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Evaluation of a modified pre-medication algorithm for non-emergent intubation in a neonatal intensive care unit

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Evaluation of a Modified Pre-Medication Algorithm for Non- Emergent Intubations in a Level IV NICU

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Study Background

- American Academy of Pediatrics (AAP) recommendation for emergent intubation premedication¹
 - Give an analgesic agent or anesthetic dose of a hypnotic drug
 - Consider use of muscle relaxants or vagolytic agents
 - Avoid benzodiazepines when possible

Study Background continued

- Fentanyl and atropine introduced as premedication
- ICN patient population evolved
- Guideline modified to include higher dose of fentanyl + midazolam + rocuronium
- Effect on intubation success, patient tolerance and personnel compliance was unknown

Study Objectives

Primary Objective

- Compare 1st attempt success rate pre vs post modified algorithm

Secondary Objective

- Assess provider compliance with the modified algorithm

Infants \leq 37 weeks PMA
OR \leq 28 days old

Infants $>$ 37 weeks PMA
AND $>$ 28 days old

Atropine 0.02 mg/kg IV x 1
Fentanyl 2 or 4 mcg/kg IV x 1

Achieve
sedation prior
to
Rocuronium

*Consider use of Rocuronium 1 mg/kg *

Fentanyl 2 or 4 mcg/kg IV x 1
Midazolam 0.1 mg/kg IV x 1
Rocuronium 1 mg/kg IV x 1

Do not use neuromuscular blockers in:

1. Infants with craniofacial anomalies
2. Known difficult airways
3. Prior difficulty with BVM

Methods

- Retrospective chart review
- Data collected from between January 1, 2015-March 31, 2019
- Patients were excluded if intubation was performed by personnel other than ICN providers
- Data analysis using the Chi Square and Cochran-Mantel-Haenszel tests

Data collected in RedCap

Demographic variables

- Post menstrual age, DOL and weight at time of intubation
- Indication for intubation, airway anomaly

Complications

- Bradycardia, SaO₂ <80%, chest rigidity, need for CPR and/or epinephrine

Complications associated with intubation	
Bradycardia (HR < 80 beats per minute)	<input type="radio"/> Yes <input type="radio"/> No
SaO ₂ < 80%	<input type="radio"/> Yes <input type="radio"/> No
Need for CPR?	<input type="radio"/> Yes <input type="radio"/> No
Need for epinephrine?	<input type="radio"/> Yes <input type="radio"/> No
Rigid Chest?	<input type="radio"/> Yes <input type="radio"/> No
Upper airway injury?	<input type="radio"/> Yes <input type="radio"/> No

Results

- 151 patients, 239 intubation events
- No significant differences in PMA, weight at intubation or gender between the two groups
- There were more airway anomalies ($p=0.009$), intubation events during 1st week of life ($p=0.005$) and 1st attempts by neonatal fellows ($p<0.001$) in the post-modification group

Results continued

Primary outcome

- First attempt success increased from 43% to 52%
($p=0.16$)
- Clinically, but not statistically significant

Results continued

Secondary outcome

- Compliance with algorithm improved from 20.3% to 39.5% ($p=0.002$)
- Use of a muscle relaxant increased from 3.1% to 63.7% ($p < 0.001$)
- Cumulative fentanyl dose increased from 1 mcg/kg to 2 mcg/kg ($p < 0.001$)

Conclusions

- Improved compliance with the algorithm
- Increased use of muscle relaxants
- No statistically difference in 1st attempt success rate

Study Limitations

- Retrospective study
- Too few patients in each weight category to determine affect of algorithm in each subgroup

Implications

- Small improvement in 1st first attempt success rate improves patient safety
- Further QI needed to identify barriers to compliance
- Better compliance needed prior to implementation of INSURE (Intubation-Surfactant-Extubation procedure)

References

Foglia EE, Ades A, Sawyer T, et al. Neonatal Intubation Practice and Outcomes: An International Registry Study. *Pediatrics*. 2019;143(1):e20180902. doi:10.1542/peds.2018-0902

Praveen Kumar, Susan E. Denson, Thomas J. Mancuso, Committee on Fetus and Newborn, Section on Anesthesiology and Pain Medicine; Premedication for Nonemergency Endotracheal Intubation in the Neonate. *Pediatrics* March 2010; 125 (3): 608–615. 10.1542/peds.2009-2863