# Organisational Aspects of Airway Equipment

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# Using the Universal Translator:

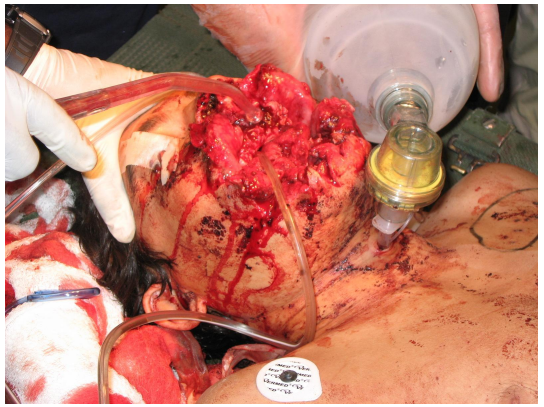
- “Organisational Aspects of Airway Equipment”

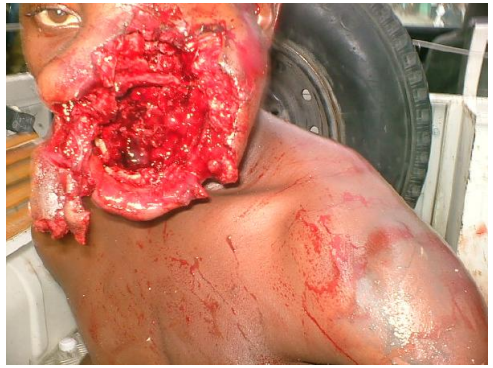


# What is our Aim?

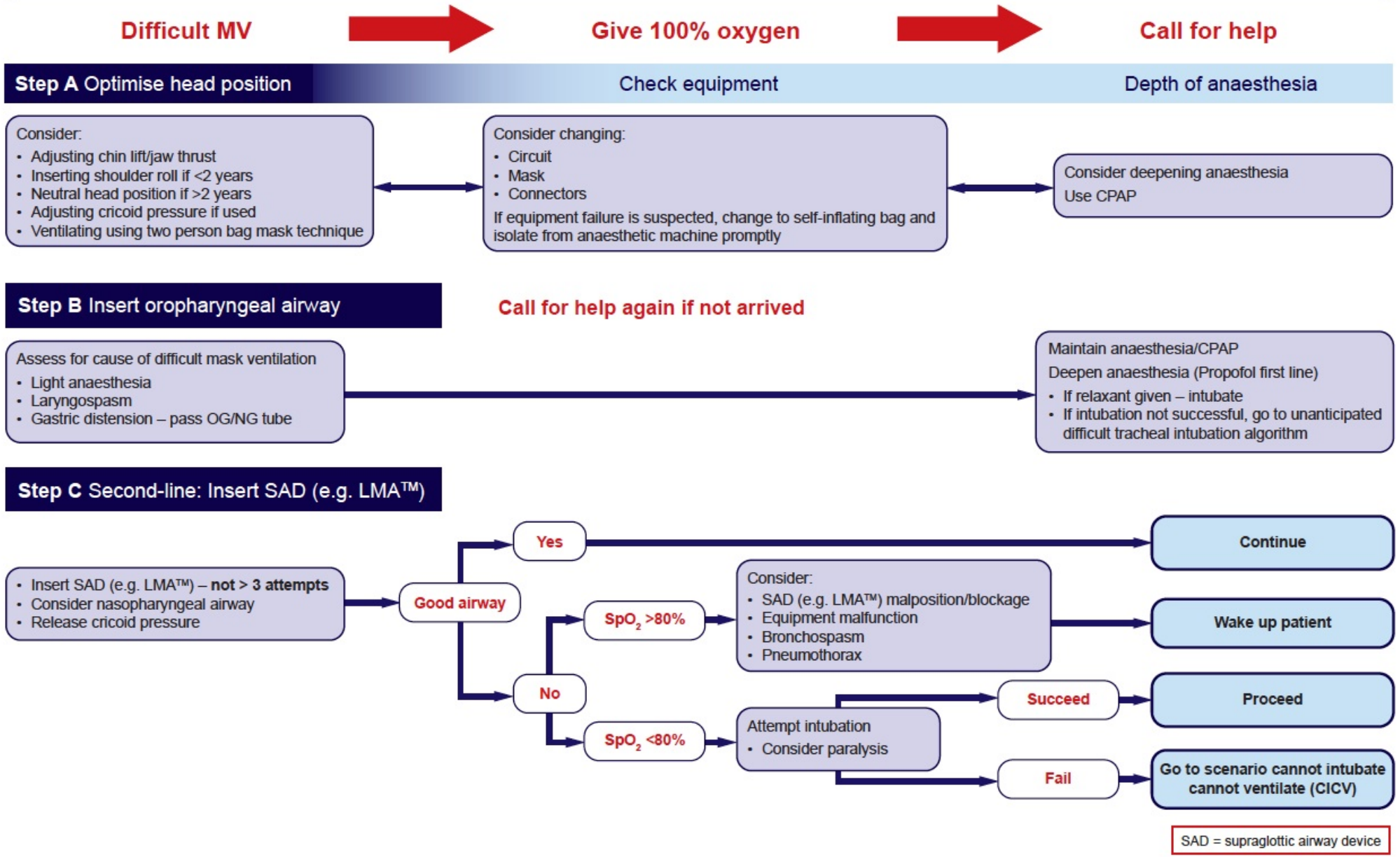
- Safety
- Oxygenation (Ventilation)
- Appropriate Staff, Location and Timing

# First, What to Stock?





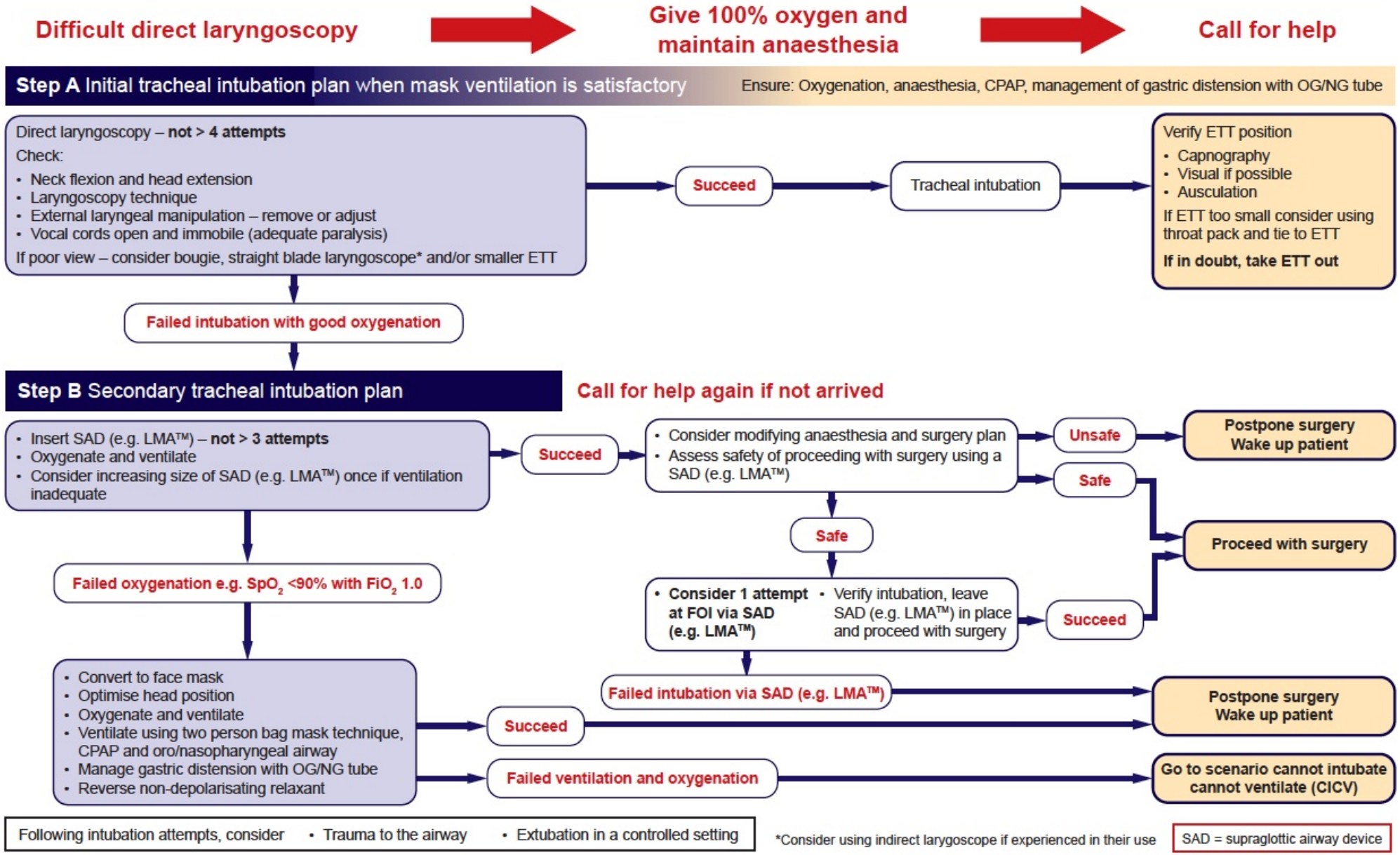
# Difficult mask ventilation (MV) – during routine induction of anaesthesia in a child aged 1 to 8 years




- Oxygen
- Facemask
- Shoulder Roll
- Circuit
- Oropharyngeal Airway
- Gastric Tube
- SAD/LMA
- Nasopharyngeal Airway
- Laryngoscope
- Endotracheal Tube

- Hypnotic Agent
- Neuromuscular Blocker

# Unanticipated difficult tracheal intubation – during routine induction of anaesthesia in a child aged 1 to 8 years




- Oxygen
- Laryngoscope(s)
- Endotracheal Tube
- Throat Pack
- Circuit
- SAD/LMA
- Face Mask
- Oropharyngeal Airway
- Nasopharyngeal Airway
- Gastric Tube
- Intubating Bronchoscope

- Hypnotic Agent
- Neuromuscular Blocker

# Cannot intubate and cannot ventilate (CICV) in a paralysed anaesthetised child aged 1 to 8 years

**Failed intubation inadequate ventilation** → **Give 100% oxygen** → **Call for help**

- Oxygen
- Circuit
- Oropharyngeal Airway
- SAD/LMA
- Gastric Tube

**Step A** Continue to attempt oxygenation and ventilation

- $FiO_2$ 1.0
- Optimise head position and chin lift/jaw thrust
- Insert oropharyngeal airway or SAD (e.g. LMA™)
- Ventilate using two person bag mask technique
- Manage gastric distension with an OG/NG tube

**Step B** Attempt wake up if maintaining $SpO_2$ >80%

If rocuronium or vecuronium used, consider suggamadex (16mg/kg) for full reversal

- Modified γ-cyclodextrin

Prepare for rescue techniques in case child deteriorates

**Step C** Airway rescue techniques for CICV ($SpO_2$ <80% and falling) and/or heart rate decreasing

Call for specialist ENT assistance

- ENT Surgeon

## Unexpected Difficult Ventilation/Oxygenation

**Basic Principles – Good technique**
Ensure adequate level of anaesthesia ±neuromuscular block

**Failed**

**Exclude/treat anatomical airway obstruction**
**Re-open airway / Insert Oro-pharyngeal airway**
**Use 2-hand/2-person bag-mask-ventilation**

**Failed**

**Call for help**

**Exclude/treat functional airway obstruction**
**Deepen anaesthesia ± Paralyse**
**I.V. epinephrine/Gastric decompression**

**Failed**

**Failed Oxgenation Plan A**
**Direct laryngoscopy**
**Exclude/remove foreign body in/from hypopharynx/larynx**
**Intubate trachea**

**Failed**

**Failed Oxygenation Plan B**
**Insert LMA**

Wake-up ← Ventilate through LMA* → Emergency surgery with LMA

*In a child with previously no signs, no symptoms and no history of / for a difficult airway → invasive ventilation techniques are not needed

- Magill Forceps
- Indirect Laryngoscope

## Unexpected Difficult Intubation

**Basic Principles – Good Technique**
Ensure adequate depth of anaesthesia and neuromuscular blockage
Apply laryngeal pressure or BURP

**Failed**

Ensure oxygenation, ventilation and anaesthesia

**Call for help**

**Failed Intubation Plan A***
Use improved direct laryngoscopic technique/conditions
Use alternative indirect laryngoscopic technique
Limit to 2 intubation attempts

**Failed**

Ensure oxygenation, ventilation and anaesthesia

Consider surgery with LMA

**Failed Intubation Plan B**
Use alternative indirect laryngoscopic technique OR
Perform fiberoptic tracheal intubation through the LMA
Limit to 2 intubation attempts

**Failed**

Ensure oxygenation, ventilation and anaesthesia

Wake-up ← Ventilate through LMA → Emergency surgery with LMA

*Rapid sequence induction intubation – Ensure deep anaesthesia and neuromuscular block, oxygenate and ventilate via face mask or via LMA

# So, to simplify;

- Oxygen
- Facemask
- Shoulder Roll
- Circuit
- Oropharyngeal Airway
- Gastric Tube
- SAD/LMA
- Nasopharyngeal Airway
- Laryngoscope
- Endotracheal Tube

- Oxygen
- Laryngoscope(s)
- Endotracheal Tube
- Throat Pack
- Circuit
- SAD/LMA
- Face Mask
- Oropharyngeal Airway
- Nasopharyngeal Airway
- Gastric Tube
- Intubating Bronchoscope

- Oxygen
- Circuit
- Oropharyngeal Airway
- SAD/LMA
- Gastric Tube

- ENT Surgeon

- Magill Forceps
- Indirect Laryngoscope

- Endotracheal Tube Guides

- Hypnotic Agent
- Neuromuscular Blocker

- Hypnotic Agent
- Neuromuscular Blocker

- Modified γ-cyclodextrin

# So, to simplify even further;

## Equipment

- Oxygen
- Facemask
- Shoulder Roll
- Circuit
- Oropharyngeal Airway
- Gastric Tube
- Magill Forceps
- SAD/LMA
- Nasopharyngeal Airway
- Laryngoscopes: Direct and Indirect
- Endotracheal Tube
- Endotracheal Tube Guide(s)
- Throat Pack
- Intubating Bronchoscope
- ENT Surgeon

## Drugs

- Hypnotic Agent
- Neuromuscular Blocker
- Modified γ-cyclodextrin

# Essential Equipment

- Minimum selection of equipment which *must* be available in *all* areas where airway management occurs

# ESSENTIAL AIRWAY EQUIPMENT

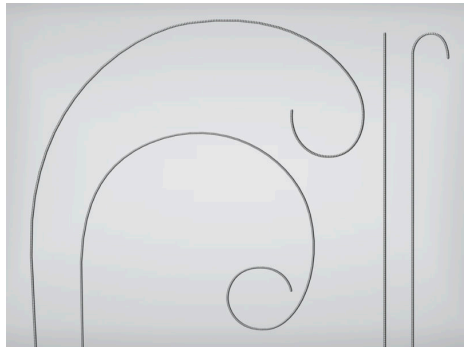
- Oxygen
- Facemask
- Shoulder Roll
- Circuit
- Oropharyngeal Airway
- Gastric Tube
- Magill Forceps
- SAD/LMA
- Nasopharyngeal Airway
- Laryngoscope: Direct and Indirect
- Endotracheal Tube
- Endotracheal Tube Guide(s)
- Throat Pack
- Intubating Bronchoscope
- (ENT Surgeon)

# Desirable equipment

- Equipment that is non-essential but can be viewed as potentially desirable, depending on local case mix and expertise

# Desirable equipment

- (Advanced) airway equipment which is to be used must be familiar to all staff, and efforts must be made to ensure exposure for all staff to maintain skills



Guidewire

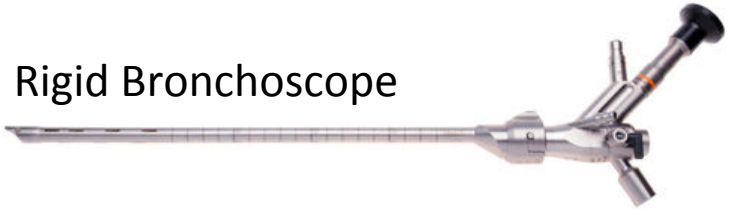
Airway Exchange Catheter

iGel

iLMA

Endoscopy Mask & Guided Oral Airway

Rigid Bronchoscope

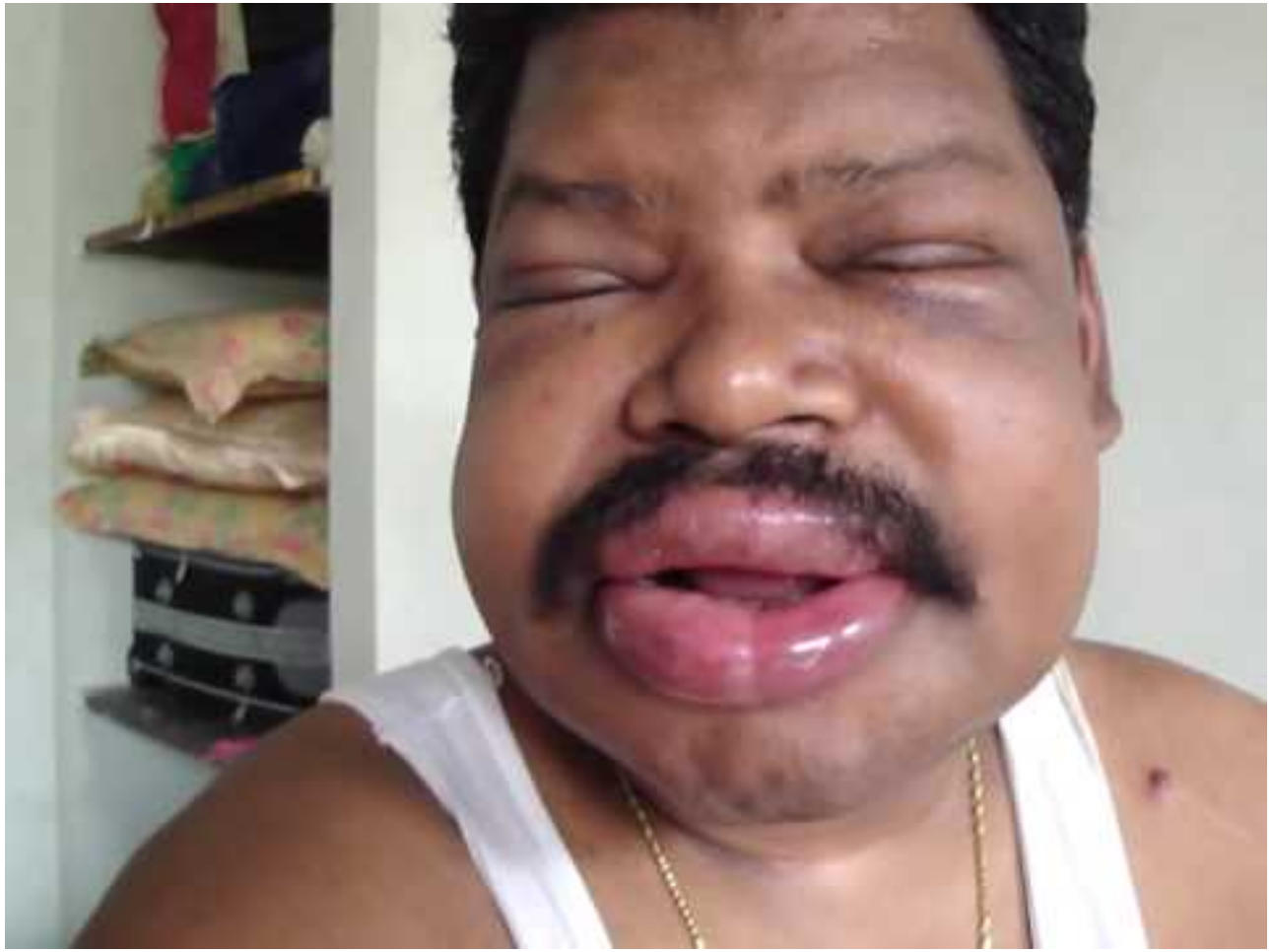


Bonfils

Shikani

Proseal LMA

# What About Videolaryngoscopes?



# Videolaryngoscopes


C-MAC (Karl Storz)

Glidescope (Verathon)

McGrath MAC (Aircraft Medical)

- These 3 devices all have a place in both adult and paediatric airway management

# Can’t Intubate, Can’t Ventilate

## NAP 4

- 184 total incidents (adults and children)
- 13 children
- 5 CICV
- Successful FoNA was managed by ENT

# Can’t Intubate, Can’t Ventilate

## SPAN Survey 2014

- 3 reported incidences of CICV requiring intervention
- Further details of 2 only
- Both rescued by tracheostomy performed by surgeons (one general surgeon, one ENT surgeon)

# Can’t Intubate, Can’t Ventilate

- Lack of firm evidence to support any one technique in the hands of an anaesthetist
- The most likely methods to succeed will be tracheal intubation via rigid bronchoscopy or surgical tracheostomy, both performed by a skilled surgeon

However

- Must carefully consider the options in the absence of resident skilled ENT/general surgical assistance

# Back to Trolleys…

# Need to Consider;

## Airway Rescue

- Unanticipated airway difficulty with physiological disturbance
- Requires urgent/emergency intervention

## Difficult Airway/Intubation

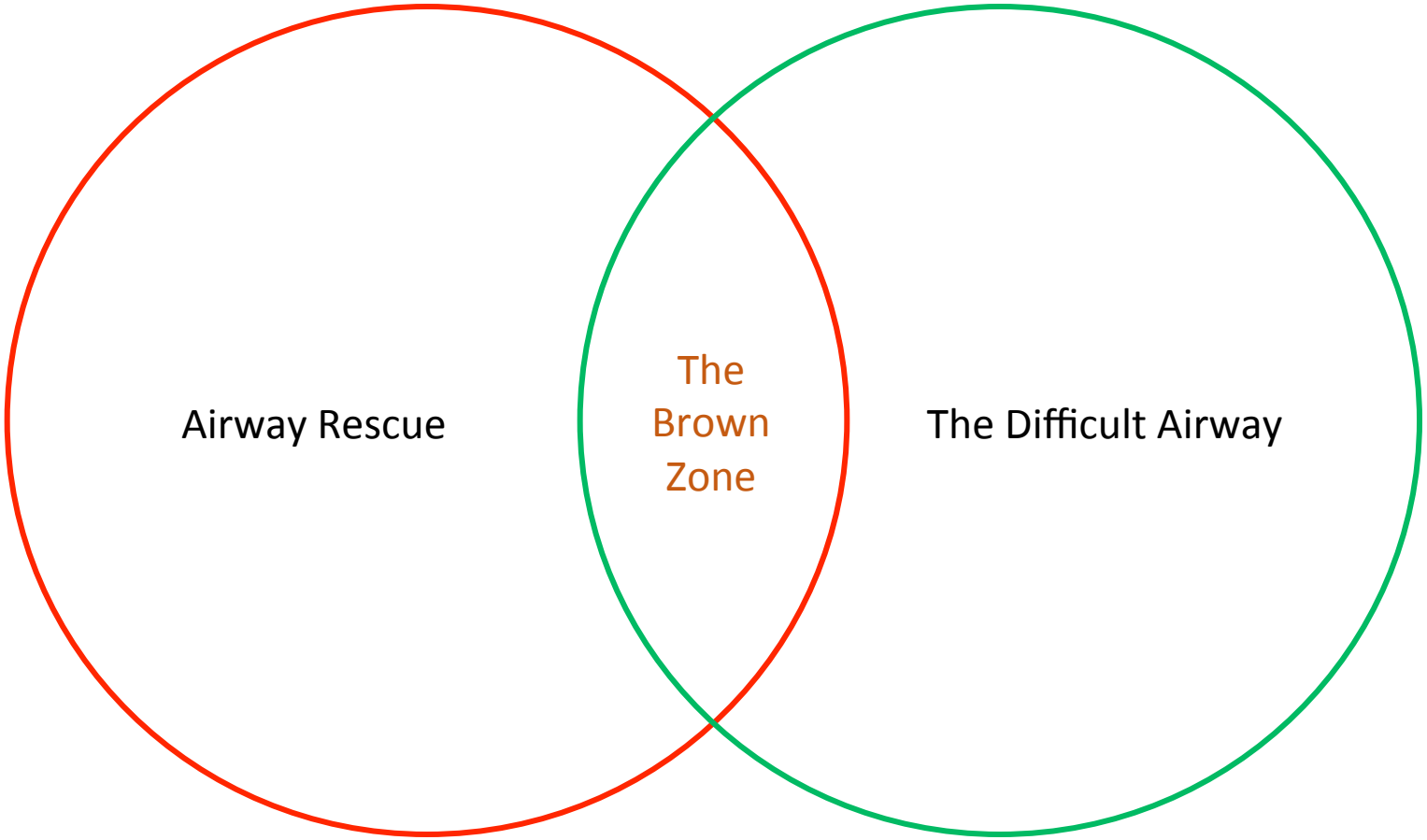
- *Popat el al:* The clinical scenario when safe oxygenation and ventilation cannot be achieved in the desired way with the use of an individual's usual practice

# Airway Rescue Trolley

- Remedy anatomical and functional problems
- Often resolved with basic airway equipment +/- drugs
- Less likely to require advanced airway equipment in a hurry

# The Difficult Airway/Intubation Trolley

- May be anticipated e.g. certain syndromes
- Hopefully will be anticipated and less urgent/emergent
- May choose to refer to specialist centre
- Otherwise, likely to have appropriate advanced airway equipment available from the outset


Airway Rescue
The Brown Zone
The Difficult Airway

# So, how many trolleys?

- Everything on one ‘difficult airway’ trollev?
- May be suitable for specialist centre with no need for separate airway rescue equipment setup

**Advantages**

- Everything in one place
- Less trolleys to check
- Reduce risk of getting ‘wrong’ trolley

**Disadvantages**

- Everything in one place
- Cluttered
- Need big trolley
- Remembering where everything is

# What's the Alternative?

- Separate Airway Rescue Equipment from Difficult Intubation Equipment
- May be suitable for non-specialist centre with separate areas, especially if co-existing adult practice

**Advantages**

- Separates advanced equipment from basic
- Less variety of equipment on trolley
- Easier to standardise

**Disadvantages**

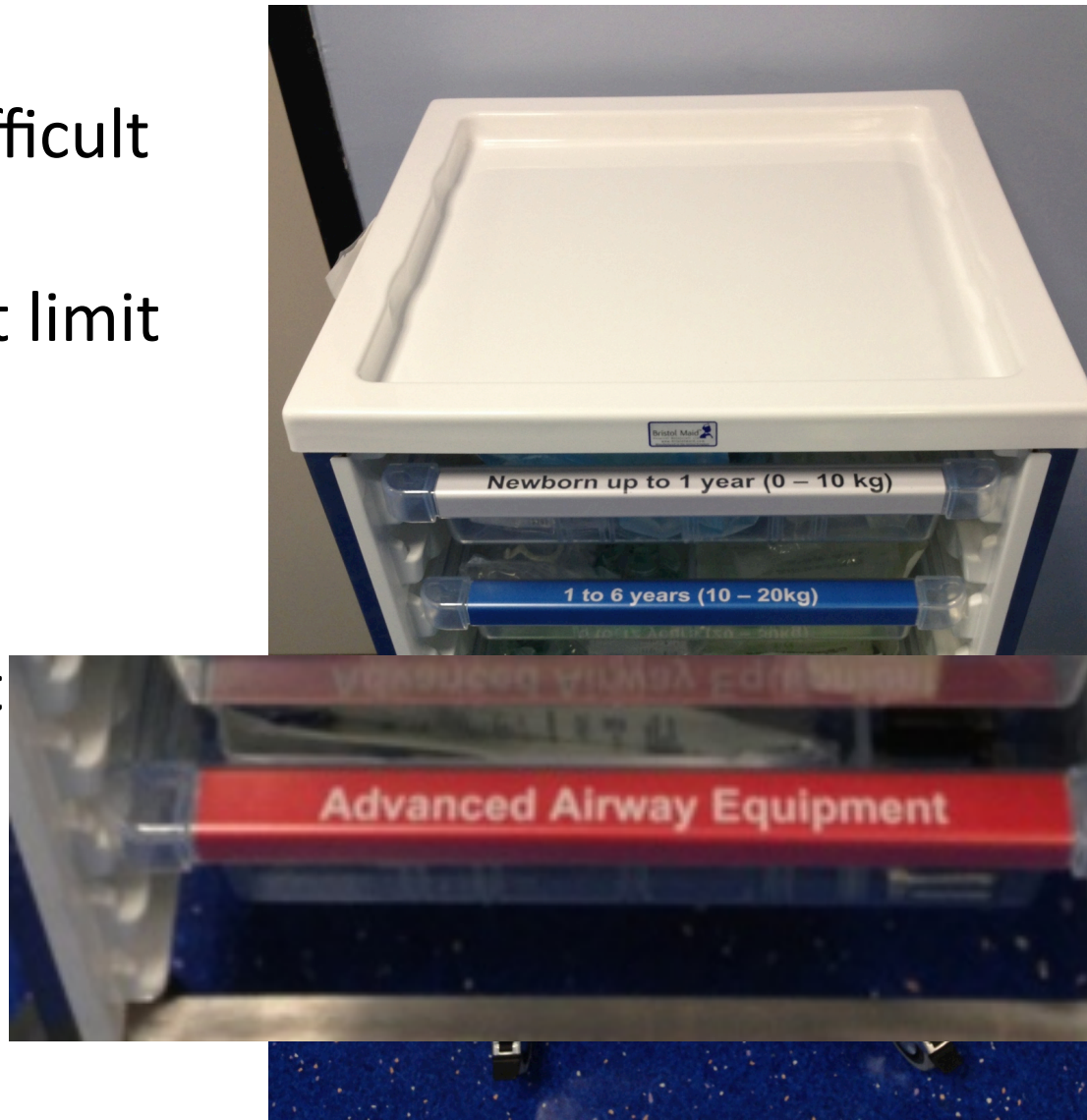
- Trolley fatigue
- Potential for confusion
- May need 2 trolleys in succession

# There is a third option…

# Sorry…

# There Really is a Third Option…

- A combination of Airway Rescue and Difficult Airway Equipment
- Keep the advantages of ‘one-trolley’ but limit volume of kit
- Again, more easily standardised due to simplicity
- Probably not suitable for large specialist centres



# Contrasting Setups

# Where?

- Areas of the hospital to consider include ED, ICU, HDU, Ward, Theatre, Theatre Recovery +/- Transfer
- Standardisation will become proportionally more difficult with more people involved



# Other Factors to Consider;

- Communication
- Small working group
- One person in charge overall
- Checking of Equipment

# Other Factors to Consider;

- Communication
- Small working group
- One person in charge overall
- Checking of Equipment
- Training
- Simulation
- Signage



# The Take-Home Message

- *(Advanced) airway equipment which is to be used must be familiar to all staff, and efforts must be made to ensure exposure for all staff to maintain skills*

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Association of Paediatric Anaesthetists of Great Britain & Ireland and the Society for Pediatric Anesthesia

# APA

Annual Scientific Meeting 14-15 May 2015

## ABERDEEN

Society for Pediatric Anesthesia

education • research • patient safety

# ANNUAL SCIENTIFIC MEETING

## Aberdeen Exhibition & Conference Centre

**14th-15th May 2015**

**Joint meeting with Society of Pediatric Anesthesia, providing an opportunity to compare and contrast practice on both sides of the Atlantic**

### Programme Highlights:

- Parallel specialist and general streams
- Workshops on human factors and surgical skills plus a special one on Highland hospitality!
- Annual Dinner at the Beach Ballroom


**Plus 13th May 2015**

**Half day meeting on Congenital Cardiac Anaesthesia**

Jointly presented by the Congenital Cardiac Anaesthesia Network and Congenital Cardiac Anesthesia Society

**Website opening soon**
**www.apagbi2015.co.uk**