Assessing the Introduction of MIST

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AIM

To assess clinical outcomes associated with the introduction of MIST into standard of care at two neonatal intensive care units (NICUs) in Ottawa

IMPORTANCE

- Avoiding or reducing the duration of mechanical ventilation is important to optimize lung health in preterm infants
- MIST offers the possibility of avoiding intubation for surfactant administration

IMPLEMENTATION PLAN AND PROJECT METHODS

- MIST implemented March 1, 2020; initially for infants >29 weeks GA
- Monthly audits and team discussions regarding compliance with protocol, adverse events
- Protocol change to include infants ≥ 25 weeks GA in July 2021
- Retrospective chart review (March 1, 2020, to December 31, 2023)

Eligibility Criteria
Spontaneously breathing
Age < 72-hours
Gestational age ≥ 25 weeks
Clinical features of RDS +/- chest radiograph
Require CPAP or NIPPV with PEEP ≥ 7cmH_2O
Require FiO_2 of 30-40%
Good respiratory drive
Clinically stable other than respiratory distress

Pre-Medication	N=127
Fentanyl (0.5-2.0 mcg/kg)	69 (54.3%)
Ketamine (0.5-1.0 mcg/kg)	56 (44.1%)
Atropine	120 (94.5%)

- Primary Objective: Assess the need for intubation and mechanical ventilation during/up to 72h after MIST
- Secondary Objectives
  - Examine adverse events
  - Assess change in outcomes over time
  - Explore associations between patient characteristics and outcomes

RESULTS

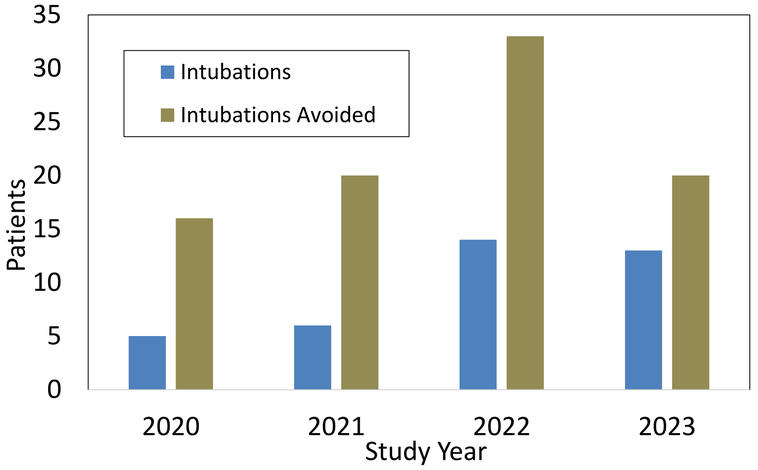

Figure 1: Number of infants requiring intubation based on study year

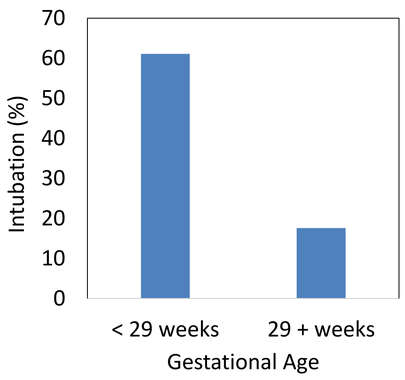

Figure 2: Number of infants requiring intubation based on GA

Characteristic	Overall (N = 127)	2020 (N = 21)	2021 (N = 26)	2022 (N = 47)	2023 (N = 33)
Median GA (wks)	31.0	33.1	31.7	29.3	30.9
<29 weeks	36 (28.3%)	3 (14.3%)	4 (15.4%)	20 (42.6%)	9 (27.3%)
29+ weeks	91 (71.7%)	18 (85.7%)	22 (84.6%)	27 (57.4%)	24 (72.7%)
Median Weight (g)	1630	2010	1915	1180	1720
Antenatal Steroid Use	101 (79.5%)	18 (85.7%)	19 (73.1%)	37 (78.7%)	27 (81.8%)
Median age MIST (h)	5.0 (3.0, 19.5)	3.0 (1.0, 18.0)	13.5 (5.0, 28)	5.0 (3.0, 13.0)	6.0 (4.0, 19.0)
Success of MIST	116 (91.3%)	20 (95.2%)	23 (88.5%)	44 (93.6%)	29 (87.9%)
No adverse events	77 (60.6%)	11 (52.4%)	17 (65.4%)	31 (66.0%)	18 (54.5%)

Primary Results

- A total of 127 infants had a MIST procedure
- Intubation and mechanical ventilation avoided in 89 patients (70.1%)
  - 14 (38.9%) with GA < 29 weeks
  - 75 (82.4%) with GA ≥ 29 weeks
- Higher GA correlated with reduced need for intubation and ventilation
- Median GA decreased with each study year

Secondary Results

- Desaturation most common adverse effect (61%)
- Apnea or chest freeze observed in 8% of patients
- Profile of adverse effects was similar in patients with GA < and ≥ 29 weeks

Characteristic	OR[1]	95% CI[1]	p-value
Gestational age (week)	0.76	0.64, 0.88	<0.001
Antenatal steroids use	1.31	0.38, 5.22	0.7
Age at MIST procedure (hours)	0.98	0.94, 1.02	0.4

CONCLUSIONS

- MIST was successfully introduced as the standard of care into our neonatal units, in a step-wise fashion
- ➢ The use of MIST avoided mechanical ventilation within 72 hours in 70% of patients
- ➢ Median GA decreased with each study year, suggesting increased comfort with MIST and likely explains the lack of further reduction in the need for mechanical ventilation
- Timing of MIST procedure had no statistically significant effect on outcomes; can be used up to 24h old
- Where appropriate, MIST should be attempted prior to intubation for surfactant delivery (including in infants with GA lower than 25 weeks)