Kent, Surrey, Sussex
NEONATAL NETWORK

Kent Surrey Sussex Neonatal Operational Delivery Network

Kent, Surrey & Sussex Neonatal Network Less invasive surfactant administration (LISA) and Surfactant administration through Laryngeal or Supraglottic Airways (SALSA) guideline	
Authors	**Vimal Vasu** **Hemant Ambulkar** **Christian Chadwick** **Annamma Binu** **Suman Fathima** **KSS Airway Group**
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Implications of race, equality & other diversity duties for this document	**This guideline must be implemented fairly and without prejudice whether on the**

	grounds of race, gender, sexual orientation or religion.

Introduction, Background and Purpose

This document outlines how to administer surfactant to neonatal patients with respiratory distress syndrome (RDS) using a less invasive method (Less invasive surfactant administration-LISA) or via a laryngeal or supraglottic airway (SALSA). The guidance is not exhaustive and is designed to be read and used in conjunction with other local neonatal unit guidance relevant to surfactant administration and the management of RDS.

Less invasive surfactant administration (LISA) provides a strategy for delivering surfactant to babies with respiratory distress syndrome (RDS), whilst spontaneously breathing and without the need for endotracheal intubation. This may be beneficial as mechanical ventilation may cause injury to the fragile preterm lung.

LISA usually utilises a thin catheter specifically designed to administer surfactant. It is for local hospital staff to be familiar with the specific type of LISA catheter available to their team and for them to follow manufacturer guidance. There is emerging evidence that instead of a thin catheter a supraglottic airway such as an IGel can be used instead (commonly referred to as surfactant administration through laryngeal or supraglottic airway-SALSA). This offers the advantage that direct laryngoscopy is not necessary. However, it is recommended that this method is only considered by clinicians with appropriate experience or training. (It is recognised that the evidence to support SALSA is evolving and there is an ongoing clinical trial evaluating its efficacy (https://www.hra.nhs.uk/planning-and-improving-research/application-summaries/research-summaries/surfactant-administration-by-supraglottic-airway-surfsup-trial/). However, given that some units across the UK are beginning to use SALSA we have chosen to incorporate some practical guidance on this technique here). In this document, IGel is used to refer to a size 1.0 IGel (Intersurgical) unless otherwise stated.

Less invasive surfactant (LISA)

LISA is associated with a reduction in preterm babies requiring mechanical ventilation and a reduction in the incidence of bronchopulmonary dysplasia (BPD) at 36 weeks postmenstrual age. When a LISA catheter is used (i) the LISA catheter is almost half the external diameter

of a standard 2.5 mm endotracheal tube, making tracheal catheterization relatively easy in most cases, even without sedation (ii) the diameter of the catheter means that the vocal cords are not forcibly abducted, and the glottis can play a more active role in containing the surfactant within the lung (iii) surfactant spreads into the lungs from the trachea with the aid of spontaneous breathing, rather than positive pressure ventilation (iv) no positive pressure inflations can be given through the catheter, and it cannot remain in situ after the procedure (unlike an endotracheal tube) preventing the volu-/barotrauma from manual ventilation before and after surfactant administration.

The following section describes how LISA should be carried out. It is intended for use by clinicians trained in the LISA method though other members of the neonatal/paediatric team, particularly neonatal nurses should be familiar with its content.

Eligibility: Any spontaneously breathing baby on CPAP or high flow nasal cannula oxygen with a likely diagnosis of RDS* requiring surfactant therapy within the first 72 hours of life (< 28 weeks, Fio2 >0.3, >28 weeks 30-40%). Though birth at 22-24 weeks is not a contraindication to LISA per se it needs to be noted that a higher proportion of these babies will end up requiring mechanical ventilation.

Depending on local clinical expertise and training, a discussion with the neonatal consultant on call at a network level 3 neonatal unit may be considered necessary.

* *In babies < 34 weeks gestation with early onset respiratory distress, RDS is the most likely clinical diagnosis. If there are uncertainties about the diagnosis, it may be appropriate to perform additional investigations prior to LISA or intubation e.g. chest x-ray or lung ultrasound. A cold light examination of the thorax to exclude a pneumothorax may also be considered*[1].

If the baby requires emergency airway support, the operator should instead prepare for endotracheal intubation and LISA would not be appropriate. If this is the case, please refer to the KSS neonatal airway/intubation guideline.

Contraindications to LISA: Haemodynamically unstable infant, Recurrent apnoeas needing stimulation, Anticipated difficult airway, Congenital tracheal or lung abnormalities, Pneumothorax, Meconium aspiration syndrome, Congenital pneumonia.

Location: LISA is not an emergency procedure and should therefore usually be provided in the controlled environment of the neonatal unit. However, as a standard of care, it should be

[1] *A recent HM Coroner issued Regulation 28 report recorded a narrative verdict indicating (i) a chest X ray should be performed prior to LISA to exclude a pneumothorax (ii) the consultant should be notified. The British Association of Perinatal Medicine Safety alert (19/11/25) takes a different view on this matter and is available here: Safety Alert: LISA | British Association of Perinatal Medicine*

administered within 30 minutes of the decision to provide treatment. There may be circumstances where with appropriate local processes & training in place, LISA is provided in the delivery room setting.

Sedation/Analgesia for LISA: The decision to provide analgesia or sedation should be made by the senior medical neonatal clinician. The evidence to support benefit of analgesia/sedation is limited and equivocal. Swaddling has been suggested to alleviate pain and increase the comfort of the baby.

Sucrose administered orally approximately 2 minutes before a painful procedure has been demonstrated to have analgesic effect through the release of endogenous opioids and breast milk should be considered.

We recommend that babies should be swaddled, and oral/buccal sucrose and/or breast milk should be given for analgesia. Low dose Fentanyl (Table 1) may be considered if babies cannot be satisfactorily managed with non-pharmacological options and is more likely to be required in more mature babies.

Parents: The plan to administer surfactant should where possible be discussed with the parents prior to procedure.

Drug	Dose	Notes
Caffeine Citrate		Ensure baby has received loading dose of caffeine prior to LISA procedure

Fentanyl	**0.5 to 1 (ONE) microgram/kg**	Fentanyl is a synthetic opioid which is a potent analgesic. Its onset is within 1-2 minutes of administration with a short duration of action. The action of Fentanyl can be variable in preterm babies and so it is recommended that the fentanyl dose is titrated to effect starting with 0.5 micrograms/kg. **Potential side effects: laryngospasm and chest wall rigidity (less likely if administered as a slow bolus and will resolve with use of a muscle relaxant, increase FiO2 and increase in PIP), respiratory and cardiovascular depression and vomiting*. Caution required in: (i) **renal impairment** (prolonged half-life in preterm neonates secondary to delayed renal excretion: *Use 50% of standard dose in severe renal impairment (*e.g Oliguria <0.5ml/kg/hr, Creatinine >120mmol/l) (ii) Infants **already on morphine** infusions or other sedative medications (due to the potential summative sedation effects). (iii) Caution or reduce dose in congenital heart disease/circulatory failure. ***In case of respiratory depression due to overdosage of fentanyl, reversal with Naloxone Hydrochloride (opioid antidote) may be required.*** - ***BNFc recommended dose of 100micrograms/kg can be given*** - ***On – call consultant should be informed immediately***!
Atropine	**10 micrograms/kg** **Slow iv bolus**	Prepare dose but do not use routinely. Use if baby develops bradycardia during intubation. Duration of action 6 hours. Side effects: urinary retention, tachycardia, impaired GI motility.
In certain circumstances, instead of pre-medication with above mentioned drugs, awake intubation along with containment holding/sucrose etc may be an option. Ensure BVM/Neopuff and oxygen delivery system functioning before administering LISA drugs. Ensure intubation drugs are also prescribed in case the baby needs intubation. If this is the case, please refer to the neonatal intubation guideline and use the drugs and doses indicated in the neonatal intubation guideline. In some circumstances, the medical team may request these drugs are drawn up along with the LISA drugs. If using Propofol as premedication for LISA or intubation be aware that Propofol and surfactant look very similar. Ensure all syringes containing medications are labelled and that if Propofol is used it is placed on a separate trolley to the surfactant.		

Table 1. Sedation/analgesia for LISA

LISA process

Ensure that prior to starting the procedure, a pre-procedure pause is conducted and there is a plan for intubation should the baby require this. *It is recommended that a pre LISA check-list is used such as the one provided in the BAPM Neonatal airway safety standard (2024). This is enclosed in Appendix A.*

1. Assess baby who will be on non-invasive ventilation and <72 hours old with a diagnosis of RDS.

2. On NNU, if increased WOB or FiO2 > 30% in babies < 28 weeks or FiO2 > 30-40% in babies > 28 weeks with likely diagnosis of RDS, consider LISA (if uncertain re: diagnosis, perform additional investigations (as described above) and seek senior advice.

3. Ensure usual equipment for endotracheal intubation and ETCO2 detector available should intubation be required.

4. If not already done, prescribe and administer loading dose of IV caffeine citrate.

5. Ensure optimal position of baby for LISA and attention to thermoregulation.

6. Draw up 200mg/kg to the nearest vial size into 5 ml/10 ml syringe (aseptic non-touch).

7. If not already done, insert nasogastric tube.

8. Before LISA establish peripheral IV or central access.

9. Swaddle baby and give oral/buccal sucrose and/or breast milk for analgesia.

10. Administer pre-medication (if needed) as described in Table 1. If medications given, wait for medications to take effect. Atropine does not routinely need to be administered.

11. If using a LISA catheter perform direct laryngoscopy or videolarygoscopy and visualise cords.

12.Pass LISA catheter 1-2cm below vocal cords (Figure 1).

13. Confirm endotracheal position of catheter.

14.Confirm position at lips [weight (kg) plus 1cm].

15. Attach syringe containing surfactant either directly to end of LISA catheter or via a cannula extension set.

16. Slow administration of surfactant (ideally when baby breathing in) over 2-3 minutes. This should be done by a second person whilst the LISA catheter is held securely in place by the person who inserted it.

17. Reassess baby and wean FiO2. Place back on non-invasive respiratory support.

18.Reassess baby. If baby apnoeic or failed LISA procedure at any point consider intubation

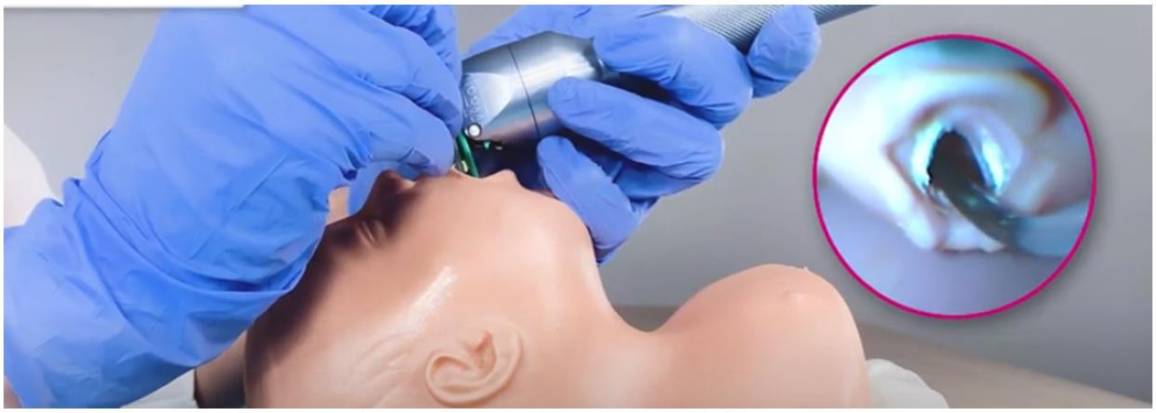

Image showing the black mark passing through the cords

Image showing the black mark just below the cords

Figure 1. Insertion of LISA catheter showing black mark at tip of catheter passing to just below the vocal cords.

Surfactant administration through Laryngeal or Supraglottic Airways (SALSA)

There is emerging evidence to support the use of an IGel to administer surfactant less invasively in babies as small as 1.2kg though the manufacturer recommendation on lower weight limit is 2kg. Practically, it may be considered an option in babies >1.2kg and/or >28 weeks after discussion with the neonatal consultant. Since 2011, a number of RCTs have been published, the largest of these compared surfactant administrations via supraglottic airway continued CPAP treatment (P: ≥ 1250 g receiving CPAP for RDS / FiO2 0.30–0.40). Intubation and MV in the first 7 days were significantly reduced in the supraglottic airway surfactant group (38% vs 64%, $p < 0.01$). No adverse events were recorded in either group.

Eligibility: Appropriate weight and gestation with diagnosis of RDS (see LISA section for additional information on diagnosis of RDS). Appropriate clinical expertise available.

Potential contraindications to SALSA: Imminent need for intubation, Maxillofacial, tracheal or known pulmonary malformations, Major congenital malformations (e.g. confirmed/suspected congenital heart disease), Alternative cause for respiratory distress e.g. pneumonia.

Location: SALSA is not an emergency procedure and should therefore usually be provided in the controlled environment of the neonatal unit. However, as a standard of care, it should be administered within 30 minutes of the decision to provide treatment. There may be circumstances where with appropriate local processes & training in place, LISA is provided in the delivery room setting.

Sedation/Analgesia for SALSA: The decision to provide analgesia or sedation should be made by the senior medical neonatal clinician. Sedation is usually not required. We recommend that babies should be swaddled, and oral/buccal sucrose and/or breast milk should be given for analgesia.

Parents: The plan to administer surfactant should where possible be discussed with the parents prior to procedure.

SALSA Process

Ensure that prior to starting the procedure, a pre-procedure pause is conducted and there is a plan for intubation should the baby require this. Some clinicians remove any indewelling nasogastric tube prior to the SALSA procedure and reinsert it afterward as this may theoretically help with a better IGel seal. There is no evidence to support practise in this area and it is acceptable to either keep the gastric tube in situ during the procedure or to remove it and then replace it after the procedure. The NIV interface can remain in situ as long as it does not interfere with IGel insertion.

1. Lubricate the back and sides of the IGel.
2. Tilt babies head back slightly, open the mouth and apply jaw thrust.
3. Insert the IGel into the mouth following the hard palate with the open side of the IGel facing the tongue. Though the use of a laryngoscope is recommended in UK Resuscitation Council Newborn Life Support courses for IGel insertion, from experience, it is not necessary to use a laryngoscope though it may be helpful in some babies.
4. Continue to insert the IGel until resistance is felt. At this point the tip of the IGel will be sitting on the oesophagus. You may feel a slight ‘bounce’ backward. This is normal.
5. The mask of the IGel should now be situated in the hypopharynx covering the laryngeal opening and occluding the oesophagus with a low-pressure seal.
6. The IGel should sit comfortably in the mouth after insertion and exhaled CO2 should be confirmed via use of an ETCO2 monitor (NeoSTAT or PediCAP). Once confirmed, remove NeoSTAT or PediCAP.
7. Attach a duckbill neopuff device to iGel (see Figure 2) and insert catheter via duckbill port to 16 cm to reach distal end of iGel. *The duckbill neopuff device enables continued use of PEEP and positive pressure breaths if required whilst enabling the administration of surfactant via a surfactant catheter at the same time*
8. Administer surfactant slowly as described in LISA procedure above. Provide PEEP via duckbill Neopuff device and PPV breaths if required.
9. Remove IGel once procedure complete and place baby back on non-invasive respiratory support if procedure successful.

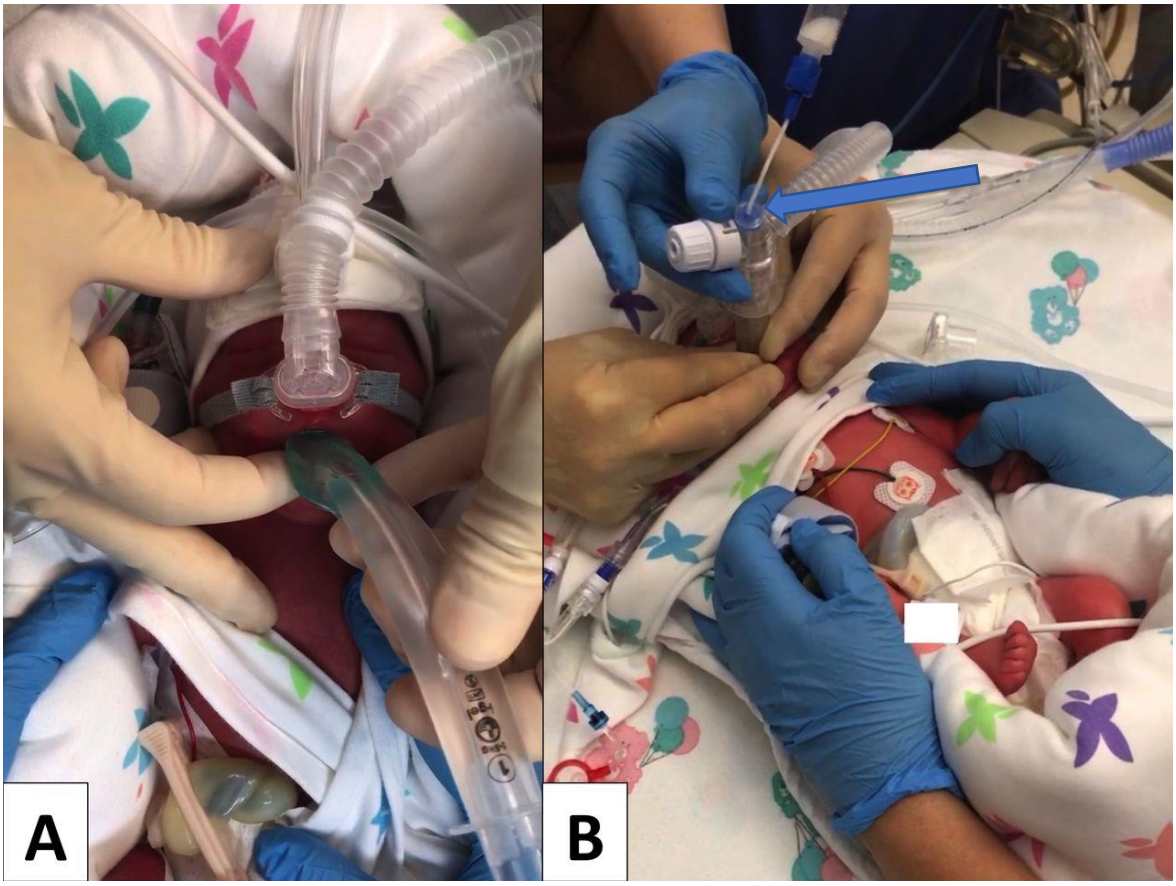

Figure 2. (A) Insertion of i-gel supraglottic airway device in a preterm infant receiving CPAP. (B) Surfactant administration by a flexible catheter inserted into the supraglottic airway device. The duckbill neopuff device enables continued use of PEEP and positive pressure breaths if required whilst enabling the administration of surfactant via a surfactant catheter at the same time (blue arrow). *Adapted From Calum T Roberts et al. Arch Dis Child Fetal Neonatal Ed 2021;106:336-341 (With permission of Dr Callum T Roberts)*

Trouble shooting and tips for LISA and SALSA procedures

Coughing/vomiting/gag reflex- Ensure adequate sedation/comfort is achieved before laryngoscopy is performed.

Surfactant reflux- Common. Consider slowing down the rate of surfactant administration or pause it temporarily. If the amount of surfactant reflux is large or continuous then have a look with the video laryngoscope to rule out catheter position for misplacement.

Bradycardia- usually resolves with slowing the rate of surfactant administration or temporarily pausing the surfactant delivery. Occasionally, may need tactile stimulation. If persistent:

(i) during LISA, remove catheter and give PPV (positive pressure ventilation) breaths. Clinical judgement to be taken by the Consultant whether to re- attempt or intubate.

(ii) During SALSA, provide PPV via duckbill neopuff device with IGel in situ and reassess. If no improvement consider removing IGel. Clinical judgement to be taken by the Consultant whether to re- attempt or intubate.

Desaturations- Usually responds to increasing the FiO_2 and slowing the rate of surfactant administration or temporarily pausing the surfactant delivery. Occasionally, may require tactile stimulation.

For SALSA only:

If you are unsure of IGel position (e.g. CO2 colour change not clear) consider 1 or all of the following 3 options:

- *Partially withdrawing the Igel and re-inserting it.*
- *Adjust the degree of neck extension/jaw thrust*
- *Allow time for the IGel to warm.*

If the surfactant catheter is bouncing in the IGel during insertion, lubricate it by injecting a small amount of surfactant.

Training and assessment for LISA and SALSA

Clinicians should have an understanding of the indications and contraindications of both LISA and SALSA along with an understanding of the physiological effects of surfactant administration. They should be aware of local unit or Network guidelines and LISA/SALSA should only be administered by a clinician (doctor or ANNP) competent in neonatal intubation and observed doing at least 1 LISA/SALSA procedure by a NNU consultant). Additional information on training can be accessed in the BAPM Neonatal airway safety standard (2024). https://www.bapm.org/resources/BAPM-Neonatal-Airway-Safety-Standard.

The following video gives a step-by-step guide to familiarise the clinician with the LISA procedure:

https://www.youtube.com/watch?v=ahBHWJzIeCQ

For assessment purposes the following should be considered:

- Ensuring appropriate vital signs monitoring
- Ensuring situational awareness and how to escalate
- Correct & checked equipment for LISA/SALSA as per local or network guideline
- Understanding and plan for needing to abandon procedure and intubate infant
- Proper positioning of patient and consideration of non pharmacological and pharmacological methods of ensuring comfort
- Pre procedure time out
- Correct & checked drug doses (if required)
- LISA: Correct and safe insertion of LISA catheter into trachea (ideally visualised using videolaryngoscope. Ability to recognise & manage incorrect placement.
- SALSA: Correct and safe insertion of supraglottic airway. Confirmation of position using colometric end tidal CO2. Ability to recognise & manage incorrect placement.
- Ability to administer surfactant slowly over 2-3 minutes whilst ensuring continued patient stability
- Understanding of common complications- surfactant reflux, desaturations, bradycardias and how to manage these including the use of positive pressure ventilation either via a face mask or via a supraglottic airway.
- Monitor clinical status of infant after procedure

Appendix A. Less invasive Surfactant Administration (LISA) Checklist.
https://hubble-live-assets.s3.eu-west-1.amazonaws.com/bapm/file_asset/file/2547/Appendix_F_-_LISA_checklist.pdf

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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