Less Invasive Surfactant Administration (LISA) UHL Neonatal Guideline

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1. Introduction and Who Guideline applies to

Preterm infants often develop respiratory problems, which may require respiratory support and surfactant administration. Surfactant therapy for prophylaxis or treatment of respiratory distress syndrome (RDS) has been shown to reduce the risk of neonatal morbidity and mortality. The standard approach for delivery of surfactant in the preterm infant has been endotracheal intubation with or without a subsequent period of mechanical ventilation. It is known that mechanical ventilation may cause adverse effects, particularly for the preterm infant and increase the risk of acute lung injury and chronic lung disease.

The use of less invasive techniques for surfactant administration in spontaneously breathing infants may reduce the incidence of mortality and bronchopulmonary dysplasia (BPD). The Less Invasive Surfactant Administration (LISA) technique allows for uninterrupted non-invasive respiratory support during the delivery of surfactant, preventing lung injury which could result from the temporary loss of functional residual capacity and atelectasis during the process of intubation. LISA depends on the spontaneous breathing effort of the newborns to distribute the surfactant in the lungs, resulting in more rapid and complete tissue incorporation of surfactant in the neonatal lung.

This guideline applies to all health care professionals involved in the care of infants within the Neonatal Service.

Aim

To provide guidance for the safe and effective use of less invasive surfactant administration (LISA).

Key Points

- Neonatal clinicians who are who are competent in airway management and able to visualise vocal cords and intubate should carry out or supervise this procedure.
- LISA may be used in a preterm baby of any gestational age. Use of LISA in babies beyond 37weeks gestation should be at consultant discretion.
- The baby must be spontaneously breathing with or without non-invasive respiratory support.
- LISA is a two person procedure.
- Monitor heart rate and oxygen saturation before, during and after the procedure.
- A recent chest x-ray must be done to assess RDS and rule out other pathology (e.g., pneumothorax) in order to assess eligibility for LISA for:
 - All babies born <a>>>32weeks gestation,
 - Babies born <32weeks gestation on non-invasive respiratory support beyond the period soon after admission to the neonatal unit,
 - All babies where the clinical presentation does not fully fit with RDS or is suggestive of other pathology.
- Non-pharmacological methods (swaddling and use of sucrose or breast milk) should be promoted to ensure comfort. Where premedication is given, use Fentanyl 1-2microgram/kg IV (NB: This is one third of the dose used for endotracheal intubation).

2. Guideline Standards and Procedures

LISA may be used in a baby of any gestational age with clinical presentation consistent with respiratory distress syndrome. This guideline is intended to provide guidance for the safe and effective use of LISA.

Applicable patients:

Consider LISA in preterm (< 37 weeks of gestation) infants:

- Spontaneously breathing
- With a clinical and/or radiological diagnosis of RDS
- Who can be managed with non-invasive invasive respiratory support

For babies born prematurely <32weeks gestation with signs of respiratory distress at birth, respiratory distress syndrome is a more common cause. Therefore, a chest x-

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ray may not be required for babies born <32weeks, where eligibility for LISA is being considered in the period soon after admission to the neonatal unit and the clinical presentation is in line with RDS. In all cases, clinicians should ensure to assess the risk of other pathology (e.g., pneumothorax) as part of assessment for eligibility for LISA and consider conducting a chest x-ray if there are concerns.

A recent chest x-ray must be done to assess RDS and rule out other pathology (e.g., pneumothorax) in order to assess eligibility for LISA for:

- All babies born >32weeks gestation,
- Babies born <32weeks gestation on non-invasive respiratory support beyond the period soon after admission to the neonatal unit,
- All babies where the clinical presentation does not fully fit with RDS or is suggestive of other pathology.

There is not much evidence for use of LISA in term babies. Use of LISA in babies beyond 37weeks gestation should be at consultant discretion.

LISA may be contraindicated when there is:

- Imminent need for invasive ventilation as judged by a senior clinician
- An alternative cause for respiratory deterioration
- Known maxillo-facial, tracheal or pulmonary malformations
- No appropriately trained staff present to carry out the procedure

Comfort and use of premedication:

Laryngoscopy is known to be an uncomfortable procedure, and premedication is routinely given prior to endotracheal intubation. The evidence for using premedication for LISA is limited, and practice varies considerably. UK based LISA consensus guidance suggests to consider use of sedation but promote nonpharmacological methods where possible. There is growing practice to individualise approach to managing comfort during LISA procedure, and consideration is given to the baby's age, maturity and responsiveness to determine need for premedication. It is vital that all babies should be assessed and monitored for comfort during the procedure.

Most babies can be managed through the use of non-pharmacological methods to ensure comfort, which involves use of swaddling with containment and oral/buccal sucrose or breast milk. If these methods are insufficient in maintaining comfort, then escalation to use of premedication will be required.

Where premedication is given, the most commonly used drug is fentanyl. Opioid medication can cause respiratory depression, but spontaneous breathing is a prerequisite for LISA. The dose of fentanyl used for LISA is, therefore, smaller (one third) of that used for intubation. To ensure the baby is comfortable, this should be combined with swaddling and containment.

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For a smooth and uncomplicated procedure, it is essential that the neonatal clinician carrying out the procedure is competent in airway management (including intubation) and an additional person is available both to assist the clinician performing the procedure and to attend to the baby's comfort.

Decision to determine most appropriate management for comfort should be made by a senior neonatal clinician or consultant.

Preparation:

Patient:

- Position the baby as for intubation
- Swaddle the baby
- Continuous monitoring of heart rate and oxygen saturation
- Obtain IV access
- Site nasogastric/orogastric tube and aspirate stomach contents
- Inform parents about the procedure where possible

Equipment:

- LISA administration catheter
- Videolaryngoscope/laryngoscope with appropriately sized blade
- Magills forceps
- Neonatal resuscitation equipment including suction, appropriately sized mask and endotracheal tube and NeoPuff should be easily accessible
- Ensure that an assistant is available

Intubation equipment should be available in case of procedure being unsuccessful.

Surfactant:

- Pre-warm Curosurf to room temperature
- Drawn up Curosurf 100-200mg/kg
- Round up dose to nearest full vial

Premedication if required:

- Fentanyl 1-2 microgram/kg IV
- Have available atropine 15 micrograms/kg IV; naloxone 10micrograms/kg IV; further dose of fentanyl 1microgram/kg IV.

Procedure (Two-person technique):

Neonatal clinicians who are who are competent in airway management and able to visualise vocal cords and intubate should carry out or supervise this procedure

- Maintain non-invasive respiratory support
- Ensure placement of a nosogastric/orogastric tube
- Ensure the baby is stable; monitor and record baseline observations
- Wash hands and adopt non-touch technique

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- Position and swaddle baby. Oral/Buccal sucrose or breast milk as analgesia to be considered.
- If premedication required: Administer fentanyl 1 microgram /kg IV slowly over 2-3 minutes. If needed can administer 1microgram/kg IV dose more.
- Gently insert the laryngoscope and visualise the cords
- Insert LISA catheter 1-2cm below the cords using the numbers of the catheter as a guide
- Hold the catheter in place securely
- Carefully remove the laryngoscope, while the LISA catheter remains in-situ
- Close the mouth
- Reassess the baby's condition
- Ask assistant to carefully connect the syringe containing surfactant to the LISA catheter. An IV extension connector may be used, to minimise risk of dislodgement of the catheter through the cords.
- Administer surfactant *slowly in small aliquots over 2-5 minutes* in coordination with the infant's breathing if possible.
- Inject the 1ml surplus air to ensure that the complete dose of surfactant is given.
- Remove the LISA catheter
- Aspirate the nasogastric/orogastric tube to ensure Curosurf not gone in stomach.
- Observe and record the baby's condition and observations
- Document the procedure
- Document the surfactant batch number and dose given

Some surfactant reflux into the oropharynx is expected during the procedure and is not a cause for concern.

Atropine may be given for bradycardia.

Naloxone may be given if the baby is apnoeic or breathing remains shallow despite stimulation. If apnoea, bradycardia or hypoxia persist following the LISA procedure, consider intubation.

Post-procedure:

Following the LISA procedure, the baby should remain on non-invasive respiratory support with continuous monitoring and be nursed in an incubator. Prone positioning may be helpful if not contraindicated.

A reduction in the baby's oxygen requirements in the following minutes to hours indicates that the procedure has been successful

Should the baby's oxygen requirement worsen, exclude other problems such as pneumothorax. Further doses of surfactant can be considered, and the method of administration should be determined by the clinical condition of the baby.

3. Education and Training

None

4. Monitoring Compliance

What will be measured to	How will compliance be	Monitoring	Frequency	Reporting
monitor compliance	monitored	Lead		arrangements
Documentation of surfactant	Audit of medical records	Neonatal	Yearly	Q&S, Audit
administration		Consultant		Meetings

5. Supporting References

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6. Key Words

Invasive Surfactant Administration, LISA, neonatal, neonatal unit, preterm,

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs. As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS						
Guideline Lead (Name and Title)			Executive Lead			
Sumit Mittal – Guideline Lead and Consultant			Chief Medical Officer			
Neonatologist						
Details of Changes made during review:						
Date	Issue Number	Reviewed By	Description Of Changes (If Any)			
September 2020	1	Neonatal Guidelines Neonatal Governance (ratified)	– New guideline			
July 2021	V2	Neonatal Guideline and Governance meeting (reviewed and ratified)				
August 2024	V3	Neonatal Guideline and Governance meeting (reviewed and ratified)	Use of non-pharmaceutical method for sedation such as swaddling or sucrose. In case baby still uncomfortable to consider for Fentanyl. Consideration of Chest X Ray in certain group of babies if planning to give LISA. Use of LISA in babies >37 weeks gestation should be a consultant decision. Procedure – added; IV extension may be used when connecting the surfactant syringe. Aspirate to ensure Curosurf not in the stomach			