

Royal Hospital for Women (RHW)
NEONATAL BUSINESS RULE
COVER SHEET



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South Eastern Sydney
Local Health District

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SUMMARY	To safely administer surfactant to spontaneously breathing neonates on non-invasive respiratory support in Newborn Care Centre.
Key Words	RDS; nCPAP; Surfactant; Minimally Invasive Surfactant Therapy, MIST, Neonate

Minimally- Invasive Surfactant Therapy (MIST)
for Neonates

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This Clinical Business Rule (CBR) is developed to guide safe clinical practice at the Royal Hospital for Women (RHW). Individual patient circumstances may mean that practice diverges from this Clinical Business Rule. Using this document outside RHW or its reproduction in whole or part, is subject to acknowledgement that it is the property of RHW and is valid and applicable for use at the time of publication. RHW is not responsible for consequences that may develop from the use of this document outside RHW.

Within this document we will use the term woman, this is not to exclude those who give birth and do not identify as female. It is crucial to use the preferred language and terminology as described and guided by each individual person when providing care.

1 BACKGROUND

Preterm neonates are increasingly being supported with nasal continuous positive airway pressure (nCPAP) at birth and are not routinely intubated, however, many of these neonates have significant surfactant deficiency. New techniques of minimally invasive surfactant therapy (MIST) have been developed, whereby exogenous surfactant can be administered to spontaneously breathing neonates on non-invasive respiratory support without the need for intubation.

Newborn Care Centre, Royal Hospital for Women utilise the “Hobart method”¹, which involves the administration of surfactant via a semi-rigid catheter briefly passed into the trachea.

2 RESPONSIBILITIES

2.1 Staff

- 2.1.1 Medical- identify neonates that may require MIST, inform parent/carer of procedure (if available), prepare required equipment including Neopuff™, safely perform MIST procedure, monitor neonate for any complications or escalation of care required, document procedure in medical record.
- 2.1.2 Nursing- prepare emergency equipment and bring to the bedside, prepare neonate for procedure, assist medical staff with procedure, monitor neonate for any complications or escalation of care required, document procedure in medical record.

3 PROCEDURE

3.1 Equipment

- nCPAP interface
- Expressed breast milk (EBM) or oral sucrose 24%
- Video laryngoscope with appropriate size blade (if available)
- Laryngoscope handle and blade – Miller 0 or 00

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- Vygon Surfcath™ 6 Fr, 0.8 x 2 mm, 200 mm (alternative BD Angiocath™ 16 G, 1.7 x 133 mm)
- Surfactant- appropriate dose for neonate from fridge in medication room
- 3mL or 5mL intravenous (IV) syringe (slip lock)
- Monoject™ needleless med prep cannula (grey needle)
- Vial access cannula
- 5 or 10mL enteral feeding syringe
- Sterile gloves- appropriate size for proceduralist
- Sterile drape
- Dexmedetomidine (intranasal) as per neonatologists discretion (refer to Australasian Neonatal Medicines Formulary [ANMF] for equipment)
- Neopuff™ with tubing and appropriate size face mask
- Drager Babylog® VN500/VN800 ventilator with Fisher and Paykel (F&P) neonatal ventilator dual heated circuit kit – 950N80 **OR**
- Getinge Servo-n® ventilator with F&P Neonatal ventilator dual heated circuit kit- 950N81
- Neonatal Resuscitation Trolley
- Shoulder roll

3.2 Clinical Practice

3.2.1 Preparation

- Ensure the neonate is suitable for administration of surfactant via MIST. This should always be at the discretion of the neonatologist.

Note

MIST should be used in neonates that are clinically stable on nCPAP where the neonate is not rapidly deteriorating and will not require escalation to invasive respiratory support.

MIST should be used with caution in neonates who have congenital airway anomalies or other respiratory conditions (e.g. pulmonary hypoplasia) contributing to their respiratory status.

- Inform parent/carer of MIST procedure (if available)
- Administer intranasal Dexmedetomidine 30 minutes prior to procedure if neonatologist has requested this. Follow [Dexmedetomidine ANMF.pdf](#) for administration procedures.
- Ensure three staff members are available to assist (1x proceduralist; 1x airway assistant for surfactant administration; 1x assistant for intragastric tube aspiration prior and during procedure)
- Assemble necessary equipment to perform the procedure.
- Ensure Neopuff™ circuit with appropriate sized face mask is checked and functional.
- Ensure neonatal resuscitation trolley and all necessary equipment required for invasive ventilation is readily available if required.

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- Draw up surfactant (Curosurf™, Chiesi Farmaceutici, Parma, Italy) in a 3 or 5 mL syringe.
 - Surfactant dose is 200 mg/kg (2.5 mL/kg). Draw up an additional 0.5 mL of air into the syringe, which allows for the dead space in the instillation catheter (~0.3 mL).

3.2.2 Procedure

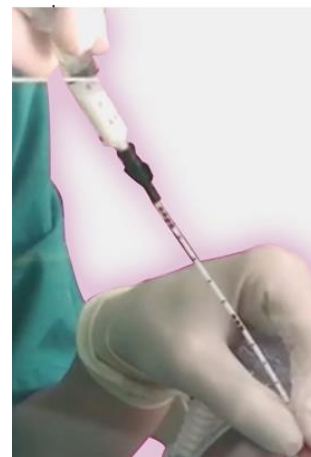
- Swaddle the neonate and administer EBM or oral sucrose 24%.
- Position the neonate as for a standard intubation procedure.
 - A shoulder roll may be required to assist with optimal positioning of neonate
- Ensure intragastric tube is secure and aspirate abdominal contents.
- Ensure nCPAP remains in place during procedure.
 - Direct visualisation of vocal cords may be limited with nCPAP in place
- Perform a 'Time Out' prior to MIST procedure.

3.2.2.1 Proceduralist

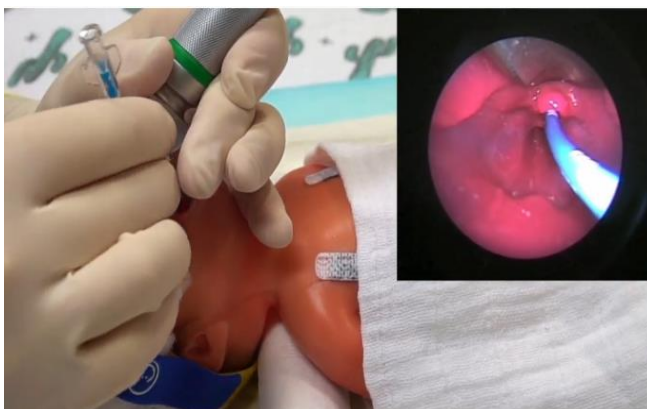
- Perform direct laryngoscopy using either a standard laryngoscope blade or video laryngoscope (Picture 1).
- Insert the Surfcath™ (Picture 2 and 3) orally and pass it through the vocal cords until the black marking or bent end is below the cords. Immobilise Surfcath™ against hard palate of neonate's mouth.



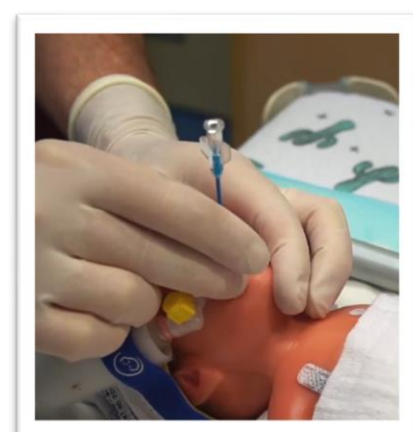
Picture 1



Picture 2



Picture 3



Picture 4

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- Remove the laryngoscope blade.
- Hold the neonate's mouth closed to maintain Positive End Expiratory Pressure (PEEP) (Picture 4).
- Take note of the measurement at the lips.

3.2.2.2 Airway Assistant

- Connect the surfactant IV syringe to the catheter hub and instil the surfactant in 2-4 boluses over 15-30 seconds (Picture5).



Picture 5

3.2.2.3 Second Assistant

- Aspirate intragastric tube intermittently during the administration of surfactant to ensure Surfcath™ correctly positioned.

3.2.2.4 Proceduralist

- If catheterisation of the trachea is not possible within 20-30 seconds, remove the laryngoscope and allow recovery on nCPAP before attempting tracheal catheterisation again.
 - Consider abandoning the procedure after three unsuccessful attempts or surfactant aspirated through the intragastric tube.
- Remove the catheter immediately after administering surfactant and continue nCPAP.

3.2.3 Post-procedure

- Remain with neonate until heart rate, oxygen saturations and respiratory effort are close to baseline values.
- Reposition neonate to their previous position.
- Avoid oral suctioning immediately after the procedure to avoid coughing or gagging.
- Document the details of the procedure in the medical record and record as a 'procedure' under NICU medical tab on eRIC.
- Sign medication order on eRIC
- Provide update to parent/carer of outcome of procedure.

3.3 Documentation

- eRIC

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3.4 Education Notes

- Neonates who have respiratory distress syndrome have been managed with a combination of early intubation and exogenous surfactant therapy. With the increasing use of nCPAP as primary therapy for preterm neonates, there is growing interest in developing new techniques to administer surfactant without the need for intubation.²
- From several potential techniques, methods involving brief tracheal catheterization have been most extensively studied. These generally involve surfactant administration using either a flexible feeding tube or a semi-rigid vascular catheter. There are a considerable number of different techniques described under the banner of MIST, none of which have been directly compared. It is likely that there is little difference between them in the ultimate effect of the instilled surfactant.²
- In clinical trials surfactant delivery via a feeding tube was found to reduce the need for subsequent intubation and ventilation and to improve short-term respiratory outcomes. Further randomized controlled trials of surfactant administration via tracheal catheterization are underway or planned, and they will help clarify the place of this therapeutic approach.³⁻⁵
- Not all preterm neonates managed on nCPAP stand to benefit from MIST. Many neonates will be well supported by CPAP alone and, conversely, many neonates with severe surfactant deficiency will require invasive respiratory support.²
- Neonates who develop severe respiratory distress syndrome (RDS) should ideally receive surfactant early to gain the most advantage, however, in practice it can be very difficult to predict which neonates will require surfactant. Currently, it is felt that consideration of MIST should be coupled with early selection of neonates who have significant RDS.²
- Published studies of MIST with the use of direct laryngoscopy and tracheal catheterization have used different approaches to premedication but all avoid narcotics. The avoidance of narcotic medications does not seem to have been associated with any major deleterious effects in the short term. There is also a theoretical benefit of more effective distribution of surfactant with spontaneous breathing during the MIST procedure, which may be ameliorated using narcotic medications.²
- Surfactant dosage in published studies has been either 100 or 200 mg/kg. We have chosen the higher dose of 200 mg/kg as reflux of surfactant into the pharynx around the thin catheter is common. It is also reported that 200 mg/kg is associated with a more prolonged effect.²
- Infiltration is generally benign, but a large volume of infiltrate can cause a compartment syndrome, compressing nerves and compromising circulation.²

3.5 Abbreviations

nCPAP	Nasal Continuous Positive Airway Pressure	MIST	Minimally Invasive Surfactant Therapy
EBM	Expressed Breast Milk	F&P	Fisher and Paykal
PEEP	Positive End Expiratory Pressure	IV	Intravenous

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RDS	Respiratory distress syndrome	ANMF	Australasian Neonatal Medicines Formulary
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3.6 Related Policies/procedures

- RHW NCC CBR- C-MAC Video Laryngoscope Care and Maintenance
- RHW NCC CBR – Continuous Positive Airway Pressure (CPAP) Therapy (Neonate)
- RHW NCC CBR- Drager Babylog VN500 set up
- RHW NCC CBR- Getinge Servo-n Ventilator set up
- RHW NCC CBR- Immuno-Supportive Oral Care (ISOC)

3.7 References

1. Dargaville PA, Kamlin CO, De Paoli AG, et al. The OPTIMIST-A trial: evaluation of minimally-invasive surfactant therapy in preterm neonates 25-28 weeks gestation. BMC Pediatr 2014;14:213.
2. Aguar M, Vento M, Dargaville PA. Minimally Invasive Surfactant Therapy: An Update. NeoReviews 2014;15:e275-85.
3. Göpel W, Kribs A, Ziegler A, et al; German Neonatal Network. Avoidance of mechanical ventilation by surfactant treatment of spontaneously breathing preterm neonates (AMV): an open-label, randomised, controlled trial. Lancet 2011;378:1627-34.
4. Kanmaz HG, Erdeve O, Canpolat FE, et al. Surfactant administration via thin catheter during spontaneous breathing: randomized controlled trial. Pediatrics 2013;131:e502-9.
5. Kribs A, Roll C, Göpel W, et al; NINSAPP Trial Investigators. Nonintubated Surfactant Application vs Conventional Therapy in Extremely Preterm Neonates: A Randomized Clinical Trial. JAMA Pediatr 2015;169:723-30.

4 ABORIGINAL HEALTH IMPACT STATEMENT DOCUMENTATION

- Considerations for culturally safe and appropriate care provision have been made in the development of this Business Rule and will be accounted for in its implementation.
- When clinical risks are identified for an Aboriginal and/or Torres Strait Islander woman or family, they may require additional supports. This may include Aboriginal

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health professionals such as Aboriginal Liaison Officers, health workers or other culturally specific services

5 CULTURAL SUPPORT

- For a Culturally and Linguistically Diverse CALD woman, notify the nominated cross-cultural health worker during Monday to Friday business hours
- If the woman is from a non-English speaking background, call the interpreter service: NSW Ministry of Health Policy Directive PD2017_044-Interpreters Standard Procedures for Working with Health Care Interpreters.

6 NATIONAL STANDARDS

- Standard 1 Clinical Governance
- Standard 4 Medication Safety
- Standard 5 Comprehensive Care
- Standard 8 Recognising and Responding to Acute Deterioration

7 REVISION AND APPROVAL HISTORY

List all previous revisions below

Date	Revision No.	Author and Approval
15.2.2017	1	T Schindler (Staff Specialist); J Sheils (NE)
17.2.2022	2	T Schindler (Staff Specialist); C Egan (aNUM); S Neale (aNE); R Prasad (Neonatal Fellow); F Perez (Neonatal Fellow)
3.6.2025	3	T Schindler (Staff Specialist), Sarah Jane Tapawan (CMO)
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1.9.25	3	RHW BRGC