Preparing EMS with Simulation

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Presentation Objectives

1. Discuss the Delayed Sequence Intubation approach to airway management in EMS.
2. Explain the role-out process for DSI to an EMS Agency.
3. Identify limitations to the implementation of the DSI approach.
4. Recognize the pitfalls to simulation in EMS.

Delayed Sequence Intubation

- Quality Improvement Project:
- A clinical Bundle to Reduce Peri-Intubation Hypoxia

DSI

- Delayed sequence intubation (DSI) is an alternative technique in the optimization of preoxygenation for noncompliant patients with altered mental status
- The technique is designed to improve preoxygenation by providing controlled sedation.

DSI

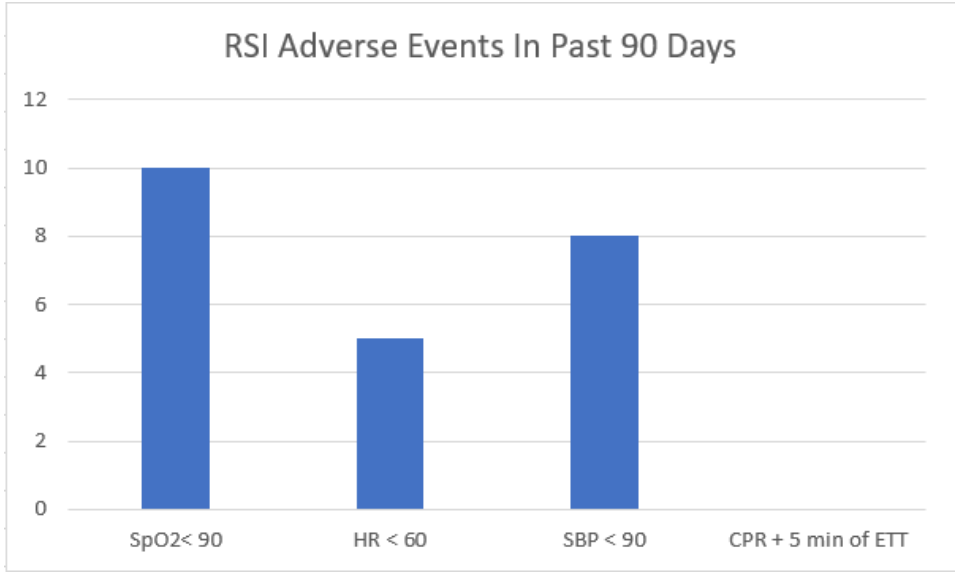
- Approach to Clinical Quality is improving outcomes
  - Data driven
  - Guided by evidence-based practice
- Formalizing quality improvement projects
  - Delayed Sequence Intubation

The Need: Our recent RSI data

Reviewed RSI cases from the previous 90 days (4/28-7/28/2021)

- 23 RSI cases
  - 7 trauma patients
  - 16 medical patients
- RSI Outcomes:
  - SpO2 < 90: 10 (43%)
  - HR < 60: 5 (22%)
  - SBP < 90: 8 (35%)
  - CPR within 5 minutes of RSI: n/a

% of patients with adverse events: 82%



Primary aim of the project:

- Implement an evidence-based clinical airway bundle
  - Emphasis on DSI
  - 12-weeks
- Compare pre and post-implementation peri-intubation outcomes
  - Hypoxia
  - Bradycardia
  - Hypotension
  - Cardiac arrest
  - First-pass intubation success rates
- If outcomes improve, we will continue the guideline

Evidence to Support Intervention: and Best Evidence

Article	Intervention	Implication
Gooch, M.D.& Roberts, E. (2017)	Care bundle including: Patient positioning, pre and peri-intubation oxygenation, & RSI	Observed increased compliance with published best practice when a bundle of care was utilized
Jarvis JL et al., (2018)	Care bundle including: Elevating head-of-bed, goal-directed pre-oxygenation (SpO2 >93% for at least 3 minutes), delayed sequence intubation, video laryngoscopy.	Observed fewer adverse events (hypoxia, hypotension, bradycardia, and cardiac arrest) as compared to the RSI group
Waack, J. et al., (2018)	Delayed sequence intubation strategy	Improved first-pass success rate of endotracheal intubation and improved peri-intubation oxygen saturation
Wimalasena, Y. et al., (2015)	Peri-intubation oxygenation (also known as apenic oxygenation)	Apneic oxygenation associated with lower rates of oxygen desaturation during intubation

Check list:

Delayed Sequence Intubation Checklist
Incident Number: _____

START HERE

Pre-Procedure

Roles	Monitoring/Resuscitation	Equipment Preparation
☐ Who is lead medic?	☐ ECG leads on?	☐ Pre-oxygenation assembly
☐ Who is the airway operator?	☐ SpO2 in place with good pleth?	(BVM+Mask+EtCO2+PEEP+Filter+OPA/NPA)
☐ Who is holding the BVM?	☐ EtCO2 with every breath?	☐ Intubation kit
	☐ Manual blood pressure?	☐ Video laryngoscope (VL) with power on
	☐ Hypotension corrected?	☐ Stop watch
	Pre-Intubation EtCO2:_____	☐ Suction (Turned-on and tested)
	Pre-Intubation RR: _____	☐ Extraglottic airway prepped
	Manual BP: ____ /_____	

DSI Pre-oxygenation Procedure

☐ Give Ketamine 1-2 mg/kg IV/IO
☐ Replace EtCO2 Cannula with standard nasal canula and MAX regulator flow
☐ Perform 2-handed mask seal with Super BVM & set PEEP to at least 5 cm/H2O then assess:
- * **Adequate breathing & SpO2 >93%**: BVM seal with NO ventilation
- * **Adequate breathing & SpO2 ≤93%**: BVM seal with NO ventilation AND increase PEEP
- * **Inadequate breathing**: BVM seal + Ventilations

☐ Maintain SpO2 > 93% for at least 3 minutes

Time SpO2 reached ≥ 93%:____:____
Use stopwatch to record pre-oxygenation duration

☐ Give Rocuronium 1.5 mg/kg then wait 90 seconds or until paralysis is achieved

Time Rocuronium given: ____:____

Intubation

☐ Suction airway
☐ Attempt intubation
☐ Confirm tube placement via VL
☐ Secure ETT

DISCONTINUE for any of the following:
☐ SpO2 drops <94%
☐ Peri-intubation arrest
☐ Significant decrease in HR
☐ Lead medic calls for "bail out"

Attempt #1	Attempt #2
Start time: _____:_____	Start time: _____:_____
Completed time: _____:_____	Completed time: _____:_____
Lowest SpO2 during attempt: _____%	Lowest SpO2 during attempt: _____%
Lowest HR during attempt: _____BPM	Lowest HR during attempt: _____BPM

Successful:	Unsuccessful:
☐ Confirm via direct visualization by 2 medics	☐ Resume DSI pre-oxygenation step as above
☐ Confirm EtCO2 + breath sounds	☐ Correct any hypotension with fluids/meds
☐ Place on vent (match Pre-ETT RR)	☐ Change airway operators
	☐ If 2 attempts made - place EGD

Post-Intubation Management

☐ Give sedation as per procedure PR35 for post-intubation sedation
☐ Ensure continuous capnography
☐ Re-assess vital signs at LEAST q 5 min
☐ Apply restraints
☐ Frequently re-assess patient, vent, and ETT

The Trial Begins:

- This guideline in more deliberate
- Less freedom of choice
- Stopwatch
- Checklist in live time
- In SpO2 < 94% at any time – repeat the pre-oxygenation process
  - Hold for 3 minutes at >93%
  - If unable to provide oxygenation at the threshold, then place EGD

Not the Whole Story:

- 19 possible cases
  - Medical (n=16)
  - Trauma (n=3)
- Excluded:
  - cardiac arrests (n=2)
  - RSI performed (n=5)

- 12 DSI cases reviewed

Remember the 5 RSI Cases?

Case #	Adverse Event	# Attempts	Notes
Medical	Hypotension post ETT	1	Transient hypoxia on the vent
Trauma	Transient hypotension & SpO2 <90	2	No documented V/S for 12 minutes during RSI (incomplete v/s)
Medical	Post intubation SpO2 <90	1	Crew education issue on indication for DSI
Trauma	Post-intubation hypoxia and hypotension	1	GSW; Blood products given
Medical	None	1	Overdose (borderline hypotension post-ketamine)

Limitations:

- Scenario implementation cases were all very similar.
- Multiple scenarios should have been selected.
- Simulation should have been used prior to the initiation of training.
- Checklist should have been utilized by multiple providers prior to initiation of training.

Pitfalls:

- Utilize several different simulations.
- Time may be needed to make sense of the results of these simulations.
- Staff reactions to the simulation are different.
- Simulation might not be realistic or reliable.
- Others

Any Questions?

Results

- Pre-Intervention
- % of patients with adverse events: **69%**
- (n=22)

- Post-Intervention

% of patients with adverse events: 8%

(n=12)