principles

Surfactant should be administered to infants with Neonatal Respiratory Distress Syndrome (RDS) who demonstrate failure of stabilisation on Continuous Positive Airway Pressure (CPAP).[1,15] The aim is to treat evolving surfactant deficiency early enough to prevent atelectasis and lung injury, while avoiding unnecessary intubation in infants who will stabilise with non-invasive support alone.[1,15] Surfactant should be administered early in the course of the disease and not be delayed waiting for radiographic confirmation if clinical features are typical of RDS. Lung ultrasound RDS scores should be used to guide surfactant therapy.[1]

Current management therefore follows an early selective treatment strategy rather than prophylactic surfactant. Exceptions are to be made to this recommendation in certain clinical situations Adverse perinatal factors (Place of delivery, Antenatal steroids status, IUGR etc).

Infants who are expected to be transferred due to clinical or service specifications reasons may be offered intubation and concomitant surfactant administration (case based individualised decision, discussion with tertiary centre, and PANDR)

FiO2 thresholds recommended in this document is in line with European Consensus Guidelines for the Management of RDS (2023 update)[1] and aligns with contemporary UK practice.[15]

Point of Care Lung Ultrasound based scores can be used to guide surfactant administration either in combination or independent of FiO2 thresholds.[1] Detailed recommendations are outside the scope of this document. Where POCUS is informing Surfactant decisions this needs to be done within local guideline framework.

Practical bedside guide:

If intubation required	Administer Surfactant regardless of FiO2 threshold
< 28 weeks	Early signs of RDS after stabilisation (selective prophylaxis)
28 – 31+6 weeks	FiO2 ≥ 30 % or increased work of breathing on CPAP
32 – 36+6 weeks	FiO2 ≥ 40 % or increased work of breathing on CPAP
≥ 37 weeks	FiO2 ≥ 40 % or increased work of breathing on CPAP (Consider other diagnoses other than Surfactant deficiency RDS)

Other Considerations

Late Preterm and Early Term Infants

In later preterm and term infants, evidence for surfactant use and its impact on clinical outcomes in is limited and heterogeneous.[17] Respiratory distress in this population commonly reflects transient tachypnoea of the newborn (TTN), pneumonia, or pulmonary hypertension rather than primary surfactant deficiency. Routine surfactant administration is therefore not recommended. However, surfactant may be considered in selected cases where there is strong suspicion of primary or secondary surfactant dysfunction, including:

- Severe RDS phenotype in late preterm infants (Infant of Diabetic Mothers, Macrosomia)
- Meconium aspiration syndrome with poor compliance
- Pneumonia with significant oxygen requirement
- Decisions should be individualised and alternative diagnoses actively evaluated before treatment.

Situations Where Early Treatment is Appropriate (outside the FiO2 thresholds listed above)

- Rapidly rising oxygen requirement
- Marked work of breathing
- Recurrent apnoea related to RDS
- Evolving respiratory acidosis
- Anticipated need for transfer

SURFACTANT ADMINISTRATION METHODS

Within this network guideline, technical hierarchy for surfactant administration is as below:

LISA	Preferred method
INSURE	Alternative where LISA cannot be safely performed and a documented local risk assessment exists
SELECTIVE PROPHYLAXIS	When infant is intubated as part of resuscitation/stabilisation or selective prophylaxis for infants < 28 weeks who demonstrate early signs of RDS after stabilisation[1]

The choice of technique should be determined by patient stability, operator competence and available equipment rather than individual preference.

PROPHYLACTIC SURFACTANT

Historically, very preterm infants were routinely intubated at birth and given surfactant before the onset of respiratory distress. This strategy improved survival in the era before widespread CPAP use. However, subsequent trials comparing prophylactic surfactant with early CPAP demonstrated that routine intubation increases exposure to mechanical ventilation without improving major outcomes. Avoiding intubation reduces ventilator induced lung injury and lowers rates of bronchopulmonary dysplasia.[1,15]

ROUTINE PROPHYLACTIC SURFACTANT ADMINISTRATION IS NO LONGER RECOMMENDED

Prophylactic surfactant may still be required because of clinical factors e.g., when effective noninvasive ventilation cannot be established, for example during prolonged resuscitation requiring intubation OR nonclinical, infant requiring transfer soon after birth due to unit designation level requiring ex utero transfer. **Selective prophylaxis should be considered for infants < 28 weeks who display early signs of RDS after initial stabilisation.**[1]

LESS INVASIVE SURFACTANT ADMINISTRATION (LISA)

Less Invasive Surfactant Administration (LISA) involves delivering surfactant through a thin catheter passed under direct laryngoscopy while the infant continues to breathe spontaneously on CPAP. The defining principle of the technique is - **Surfactant delivery with preservation of spontaneous breathing efforts and avoidance of positive pressure ventilation**

Physiological Rationale

During spontaneous breathing, negative intrathoracic pressure promotes uniform lung recruitment and improves surfactant distribution. Positive pressure ventilation, in contrast, preferentially inflates already aerated lung regions leading to volutrauma and atelectrauma.

LISA therefore:

- Maintains functional residual capacity
- Avoids lung overdistension
- Reduces inflammatory lung injury
- Reduces intrathoracic pressure fluctuations
- Preserves cerebral haemodynamic stability

These mechanisms are believed to underpin improved clinical outcomes compared with intubationbased techniques.

Evidence Base

Randomised controlled trials[6-9] and Cochrane review[18] comparing LISA with INSURE or mechanical ventilation demonstrate reduction in:

- Need for mechanical ventilation within 72 hours
- Mortality
- Bronchopulmonary dysplasia
- Severe intraventricular haemorrhage

Unlike INSURE, this approach avoids positive pressure ventilation and routine sedation, helping maintain spontaneous breathing, establishes functional residual capacity and supports a more physiological respiratory transition after birth. Multiple randomised trials and meta-analyses have demonstrated reductions in the need for mechanical ventilation, bronchopulmonary dysplasia, and severe intraventricular haemorrhage when compared with intubation-based techniques.[18]

LISA IS THE PREFERRED METHOD OF SURFACTANT DELIVERY FOR SPONTANEOUSLY BREATHING INFANTS WITH RDS ON NON-INVASIVE RESPIRATORY SUPPORT WHO MEET TREATMENT CRITERIA

Gestational Age Considerations

A. Extremely preterm infants (23–26 weeks) in NICU setting

Evidence supports LISA use from 23 weeks gestation in units that have established this into practice over time. These infants benefit most from avoiding mechanical ventilation but are also most vulnerable to instability. **Decision making process must consider:**

- Unit guidance and philosophy of care
- Operator competence
- Expected success on first attempt
- Cardiovascular stability of Neonate
- Anticipated transfer needs
- Support mechanisms for frontline staff

B. Infants who are likely to be transferred out

(Typically, <27 weeks in Local Neonatal Units & < 32 weeks in Special Care Units)

LISA may improve transport stability but repeated attempts causing deterioration should be avoided. Priority remains safe stabilisation rather than procedural completion. On balance the best option is to intubate and administer surfactant on Prophylactic indication, contact transport team and arrange for a timely transfer out.

C. Very preterm infants (27–32 weeks)

Strong evidence supports routine LISA when CPAP failure FiO2 threshold is reached (page 5) or on clinical judgement based on work of breathing, blood gases and other relevant clinical parameters.

D. Moderate to Late Preterm (32-36 weeks) **| Early Term** (37–38^{+6} weeks) **| Term infants** (>38^{+6} weeks)

Treatment should be individualised surfactant deficiency may not be the primary cause for RDS in this group of infants. If clinical history, chest X-ray, and lung ultrasound findings/score indicative of surfactant deficiency RDS then early LISA should be considered once CPAP failure FiO2 threshold is reached (page 5) or on clinical judgement based on work of breathing and blood gases.

Contraindications:

Absolute

- Imminent need for intubation as judged clinically by the attending senior clinician
- Alternative cause for respiratory distress e.g. Congenital pneumonia
- Maxillo-facial, tracheal or known pulmonary malformations
- Infant requiring transfer
- No experienced personnel available to perform LISA **Relative**

1. Severe RDS with high oxygen requirements, severe respiratory acidosis and/or widespread atelectasis on chest x-ray/lung ultrasound
2. Infants < 26 weeks gestation in a unit with less LISA experience
3. Pneumothorax requiring drainage
4. Prominent apnoea, periodic or irregular breathing pattern, despite adequate caffeine citrate administration

Location of treatment

- Neonatal Unit
- Delivery Suite / Theatres (Early LISA is beneficial, however, this should be a locally agreed decision with adequate checks and balances to ensure safety.

Premedication

LISA involves laryngoscopy and thin catheter placement through vocal cords and these are painful procedures associated with bradycardia, hypoxia and increased intracranial pressure, and analgesia with or without sedation reduces physiological instability and procedural complications.[19] However, LISA success depends on preservation of spontaneous breathing and maximise chances of continuing non-invasive respiratory support without recourse to mechanical ventilation post procedure. The

success of the technique depends on preservation of respiratory drive and functional residual capacity during procedure. Studies of minimally invasive surfactant delivery demonstrate reduced need for mechanical ventilation and bronchopulmonary dysplasia when spontaneous breathing is maintained.[1,20-21]

Sedative and opioid medications can suppress respiratory effort and airway reflexes in preterm infants, increasing the likelihood of apnoea, desaturation and subsequent ventilation, thereby counteracting the physiological benefits of LISA.[22,23] Observational and comparative studies have not shown improved outcomes with routine sedative premedication during LISA and instead report higher rates of respiratory depression and mechanical ventilation.[22,23] For these reasons current expert consensus does not recommend routine sedative premedication before or during LISA. An individualised approach is needed that considers infant gestation, activity/vigour and postnatal age. Comfort should be supported using nonpharmacological measures such as sucrose and facilitated containment.[24,25]

If intubation becomes necessary, standard neonatal intubation premedication guidance should then be followed.

It is recognised, however, that some units may choose to use sedation/analgesia during early implementation of LISA or when the procedure is performed by less experienced clinicians. During the learning phase, operators may find laryngoscopy and catheter placement technically easier in a calmer infant, and a small dose of premedication/analgosedation may occasionally be considered following senior clinical judgement. Where used, this should be minimal and titrated, typically Fentanyl 0.5–2 micrograms/kg, with readiness to provide respiratory support or reverse opioid related respiratory depression, if required. The intention in such cases is facilitation of the procedure rather than routine sedation, and this approach should remain exceptional rather than standard practice. Other agents including Propofol, Midazolam and/or Morphine are used in some centres; however current evidence does not demonstrate improved procedural success or clinical outcomes with these medications during LISA and they are associated with increased respiratory depression, loss of spontaneous breathing and need for ventilation.[22,23] When pharmacological support is necessary, the limited, low quality evidence favours following;

Fentanyl 0.5–1 micrograms/kg IV slow bolus & Atropine 20 micrograms/kg IV

Midazolam has been reported in a recent single-centre experience within the network to be associated with acceptable short-term procedural outcomes.[26] However, the overall evidence base for its use in LISA remains limited, with no comparative data and ongoing concerns regarding its lack of analgesic

effect and potential impact on respiratory drive and neurodevelopment. **Routine use of Midazolam cannot be recommended.** If a unit chose to use midazolam, this should be undertaken within a prospective audit framework under senior supervision to monitor LISA success and failure rates, need for escalation, and adverse event profile.

Propofol and morphine risk respiratory depression and should not be routinely used. Units using these agents should review practice through local clinical governance.

TABLE 1: DRUGS FOR LESS INVASIVE SURFACTANT ADMINISTRATION

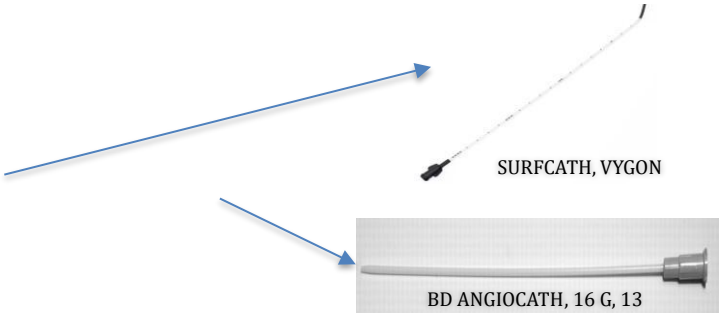
Medication	Preparation	Dose	Administration	Side effect
FENTANYL (Analgesic, Controlled Drug)	50 micrograms/ml 2ml size Diluent: 0.9% sodium chloride or 5% glucose	**0.5 - 1 micrograms/kg** IV **slowly over 1-2 minutes** followed by a slow 0.9% sodium chloride flush	Draw 0.2mls (10micrograms) and dilute to 1ml with glucose 5% in a 1ml syringe = 10micrograms/ml, then give 0.05 - 0.1 ml for each Kg of baby's weight	Chest wall rigidity (can be reversed with naloxone or muscle relaxant), seizure-like activity, respiratory depression, bradycardia
ATROPINE (Vagolytic)	600 micrograms/ml 1ml size Dilution not recommended	**20 micrograms/kg** stat rapid IV bolus	Draw up 0.033mls (20 micrograms) for each kg of baby's weight Alternatively, dilute to 60 micrograms/ml solution (0.1 ml from 600 micrograms/ml solution to 0.9 ml of 0.9% sodium chloride to make up a final volume of 1 ml) & draw up 0.33 ml for each Kg of baby's weight	Tachycardia (selfresolving)

IN CASE OF FENTANYL INDUCED CHEST WALL RIGIDITY (not responding to mask ventilation, increase in pressures – use **NALOXONE**, it may be helpful to have Naloxone prescribed and prepared beforehand)

NALOXONE (Opioid Antagonist – to reverse Fentanyl related respiratory depression or chest wall rigidity)	400 micrograms/ml solution for injection OR Available as 400 micrograms/ml minijets	10 micrograms/kg IV bolus Can be repeated every 2-3 minutes to a cumulative dose of 100 micrograms/kg if necessary BUT risks complete reversion of opioid analgesia	Draw 0.1 ml (40 micrograms) and dilute to 1 ml with 0.9 % sodium chloride = 40 micrograms/ml then draw up 0.25 ml for each Kg of baby's weight	Onset of action: 1-2 minutes Duration 3-4 hours Arrhythmias Hypertension Hypotension (rare)

Preparation

- Confirm indications for LISA with senior clinician and nursing team
- Team briefing and role allocation
- Monitoring – HR | ECG | SpO2
- Functioning CPAP interface
- Appropriate catheter selected (Surf Cath or Angiocath)
- Surfactant drawn in a luer-lock syringe
- Comfort measures OR Premedication



Procedure

- Maintain infant on CPAP/High flow throughout
- Continuous cardiorespiratory monitoring
- Perform direct laryngoscopy (Videolaryngoscope preferred)
- Insert thin catheter through vocal cords
- Remove laryngoscope while catheter remains
- Administer surfactant slowly over 1–3 minutes or Air-Flush technique[27] (individual preference)
- Remove catheter after administration
- Observe for improvement in oxygen requirement
- Transient events are common and usually self-resolving:
  - desaturation
  - bradycardia

coughing ○

surfactant reflux

- Abandon the Procedure, if persistent bradycardia, prolonged apnoea, inability to maintain oxygenation or repeated unsuccessful catheter placement.

Aftercare

- Maintain CPAP /High flow Oxygen
- Titrate oxygen down as compliance improves
- Monitor for apnoea
- Repeat LISA may be attempted if the infant remains stable and breathing spontaneously

Complications

- Surfactant reflux
- Transient desaturation or bradycardia
- Treatment failure requiring intubation
- Apnoea requiring ventilation
- Pneumothorax (rare)

Causes of LISA Failure (Defined as need for intubation within 72 hours of LISA)

Poor case selection (see list of absolute and relative contraindications)

Advanced lung disease at time of treatment

Delayed treatment resulting in poor surfactant efficacy

Inadequate CPAP pressure

Technical difficulty

LISA Checklist

(adapted from BAPM Neonatal Airway Safety Standards Framework)

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Less Invasive Surfactant Administration (LISA) Checklist

Has this infant previously been intubated or received LISA? If so, please check their records.

Baby's Name:

Hospital number:

DOB:

Does the baby meet the criteria for ventilation rather than LISA?	Has pneumothorax been considered?	Loading dose of Caffeine citrate needed?	IV antibiotics?	Consultant aware? (if applicable)
Y / N	Y / N	Y / N	Y / N	Y / N

Equipment	Patient	Team/Roles	Post LISA Notes
☐ Laryngoscope (Video and Direct) ☐ Fine tracheal catheter ☐ Surfactant prescribed and ready ☐ Facemask, T-piece with correct PIP/PEEP settings. ☐ Working suction and catheter ☐ Intubation equipment available ☐ OG tube and syringe for aspiration ☐ Timer ☐ McGills Forceps (if used) ☐ Atropine prescribed and ready (if used) ☐ Sedative and Naloxone drugs prescribed and ready (if applicable)	☐ Identify patient and check ID ☐ Parents aware ☐ Non-invasive respiratory support (eg.CPAP/ nHFT) ☐ Position baby/swaddle ☐ Analgesia/sedation ☐ Thermoregulation ☐ IV access ☐ ECG and saturation monitoring ☐ OG aspirated	**Team Leader:** to check sedative plan and vocalise escalation plan **Airway:** insert Surfactant catheter **Drug administration:** administer sedative drugs (if used) and assist in Surfactant administration **Patient comfort:** non-pharmacological comfort measures and suction **Patient observation:** monitor observations and OG aspiration	**Catheter inserted by** (name and role): Catheter insertion length post vocal cords: **1.5cm for babies < 27 weeks** **2cm for babies >27 weeks** Note: Black tip on surfcath is 2cm, Ensure 0.5cm black tip visible above vocal cords in babies <27 weeks. Amount of Surfactant aspirated from the OG tube in mL: **Any complications occurring during the procedure to be documented here:**

Checklist completed by (name & role):

Signature:

Date:

British Association of Perinatal Medicine

Appendix F - Less Invasive Surfactant Administration (LISA) Checklist, © BAPM, 2024

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LISA – QUICK REFERENCE GUIDE

- Pass LISA catheter to guide mark, usually 1-2 cm (Surf Cath 2 cm black tip) & hold catheter firmly at lips as you withdraw laryngoscope blade
- Instill surfactant in small boluses over 2 - 3 minutes
- Continue baby on nasal High Flow Oxygen/ CPAP throughout procedure

⇩

- Continue to monitor infant
- Ensure contemporaneous, clear documentation, sign/date checklist
- Update parents

⇩

Spontaneously breathing neonate with respiratory distress on non -invasive respiratory support (CPAP or High Flow)

⇩

- Careful case selection considering gestation, signs of RDS, FiO2 requirements (see table 1 on page 5 of this guideline)
- Lung ultrasound findings suggest surfactant need (Modified Brat score)
- Check absolute and relative contraindications
- Seek senior advice and support and include them in the decision-making process

⇩

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- Continue non-invasive respiratory support
- Continuous HR and Spo2 monitoring throughout
- Ensure reliable intravenous access
- IV caffeine < 30 weeks
- Assemble required equipment ○ Suitable LISA catheter ○ Video laryngoscope *(preferred, improves success rates and reduces airway injury)* ○ Conventional laryngoscope (back up) ○ Prepare surfactant in a luer-lock syringe *(do not use the standard surfactant administration kit as the syringe would not fit the LISA catheter)*

  Premedications not required routinely

  If using premeds ○ Fentanyl 0.5 – 1 micrograms/kg slow IV bolus over 1-2 minutes
- *(see page 11)* ○ Atropine 20 micrograms/kg IV
- Use LISA checklist
-

Have immediately available on standby in case required:

Naloxone (to reverse fentanylinduced prolonged apnoea if it occurs, prevention best)

Endotracheal tube (in case of need to proceed to full intubation)

Suxamethonium (to reverse any chest-wall rigidity or in case need to proceed to full endotracheal intubation)

INTUBATE, SURFACTANT AND EXTUBATE (INSURE)

INSURE consists of endotracheal intubation, administration of surfactant through the endotracheal tube, followed by rapid extubation back to CPAP. This strategy marked an important shift away from prolonged mechanical ventilation and remains widely used in clinical practice. Compared with continuing ventilation after surfactant delivery, INSURE reduces the duration of ventilation and associated complications. However, the technique still requires laryngoscopy and positive pressure ventilation. As a result, the infant is exposed to potential lung inflation injury, haemodynamic instability, sedation related respiratory depression, and the risk of failed extubation. More recent evidence suggests that techniques which avoid intubation altogether may provide additional benefit.

INSURE SHOULD NO LONGER BE THE DEFAULT METHOD OF SURFACTANT ADMINISTRATION WHEN LESS INVASIVE TECHNIQUES ARE FEASIBLE

Rationale and Historical Role

INSURE represented a major advance compared with prolonged mechanical ventilation and significantly reduced ventilator exposure in preterm infants a decade ago.

However, the technique still requires:

- Analgosedation
- Laryngoscopy
- Endotracheal Intubation
- Positive pressure ventilation

These factors contribute to lung injury, haemodynamic instability and potential failure to extubate.

LISA vs INSURE

Multiple randomised trials and meta-analyses have compared INSURE with Less Invasive Surfactant Administration (LISA).[1,18]

Compared with INSURE, LISA is associated with:

- Lower need for mechanical ventilation within 72 hours
- Reduced bronchopulmonary dysplasia
- Reduced severe intraventricular haemorrhage
- Less exposure to sedative medication
- More stable physiological transition

The difference is primarily explained by avoidance of positive pressure ventilation and preservation of spontaneous breathing. Therefore:

INSURE is inferior to LISA when LISA can be safely performed. INSURE should be ONLY used where LISA cannot be safely performed, and a documented local risk assessment exists

Premedication for INSURE

Premedication should follow the East of England neonatal intubation and premedication guideline.

Typical regimen:

- Opioid analgesia – **Fentanyl 2 micrograms/kg slow IV bolus over 1-2 minutes** • Anticholinergic – **Atropine 20 micrograms/kg IV bolus**
- Short-acting muscle relaxant (If needed) – **Suxamethonium 2mg/kg IV bolus**
- Opioid reversal (if indicated) – **Naloxone 10 micrograms/kg IV bolus**

  (Slow saline flush following Fentanyl, and standard flush following other medications)

Procedure Principles

The procedure should aim for minimal ventilation exposure:

- Use intubations checklist
- Check team configuration and roles
- Administer premedications (refer to EoE Intubation guideline for specifics)
- Perform Endotracheal intubation (Videolaryngoscopy preferred)
- Administer surfactant promptly (dose as per indication and dose number)
- Avoid unnecessary positive pressure breaths
- Confirm readiness for extubation prior to intubation
- Extubate early to CPAP once stable

AUDIT STANDARDS

	Standard	**Expected compliance**
1	Units should conduct prospective audit of all LISA procedures against criteria set in this guideline with an aim for continuous improvement	Annual audit of all babies who receive Surfactant in the unit
2	Number of infants who require mechanical ventilation within 72 hours of LISA	< 20 %

3	Adequate documentation / use of checklist of LISA/INSURE in clinical records	100 %
4	Analgosedation use for LISA/INSURE with patient benefit and complication metrics	Annual audit of all babies who receive LISA / INSURE

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