

A Clinical Bundle to Reduce Peri-Intubation Hypoxia in the Pre-Hospital Setting

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Background

- Rapid sequence intubation (RSI) is a high-risk/low-frequency procedure in Emergency Medical Services (EMS).
- Patients are at risk for peri-procedure hypoxia, hypotension, bradycardia, and peri-intubation cardiac arrest.

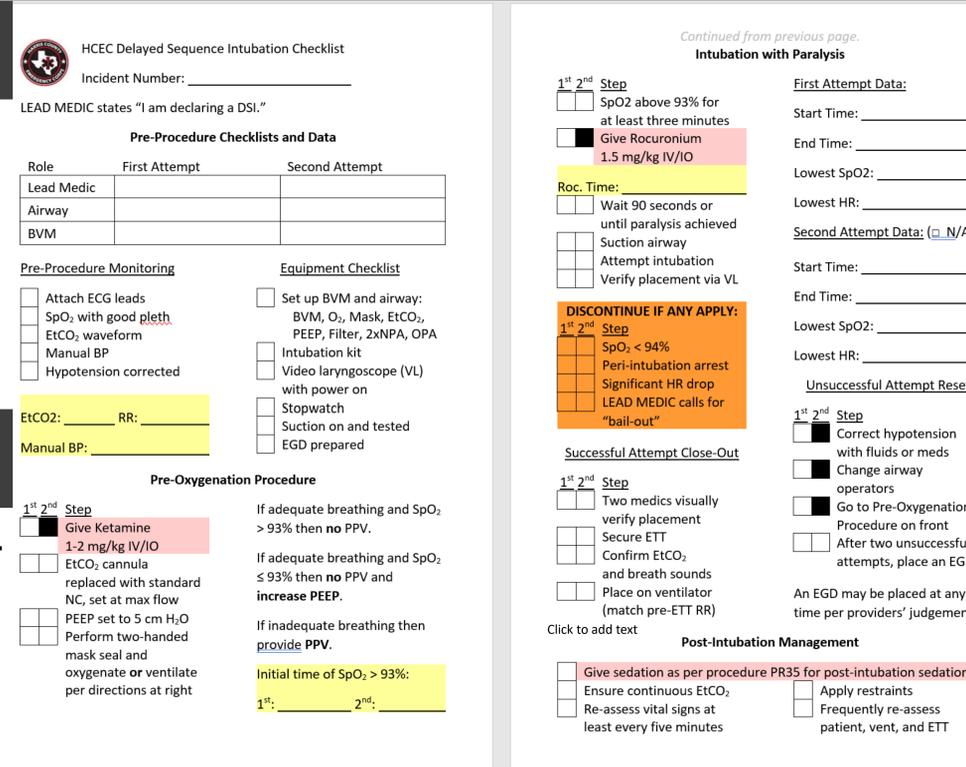
Purpose & Aims

Implement a clinical bundle with emphasis on delayed-sequence intubation (DSI) to reduce adverse events during medication-facilitated intubation. (MFI)

- Aim 1: Decrease rate of hypoxia, hypotension, bradycardia and cardiac arrest during medication facilitated pre-hospital intubation.
- Aim 2: Improve first-pass intubation success rate.
- Aim 3: Determine if Paramedic knowledge scores of the clinical bundle improve after education.
- Aim 4: Determine if the clinical bundle is considered usable by the Paramedics.

Intervention

- A new clinical airway bundle and aviation-style checklist was implemented in the field after Medics received education in 2021.
- The bundle requires goal-directed SpO₂ and systolic blood pressure (SBP) targets prior to administering Rocuronium and performing endotracheal intubation.



HCEC Delayed Sequence Intubation Checklist

Incident Number: _____

LEAD MEDIC states "I am declaring a DSI."

Pre-Procedure Checklists and Data

Role	First Attempt	Second Attempt
Lead Medic		
Airway		
BVM		

Pre-Procedure Monitoring

Attach ECG leads

SpO₂ with good pleth

EtCO₂ waveform

Manual BP

Hypotension corrected

Equipment Checklist

Set up BVM and airway: BVM, O₂, Mask, EtCO₂, PEEP, Filter, 2xNPA, OPA

Intubation kit

Video laryngoscope (VL) with power on

Stopwatch

Suction on and tested

EGD prepared

Pre-Oxygenation Procedure

If adequate breathing and SpO₂ > 93% then **no** PPV.

If adequate breathing and SpO₂ ≤ 93% then **no** PPV and **increase** PEEP.

If inadequate breathing then **provide** PPV.

Initial time of SpO₂ > 93%:
1st: _____ 2nd: _____

Intubation with Paralysis

Continued from previous page.

1st 2nd Step

SpO₂ above 93% for at least three minutes

Give Rocuronium 1.5 mg/kg IV/IO

Roc. Time:

Wait 90 seconds or until paralysis achieved

Suction airway

Attempt intubation

Verify placement via VL

DISCONTINUE IF ANY APPLY:

1st 2nd Step SpO₂ < 94%

Peri-intubation arrest

Significant HR drop

LEAD MEDIC calls for "bail-out"

First Attempt Data:

Start Time: _____

End Time: _____

Lowest SpO₂: _____

Lowest HR: _____

Second Attempt Data: (N/A)

Start Time: _____

End Time: _____

Lowest SpO₂: _____

Lowest HR: _____

Unsuccessful Attempt Reset

1st 2nd Step Correct hypotension with fluids or meds

Change airway operators

Go to Pre-Oxygenation Procedure on front

After two unsuccessful attempts, place an EGD

An EGD may be placed at any time per providers' judgement.

Successful Attempt Close-Out

1st 2nd Step Two medics visually verify placement

Secure ETT

Confirm EtCO₂ and breath sounds

Place on ventilator (match pre-ETT RR)

Click to add text

Post-Intubation Management

Give sedation as per procedure PR35 for post-intubation sedation

Ensure continuous EtCO₂

Re-assess vital signs at least every five minutes

Apply restraints

Frequently re-assess patient, vent, and ETT

Methods

- **Design & Setting:** Pre/Post implementation design in a Houston area ambulance 911 response model by Paramedics from June 1, 2021- November 30, 2021.
- **Intervention:** Clinical airway bundle during MFI.
- **Measures:** Incidents of SpO₂ < 90, Heart rate < 60, Systolic blood pressure < 90, or peri-intubation CPR & First-Pass intubation success rate. Medic knowledge score comparison on clinical bundle exam. Usability score of the clinical bundle checklist by medics.
- **Analysis:** Chi-square, Fisher's exact test, ANOVA test of repeat measures, mean and standard deviation.

Table 1 Results

Aim	Pre – f (%)	Post – f (%)	p-Value
Aim I	(n=20)	(n=15)	
SpO ₂ < 90	6 (30.0)	4 (26.7)	.829
HR < 60	3 (15)	0 (0.0)	.244
SBP < 90	6 (30)	3 (20.0)	.503
CPR	0 (0)	0 (0)	n/a
Aim II	(n =20)	(n=15)	
First-pass success	17 (85)	12 (80)	.698
Aim III	(n=30)		
Test I :	Test II:	Test III:	< .001
75.67	93.67	85.33	
Aim IV	Mean: 72.1	SD: 21	(n=36)

Conclusion

- Decreased hypoxia, bradycardia, and hypotension when the bundle was used. No CPR observed in either group.
- First-pass rate decreased slightly, but not statistically significant.
- Paramedic knowledge scores re: DSI and the bundle improved after training.
- Medics reported the bundle checklist was beneficial during DSI.

Reference

Jarvis, J., Gonzales, J., Johns, D., & Sager, L. (2018, September). *Implementation of a clinical bundle to reduce out-of-hospital peri-intubation hypoxia*. Retrieved January 31, 2021, from <https://www.sciencedirect.com/science/article/abs/pii/S0196064418300714>