EVMS EM JC CRITICAL REVIEW FORM:

Resident: Laura Strojny **Date: 8/23/22**

Citation:

Donoghue, A., O'Connell et al., | **Videographic Assessment of Tracheal Intubation Technique in a Network of Pediatric Emergency Departments: A Report by the Videography in Pediatric Resuscitation (VIPER) Collaborative.** *Annals of Emergency Medicine*. VOLUME 79, ISSUE 4, P333-343, APRIL 01, 2022.

Background:
Intubation is an infrequent though life-sustaining procedure for critically ill or injured pediatric patients. The infrequency of pediatric intubations (Cabalatungan 2020) has prompted research on potential advantages of video-assisted laryngoscopy (VAL) however, several studies have actually shown less common first pass success and more common harms such a hypoxemia and clinical deterioration in pediatric patients.

This study cited a paper published in 2012 in the Annals of Emergency Medicine by Kerrey et al, where they reviewed VAL and found 52% first pass success rate and 38% rate of desaturation in pediatric intubations. These numbers were worse than previously reported for VAL in pediatric intubations. Since then, three Cochrane reviews, one in neonates (2018) and another in children (2017) demonstrated increased time to intubation in both groups with some improvement in first -pass rate in neonates by trainees using VAL. In contrast, a third Cochrane review in adult patients (2022) demonstrated moderate certainty of evidence of higher first-pass success and less hypoxic events using VAL.

Study Objectives:
1. Primary goal was to expand research on use of videolaryngoscopy
2. Describe intubation techniques between various children's hospitals
3. Explore association between techniques and first pass success rate
4. Determine length of time of intubation
5. Determine rate of hypoxemia

Study Methodology:
VIPER is a collaborative multicenter research group consisting of CHOP, Children's National, Cincinnati Children's and Children's Hospital Colorado. These centers use video recording for quality assurance in all ED resuscitations. Most studies published to date have been based upon retrospective chart reviews of medical records which predisposed data to bias based on incomplete information and underreported documentation of harms as an example

This was a prospective observational study that included all children undergoing tracheal intubation captured on video camera recordings. Those excluded were intubations without video recording, video review not possible because of technical complications, intubation via methods other than laryngoscopy.

- Intubations were classified by specialty and level of training and included pediatric emergncy medicine, pediatric critical care medicine, adult emergency medicine, anesthesiology, and neonatology.
- CMAC was used as first line device for all intubations.
- Direct or indirect visualization was at discretion of intubator and supervising physician.
- The patients were categorized as infants (<1 year old) or children (>1 year old)
- Results categorized by location and pooled results

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Primary outcomes of interest 1) tracheal intubation success 2) time of laryngoscopy
3) occurrence of hypoxemia

Definition of **intubation success**=successful placement of ETT in trachea prior to removal of larygnoscpe (with CO2 detection)

Definition of **duration**=
Laryngoscopy time: from blade insertion to removal of blade
Time of tube entry: ET tube seen to advanced into oropharynx
Using these times 2 components of larynscopy
1. **Glottic visualization time**: blade insertion to tube entry
2. **Tube placement time**: tube entry to blade removal

Definition of **hypoxemia**: SpO2 <90% during or immediately after attempt
Time of hypoxema= when fell below 90% to when increased about 90%

Randomization and Blinding: No randomization or blinding.

What were the results
Data available for 494/508 patients intubated (excluded 3% intubated outside resuscitation area or not on video recording)

- Overall first attempt success rate 67% among all enrolled patients.
- Median of one attempt made [IQR 1-2] (range 1-6)
- No difference in first-attempt success between medical and trauma patients
- First-attempt success rate was lowest in Age 0-1 (50%)
- First-attempt success rates across all facilities were among “EM resident” and “anesthesia”

Median duration 35 seconds [IQR 24-50], duration further stratified based on provider group.

72 first attempts without measurable oxygen saturation (cardiac arrest or severe shock)
- Among those with measurable vitals, 149 (30.1%) had an SpO2 <90% at time of first attempt.
- Among those with initial SpO2 or 91% or greater, 41(15%) experienced hypoxemia. Median duration when it did occur was 77 seconds.

VAL was used for at least one phase of tracheal intubation attempts in 46% first attempts
Both phase 41% vs direct in both phases used 44%
No association between videolaryngoscopy and success,
VAL was associated with longer duration intubations,

Apneic oxygenation, cricoid pressure, lip retraction were infrequently used.

Applicability to my patient care
Not as larger of cities but similar patient populations

Strengths
Fairly large data base for an infrequent pediatric procedure. Data collection since 2015.
Multi-site study different sites spread across the country.
Prospective data collection with *a priori* objectives.
Standardization using CMAC devices

Weaknesses

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- Major of providers intubating were fellows in peds EM or ped crit care making this difficult to generalize to non-teritary care settings with community providers.
- Did not report on having 2 or more independent assessors of videos and their agreement (kappa score) regarding interpretation of video data.
- No follow-up on those with transient hypoxemia to determine clinical relevance. Did those with slightly longer times to intubation have higher first-pass rates? This was not reported
- As a QA/QI study did it identify actionable interventions that could improve better outcomes?
- One site (National) represented only 9% of patients two sites represented 68%

In my opinion, did not provide research advance on videolarynoscopy use. Similar results to prior without identifying findings that would increase success rate or decrease harms that for example could be useful for the community EM practitioner.

My Clinical Bottom Line
We still don't know best practices for pediatric intubation. The success rate from this study was similar to prior studies and may be biased in favor of direct because tertiary care centers may have higher rates of direct laryngoscopy thereby reducing intuitive advantages of VAL .

There were no follow-up data to assess outcomes in those with longer duration of time to intubation or of transient hypoxia.