NORTHERN TRAUMA NETWORK

Paediatric Emergency Airway Management/Anaesthesia in the ED

Key Points

- Maintain oxygenation at all times.
- C-spine injury should be suspected in all head-injured patients until proven otherwise.
- Spinal precautions should be maintained in trauma cases, but NOT at the expense of airway compromise.
- Contact senior Anaesthetist for any child predicted to require airway support.
- Wherever possible airway management should be undertaken by the most senior anaesthetist available with support from an ODP / Anaesthetic Nurse.
- There should be immediate access to difficult airway equipment.
- Intubation checklists should be used routinely (*Appendix - NECTAR Intubation checklist*).
- There should be a plan for failed intubation and ventilation for all cases. (*APPENDIX – DAS Guidelines*).
- If difficult airway is predicted and the clinical situation allows, consider requesting senior ENT presence and performing airway management in theatre.
- For FONA in children: if the cricothyroid membrane is not easily palpable (typically under age 8), needle cricothyroidotomy is the recommended approach with surgical cricothyroidotomy should this fail. Note that under 1 year a surgical tracheostomy may be necessary if all other means of maintaining an airway have failed.

Consider the following:

1. Most appropriate location and staff that time allows.
2. Preparing equipment, drugs and monitoring in advance
3. When C-spine injury is suspected, manual in-line immobilisation should be maintained during intubation, and VL/fibreoptic scope and bougie should be considered to minimise neck movements.
4. If intubation fails, plan for maintaining oxygenation
5. Call for senior support including senior ENT input if difficult airway predicted
6. Use North East Children's Transport and Retrieval Service (NECTAR) 'Emergency intubation Check list' – *See Appendix*
7. Follow the Difficult Airway Society (DAS) protocols for:
    a. Difficult Mask Ventilation – *See Appendix*
    b. Unanticipated Difficult Tracheal Intubation – *See Appendix*
    c. Can't Intubate, Can't Ventilate (CICV) in a Paralysed and Anaesthetised Child – *See Appendix*
8. Prior to patient transfer (inter/ intra Hospital) use the NECTAR 'Ventilated Patient Transfer' Checklist. - *See Appendix*

Appendix 1

EMERGENCY PRE-INTUBATION CHECKLIST

PATIENT PREPARATION

Pre-oxygenation
- ☐ 100 % O2
- ☐ CPAP via Anaesthetic circuit/mask

Patient Position
- ☐ Elevate head up to 30°
- ☐ Optimised for intubation
  - Pillow
  - Neck roll

IV Access
- ☐ Adequate
- ☐ Patent
- ☐ Secure

Optimisation
- ☐ Fluids
- ☐ Vasopressors

NG Tube
- ☐ Stop feed
- ☐ NGT aspirated/free drainage

EQUIPMENT PREPARATION

Monitoring
- ☐ ECG
- ☐ NIBP (on cycle) +/- IABP
- ☐ SpO2 – QRS tone on
- ☐ EtCO2 – in-line/detector

Equipment
- ☐ Suction on - Yankauer/catheters
- ☐ Oral / Nasal Airways
- ☐ Stethoscope
- ☐ 2 laryngoscope handles + blades
- ☐ 2 ETT (1 smaller) / Cuffed
- ☐ Bougie/Stylet
- ☐ Magills forceps
- ☐ Syringe for cuff + manometer
- ☐ Tape to secure ETT
- ☐ Ventilator checked

Drugs
- ☐ Induction agents/sedation
- ☐ Muscle relaxant/reversal agent
- ☐ Vasopressor / Inotropes
- ☐ Sedative Infusion

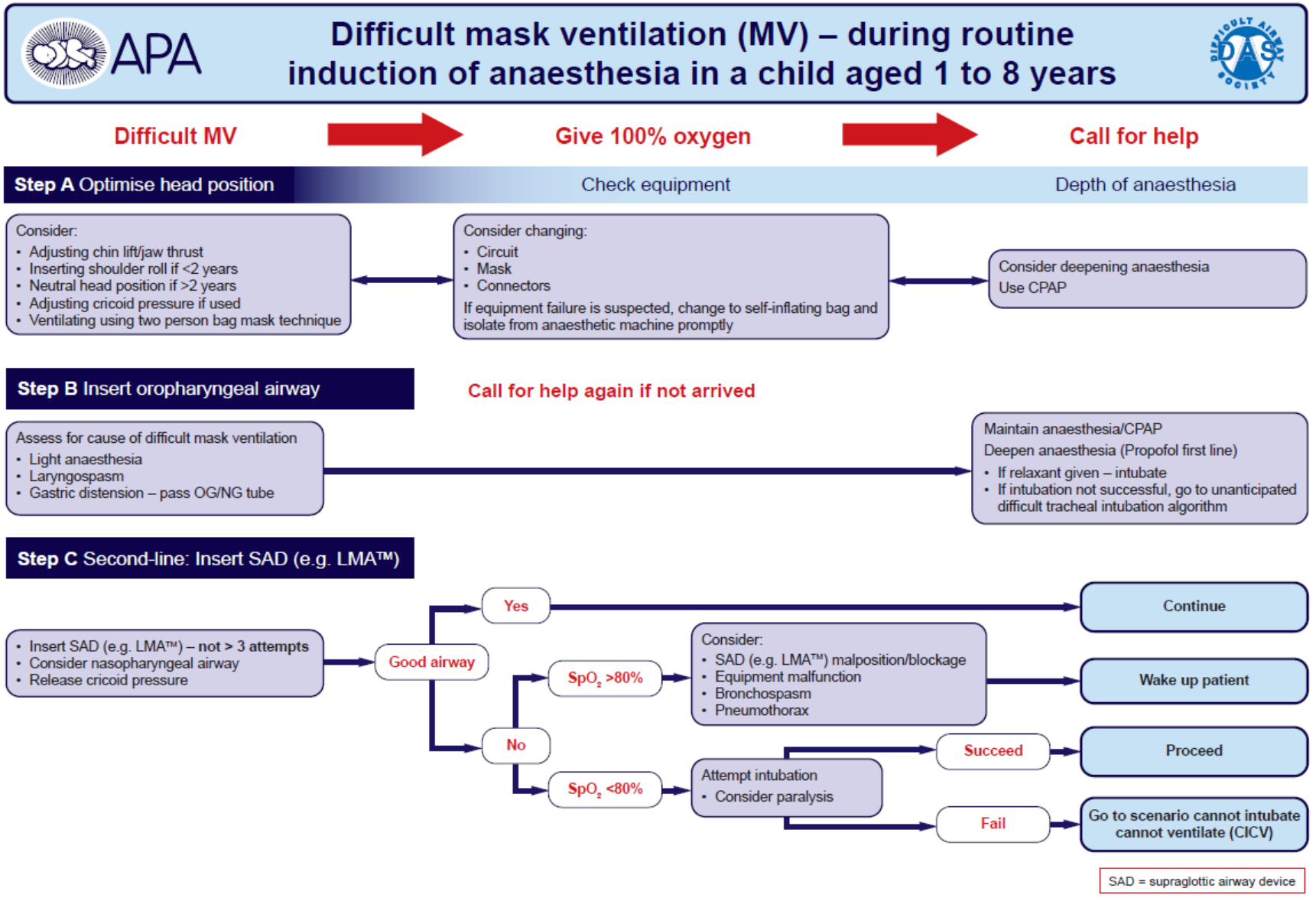
FINAL PREPARATION

Team
- ☐ 2 Doctors/2 Nurses
- ☐ RSI/Cricoid Pressure
- ☐ Drugs (doses checked)
- ☐ Manual in-line stabilisation
- ☐ **Intubation Plan Shared?**

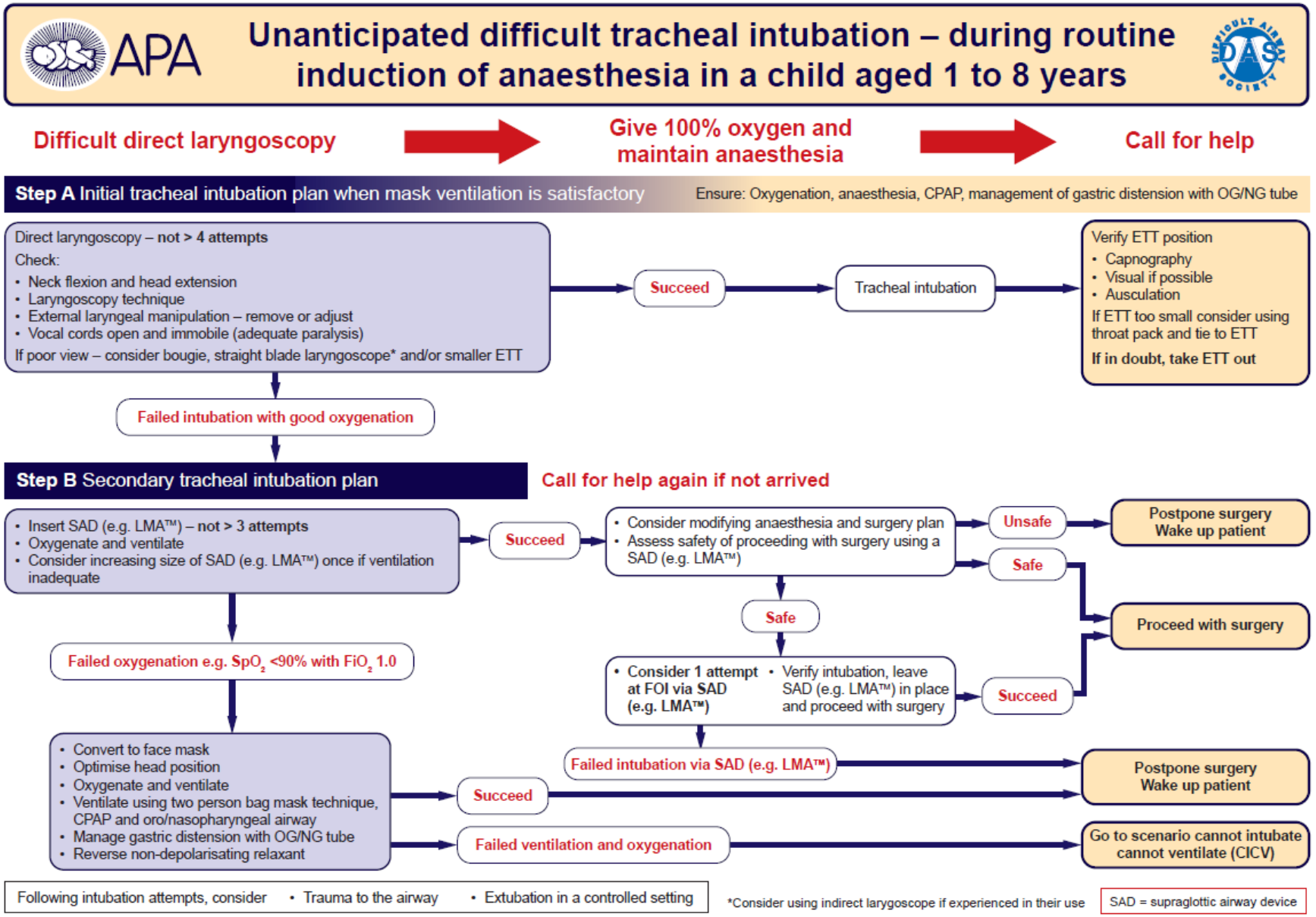
Difficult Airway Anticipated
- ☐ Difficult Airway trolley needed
- ☐ Paediatric Anaesthetist required

SEE DIFFICULT AIRWAY ALGORITHM

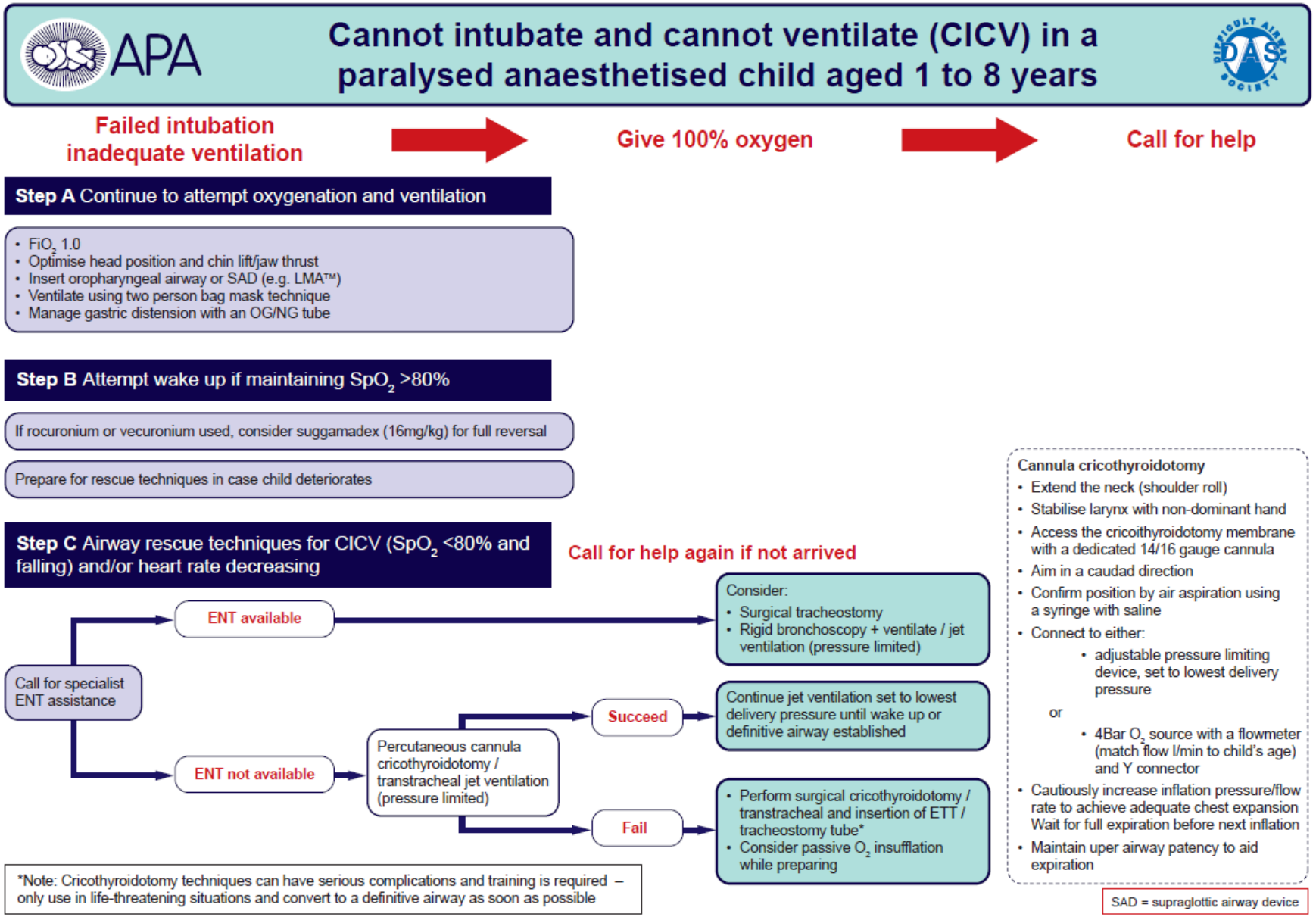
Appendix 2


APA
Difficult mask ventilation (MV) – during routine induction of anaesthesia in a child aged 1 to 8 years
Difficult MV
Give 100% oxygen
Call for help
Step A Optimise head position
Check equipment
Depth of anaesthesia
Consider:
• Adjusting chin lift/jaw thrust
• Inserting shoulder roll if <2 years
• Neutral head position if >2 years
• Adjusting cricoid pressure if used
• Ventilating using two person bag mask technique
Consider changing:
• Circuit
• Mask
• Connectors
If equipment failure is suspected, change to self-inflating bag and isolate from anaesthetic machine promptly
Consider deepening anaesthesia
Use CPAP
Step B Insert oropharyngeal airway
Call for help again if not arrived
Assess for cause of difficult mask ventilation
• Light anaesthesia
• Laryngospasm
• Gastric distension – pass OG/NG tube
Maintain anaesthesia/CPAP
Deepen anaesthesia (Propofol first line)
• If relaxant given – intubate
• If intubation not successful, go to unanticipated difficult tracheal intubation algorithm
Step C Second-line: Insert SAD (e.g. LMA™)
• Insert SAD (e.g. LMA™) – not > 3 attempts
• Consider nasopharyngeal airway
• Release cricoid pressure
Good airway
Yes
Continue
No
SpO2 >80%
Consider:
• SAD (e.g. LMA™) malposition/blockage
• Equipment malfunction
• Bronchospasm
• Pneumothorax
Wake up patient
SpO2 <80%
Attempt intubation
• Consider paralysis
Succeed
Proceed
Fail
Go to scenario cannot intubate cannot ventilate (CICV)
SAD = supraglottic airway device

Appendix 3


APA
Unanticipated difficult tracheal intubation – during routine induction of anaesthesia in a child aged 1 to 8 years
DAS
Difficult direct laryngoscopy
Give 100% oxygen and maintain anaesthesia
Call for help
Step A Initial tracheal intubation plan when mask ventilation is satisfactory
Ensure: Oxygenation, anaesthesia, CPAP, management of gastric distension with OG/NG tube
Direct laryngoscopy – not > 4 attempts
Check:
• Neck flexion and head extension
• Laryngoscopy technique
• External laryngeal manipulation – remove or adjust
• Vocal cords open and immobile (adequate paralysis)
If poor view – consider bougie, straight blade laryngoscope* and/or smaller ETT
Succeed
Tracheal intubation
Verify ETT position
• Capnography
• Visual if possible
• Ausculation
If ETT too small consider using throat pack and tie to ETT
If in doubt, take ETT out
Failed intubation with good oxygenation
Step B Secondary tracheal intubation plan
Call for help again if not arrived
• Insert SAD (e.g. LMA™) – not > 3 attempts
• Oxygenate and ventilate
• Consider increasing size of SAD (e.g. LMA™) once if ventilation inadequate
Succeed
• Consider modifying anaesthesia and surgery plan
• Assess safety of proceeding with surgery using a SAD (e.g. LMA™)
Unsafe
Postpone surgery Wake up patient
Safe
Proceed with surgery
Safe
Failed oxygenation e.g. SpO2 <90% with FiO2 1.0
• Consider 1 attempt at FOI via SAD (e.g. LMA™)
• Verify intubation, leave SAD (e.g. LMA™) in place and proceed with surgery
Succeed
Failed intubation via SAD (e.g. LMA™)
Postpone surgery Wake up patient
• Convert to face mask
• Optimise head position
• Oxygenate and ventilate
• Ventilate using two person bag mask technique, CPAP and oro/nasopharyngeal airway
• Manage gastric distension with OG/NG tube
• Reverse non-depolarisating relaxant
Succeed
Failed ventilation and oxygenation
Go to scenario cannot intubate cannot ventilate (CICV)
Following intubation attempts, consider • Trauma to the airway • Extubation in a controlled setting
*Consider using indirect larygoscope if experienced in their use
SAD = supraglottic airway device

Appendix 4


APA
Cannot intubate and cannot ventilate (CICV) in a paralysed anaesthetised child aged 1 to 8 years
DAS
Failed intubation inadequate ventilation
Give 100% oxygen
Call for help
Step A Continue to attempt oxygenation and ventilation
• FiO2 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 SpO2 >80%
If rocuronium or vecuronium used, consider suggamadex (16mg/kg) for full reversal
Prepare for rescue techniques in case child deteriorates
Step C Airway rescue techniques for CICV (SpO2 <80% and falling) and/or heart rate decreasing
Call for help again if not arrived
Call for specialist ENT assistance
ENT available
Consider:
• Surgical tracheostomy
• Rigid bronchoscopy + ventilate / jet ventilation (pressure limited)
ENT not available
Percutaneous cannula cricothyroidotomy / transtracheal jet ventilation (pressure limited)
Succeed
Continue jet ventilation set to lowest delivery pressure until wake up or definitive airway established
Fail
• Perform surgical cricothyroidotomy / transtracheal and insertion of ETT / tracheostomy tube*
• Consider passive O2 insufflation while preparing
Cannula cricothyroidotomy
• Extend the neck (shoulder roll)
• Stabilise larynx with non-dominant hand
• Access the cricoithyroidotomy membrane with a dedicated 14/16 gauge cannula
• Aim in a caudad direction
• Confirm position by air aspiration using a syringe with saline
• Connect to either:
• adjustable pressure limiting device, set to lowest delivery pressure
or
• 4Bar O2 source with a flowmeter (match flow l/min to child's age) and Y connector
• Cautiously increase inflation pressure/flow rate to achieve adequate chest expansion Wait for full expiration before next inflation
• Maintain uper airway patency to aid expiration
*Note: Cricothyroidotomy techniques can have serious complications and training is required – only use in life-threatening situations and convert to a definitive airway as soon as possible
SAD = supraglottic airway device

Appendix 5

VENTILATED PATIENT TRANSFER CHECKLIST

It can be challenging caring for a critically ill child whilst waiting for the NECTAR team to arrive with more interventions possibly needed once the team arrive. However there are things you can do to make the handover of the child to the NECTAR team both smooth and time effective.

AIRWAY

- ☐ ETT correct size and length
  Uncuffed ETT
  Internal Diameter (mm): Age/4 + 4
  Length (cm): Oral - Age/2 + 12
  Nasal - Age/2 + 15
- ☐ ETT secured with 'pink' Elastoplast
- ☐ **DO NOT USE pre-cut ETT TUBES**
- ☐ Add appropriate HME filter for patient size
- ☐ NG/OG Tube on free drainage

BREATHING

- ☐ Position of ETT and NGT confirmed on X-ray (tip at T2 on CXR ideal for transfer)
- ☐ Attach $ETCO_2$ monitoring
- ☐ Ensure adequate ventilation
  - Adequate PEEP (4-6cm)
  - Regular blood gases

CIRCULATION

- ☐ Minimum 2 points of IV access for transfer
  -discuss inotrope options with NECTAR Consultant
  -gain IO access until central venous access can be obtained
- ☐ Regular BP monitoring
- ☐ Arterial line sited if on inotropes
- ☐ Adequately fluid resuscitated with appropriate IV maintenance fluids running
- ☐ Monitor urine output and consider inserting a urinary catheter

DISABILITY AND EXPOSURE

- ☐ Adequate sedation and muscle relaxants
  -see NECTAR Infusions Guide
  -all infusions and fluids in 50ml syringes
- ☐ GCS recorded – with regular pupillary monitoring
- ☐ C-Spine Protection (if necessary)
- ☐ Regular/core temperature monitoring
- ☐ Maintain normal blood glucose

DOCUMENTATION AND COMMUNICATION

- ☐ Be prepared to verbally handover patient to the NECTAR team
- ☐ Have any X-rays available for review/transfer images electronically
- ☐ Transfer letter with photocopy of relevant notes, results, drugs charts, anaesthetic charts etc.
- ☐ Document and highlight any Safeguarding issues to the NECTAR team
- ☐ Keep parents up to date (at least one parent can travel with NECTAR)
- ☐ Telephone NECTAR team if there are any changes in the patient's condition or you are concerned that the patient is deteriorating

WHAT TO EXPECT FROM THE NECTAR TEAM

- Call you when we leave base and give an ETA
- Upon arrival we will introduce ourselves, take handover and update parents
- Review the patient and all notes/documentation
- Ensure ETT and IV access is secure, accessible and transfer infusions over to our syringe drivers
- Transfer patient onto the transport ventilator and make sure they are suitable for transfer

IF AT ANY POINT YOU WANT FURTHER ADVICE CALL NECTAR ON 01912826699

V1.1 TY/ASK April 2016

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Related information	