



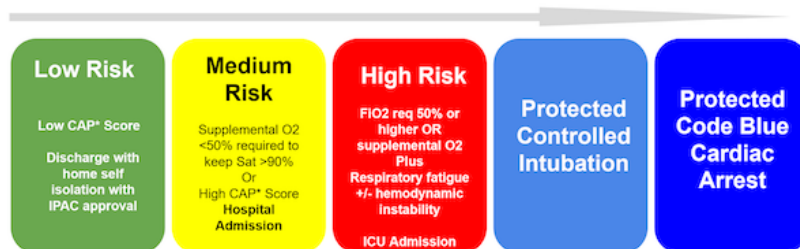
Episode 140 COVID-19 Part 4 – Protected Intubation

With Dr. George Kovacs

Prepared by Anton Helman, March 2020

This podcast and blog post are based on Level C evidence – consensus and expert opinion

Risk assessment to guide need for protected intubation



* CAP - Community Acquired Pneumonia Score

Use a *CAP Score of choice (anticipate at some point there will be a COVID 19 Severity Score)

Identify high risk patients for early intubation
Persistent hypoxemia (<90% O2sat) despite 5LNP and 15L NRB

What is different about the protected RSI compared to the standard RSI?

Guiding general principles of protected intubation

- The emphasis is on provider safety: rapidly securing the airway but slowing down to prepare yourself, your team and your patient with strict adherence to PPE donning/doffing
- With these safety measures we may not be able to optimize the patient prior to intubation as we normally would, and have to accept this.
- We need to pay particular attention to the details of how to prepare for, how to pre-oxygenate, and the sequencing of RSI
- There is no high level evidence for these modifications – at best the evidence is Level C – consensus/expert opinion
- Slow down so that you and your team's safety is preserved – take the time to prepare yourself, your team and your gear before you enter the room
- We need to think about how PPE might effect our performance and come up with solutions or modifications
- Training properly is paramount to ensure the safety of ED providers and patients

Do's and Don'ts of protected intubation

Do's

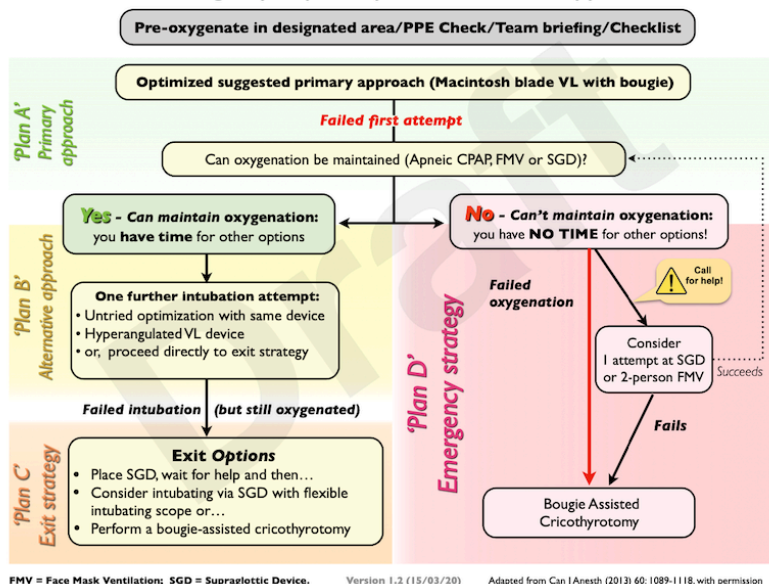
- Do ensure viral filters on all masks (e.g. Tavish, HiOx on NRB)
- Do accept lower oxygenation goals at lower flows
- Do have all necessary equipment at arm's reach
- Do paralyze the patient before intubation to avoid coughing and subsequent aerosilization of particles and wait 45-90 seconds after pushing the paralytic
- Do understand that all patients will be apnea intolerant
- Do slow down to ensure you and your team are safe
- Do employ the most experienced available airway provider
- Do limit personnel in room to 3 if possible
- Do employ positive pressure ventilation and sustained waveform CO₂ should occur only *after* the cuff is inflated.
- Do ensure all connections are secure
- If a supraglottic airway is required, do ensure it is the adequate size, at the adequate depth, and the cuff is fully inflated (if your model has an inflatable cuff).
- Do wait ≥15 mins after intubation to take portable CXR
- Do use 2 hand vice grip/2 person jaw thrust for BVM
- Do have a dissociative dose of ketamine ready to give slowly during pre-oxygenation as per delayed sequence intubation for uncooperative patients

- Do consider HFNC with mask overtop for COVID pts in respiratory failure when ventilators and/or ICU beds are in short supply
- Clamp the ETT before disconnecting the BVM and connecting the ventilator
- Adapt your airway management/RSI algorithm and equipment to your ED
- Do have a trained observer watch you don PPE
- Do have a shower and put on new greens after donning PPE
- Do simulated protected intubations in your ED – train, train, train, practice, practice, practice! COVID Safety Airway Course <https://drkeefe.com/>

Don'ts

- Don't delay intubation if in doubt
- Don't rush donning/doffing or aerolization prevention measures
- Don't use BiPAP whenever possible
- Don't use nebulizers
- Don't employ positive pressure ventilation before the cuff is inflated
- Don't auscultate to confirm tube placement
- Don't bag the patient unless absolutely necessary
- Don't employ positive pressure ventilation whenever possible

COVID-19 Emergency Rapid Sequence Intubation Approach



Protected intubation preparation: Personnel, Pre-brief, Equipment, Medications and Checklists

Protected intubation personnel – all in PPE (except runner and safety officer)

Inside room: MD1, RN1, RT

Outside room: MD2, RN2, RN3 (runner), Safety officer

Pre-brief for protected intubation

1. Role assignment

2. Equipment and medication packs check (see below)
3. Turn on speaker phone
4. Plan for pre-oxygenation, Plan A, re-oxygenation after 1st attempt, PLAN B and C *and cardiac arrest management modifications*

Protected intubation checklists for MD, RT, RN, Safety Officer
NYGH

Equipment for protected intubation

Base Go-Pack

- GVL Mac & HA sized or
- CMAC Mac 3 or 4 & D
- Evac TT 7.0, 7.5
- Regular TT 7.5, 8.0
- Stylets (2)
- Lubricant (2)
- OPA (sized)
- igel (sized)
- #10 blade
- Regular 6.0 TT
- 2 bougies (outside)
- Extra viral filter

Meds Go-Pack (Labelled)

- RSI: ketamine 1.0 mg/kg + Roc or sux 1.5 mg/kg
- Ketamine behaviour control
- Push dose pressor (Phen, epi or norepi)
- Norepinephrine infusion
- Post intubation bolus sedation/analgesia
- Post intubation sedation infusion

Pre-Ox Pack

- BVM/PEEP/Monometer-Flex mount-WFCO2-Viral filter-Mask
- Non-rebreathing mask
- Nasal prongs
- Spare mask


- Closed system suctions x 2
- BVM with viral filter and PEEP valve (spare mask)
- Tracheal tubes: (Evac, standard or Parker Flextip), stylets, 10- cc syringe
- Primary device Macintosh-VL with bougie

- Secondary device Hyperangulated-VL with prepared tube stylet to appropriate shape
- SGA that supports flexible endoscopic intubation, ideally with an esophageal drainage port (igel)
- Cricothyrotomy: Bougie, #10 scalpel blade, 5.5 and 6.0 TT
- Ventilator

EMcrit COVID Intubation Packs and Pre-oxygenation with Apneic CPAP video <https://youtu.be/C78VTEAHhWU>

Medications for protected intubation to be drawn up outside room

- **Norepinephrine** infusion (0.1 mg/kg/min infusion started 16 mcg/ml mix)
- Bolus dose **rescue pressor** (Epinephrine 5-20 mcg; Phenylephrine 50-200 mcg; Norepi 8-16 mcg= 0.5-1 ml of 16 mcg/ml infusion mix in 3cc syringe)
- Consider **glycopyrolate** 0.2 mg IV (to help minimize ketamine-related secretions)
- **Ketamine** 0.2-1mg/kg, Rocuronium 1.5 mg/kg
- **Fentanyl** infusion Dosing: 0-100 mcg/hr; Typical starting dose 25-50mcg/hr

 **A Pandemic Airway Checklist**
The basics of how to potentially increase safety during intubation, donning, and doffing

Intubating COVID-19 patients

Can be associated with performance-retarding anxiety and information overload




Accordingly, a simple checklist may allay fears, expedite action and decrease spread

Benefits of a Checklist:




- ✓ **Enhanced shared mental models**
Especially if PPE impairs communication
- ✓ **Maintain cognitive bandwidth**
Via a common aid memory
- ✓ **Increase safety**
By decreasing time in infected rooms, increasing first-pass success, and optimizing donning and doffing technique
- ✓ **Improved cross monitoring of teams**
Via "Buddy Checks"

Because of the need for coordination, role clarity, and shared safety, we offer a simple 5-step acronym using each of those five unforgettable letters.




C

-  **Coordinate** who will do what and when. Perform a pre-brief where roles are assigned before entering the room, and assign "buddies" to check that PPEs offer body coverage.
-  **Collect** all equipment at bedside, so that you do not have to doff and leave room.
-  **Colleague** outside of the room. Available to help if needed and already wearing PPE.




O

-  **Only** have **three people** in the room and use most experienced intubator and techniques that increase first pass success (i.e. full-dose paralysis).
-  **Outside** the room until your PPE has been checked by your buddy, and negative pressure turned on (if available).
-  **Obstruct** the ETT with a clamp prior to connecting the ventilator




V

-  **Videolaryngoscopy** is preferable to decrease intubator's exposure to aerosols.
-  **Voice communication** with those **outside the room** (activate a microphone or walkie-talkie)
-  **Verify** tube placement with ETCO2 and that the ETT cuff is inflated before initiating positive pressure breaths.

I

-  **Inflate** the endotracheal tube cuff **prior to bagging** or placement on the ventilator.
-  **Interrupt** the circuit as **infrequently** as possible and only at end expiration.
-  **Insert** a supraglottic airway rather than using vigorous bag-mask ventilation.

D

-  **Don and Doff** safely (include a **buddy check** and 15-second hand-washing whenever gloves, gowns or masks are touched).
-  **Double glove** (intubator only) and **apply sanitizer** to outside of gloves before removal.
-  **Don't** leave the room prematurely (before your buddy has given the "okay")

While this mnemonic has not been tested empirically, it was associated with a subjective increase in team cohesion and shared safety during airway simulations.

Passive Pre-oxygenation ***NO BAGGING**

**Use the lowest flow necessary to achieve an oxygen saturation of 90%*

**Have a dissociative dose of ketamine ready to give slowly during pre-oxygenation as per delayed sequence intubation for uncooperative patients.*

1. Nasal prongs (NP) 5L max
2. Non-rebreathing Mask (NRB) 15L max
3. BVM + PEEP valve + viral filter + flex mount + waverform CO2 at 15L O2, 10cm PEEP

The protected intubation

Primary intubation device: Macintosh video laryngoscopy with bougie

Optimized Macintosh video laryngoscopy with bougie:

video <https://vimeo.com/382021758>

Examples of Macintosh VL include:

- Storz C-MAC® S with single-use Macintosh 3 or 4 blades;
- GlideScope ® Spectrum™ with single use [Macintosh-shaped] DVM 3 or 4 blades;
- McGrath Mac with single-use Mac size 3 or 4 blades.

If no Macintosh device is available, use hyperangulated video laryngoscopy.

**Using a conventional out-of-package (straight to coudé tip) bougie is not recommended as an adjunct with hyperangulated video laryngoscopy. In experienced hands, a 'customized' distally bent bougie, a purposeful made malleable or steerable bougie may be used with hyperangulated video laryngoscopy.*

Optimized hyperangulated video laryngoscopy:

video <https://vimeo.com/380837385>

Examples of hyperangulaed VL include:

- Storz C-MAC® S with single-use D-blade;
- GlideScope ® Spectrum™ with single use LoPro S3 or S4 blade;
- McGrath™ Mac with X blade.

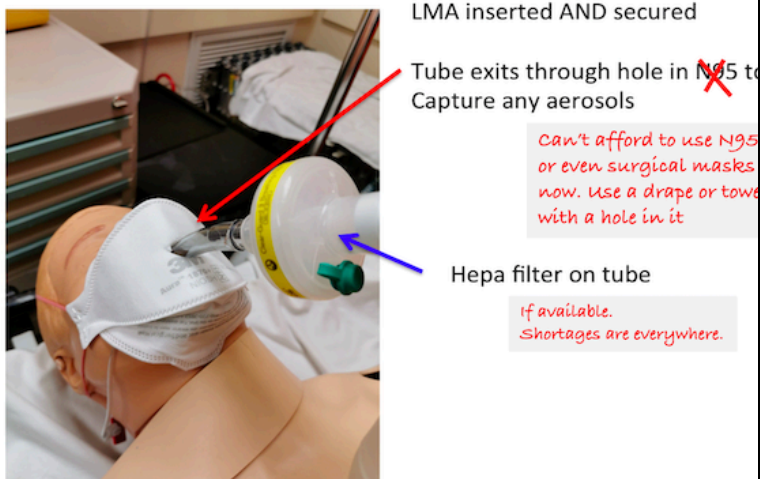
Re-oxygenation options after failed 1st attempt in protected intubation

1. **Apneic CPAP:** 5LNP, BVM – 10cm PEEP, 15Lpm <https://vimeo.com/400368564>.
 - Note that you won't see an ETCO2 trace unless you gently provide pressure support. Anytime you squeeze the bag there is some risk to aerosolization. The risk of controlled ventilation (6-10 breaths over 1 minute) must be balanced against worsening hypoxemia that results in cardiac arrest.

2. **Controlled manual ventilations** (gentle pressure support): 6-10 over 1 minute, ≤ 15 pressure
 - o Place an oral airway and apply your filtered BVM system with 10cm PEEP, 15 LO2 *with* manual breaths (6-10 over 1 minute). Having a pressure manometer attached to the MDI port to avoid pressures >15 is ideal.
3. **Supraglottic airway** (EMS igel recommended)

Plan B options in protected intubation

1. Hyperangulated blade VL (if Macintosh VL used in 1st attempt) 2. Supraglottic airway (SGA)/LMA – igel preferred



Plan C in protected intubation

Scalpel/Bougie Cricothyrotomy – If you can't maintain oxygenation by either apneic CPAP, controlled ventilation or an SGA, employ your 'emergency' double setup strategy and perform a cricothyrotomy.

Modifications to scalpel/bougie cricothyrotomy

- Do not proceed with ventilations through the mouth/nose
- Cover the patient's mouth and nose with a mask when they are placed on the ventilator

Initial vent settings after protected intubation

Lung Injury Ventilation (Vol-AC)		
Protection	TV	6cc/kg Ideal Body Weight
Ventilation	RR	16 - 18 BPM
Comfort	IFR	60 - 80 LPM
Oxygenation	FiO2/PEEP	Start at FiO2 100%/PEEP = 5 cmH2O (See ARDSnet Titration)
REBELEM	Pplat	Goal <30 cmH2O

Via Salim Rezaie REBEL EM

High Flow Nasal Cannula (HFNC) in COVID-19 protected airway management

- HFNC is thought to increase the risk of viral spread through aerosolization, but, in combination with a mask placed overtop, is thought to be safer than CPAP/BiPAP
- The WHO does recognize HFNC as an option for respiratory failure associated with COVID-19
- HFNC has/is being used in China, Italy and United States.

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