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CSOP 013 - PRE-HOSPITAL EMERGENCY ANAESTHESIA

Version No: 3.2 Effective Date 17/02/2020

APPROVALS

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Next Review Date:	February 2022		

HISTORY

Effective Date	Version No.	Summary of Amendment
09/12	v1.0	Creation of Document
11/02/2014	v2.0	Update of CSOP to include paediatric references and RSI Observation Chart – see Annex 4.
June 2017	V3.0	Review and change of name from Rapid Sequence Induction
October 2017	V3.1	Improved checklist following crew survey
January 2020	V3.2	Review and revision of PHEA indications, removal of unused observations chart, change to taasBase.

KEY DOCUMENT

AAGBI Safer Pre-Hospital Anaesthesia 2017 Anaesthesia 2017, 72, 379–390

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ANNEXES

No.	Title
1	Checklist for PHEA
2	Thirty Second Drills
3	Failed Intubation Drills
4	Capnography set-up

1. PURPOSE

From the key document (AAGBI Safer Pre-Hospital Anaesthesia 2017):

"Pre-hospital emergency anaesthesia with oral tracheal intubation is the technique of choice for trauma patients who cannot maintain their airway or achieve adequate ventilation. It should be carried out as soon as safely possible, and performed to the same standards as in-hospital emergency anaesthesia. It should only be conducted within organisations with comprehensive clinical governance arrangements. Techniques should be straightforward, reproducible, as simple as possible and supported by the use of checklists. Monitoring and equipment should meet in-hospital anaesthesia standards. Practitioners need to be competent in the provision of in-hospital emergency anaesthesia and have supervised pre-hospital experience before carrying out pre-hospital emergency anaesthesia."

2. SCOPE

TAAS recognises that some staff have considerable anaesthetic experience. However, when delivering PHEA within TAAS the expectation is that this SOP is followed. In exceptional circumstances where deviation from the SOP is warranted this should be discussed if possible with the on call clinical supervisor.

3. TRAINING & MANDATE

PHEA must only be undertaken by a doctor and paramedic who have both been trained and approved to do so by TAAS – see below. In the circumstance of a patient already intubated as part of ALS who regains spontaneous circulation, a dual CCP crew can administer muscle relaxant and sedation as required, under relevant PGDs.

3.1 Doctors

PHEA must only be undertaken by doctors who have been assessed and approved by the Clinical Lead.

3.2 Paramedics

Paramedics must be specifically trained by TAAS to assist in PHEA.

4. INDICATIONS FOR PHEA

Patients with the following clinical indications should be considered for PHEA:

- Airway obstruction (actual or impending)
- Ventilatory failure or severe hypoxia
- Unconscious
- Agitated or combative patients

The following are soft indications for PHEA and as such the threshold to intervene and the margin of safety needs to be higher than for more time critical PHEA.

- *Humanitarian indications*
- *Anticipated clinical course.*

If the risk to the patient or rescuer outweighs the benefit of PHEA it should not be attempted and basic medical care appropriate to the environment should be provided.

The TAAS crew should consider the risk versus benefit of PHEA on a case by case basis and make an appropriate judgement and subsequent decision. In difficult cases the clinical supervisor can be contacted for advice.

Care should be exercised when considering the use of anticipated clinical course as an indication for PHEA. There should be a clear and unequivocal reason for PHEA to avoid unnecessary anaesthesia and consequent delay on scene.

Newly published data demonstrates an association between PHEA and mortality in hypotensive trauma patients. This association is strengthened when haemodynamic instability is due to significant hypovolaemia. The prehospital team must be fully conversant with the risks of the procedure and see clear potential benefits in performing PHEA distant from hospital resuscitative and surgical interventions. In these patients it may be appropriate to delay anaesthesia until arrival in hospital **even in the context of a reduced level of consciousness.**

5. PAEDIATRIC PHEA

AAGBI: Safer Pre-Hospital Anaesthesia 2017 guidance for pre-hospital anaesthesia in children states the following:

"It is increasingly recognised that anaesthesia for children aged 8 years or under is a sub-specialist area of in-hospital anaesthesia. Young children with severe injuries are uncommon, but can present pre-hospital practitioners with significant challenges.
In general terms, the threshold for anaesthesia and tracheal intubation in young children is high. The majority can be adequately managed with simple airway techniques. Pre-hospital emergency anaesthesia is considered only after careful risk–benefit analysis. This will usually mean that a skilled anaesthetic practitioner with appropriate equipment is present, and that simple airway manoeuvres combined with oxygen therapy have failed to provide a patent airway or adequate oxygenation. In difficult circumstances, rapid transfer to the nearest hospital to enable advanced airway management may be appropriate, even if definitive care needs to be undertaken at a different hospital."

Within TAAS PHEA for children under the age of 8 should not be undertaken unless the doctor is an NHS anaesthetist with paediatric expertise or the clinical condition of the child is such that paediatric PHEA is the only option (airway obstruction or significant hypoxia not corrected by simple measures for example).

The on call clinical supervisor should be contacted in all cases of proposed paediatric PHEA under the age of 8 before proceeding except in exceptional circumstances. Do not delay PHEA if the clinical condition of the child warrants immediate intervention.

Consider transfer to the nearest hospital with a paediatric emergency department for children who require emergency anaesthesia (where this cannot be provided on scene within the guidance above) prior to onward transfer to a paediatric MTC.

6. PREPARATION

6.1 Access

- Confirm scene safety
- Move the patient to ensure 360° access if practical and this will not expose the patient unnecessarily or create unacceptable delay.
- The optimum position of the patient is on an ambulance trolley at kneeling height
- Ensure adequate lighting and/or shield the patient from direct sunlight
- Trapped patients can usually be extricated rapidly if their airway is compromised.
- Genuine entrapment is relatively uncommon. In these circumstances a supraglottic airway or surgical airway will probably be safer alternatives than PHEA in situ. This may be facilitated with the use of sedation and appropriate monitoring prior to extrication.
- The scene should be as quiet as possible.
- Do not anaesthetise a patient in a confined space unless there is no alternative.

6.2 Airway Assessment

All patients should have an airway assessment to help predict the possibility of a difficult airway including difficult mask ventilation and difficult intubation. This may influence the conduct of PHEA or change the risk benefit balance of PHEA.

6.3 Pre Oxygenation and Apnoeic Oxygenation

Pre oxygenation should be done using a bag valve mask with a two handed mask seal and nasal cannula in situ at 5-15lpm. The reservoir should be seen to move thus demonstrating a good mask seal.

A non rebreathing mask with nasal cannula at 15lpm can be used if it is not possible to use a bag valve mask but evidence has shown that this is less effective.

Apnoeic oxygenation via nasal cannula at 15lpm should be used for all patients during laryngoscopy if possible.

Oxygenation and ventilation should be optimised prior to PHEA where possible: open chest wounds should be sealed; consider treatment for tension pneumothoraces or plan for immediate post PHEA thoracostomy; ensure adequate tidal volume with assisted ventilation taking care to avoid gastric insufflation

6.4 Circulatory Access

In ideal circumstances prior to commencing PHEA the patient should have two IV cannula. Both should be flushed to ensure patency. Take particular care with cannula in the antecubital fossa that have not been placed by the TAAS crew (risk of inadvertent arterial placement or misplaced in soft tissues). If in doubt insert your own cannula(s).

If it is not possible to site an intravenous cannula use intraosseous access. The preferred site is the humeral head. One IO cannula is sufficient for PHEA if no other options are available.

6.5 Sedation

It may be necessary to sedate a patient prior to PHEA to facilitate management. This can be done using IV or IO boluses of:

- Midazolam in divided doses up to 0.1 mg / kg
- Ketamine in divided doses up to 0.5 mg / kg

6.6 Clinical Observations and Measurements

Prior to PHEA, the following should be recorded:

- Heart rate & pulse volume
- Respiratory rate and tidal volume assessment
- Level of consciousness (you must record GCS prior to PHEA)

- Focal neurology and spinal cord function
- Pupil size and reactivity
- Blood glucose

6.7 Monitoring

Establish monitoring with TAAS equipment as soon as possible and before commencing PHEA.

The following must be monitored:

- 3 lead ECG
- Oxygen saturations
- Non-invasive blood pressure
- End tidal CO2

ECG, pulse oximetry and end tidal CO2 are recorded continuously. NIBP should be cycled every three minutes or more frequently if possible. Temperature should be recorded as per CSOP 12.

6.8 Equipment Preparation

Oxygen	One for BVM or NRM, one for nasal cannula
Suction	Checked with a yankauer catheter connected and spare suction unit available
Bag Valve Mask Reservoir	Checked, bag inflated and connected to oxygen
Nasal cannula	In place on patient at 5-15lpm oxygen
Two Laryngoscopes	A choice of two blades, checked and working
Simple airway adjuncts	A range of OP and NP airways appropriate to patient

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Rescue Airway 1	Correct size LMA supreme with syringe and lubricant
Rescue Airway 2	Surgical airway equipment
Endotracheal Tubes	One of the appropriate size with the cuff checked and lubricated and one size smaller
20 ml syringe	To inflate the cuff
Bougie	To be available for all PHEA
Catheter Mount and Filter	Use during pre-oxygenation
End Tidal CO_2 adapter	Use during pre-oxygenation
Thomas tube holder or tape	The Thomas tube holder is the preferred device. Tape is to be used in small children. Avoid tube ties to mitigate the risk of worsening ICP
Check List	Final check before induction

6.9 Drugs

- Only drugs provided by TAAS should be used
- Two TAAS clinicians should verify dose, concentration, volume, expiry date and drug when drawing up medications
- Syringes should be labelled and capped until delivery as per CSOP 007 Critical Care Medicines

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Drug	Dose	Notes
Induction Agents		
Ketamine	1-2mg / kg IV or IO	Induction agent of choice for PHEA
Thiopentone	Up to 5mg / kg	Consider for isolated hypertensive head injury and status epilepticus
Analgesia and Sedation / Maintenance		
Fentanyl	1-3 µg/kg	Analgesia and as co induction to mitigate hypertensive response to laryngoscopy
Morphine	Up to 0.1 mg / kg	Maintenance of anaesthesia Small boluses (< 0.1 mg / kg) titrated to effect to avoid hypotension
Midazolam	Up to 0.1 mg / kg	Maintenance of anaesthesia Small boluses (< 0.1 mg / kg) titrated to effect to avoid hypotension
Paralysis		
Rocuronium	1mg/kg	Relaxant of choice for PHEA
Rocuronium	0.5 mg / kg	Ongoing paralysis if required
Vasoactive Agents		
Ephedrine	30mg in 10mls saline 3-6mg boluses	Titrated to response

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Metaraminol	10mg in 20mls saline 0.5mg (1ml) increments	Titrated to response Preferred choice to maintain cerebral perfusion pressure

The following dose regimes are suggested guidelines only – use clinical judgement to determine the correct drug(s) and to calculate the appropriate drug dose(s) for PHEA

Standard PHEA

1. Fentanyl up to 3 micrograms / kg
2. Ketamine 2 mg / kg
3. Rocuronium 1 mg / kg

Adjusted doses for patients who are felt to be at risk of significant post induction hypotension

1. Fentanyl 1 microgram / kg
2. Ketamine 1 mg / kg
3. Rocuronium 1 mg / kg

Consider rocuronium only in the peri-arrest / agonal patient whose airway reflexes or muscle tone prevents direct laryngoscopy but who in your judgement do not require an induction agent.

Consider the following for post ROSC PHEA

1. Fentanyl 2 micrograms / kg
2. Midazolam 0.05 – 0.1 mg / kg
3. Rocuronium 1 mg / kg

Under the appropriate PGD for TAAS CCPs midazolam and / or rocuronium may be used in selected patients for the provision of sedation and in the already intubated patient requiring subsequent paralysis.

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6.10 Personnel

Ideally there should be four clinicians in the team of people performing the PHEA. Where numbers are inadequate, non-clinicians (pilots, fire fighters) may be helpful however their role must be one of support.

The following roles are crucial:

Intubator	Must be either the TAAS Doctor or TAAS Paramedic
Drug Giver	Must be either the TAAS Doctor or TAAS Paramedic
MILS (if appropriate)	MILS should be used unless to do so adversely affects airway management
Kit Passer	Must be either the TAAS Doctor or TAAS Paramedic
Monitoring	The monitor must be placed where the TAAS Doctor and Paramedic can see it. The person not doing the intubation must continually monitor the screen, calling out any significant change in heart rate, NIBP or oxygen saturation
Cricoid Pressure	Ideally this should be carried out by someone who has been trained to perform it. Cricoid pressure should be removed if it makes the view of the cords difficult on the instruction of the intubator.

6.11 The PHEA Checklist and the PHEA Brief

A TAAS clinician should lead the team brief to ensure all staff present understand the process and that roles are clearly identified.

Following the team brief one of the TAAS crew should lead and complete the PHEA checklist (annex 1).

Once the brief and checklist is complete there should be no interruptions other than to identify an emergency or to confirm successful intubation.

7. PROCEDURE

The first intubation attempt should be optimised to maximise the first pass success rate.

Intubation should take less than thirty seconds from commencing laryngoscopy. If it is not achievable within this time: stop, ventilate the patient and commence the Thirty Second Drills.

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If after two attempts intubation has not been achieved move to the Failed Intubation Drill**.**

A key to minimising scene time is to ensure simultaneous activity throughout the process. Involve on scene crews – this might be their only serious trauma case over a longer period and will help maintain good working relationships with crews. Think several steps ahead and utilise scene personnel accordingly.

1. Complete the team brief and PHEA checklist

2. Apply manual in-line stabilisation, loosen the front of the collar and remove the head blocks

3. Confirm anatomy and landmarks for surgical airway and to position cricoid pressure correctly

4. Apply cricoid pressure if appropriate

5. On the instruction of the lead TAAS clinician administer the induction agent(s) as a rapid bolus followed by the neuromuscular blocking agent. Use a 10-20 ml saline flush following drug administration

6. Allow one minute for full muscle relaxation after administering the drugs and prior to laryngoscopy. Gentle ventilation (avoiding gastric insufflation) may be achievable and appropriate in some patients during this period. Obtain an appropriate laryngoscopic view to facilitate endotracheal intubation. Aim for a grade 2 view rather than a grade 1 view. Attempts to achieve a better than necessary view may worsen the hypertensive response to laryngoscopy, raise intracranial pressure and risk inadvertent movement of the cervical spine

7. A bougie is recommended for all intubations. At the discretion of the intubator with a good view the endotracheal tube may be inserted without a bougie. Pass the ET tube through the vocal cords, note the position of the black line above the cords and note the length of the tube at the teeth

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8. Remove the bougie and connect the self-inflating bag with catheter mount, angle piece, filter and CO2 adapter

9. Inflate the cuff gently obliterating any air leak but taking care to avoid over inflation

10. Confirm intubation by:
- Watching the tube go through the cords.
- Watching for equal chest rise and fall.
- Check presence of CO2 on monitor (or Easy Cap).
- Listen to confirm that there is no gastric insufflation and that there is equal air entry across both lung fields.

11. Remove cricoid pressure

12. Attach to Oxylog 3000 at the earliest opportunity. Initial settings: Vt 6-8 ml /kg, FIO2 1.0, no PEEP, CMV, adjust rate for a target ETCO2 of 4.5 kPa. As soon as practical start to titrate the FiO2 down to avoid hyperoxia. Aim for oxygen saturation of at least 96%

13. Consider the need for thoracostomies - positive pressure ventilation can rapidly convert a simple pneumothorax to a tension pneumothorax

14. Consider the insertion of an orogastric tube prior to securing the ET tube

15. The intubator will secure the ET tube in place, noting the depth of insertion at the teeth or upper gum. This is done with either a Thomas Tube Holder or tape, avoiding excessive circumferential pressure around the neck

16. Based on the clinical condition, vital signs and presence or absence of lacrimation administer titrated boluses of maintenance analgesia and sedation

17. Immobilise the patient as indicated and provide hearing protection

18. Monitor and maintain core body temperature

8. LOADING AND TRANSPORT

- Secure all lines and tubes
- Ensure hospital is pre alerted using a conference call via EOC if possible
- Check that the following is immediately available throughout the transfer to hospital
    - Bag valve mask
    - Laryngoscope, cuff syringe, bougie and replacement ET tube
    - Suction - flexible catheters and yankauer catheter
    - LMA Supreme
    - Nellcor N85 capnograph in case of primary $ETCO_2$ failure
    - Drugs for maintenance: analgesia and sedation
    - Resuscitation drugs

9. DOCUMENTATION

The following information must be documented to allow reference by hospital staff after hand over:

- Indication for PHEA
- Pre-induction vital signs and clinical condition including neurology
- Drugs used, timings and doses
- View at laryngoscopy and ease of mask ventilation where relevant
- Number of attempts at laryngoscopy
- Endotracheal tube size and length at lips
- Vital signs summary (print trends)
- Clinical course post induction
- Name(s) of the TAAS crew members
- Contact details for TAAS
- Any other relevant detail from the PHEA process including adverse events

10. AUDIT

All cases involving PHEA (or CCP administered rocuronium under the relevant PGD) must be recorded via taasBase and submitted to the TAAS governance group for review.

END OF DOCUMENT