Airway Management in the Rural Setting

Presentation to UBC CPD Rural Rounds
June 5, 2025

C. Ryan Hoskins, MD, CCFP (EM), MSc., MPA, DTM&H
ER Clinical Lead, West Coast General Hospital, Port Alberni
Lecturer in Global Health, UBC (SPPH)
Founder and Director, BREATHE course

THE BREATHE COURSE

Land Acknowledgement

We acknowledge that we work on the traditional, ancestral and unceded territory of the Skwxwú7mesh (Sḵwx̱wú7mesh), xʷməθkwəy̓əm (Musqueam), and Səl̓ílwətaʔ/Selilwitulh (Tsleil-Waututh) Nations.

Presenter Disclosure

- Founder and Director of Basic Rural Education in Airway Technology for the Hospital Environment (BREATHE) course

Mitigation of Bias

- All content developed as part of this program was reviewed for potential bias by the members of the program planning committee. .

Evolution of BREATHE course:

Airway is scary.

Number one identified concern of rural providers of technical skill they feel deficient.

ACLS or ATLS may or may not teach you how to do this successfully.

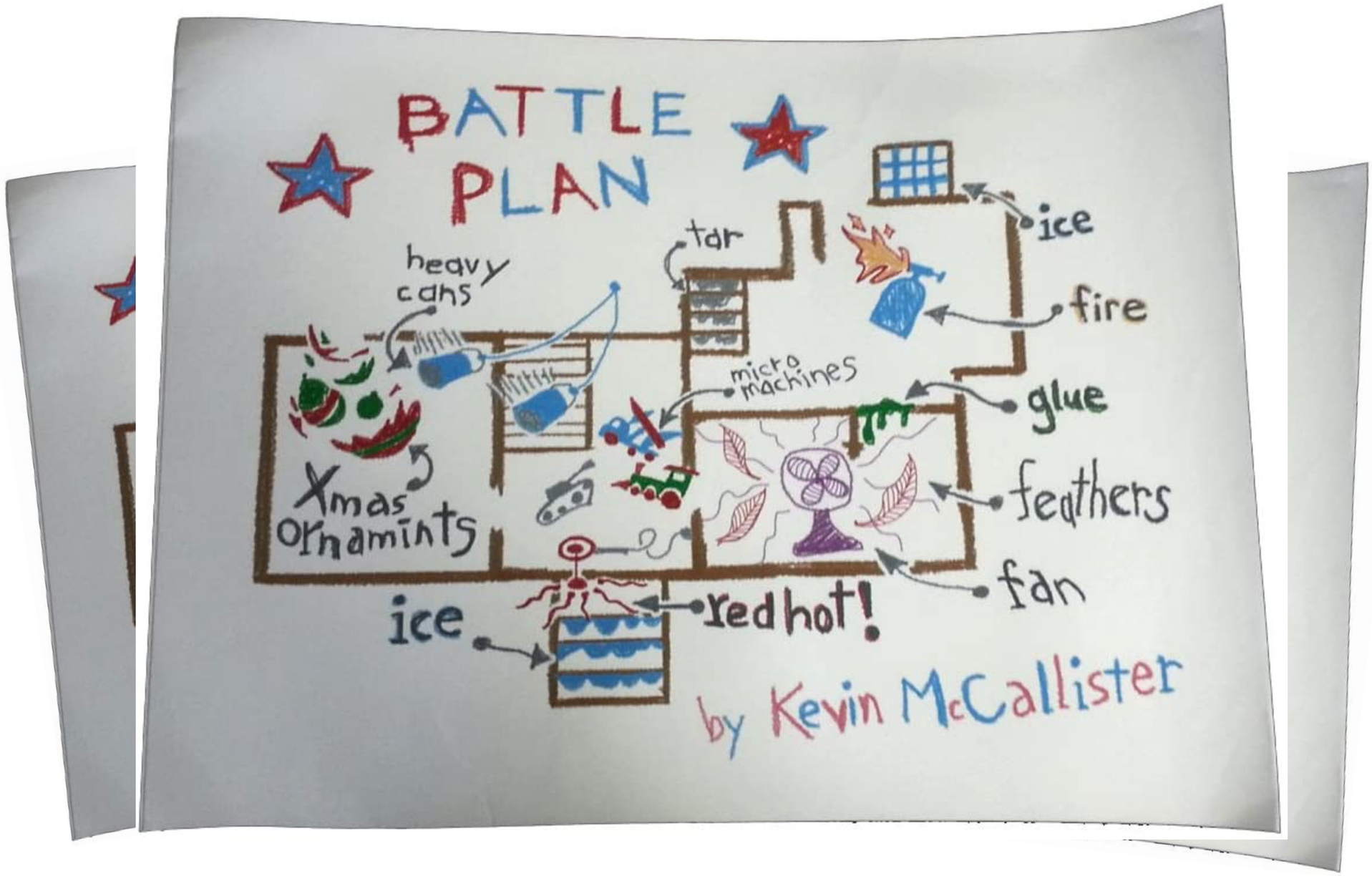
Learning Objectives

1. Get comfortable with a simple airway management algorithm and an airway management checklist

2. Master the surgical airway.

3. Myth bust to separate the nice from the necessary in airway medications, equipment, and procedure.

1. Airway management is easy if you have a plan. And a checklist.



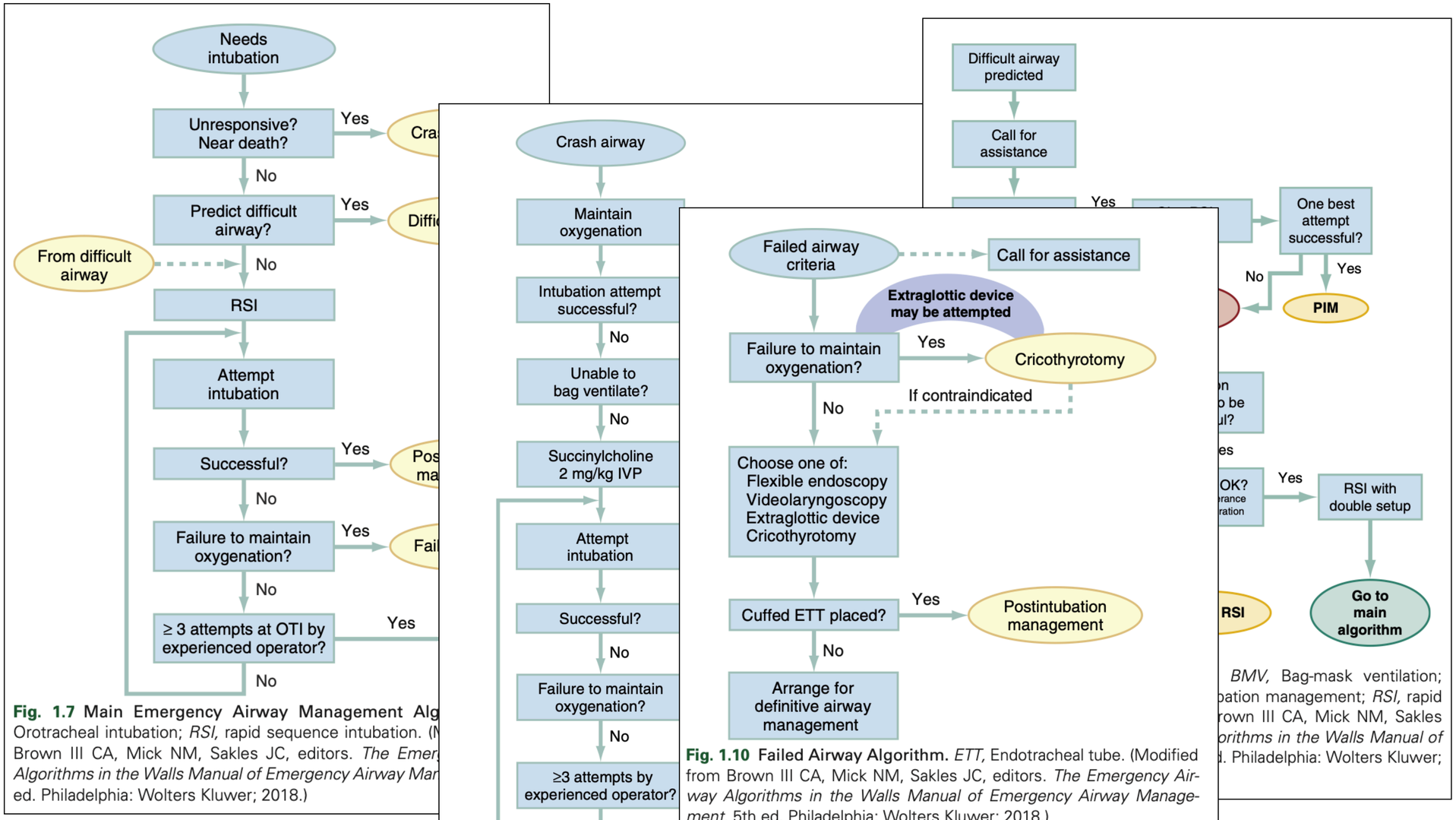


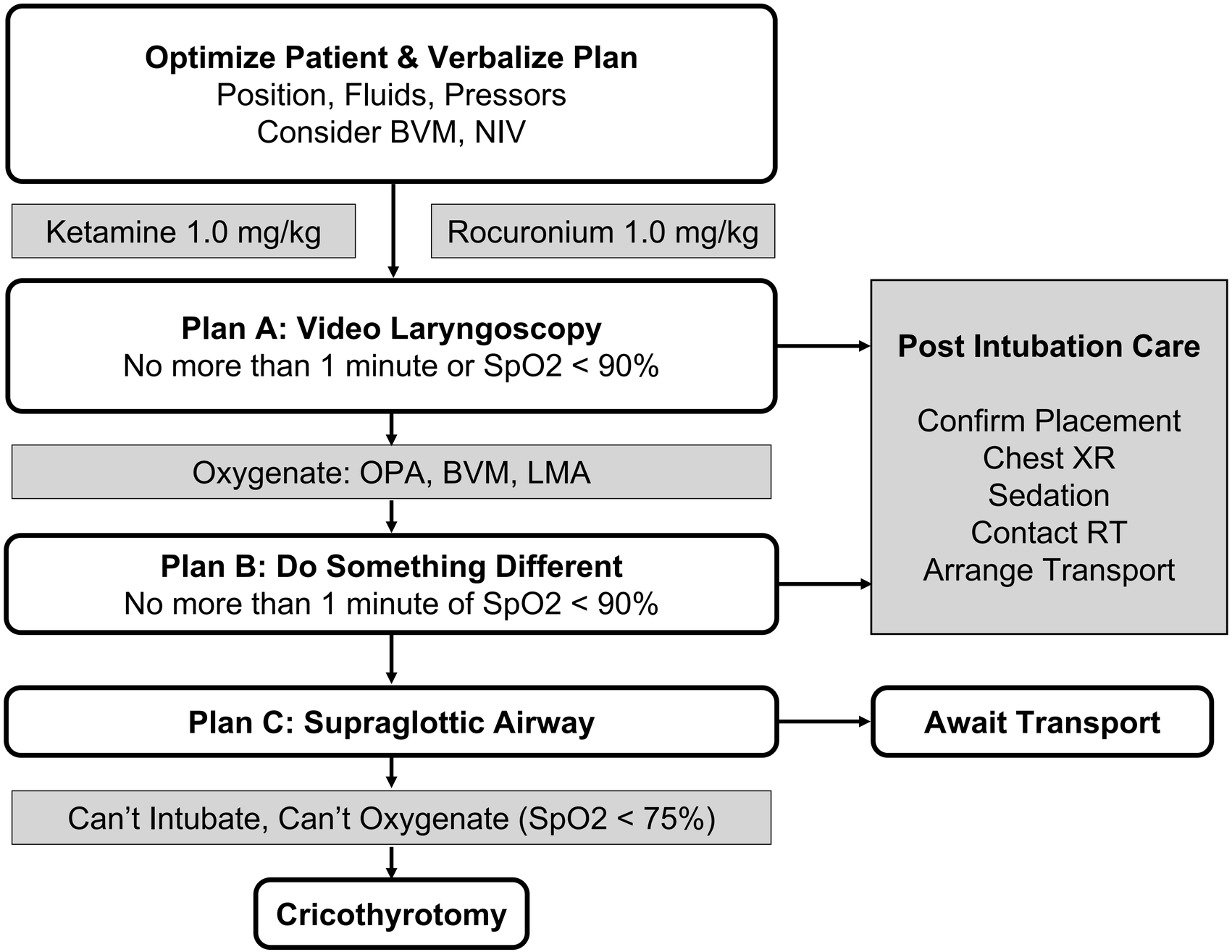
Fig. 1.7 Main Emergency Airway Management Alg
Orotracheal intubation; *RSI,* rapid sequence intubation. (N
Brown III CA, Mick NM, Sakles JC, editors. *The Emer*
Algorithms in the Walls Manual of Emergency Airway Mar
ed. Philadelphia: Wolters Kluwer; 2018.)

Fig. 1.8 Crash Airway Algorithm. *IVP,* Intravenous push. (Modified from Brown III CA, Mick NM, Sakles JC, editors. *The Emergency Airway Algorithms in the Walls Manual of Emergency Airway Management.* 5th ed. Philadelphia: Wolters Kluwer; 2018.)

Fig. 1.10 Failed Airway Algorithm. *ETT,* Endotracheal tube. (Modified from Brown III CA, Mick NM, Sakles JC, editors. *The Emergency Airway Algorithms in the Walls Manual of Emergency Airway Management.* 5th ed. Philadelphia: Wolters Kluwer; 2018.)

BMV, Bag-mask ventilation;
pation management; *RSI,* rapid
rown III CA, Mick NM, Sakles
orithms in the Walls Manual of
d. Philadelphia: Wolters Kluwer;

BC RURAL INTUBATION ALGORITHM



BC CHECKLIST FOR RAPID SEQUENCE INTUBATION

PATIENT

- ❑ Hemodynamics optimized (fluid/vasopressors)
- ❑ Patient position optimized (sniffing)
- ❑ Oxygen connected – nasal canula, nonrebreather, or high flow nasal oxygen
- ❑ SpO2 monitor connected
- ❑ EtC02 monitor connected
- ❑ Heart rate monitor connected
- ❑ Intravenous access * 2

MEDICATION

- ❑ Ketamine 1.5 mg/kg (can estimate 100 mg)
- ❑ Rocuronium 1.5 mg/kg (can estimate 100 mg)
- ❑ Phenylephrine 100 mcg aliquots (up to 5)
- ❑ Norepinephrine infusion prepared (0.025-1.00 mcg/kg/minute- ie. 2-80 mcg/minute)

EQUIPMENT

- ❑ Suction - *tested and under right shoulder of patient*
- ❑ BVM
- ❑ Video laryngoscope - *power tested*
- ❑ Direct laryngoscope - *light tested*
- ❑ Endotracheal tube (ETT)
- ❑ Stylet - *inserted in ETT*
- ❑ Bougie - *ready*
- ❑ Endotracheal tube securing device – *ready*
- ❑ I-gel – *ready*
- ❑ Crychothyroidotomy kit ready – 10 gauge blade, bougie, 6.0 ETT


THE
CHECKLIST
MANIFESTO
ATUL GAWANDE

2. Crichothyrotomy.

Cricothyrotomy

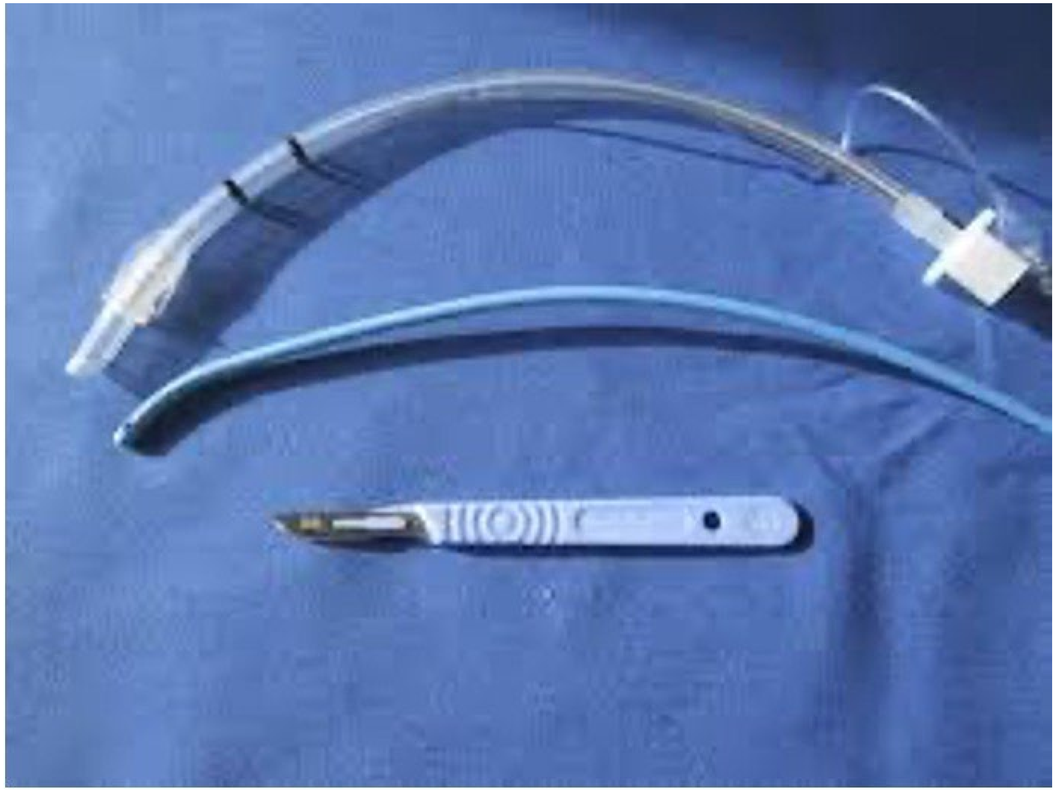
Plan for it and move decisively

The single biggest factor for unsuccessful cricothyrotomy is the delay in decision to do it

Cricothyrotomy

Equipment – 3 simple items

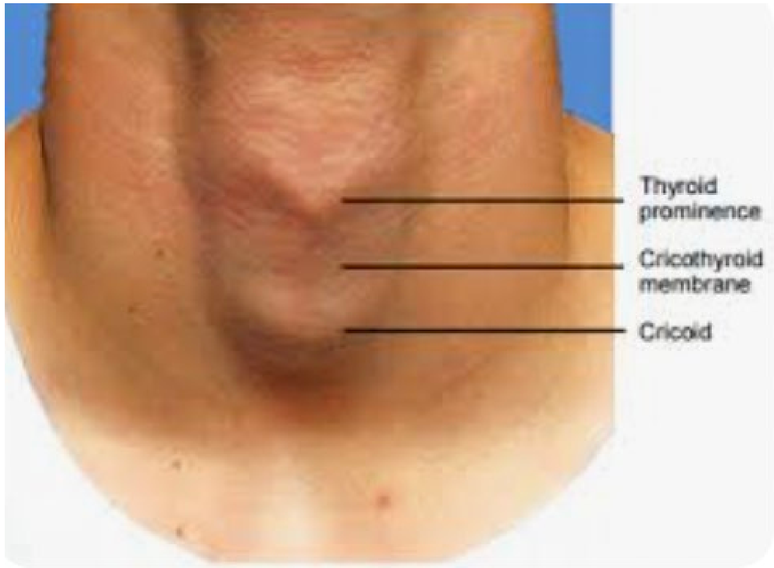
- Scalpel
- Bougie
- Size 6 ETT (cuffed)



Find the crichothyroid notch

- the “valley between the mountains”

- about three finger widths above the sternal notch



Cricothyrotomy

Plan for it and move decisively

- Make a vertical incision with scalpel (size 10) that crosses the membrane
- Make horizontal incision with the scalpel in the membrane, then remove scalpel
- Place index finger in the hole followed by bougie and railroaded size 6 ETT

Make a vertical incision

Make a horizontal incision across membrane

Place in bougie and railroad endotracheal tube over bougie

Crichothyrodotomy is a HALO event

High acuity – Low Occurrence

You will likely (hopefully) only do one in your career

Knowing exactly **when** and **how** to do it will decrease your stress about all other parts of airway management

2. Separating the nice from necessary

Do we need to tube?

Case 1: Do we intubate?

- 75 year old woman presents with cough and mild fever for five days
- On exam, her SpO2 is 89% on room air, but she is not short of breath and appears comfortable at rest.

Case 1 : Low O2, GCS 15

- Treat the patient, not the numbers
- No single vital sign or lab value is an indication for intubation
- Use the oxygenation cascade as appropriate.

The Oxygenation Cascade – GCS 15

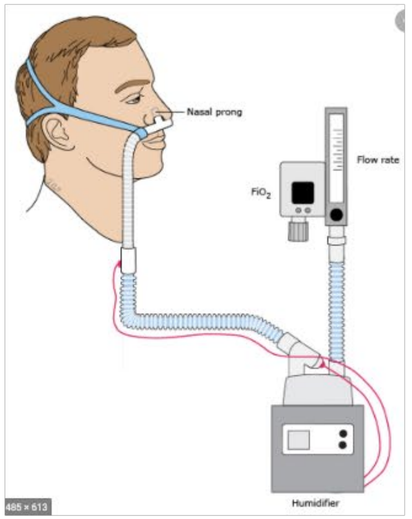
Stepwise approach to oxygenation

Nasal Prongs
6L

Non-Rebreather
15L

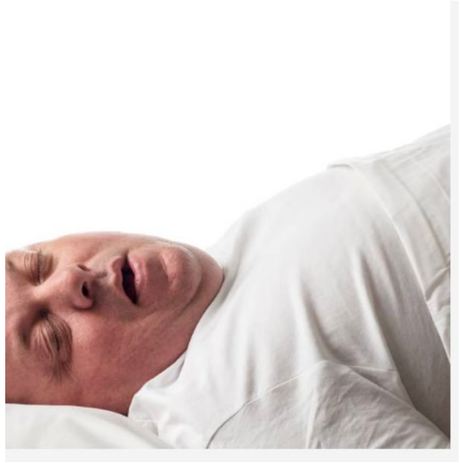
NIPPV
15L

Nasal prongs (6L) with mask (15L)



High flow (60L)

Case 2: Do we intubate?



- You are called into the ER at midnight Saturday night because a 57 patient has been brought in by EMS. He was found outside the local convenience store by a passerby who had been concerned after they were unable to wake him up.

- He is reported to have resp rate of 10 a minute, does not open his eyes to sternal rub, withdraws to pain, and makes incomprehensible sounds (GCS of 7). O2 sat 94%.

Case 2: Low O2, GCS Falling

- GCS < 8, intubate?
  - **This is not a universal rule**
- GCS 6 can be stable (e.g. intoxicated)
- GCS 12 can requiring intubation if declining over time (e.g. head trauma)

Do we intubate?

Nuance and clinical judgement

- Are they protecting their airway?
  - Secretions? Stridor? Snoring? *BAD*
- Are the symptoms likely reversible?
  - Naloxone?
- Gag reflex is a poor indicator as 20% of population do not have this reflex

Airway Adjuncts – Protecting airways with low GCS

Head tilt and chin lift

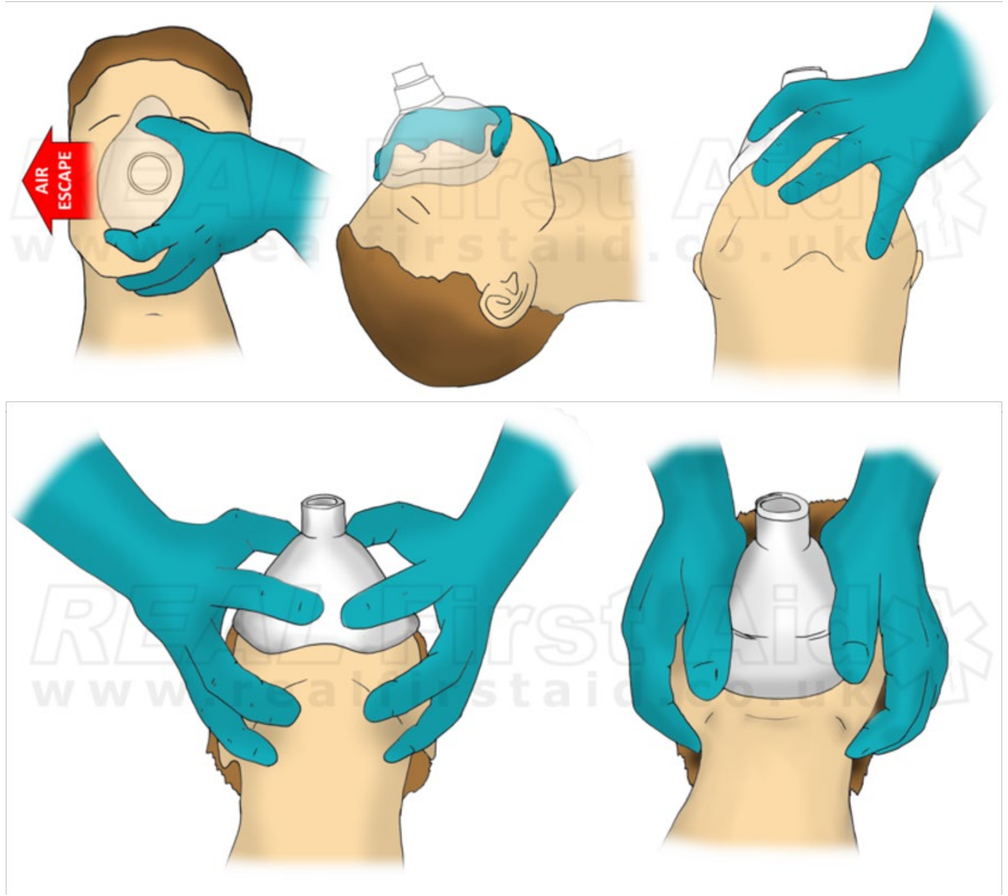
Airway Adjuncts – Protecting airways with low GCS

Oral and nasal airways

Airway Adjuncts

Bag-Valve-Mask (BVM)

- One person? Use CE grip.
- Two people? Use 2 thumbs down.
- Two hand grip preferred for infrequent operators.

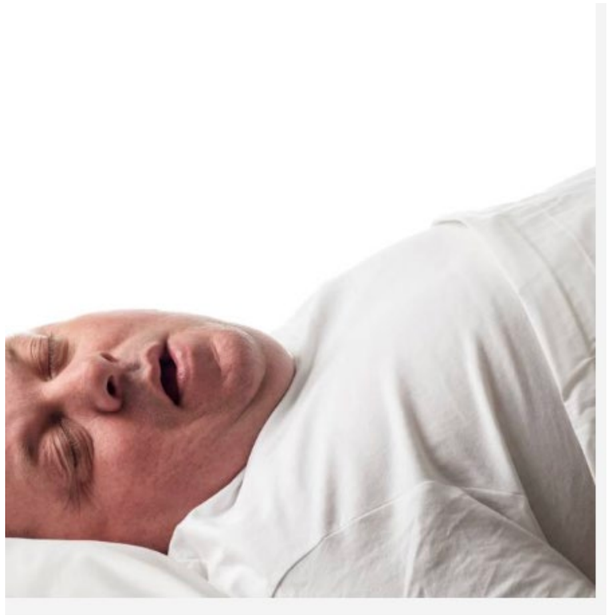


A note on dentures:

Keep them in for BVM, take them out for intubation

Case 3 : Do we intubate?

Our same patient becomes entirely unrousable. We note that he actually has a significant hematoma in his occiput. His GCS declines to 3.



Case 3: GCS of 3, Not protecting airway

Supraglottic airways (i.e. iGEL) with BVM

- Excellent for bringing airway protection in a patient that is GCS3 and will accept the intrusion
- Not a definitive airway but a viable option for occasional intubators at least temporarily

Case 4: Do we intubate?

19 year old man with Type I diabetes. Two days ago drank heavy alcohol with friends. Has since been having 2 days of fever, chills, vomiting abdominal pain. Blood pressure is 85/50. Heart rate 115. Temperature 39.0. Resp rate 32. Glucose 37.

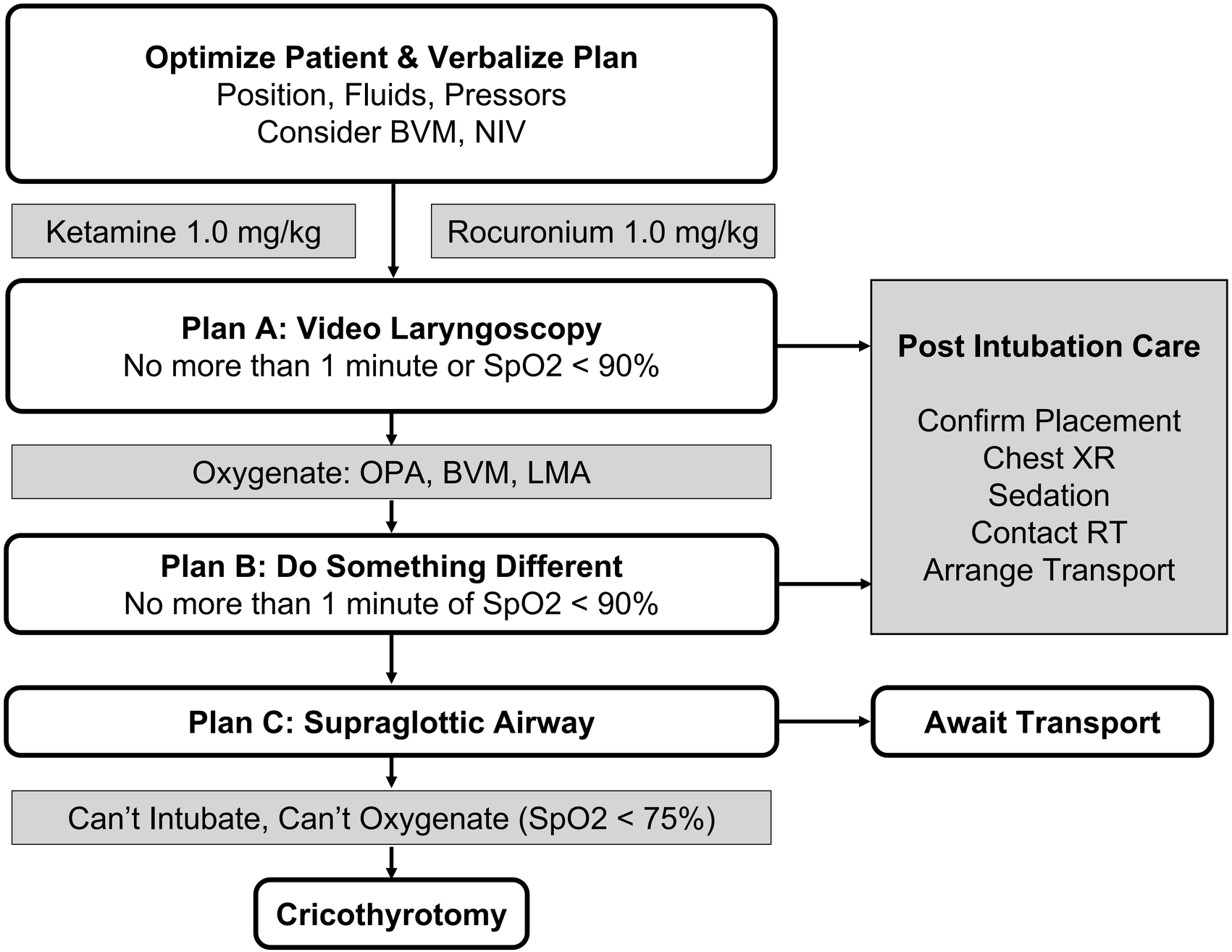
Case 4: Unstable patient with reversible causes

- This patient may not need intubation with IV normal saline and pressor
- **Stabilize first! You almost always have time to temporarily treat airway, so long as thinking of next steps.**
- Intubating while unstable is going to present even higher risks of apnea and crashing
- *In this particular patient, the likely diagnosis is DKA. Intubating may actually worsen his health status as he requires rapid breathing to remove excess C02, a challenge to do when on a ventilator.*

Review so far: lots of airway things to do before deciding to intubate

1. GCS 15, but low O2: **- use oxygen cascade; prepare to intubate**
2. GCS <8: **- do not necessarily intubate, use adjuncts;**
3. GCS 3: **- use supraglottic device (iGEL); prepare to intubate**
4. Unstable: **- optimize, correct prior to intubation**

BC RURAL INTUBATION ALGORITHM



What is Rapid Sequence Intubation?

Definition of Modern RSI

Rapid sequence intubation

- **Pre-oxygenation** with the purpose of nitrogen washout and prolonging time to desaturation (3 minutes or 6 vital capacity breaths)
- **Near simultaneous delivery of sedative and paralytic**, minimizing time between agents and intubation (try: induction 1 minutes, paralysis 45 seconds)
- **No/minimal BVM once medications given** (aspiration risk)
- Cricoid pressure? (No longer used but part of original definition)

Alternatives to RSI – NOT advised for occasional intubators

- Awake intubation
  - (Little to) no sedation, no paralytics
  - Patient retains spontaneous respirations
- Delayed sequence intubation
  - Stepwise sedation, oxygenation, paralytics

Modern RSI

Not without risk

- **Hypoxia and acidosis** should intubation fail (e.g. esophageal)
- **Hypotension and hypo perfusion** caused by abrupt transition from negative pressure to positive pressure ventilation

www.shutterstock.com · 1152969653

What are the essential airway equipment?

Airway Equipment

People, people, checklist, and checklist

- Attempt to have another physician. A helping hand and second opinion is invaluable. Maybe call Rudi
- Go through checklist – Patient, Medication, Equipment. Strong evidence that checklists improve performance in occasional settings.

BC CHECKLIST FOR RAPID SEQUENCE INTUBATION

PATIENT

- ❑ Hemodynamics optimized (fluid/vasopressors)
- ❑ Patient position optimized (sniffing)
- ❑ Oxygen connected – nasal canula, nonrebreather, or high flow nasal oxygen
- ❑ SpO2 monitor connected
- ❑ EtC02 monitor connected
- ❑ Heart rate monitor connected
- ❑ Intravenous access * 2

MEDICATION

- ❑ Ketamine 1.5 mg/kg (can estimate 100 mg)
- ❑ Rocuronium 1.5 mg/kg (can estimate 100 mg)
- ❑ Phenylephrine 100 mcg aliquots (up to 5)
- ❑ Norepinephrine infusion prepared (0.025-1.00 mcg/kg/minute- ie. 2-80 mcg/minute)

EQUIPMENT

- ❑ Suction - *tested and under right shoulder of patient*
- ❑ BVM
- ❑ Video laryngoscope - *power tested*
- ❑ Direct laryngoscope - *light tested*
- ❑ Endotracheal tube (ETT)
- ❑ Stylet - *inserted in ETT*
- ❑ Bougie - *ready*
- ❑ Endotracheal tube securing device – *ready*
- ❑ I-gel – *ready*
- ❑ Crychothyroidotomy kit ready – 10 gauge blade, bougie, 6.0 ETT

What drugs should we use?

Simple Drug List:

- **Ketamine**
- **Rocuronium**
- Phenylephrine
- Norepinephrine

Pre-treatment

Little evidence that it improves outcomes

Not advised for occasional intubators

Induction

Ketamine 1.0 mg/kg

Paralysis

Rocuronium 1.0 mg/kg IV

Adjusting drugs

- If you are worried about hypotension or apnea, consider reducing sedation (e.g. reducing ketamine to 0.5 mg/kg) and increasing rocuronium to 1.5 mg/kg to reduce apneic time
- **<u>Never</u> decrease paralytic dosage**

Vasopressors

Keep it simple

Phenylephrine 100 mcg IV push q2-5 min

Norepinephrine IV infusion 0.1-1 mcg/kg/min

How do I know I got the tube in the right place?

End tidal CO_2 is the gold standard of correct ETT placement!

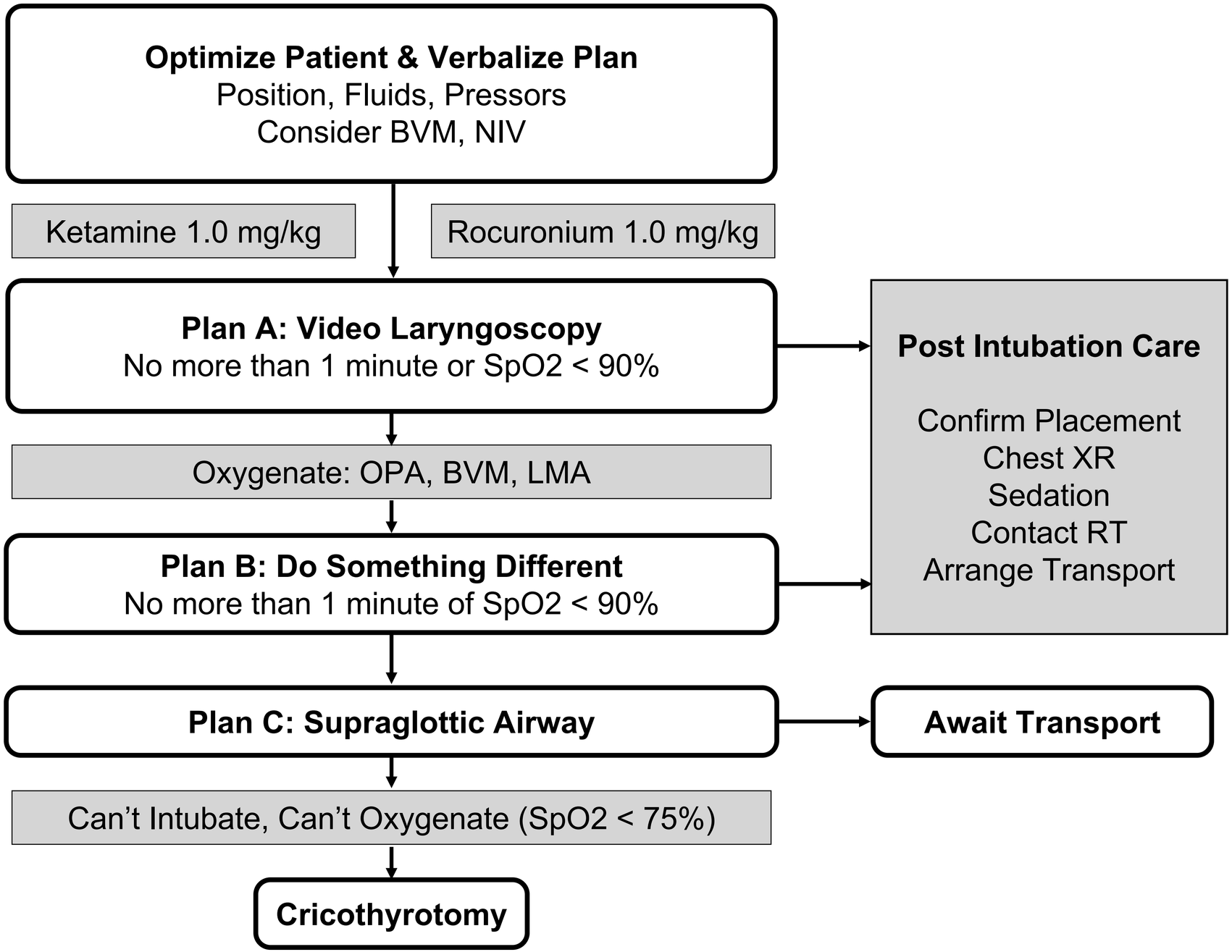
Proof of Placement

Check that you're in the correct tube

- **End tidal CO2 is the gold standard of correct ETT placement**
- Other indicators:
  - Visualization of ET between the cords
  - Misting of tube
  - Equal air entry and chest rise
- **Oxygen saturation is not a good indicator – can lag by up to 45 seconds**

What can be done for a second attempt?

BC RURAL INTUBATION ALGORITHM



First, reoxygenate. Then think about something different to do for the second attempt.

Second Attempt

Do something different! Some common ideas:

- Switch from Video to direct
- External laryngeal manipulation
- Use a bougie
- Use suction

Second Attempt

External laryngeal manipulation (bimanual laryngoscopy)

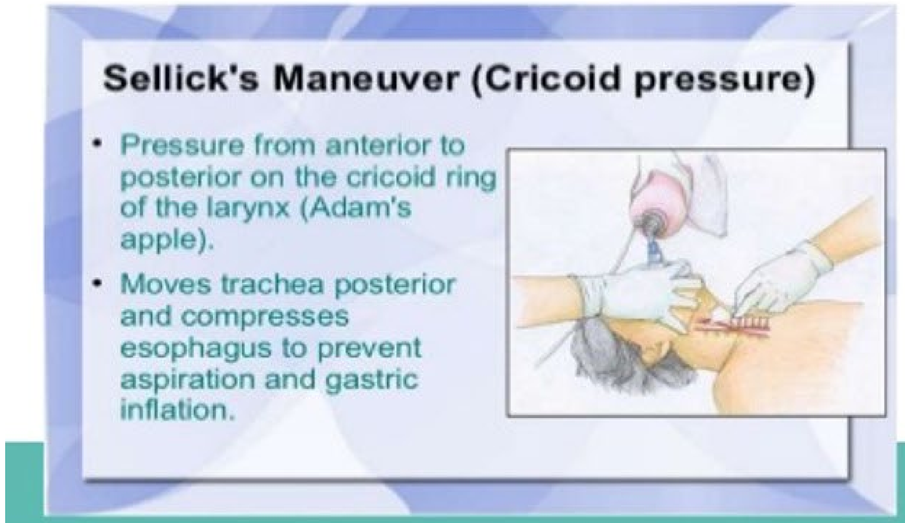
-Backward

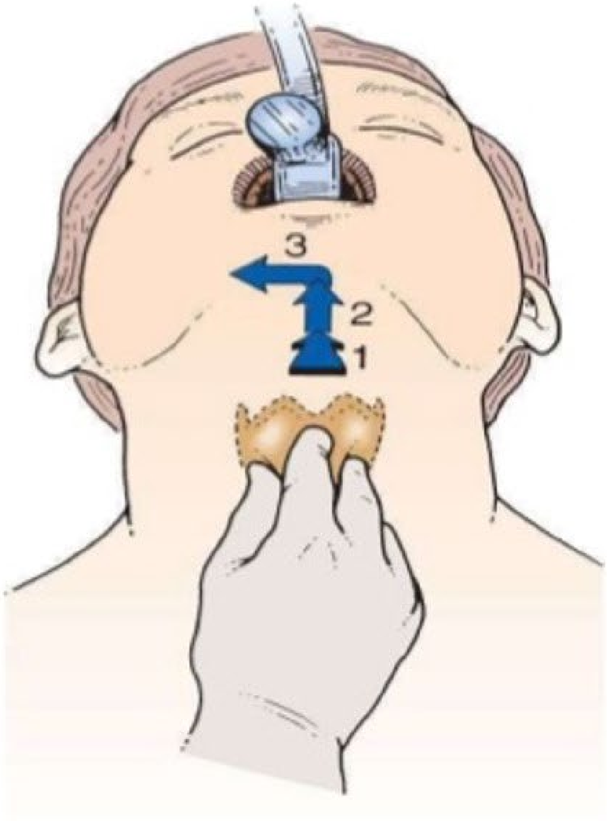
-upward

-rightward pressure

Helps to increase laryngoscopic view.

Different from Sellick's manuever



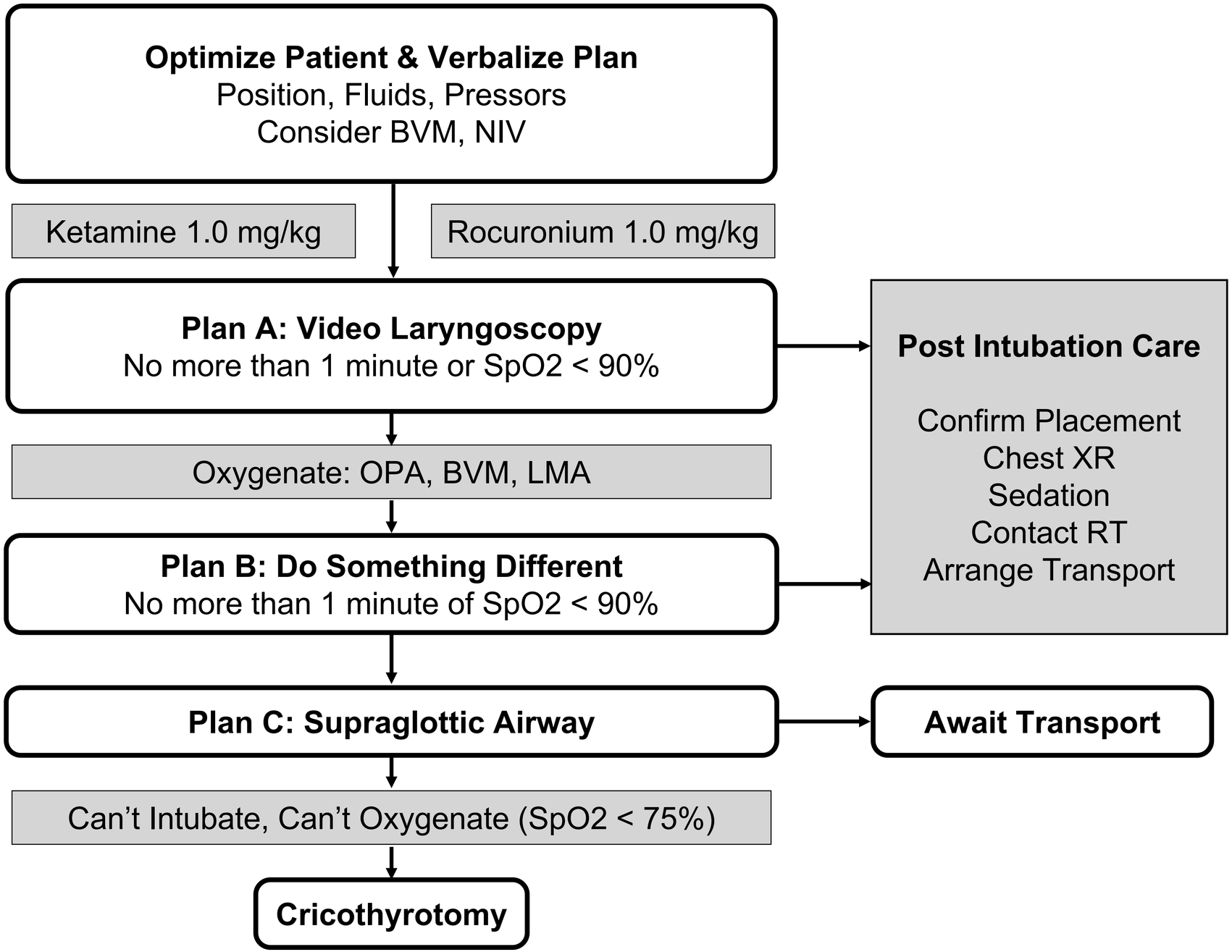


Second Attempt

Do something different! More ideas

- Different blade
- Patient position
- Provider position
- ETT size
- **Different person to intubate – a valid option always.**

BC RURAL INTUBATION ALGORITHM



Oh no. It still didn’t work.

Unable to intubate - time to go to supraglottic airway

Supraglottic airways (i.e. iGEL) with BVM

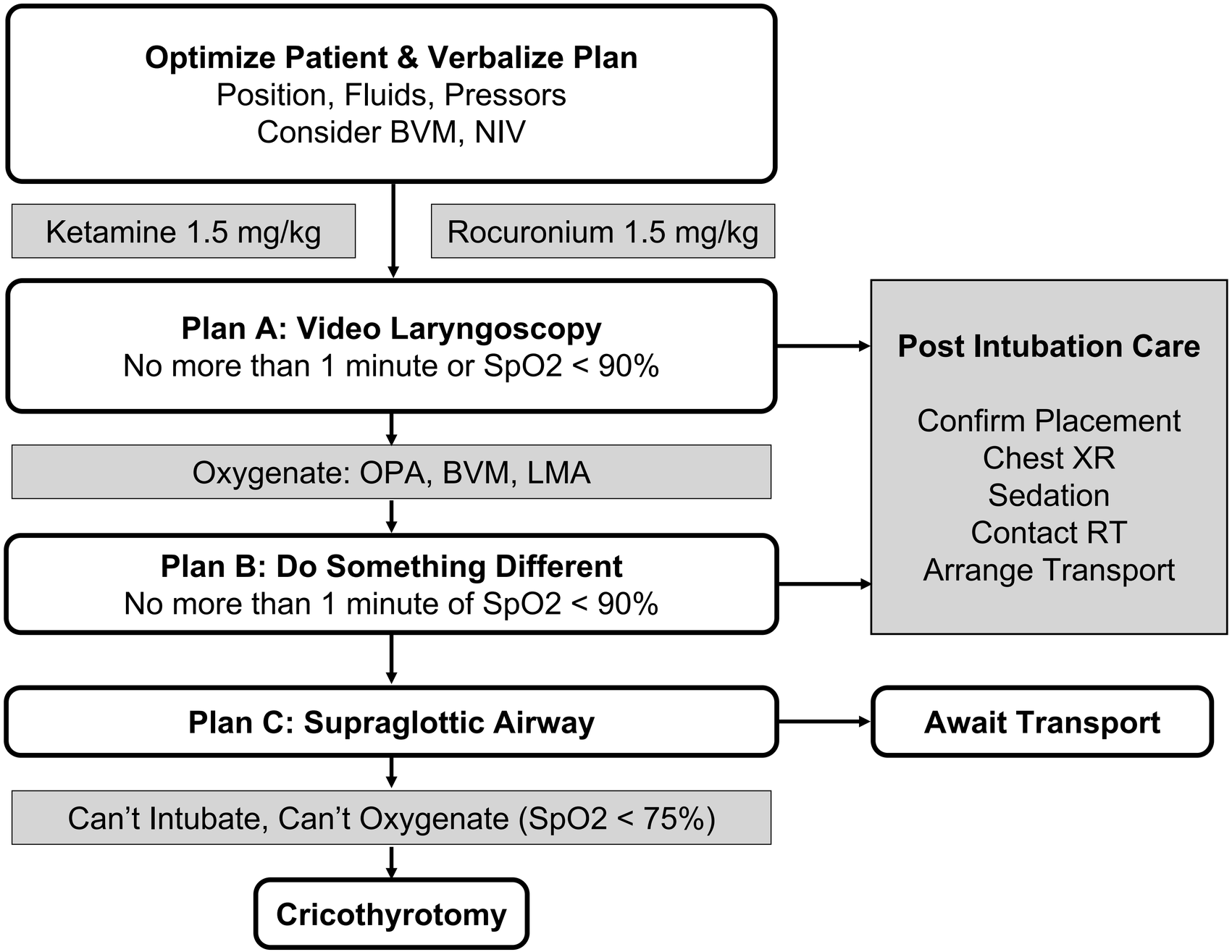
- GCS is 3 now
- You have tried to intubate unsuccessfully two times. iGEL with bagging may be the best alternative at this point.

Now you will be fine almost all the time!

Supraglottic airways (i.e. iGEL) with BVM

- In almost all circumstances you will be able to wait for transport using the Igel and and a BVM
- But if O2 sat drop below 75% - you known what to do!
- Can’t oxygenate, can’t intubate - Crichothyrotomy!

BC RURAL INTUBATION ALGORITHM



Review

1. Follow an airway algorithm and checklist
2. Master the crichothyrotomy
3. Remember these simplifications:

- Many airway options before intubating – use them. You have time.

- Use Rapid Sequence Intubation

- Use only Ketamine, and Rocuronium (Phenylephrine, and Norepinephrine if needed)

  - Do something different if first pass does not work.

  - If intubation does not work after 2 attempts almost always safe with Igel in place to wait for transport