

# Lung Health The Ottawa Hospital

Ottawa EPIQ team  
Brigitte Lemyre, Melissa Faulkner, Emily Reuvers, Manon Boileau,  
Darine El Char, Sarah Lawrence



Evidence-based Practice for Improving Quality

# Lung health: changes in practice

2019-2020

## 1. Implementation of MIST

- Using 16G Angiocath and premedication
- With BLES 5 ml/kg
- Required training on mannequin first
- Implemented for infants  $\geq 29$  weeks GA

# Implementation of MIST

## INCLUSION CRITERIA:

- Spontaneously breathing neonate with a GA  $\geq$  29 weeks\*
- $< 72$ h
- On NIPPV or nCPAP with a PEEP  $\geq$  to 7cmH<sub>2</sub>O
- FiO<sub>2</sub> of 0.30 to 0.40
- Chest radiograph or clinical features consistent RDS
- Good respiratory drive (40 to 60 breaths per minute) and clinically well apart from the respiratory distress

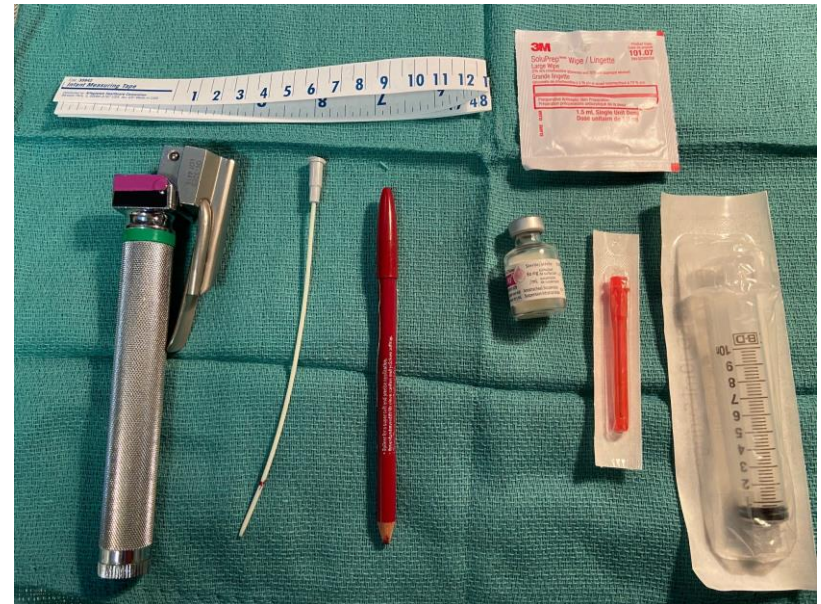
# Implementation of MIST

## EXCLUSION CRITERIA:

- \*Poor respiratory drive and/or frequent apneas
- \*Hemodynamically unstable post NRP (hypotension, sepsis)
- \*Major congenital anomalies
- \*Respiratory compromise that requires I & V

# Equipment

- \* Sterile green OR towel
- \* Laryngoscope with appropriate size blade
- \* Marker pen
- \* Tape measure
- \* BD Angiocath 16G, 1.7 x 133 mm
- \* 10 ml syringe
- \* 18- or 19-gauge needle
- \* Alcohol swabs



# Implementation of MIST

## Appendix C - Premedication

Gestational age	Premedication
Less than 29 weeks	Sucrose 24% according to policy Atropine 20 mcg/kg IV Optional: fentanyl 0.5-1 mcg/kg over 3-5 minutes OR ketamine 1 mg/kg over 2 minutes
29 weeks or greater	Sucrose 24% according to policy Atropine 20 mcg/kg IV Fentanyl 1 mcg/kg over 3-5 minutes OR Ketamine 1 mg/kg over 2 min

# Audit results MIST

- \* 23 procedures performed x March 1 2020
- \* 27-36 weeks; 22/23 with BLES
- \* Number of attempts:
  - \* 1 attempt 13/23 (57%)
  - \* 2 attempts 7/23 (30%)
  - \* 3 attempts 3/23 (13%)

# Audit results MIST

- \* 6/23 (26%) required intubation and 2<sup>nd</sup> dose of surfactant
- \* 10/23 (43%) had a desaturation, apnea or chest freeze
- \* Reduced dose of fentanyl and added ketamine as an alternative or first choice
- \* Team remains enthusiastic towards procedure



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## 2. Changes to ventilation protocol

- Use of HFOV with VG for all < 26 weeks GA and requiring invasive respiratory support
- Defined criteria to go from CMV to HFOV: based on PIP required to reach VT
- Determination of ideal MAP prior to receipt of surfactant (Van Kaam)
- Ongoing audits: hyperinflation, hyperventilation, days on MV, BPD

## Recommended initial tidal volume (VT) and Peak pressures.

Condition	Initial Vt	Initial PIP limit	Rationale
Term, late preterm, normal lungs	4-4.5 ml/kg	18 cm H20	Baseline/normal compliance
Preterm RDS <700g	5.5-6 ml/kg	24 cm H20	Dead space of the flow sensor / decreased compliance, risk of air leak
Preterm RDS 700-1249g	4.5-5 ml/kg	24 cm H20	Dead space of the flow sensor / decreased compliance, risk of air leak
Preterm RDS 1250-2500g	4-4.5 ml/kg	26 cm H20	Low alveolar dead space/decreased compliance
Preterm evolving BPD, 3 weeks old	5.5-6.5 ml/kg	26 cm H20	Increased anatomical and alveolar dead space/worsening compliance
Established severe BPD	6-8 ml/kg	30 cm H20	Greatly increased alveolar and anatomical dead space; lower respiratory rate due to long time constants, needs larger VT
Sick term lungs	4.5-5 ml/kg	25 cm H20	Increased anatomical and alveolar dead space/worsening compliance
Term MAS with classic CXR	5.5-6 ml/kg	28 cm H20	Increased alveolar dead space/poor compliance
Term MAS with white out CXR	4.5-5 ml/kg	30 cm H20	Alveolar dead space less of a problem/very poor compliance

### Lung recruitment maneuver:

At the start of HFV, set the MAP at 8 cmH<sub>2</sub>O and the FiO<sub>2</sub> resulting in a SpO<sub>2</sub> between 90-95% or desired range.

Increase the MAP 1 – 2 cmH<sub>2</sub>O every 2 – 3 min and decrease the FiO<sub>2</sub> stepwise (0.05 – 0.10) as oxygen improves. Stop recruitment when oxygenation no longer improves and/or FiO<sub>2</sub> ≤ 0.25% Notify MD if a MAP greater than 14cmH<sub>2</sub>O < 26wks and 18cmH<sub>2</sub>O ≥ 26wks is required during this procedure

Pre-surfactant opening pressure (MAP<sub>O</sub>)  
Record Vitals and Opening pressures

Decrease the MAP 1 – 2 cmH<sub>2</sub>O every 2 – 3 min until oxygenation deteriorates or SaO<sub>2</sub> ≤ 85% or when SaO<sub>2</sub> drops by 5%

Pre-surfactant closing pressure (MAP<sub>C</sub>)  
Record Vitals and Closing pressures

Recruit the lung once more with the known MAP<sub>O</sub> for 2 – 3 min and set the MAP 2 cmH<sub>2</sub>O above MAP<sub>C</sub>. Notify MD if optimal MAP >12 cmH<sub>2</sub>O for babies <26wks or >16cmH<sub>2</sub>O for babies ≥26wks is required

Pre-surfactant optimal pressure (MAP<sub>OPT</sub>) Record Vitals and Optimal pressures

Administer surfactant

5 – 10 min following surfactant treatment decrease the MAP 1 – 2 cmH<sub>2</sub>O every 5 min until oxygenation deteriorates

Post-surfactant MAP<sub>C</sub>  
Record Vitals and Closing pressures

Increase the MAP in steps of 1 – 2 cmH<sub>2</sub>O every 2 – 3 min until oxygenation is restored

Post-surfactant MAP<sub>O</sub>  
Record Vitals and Opening pressures

Set the MAP 2 cmH<sub>2</sub>O above the post-surfactant MAP<sub>C</sub>

Post-surfactant MAP<sub>OPT</sub>  
Record Vitals and Optimal pressures

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## 3. Prophylactic hydrocortisone

- Premiloc protocol:
  - 0.5 mg/kg q 12h x 7 days, then 0.5 mg/kg daily x 3 days
- For all infants born < 28 weeks
- Implementation Sept 1 2019
- Outcomes of interest:
  - BPD free survival
  - Late-onset sepsis
  - SIP

22-27 weeks	Jan-Dec 2018	Sept 2019 – June 2020
BPD	67%	48%
Moderate-severe BPD	30%	25%
LOS	17%	15%
SIP	1.6% (1/61)	8.8% (3/34)

# Site Visits in 2020



# Contact Information

Brigitte Lemyre, [blemyre@toh.on.ca](mailto:blemyre@toh.on.ca)