ADVANCED PRE-HOSPITAL EMERGENCY CARE COURSE

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Pre-hospital Emergency Anaesthesia Assistance (PHEA)

- Also referred to as RSI (rapid sequence induction of anaesthesia)
- Delivery of general anaesthesia by a doctor and appropriately-trained assistant in the pre-hospital environment
Aims

To enable you to SUPPORT a suitably trained pre-hospital provider in the conduct of PHEA and/or procedural sedation

NOT designed to teach you how to conduct PHEA yourself
Rapid Sequence Intubation – a team process

- Loss of protective airway reflexes
- Loss of airway maintenance
- Loss of ventilatory effort

- Misjudged procedural sedation can have similar results
To assist effectively

Understand what is going to happen and in what order
- Sufficiently to be able to “challenge”

Familiarity with the equipment layout
Familiarity with the monitoring devices
- Obtain vital signs, ECG, SpO$_2$ and ETCO$_2$ readings

Familiarity with the suction devices
- How to check, operate and troubleshoot

ESTABLISH MONITORING EARLY
Why is location important?

- PHEA is one of highest risk advanced procedures
- Standard of care should be equal to that of a patient receiving a general anaesthetic in hospital
- Many things challenge this
  - Access and egress
  - Environmental factors: light, temperature, weather, cleanliness
  - Team
- The desire is to control as many variables as possible to enhance safety of procedure
The ideal location

- Safe from public / traffic / other hazards
- Open space, level surface
- No further extrication required
- Good lighting
- Dry and warm
- Supine patient
- 360 degree access
- Close to ambulance for further equipment if required
Indications to consider PHEA

Failure to MAINTAIN an airway
- Actual or impending
- Unconscious, obtunded, drugs, trauma, burned airway

Failure to PROTECT airway
- Head injury, lowered or falling GCS, obtunded, drugs,
- Trauma to airway or haemorrhage into it

Failure to adequately OXYGENATE or VENTILATE
- Hypoventilation, head injury, chest injury

Expected clinical course
- Polytrauma
- Lowered or falling GCS
- Transport and management considerations

Not only for trauma
Risks v Benefits

• Each decision should be based on individual patient
  • Patient factors: predicted technical difficulty, risk of further harm
  • Strength of indications
  • Time and distance to destination hospital
  • Mode of transport
  • Environmental factors
  • Consent – majority of patients will lack capacity
Intubation mandated... ...now what method?

Ask yourselves again

- “Do we REALLY need to do this?”
- Relative location
- Clinical circumstances

If yes then which protocol?

- Crash intubation sequence
- Difficult intubation sequence
- Failed Intubation sequence
- Standard Rapid Sequence induction
RSI is a team process

- PREPARATION
- POSITIONING of the patient
- PRE-oxygenation
- PRE-treatment
- PRE-anaesthetic final checks with PLAN for failure
- PARALYSISIS and anaesthesia
- PROTECTION and POSITIONING
- PASSING the tube and PROOF of placement
- POST-intubation management
Monitoring to AAGBI & ICS standards

Establish monitoring very early in process

The minimum standards are

- ECG
- Blood pressure
- Pulse oximetry
- Capnography (after airway secured)
- Continuous presence of trained personnel

Recommendations for standards of monitoring during anaesthesia and recovery. Association of Anaesthetists of Great Britain and Ireland 2000
Guidelines for transport of the critically ill adult. The Intensive Care Society 2002
Preparation - equipment dump & IV access

- Best ergonomic location
- Monitor position
  - Visible to operator
- Failed airway kit
- Suction
- Oxygen
- Ventilator - running
- Gas delivery tube with ETCO$_2$, Easycap and HME filter
- Drugs – drawn up
- 2 IV/IO lines
Preparation of the Patient – by the operator

- Pre-oxygenation
- “Airway Silo” NPA x 1 or 2 plus OPA if tolerated
- BVM device as oxygen supplementation system
- Personal positioning / trolley height adjustment / sun direction
- Briefing of Cricoid and MILS operatives
Positioning - 360° access

- MILS
- Cricoid
- Operator & Airway
- Kitman & Drugs
- Kit Dump:
  - Monitors
  - Ventilator
  - Suction
  - Drugs

PATIENT
Pre Oxygenation & Pre-Treatment

Pre Oxygenation is ESSENTIAL

- Saturates the blood
- Buys time
- Several minutes of apnoea time before SpO₂ drops below 92%

Either

- 3-5 minutes high flow O₂ via BVM +reservoir mask
- OR (if able to cooperate) 8 vital capacity breaths via BVM system

Pre Treatment

- Operator will advise
Drugs

- Dependant on system & operator experience
- Induction
  - Anaesthetic agent: Ketamine or Propofol
  - Muscle relaxant: Suxamethonium or Rocuronium
- Extension of anaesthesia
  - Maintenance and extension require longer acting drugs titrated to effect
  - Sedation: Midazolam
  - Analgesia: Morphine
  - Paralysis: Rocuronium

KNOW THE PHARMACOLOGY and DOSAGE so you can challenge and so you know what to expect
Checklists

- Checklists increasingly commonplace in medicine
  - Introduces standardisation
  - Reduces error
  - Focuses team
  - Increased safety
- Aide-memoire during kit dump and preparation
- Assistant challenges the operator with questions on the Checklist
- DON’T RUSH THEM - AWAIT THE ANSWERS
Drug administration

IV/IO access via two lines of access

Administration of drugs

- Labelled syringes
- Predetermined dose of anaesthetic muscle relaxant
- BOTH BY FAST IV PUSH
- Cricoid pressure on LOC
- Time to intubation approx 45-60s
Cricoid pressure

- May reduce aspiration
- Pushing on cricoid ring
  - enough to hurt if pushing at top of nose
- May make view at laryngoscopy worse
- May be too late if patient unconscious
Assisting the operator

Consider the potential problems

Back-up options

- Revert to simple airway and BVM
- Surgical Airway
Assisting the operator

- Operator will perform the laryngoscopy
- Position yourself at their right side
- Be able to access the kit dump and the monitor during laryngoscopic visualisation of the cords
- When asked, place the bougie into their right hand kinked end first
- When operator calls “bougie through cords”, pass tube over the bougie & slide the tube down to operator
Assisting the operator

- As they take the tube call, “you have the tube I have the bougie”
- Stabilise the bougie until told “Tube past the cords, remove the bougie”
- Attach the delivery tube / catheter mount /EtCO$_2$ assembly to tube
- The ventilator should have been running throughout this process
Assisting the operator

- Check chest movements equal
- Auscultate breath sounds
- Check easy cap turned yellow or ETCO$_2$ trace on monitor
- Check BP – may need fluid challenge
- Secure tube if satisfactorily placed
- After each movement
  - Check tube positioning
  - Check ETCO$_2$ trace and value, BP and pulse rate
- Before and after any drug administration
  - Check pulse rate BP ETCO$_2$ and SpO$_2$
Confirming tube placement

View passing through cords
(Easycap changes to yellow)
ETCO$_2$ trace on monitor
Post intubation management

- Continued monitoring
- Continued resuscitation as appropriate
- Re-apply collar (if trauma)
- Extend Anaesthesia
  - Maintain sedation, analgesia and paralysis
- Prepare for transport

**POST - RSI CHECKLIST**

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| A & B | ETCO₂ trace  
Oxygenated  
Adequate ventilation  
ETT length & Secured  
Thoracostomy required |
| C | Post-induction BP  
Vasopressor or fluids required  
Vascular access adequate |
| D | Maintain anaesthesia |
| E | Temperature Probe & management plan  
Splintage required |

**TRANSFER CHECKLIST**

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<tr>
<td>A</td>
<td>Tube Secure, BVM &amp; Mask, Laryngoscope, Suction</td>
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| B | Sufficient O₂  
Optimal ventilation  
Thoracostomy / interventional procedure required before loading |
| C | Lines patent & accessible  
Resus drugs & vasopressor support |
| D | Maintain anaesthesia |
| Pre-alert | Appropriate receiving unit & team  
ATMIST +/- shock pack  
ETA confirmed & landing site informed |
Physiological Aims

- $\text{SpO}_2 \geq 95\%$ (at least)
- $\text{ETCO}_2$ 4.5 – 6.0 kPa (35-45mmHg)
- $\text{SBP} \geq 90\text{ mmHg}$ or $\text{MAP} \geq 80\text{ mmHg}$
Early complications

- AIRWAY
  - Difficult airway / intubation
- BREATHING
  - Difficulty ventilating patient
  - Think tension pneumothorax and bronchospasm
  - Hypoxia
- CIRCULATION
  - Circulatory collapse
  - Most likely drug or pathology related
  - Consider anaphylaxis
  - Hypotension
Later complications

- **AIRWAY**
  - Loss of airway

- **BREATHING**
  - Hypoxia
  - Difficulty ventilating patient
  - Ventilator failure

- **DISABILITY**
  - Inadequate anaesthesia
Problems

- Failed Airway drill (see above)
- Patient becoming “light”
- Ventilator alarms
- Disconnections or failed circuits
- Inability to achieve/maintain physiological parameters
- Watch the clock
Pre-hospital Emergency Anaesthesia Assistance

Questions?
Summary

- Pre-hospital anaesthesia is a process
- It is performed by a trained team
- Prepare the patient, team and equipment
- RSI is not the end of resuscitation - it is often the beginning
- Be aware of problems
- Practice the failed intubation drill

THIS PRESENTATION DOES NOT TRAIN YOU FOR PHEA/RSI

Its aim is to allow you to assist a PHEA / RSI trained provider

Read up the pharmacology, know the kit, know the DAS drills