Less Invasive Surfactant Administration (LISA)

Procedure Responsibilities and Authorisation

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Target Audience	SMOs, Registrars, Nurse Practitioners, Clinical Nurse Specialists
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Procedure Review History

Version	Updated by	Date Updated	Summary of Changes
1.0	Lee Carpenter	Feb 2021	New document
2.0	Jutta van den Boom	July 2024	Update as per national guideline Updated indications Updated equipment Updated procedure

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1 Overview

1.1 Purpose

LISA (less invasive surfactant administration) has been shown to be an effective and safe treatment of respiratory distress syndrome (RDS). It does not require sedation, minimises airway injury, and avoids placing positive pressure ventilation on an immature lung therefore reduces need for intubation, reduces oxygen requirement, reduces pCO2 levels and prevents risk of pneumothorax in a spontaneously breathing infant.

1.2 Staff group

Health NZ Waikato staff working in NICU e.g. Medical staff.

1.3 Patient / client group

A neonate with gestational age equal to or greater than 25 weeks.

1.4 Exceptions / contraindications

- Intubated infants
- Infants < 25 weeks unless SMO approval

1.5 Definitions and acronyms

CNS	Clinical Nurse Specialist
CPAP	Continuous positive airways pressure
IN-REC-SUR-E	INtubate-RECruit-SURfactant-Extubate
INSURE	INtubation – SURfactant - Extubation
IV	Intravenous
Medical Staff	In NICU they include Neonatal Nurse Practitioners, Clinical Nurse Specialists, Registrars and SMO's
NP	Nurse Practitioner
RDS	Respiratory Distress Syndrome
SMO	Senior Medical Officer

2 Clinical management

2.1 Competency required

Competent at oral intubation or under supervision by SMO, NNP, CNS or Registrar.

2.2 Indications for LISA

- For infants less than 25 weeks gestation, consider surfactant administration via LISA **only** if:
  - FiO2 < 0.5
  - good respiratory drive/ no significant WOB
  - adequate CPAP delivery
- For infants between 25^{+0} and 31^{+6} weeks with clinical signs of RDS, such as:
  - persistent or rising FiO2 requirement, following stabilisation (and optimisation) on non-invasive respiratory support
  - Tachypnoea and increased work of breathing
  - A chest x-ray consistent with RDS
  - A recent blood gas suggestive of respiratory acidosis
  - Surfactant administration is clinically indicated without the need for ongoing ventilation, and the infant is clinically stable with regular respiratory effort, no apnoeas and a heart rate over 120 beats per minute
- For infants greater than 32 weeks' gestation, evidence of surfactant deficiency, such as:
  - persistent or rising FiO2 requirement > 30% following stabilisation on non-invasive respiratory support
  - CXR is consistent with the diagnosis of surfactant deficiency
  - Treatment may be considered at any time in the first 72 hours
  - At SMO discretion, LISA may be performed, without awaiting radiological diagnosis, in an infant with a higher initial oxygen requirement (FiO2 > 40%)

Subsequent doses

For infants less than 25 weeks gestation, subsequent doses should NOT be via LISA unless discussed with second SMO.

For infants less than 28 weeks **a second dose** of surfactant administration via LISA may be considered if FiO_2 <50% and no other signs of respiratory failure.

A **third dose** of surfactant administration via LISA or surfactant need after 48h post birth, must be discussed with a second SMO.

2.3 Equipment

The neonatal resuscitation trolley, intubation equipment and a Neopuff should be readily available. Ensure there is a working suction with a size 10 suction catheter attached. For the procedure itself the following equipment is required;

- Surfactant refer to: Surfactant (Poractant alfa) for neonates Ref 0444 warmed to room temperature
- A 5ml syringe with a drawing up needle, ensure this is not a filter needle
- A (video-) laryngoscope with the appropriate sized blade
- Vygon Surfcath
- Short IV extension tubing to attach to syringe of Surfactant (optional)
- Optional: CO2 detector (Pedicap) with an ETT connector (blue part from ETT 3.5).

2.4 Procedure

Video Link to Procedure (scroll down to bottom of webpage):
https://starship.org.nz/guidelines/practice-recommendation-for-lisa-mist/

Caffeine Citrate (0591) should be part of the management plan for infants < 32 weeks (Schmidt et al, 2006).

Once a decision to perform LISA for RDS has been made, caregivers should be informed.

The procedure can be performed on a resuscitaire, babytherm, or even inside the incubator to ensure minimal handling. The infant will need full monitoring, including ECG and oxygen saturation. An intravenous cannula should be in situ and patent. A gastric tube may be in situ, and may be left in situ during the procedure.

2.4.1 Before LISA

Complete cares and aspirate the stomach, record observations, swaddle the baby and administer sucrose refer to: Oral Sucrose for Analgesia (2905)

The use of sedation is reported to have resulted in more frequent desaturations and the need for positive pressure ventilation (PPV). If vigorous; consider use of intranasal Midazolam @200-300mcg/kg Intranasal Midazolam (2939) as a last resort when all efforts to calm the baby are exhausted.

One nurse is assigned to hold the infant during the procedure.

If necessary, intravenous atropine may be given at 20mcg/kg/dose.

2.4.2 LISA Procedure

- Draw up the required surfactant (2.5ml/kg or 200mg/kg for first dose and 1.25ml/kg or 100mg/kg for second and subsequent doses), and remember **not to use** a filter needle. The vial should be **gently turned upside down without shaking**, in order to obtain a homogenous suspension!

- If using an IV extension, flush the tubing, but do not attach to the Vygon surfcath until after insertion.
- For all procedures (for any gestation), consider using the video laryngoscope over direct laryngoscopy when available. Also, if a less experienced practitioner is inserting the catheter, a video laryngoscope (when available) must be used.
- **Ensure that the baby remains on CPAP throughout the procedure to maintain PEEP**. If the interface on the nose is in the way of the laryngoscope push it out of the way whilst visualizing the cords, then reposition before administering the surfactant.
- Visualize the cords with the laryngoscope and insert Vygon surfcath aiming to pass the catheter past the vocal cords to the desired depth*. Magill's forceps can be used to help.

  *Options for calculation of intubation depth:

  - **Starship Hospital**: weight (rounded to nearest 0.5kg) + 6cm at the lips
  - **Take care method**: 1cm in 25-26/40, 1.5cm in 27-28/40, 2cm in 29-32/40 below the cords
  - **Vygon**: until black tip disappears below the cords
  - **Scotland NHS**: 1.5cm of < 27/40, 2cm for >=27/40 below the cords
- There should be no more than 2 attempts by either senior medical officer, NNP, registrar or CNS to intubate, and 1 attempt by a second staff member before consideration of alternate mode of surfactant administration (INSURE / IN-REC-SUR-E / premedication + intubation + short ventilation).
- Remove the laryngoscope and hold the baby's mouth closed with your hand to secure the Vygon surfcath in position. Check observations are stable. Check position of the Vygon surfcath with a CO2 detector if unsure of placement.
- Connect the IV tubing or syringe and instil the surfactant either as a continuous slow push, as demonstrated in video (see link above), over a period of 2-3 minutes.
- If the heart rate drops or the baby stops breathing, consider slowing down the administration of surfactant, increasing PEEP and/or increasing FiO2.
- Flush the remaining surfactant through the IV tubing and Vygon/angiocath catheter with some air.
- Remove the Vygon surfcath once the surfactant has been given and maintain CPAP.
- Be prepared to give positive pressure ventilation if clinically indicated, such as apnoea, chest not moving, or bradycardia. Some refluxing of surfactant into the oropharynx is to be expected.

2.4.3 After the LISA procedure

- Consider optimising by positioning the baby prone (discuss with SMO if appropriate), as this is the ideal position for lung expansion and uptake of surfactant, and leave undisturbed for as long as able after the procedure.
- The baby may also sound like it will need a suction however if possible avoid suction for up to 12 hours post procedure (as per ETT surfactant administration) unless absolutely indicated and then minimal gentle suction only.
- Once heart rate, oxygen saturation, and respiratory effort are close to baseline values, restore the infant into their previous position, ensuring CPAP is optimized.
  - Titrate inspired oxygen to saturation targets and reduce PEEP once FiO2 <0.25.
  - Do a blood gas as clinically indicated post procedure.
  - Document the procedure in clinical notes.
- A second installation of surfactant is possible after 6-12 hours if clinically indicated and generally at 100mg/kg (1.25ml/kg) unless SMO direction for repeat dose of 200mg/kg (2.5ml/kg) is requested.

3 Patient information

Once a decision to perform LISA for RDS has been made, the parents are to be informed about the procedure.

4 Evidence base

4.1 Bibliography

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4.2 Associated Health NZ Waikato Documents

- Caffeine Citrate for neonates (Ref: 0591)
- Midazolam for neonates (Ref: 2939)
- Poractant alfa (Curosurf) for neonates (Ref: 0444)
- Sucrose Oral Liquid for Analgesia in Neonates and Infants (Ref 2905)
- Video laryngoscope