



CG007.v1 Emergency Anaesthesia

1	Assessment	<ul style="list-style-type: none"> Carefully appraise risk-benefit of proceeding to anaesthesia Assess airway for difficulty in each area of airway management: <ul style="list-style-type: none"> mask ventilation, laryngoscopy and cricothyroidotomy Gain consent where feasible
2	Set up	<ul style="list-style-type: none"> Position patient on a trolley and optimise height, patient position and lighting Establish an organised equipment dump Assemble BVM with catheter mount, HME and capnograph; consider a PEEP valve Confirm function of capnograph during set up Ensure monitoring is applied and visible to the airway assistant
3	Pre-oxygenation	<ul style="list-style-type: none"> Apply high flow oxygen Consider nasal cannula oxygen delivery if adequate oxygen cylinders Use BVM and tight fitting face mask with any chest or pulmonary pathology: assist spontaneous breathing and consider a PEEP valve Consider ketamine 0.25 mg/kg boluses for sedation to allow pre-oxygenation
4	Cardiovascular	<ul style="list-style-type: none"> Establish running IV infusion Consider methods to optimise haemodynamic state prior to induction
5	Team	<ul style="list-style-type: none"> Allocate roles and provide a briefing appropriate to all team members Use the challenge and response checklist
6	Induction	<ul style="list-style-type: none"> Consider Ketamine as hypnotic: 2 mg/kg or 1mg/kg in shock Consider either Alfentanil 10-20 mcg/kg or Fentanyl 1-3 mcg/kg Consider Rocuronium 1.2 mg/kg as primary muscle relaxant <ul style="list-style-type: none"> consider Suxamethonium 1.5 mg/kg as an alternative
7	Cricoid pressure	<ul style="list-style-type: none"> Consider using cricoid pressure Explain cricoid pressure to patients who are awake prior to induction Remove it early if difficulty in ventilating or passing endotracheal tube
8	Per-oxygenation	<ul style="list-style-type: none"> Use mask IPPV with slow gentle inflations - do not allow apnoea Continue nasal cannula oxygen delivery if used in preoxygenation
9	Intubation	<ul style="list-style-type: none"> Use a maximum of three attempts, including videolaryngoscopy Consider use of bougie: do not use blind nor seek hold up Use waveform ETCO₂ to confirm endotracheal tube placement
10	Failed intubation	<ul style="list-style-type: none"> Insert second generation LMA <ul style="list-style-type: none"> transport if insertion successful; keep paralysed Face mask ventilate: consider feasibility of continuing in transport Perform open surgical cricothyroidotomy
11	Maintenance	<ul style="list-style-type: none"> Use propofol by infusion or boluses of midazolam or ketamine Consider need for maintenance opioids in all patients by bolus or infusion Provide sufficient anaesthesia to prevent awareness



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2. Document History			
Reference Number	CG007		
Version	1		
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		Paediatric	X
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	BASICS Scotland		X
	Medic 1		✓
	Tayside Trauma Team		✓
	Rural GPs Association of Scotland		X
SAS Air Ambulance Division		for information	





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3. Scope and purpose

- Overall objectives:

Anaesthesia is one of the cornerstones of critical care provision in the prehospital, remote and rural environment. Given the resource limitations, it is not without risk. The aim of this guideline is to define the approach to delivery of general anaesthesia in the retrieval and prehospital environments. In addition, a number of “consider” points have been identified that may serve as useful modifications depending on the exact environment or clinical presentation.

- Statement of intent:

This guideline is not intended to be construed or to serve as a standard of care. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan.

- Feedback:

Comments on this guideline can be sent to: scotamb.CPG@nhs.net

- Equality Impact Assessment:

Applied to the ScotSTAR Clinical Standards group processes.

- Guideline process endorsed by the Scottish Trauma Network Prehospital, Transfer and Retrieval group.





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4. Explanatory Statements		
4.1 Assessment	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> <i>Carefully appraise risk-benefit of proceeding to anaesthesia</i> <p>Induction of anaesthesia within 45 minutes of the initial call is advised, at the scene if required, in patients with airway compromise or ventilatory failure [1]. The only RCT showed improved functional outcome in head injury [2]. A meta-analysis of mostly retrospective studies however suggests that the in-hospital environment may be safer [3] and a small retrospective analysis suggested that conscious hypovolaemic patients may do worse [4]. Overall, careful assessment is essential; consider discussion with a colleague.</p>	GPP	Guideline [1] 1++ [2] 2- [3,4]
<ul style="list-style-type: none"> <i>Assess airway for difficulty in each area of airway management:</i> <ul style="list-style-type: none"> <i>mask ventilation, laryngoscopy and cricothyroidotomy</i> 	Strong	Guidelines [5,6]
<ul style="list-style-type: none"> <i>Gain consent where feasible</i> 	GPP	
4.2 Set-up	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> <i>Position patient on a trolley and optimise height, patient position and lighting</i> <p>Ideally, the patient should be raised on a trolley with 360° access. Full 360° access needs to be balanced with the weather conditions and induction the back of the ambulance may be required [GPP]</p> <p>If feasible, position the head into the “sniffing” position or “ramped” for the obese to optimise laryngoscopic view. Head-up tilt or tilt of the whole trolley is recommended to improve pre-oxygenation although in a heterogeneous ICU population it might not reduce desaturation and may increase incidence of difficult laryngoscopy.</p> <p>Lighting should be sufficient but not too bright.</p>	Conditional	Guideline [7] Guidelines [5,6,7] 1++ [8] Guideline [7]
<ul style="list-style-type: none"> <i>Establish an organised equipment dump</i> 	Strong	Guideline [7]
<ul style="list-style-type: none"> <i>Assemble BVM with catheter mount, HME and capnograph; consider a PEEP valve</i> <p>A PEEP valve is suggested to prevent desaturation secondary to absorption atelectasis [6].</p>	GPP	
<ul style="list-style-type: none"> <i>Confirm function of capnograph during set up</i> 	Strong	Guideline [7]
<ul style="list-style-type: none"> <i>Ensure monitoring is applied and visible to the airway assistant</i> 	GPP	



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4.3. Preoxygenation	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Apply high flow oxygen 	Strong	Guideline [7]
<ul style="list-style-type: none"> Consider nasal cannula oxygen delivery if adequate oxygen cylinders <p>Nasal cannula to augment preoxygenation is suggested with the recognition that the evidence base is uncertain [6]. The RCT evidence for standard flow nasal cannulae prolonging oxygenated apnoea time comes from small studies in elective theatre patients without pulmonary pathology [9-11]. An RCT in ICU patients showed no benefit [12].</p>	Conditional	Guideline [6] 1- [9,10,11] 1++ [12]
<ul style="list-style-type: none"> Use BVM and tight fitting face mask with any chest or pulmonary pathology: assist spontaneous breathing and consider a PEEP valve <p>The recommended [6] "C" (Waters) circuit will not be available; accordingly, pre-oxygenation is a matter of compromise between the trauma mask and BVM. The BVM provides for a higher ETO₂, at least in volunteers [13]. The BVM is recommended for patients with respiratory compromise [7]. Use of the BVM avoids the need to change oxygen sources and provides an immediate means of mask ventilation. Consider gentle support of spontaneous ventilation.</p>	Conditional	1- [13] Guideline [7]
<ul style="list-style-type: none"> Consider ketamine 0.25mg/kg boluses for sedation to allow pre-oxygenation <p>Sedate with ketamine to facilitate preparation and pre-oxygenation. Only do so when otherwise prepared to proceed with anaesthesia. The cited study used an initial dose of 1mg/kg ketamine; we consider an incremental approach with 0.25mg boluses to be more reasonable (GPP). (Midazolam is also suggested [7])</p>	Conditional	2+ [14] Guideline [7]
4.4. Cardiovascular	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Establish running IV infusion 	GPP	
<ul style="list-style-type: none"> Consider methods to optimise haemodynamic state prior to induction <p>In shocked non-trauma patients, cardiovascular state may be improved by fluid or vasopressor boluses or starting an inotrope infusion.</p>	Conditional	Guideline [6]



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4.5 Team	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Allocate roles and provide a briefing appropriate to all team members 	Strong	Guideline [7]
<ul style="list-style-type: none"> Use the challenge and response checklist <p>Checklists are recommended although they appear not to alter patient centred outcomes.</p>	Strong	Guidelines [6,7] 1++ [15]

4.6 Induction	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Consider Ketamine as hypnotic: 2 mg/kg or 1mg/kg in shock <p>Ketamine is recommended as a suitable induction agent. Caution has been advised where the sympathomimetic effects might be harmful (eg severe cardiac disease). Use the reduced dose in hypovolaemic patients or consider titrating to loss of consciousness.</p>	Conditional	Guidelines [6,7]
<ul style="list-style-type: none"> Consider either alfentanil 10-20 mcg/kg or fentanyl 1-3 mcg/kg <p>An opioid should be considered to suppress the pressor response and minimise the hypnotic dose. The only relevant RCT was small and performed in trauma patients with normal BP and did not show a difference between alfentanil and fentanyl [16].</p>	Conditional	Guideline [6] 1- [16]
<ul style="list-style-type: none"> Consider Rocuronium 1.2 mg/kg as the primary muscle relaxant <p>Latest guidelines appear to recommend rocuronium over suxamethonium [5,6] since rescue techniques are thought more likely to be successful in a paralysed patient. Rocuronium use has been demonstrated to be effective in a cohort comparison [17]. Meta-analysis of intubating conditions alone is in favour of suxamethonium [18].</p>	Conditional	Guidelines [5,6] 2+ [17] 1++ [18]
<ul style="list-style-type: none"> Suxamethonium 1.5 mg/kg is an alternative <p>Suxamethonium does enable a wake-up option, even if this is seldom appropriate. Contraindications to suxamethonium are:</p>	GPP	
<ul style="list-style-type: none"> Absolute: <p>Allergy to suxamethonium Hyperkalaemia Crush injury Burns >24hr Spinal cord injury >24hr Denervating conditions (eg MND, MS) Muscular dystrophy Previous malignant hyperthermia</p>	<ul style="list-style-type: none"> Relative: <p>Suxamethonium apnoea Family history of MH Open eye injury</p>	



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4.7 Cricoid pressure	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>Consider using cricoid pressure</i> <p>An on scene decision should be made if the available resource enables this. It should be applied by a competent individual, as their only procedural task. Apply with loss of consciousness, remove only when intubation is confirmed. Cricoid pressure also allows external laryngeal manipulation and may reduce gastric distention if mask ventilation is used. Cricoid pressure remains a recommendation of major guidelines (even though the evidence base is limited [19]). The debate is recognised in the most recent guideline [6]. This writing group cannot find guidance within the literature to inform a decision to work contrary to these guidelines but recognise the space and resource implications of its use and that many patients will already have reduced consciousness. Overall, we make a conditional “consider” recommendation.</p>	Conditional	Guidelines [5,6,7] 1++ [19]
<ul style="list-style-type: none"> • <i>Explain cricoid pressure to patients who are awake prior to induction</i> 	GPP	
<ul style="list-style-type: none"> • <i>Remove early if difficulty in ventilating or passing ETT</i> <p>Remove cricoid pressure if active vomiting (<i>ie</i> before the muscle relaxant has worked) or if there is difficulty with face mask ventilation, laryngoscopy, intubation or during failed intubation procedures, including LMA insertion.</p>	Strong	Guideline [5,6,7]
4.8 Per-oxygenation	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>Use mask IPPV with slow gentle inflations - do not allow apnoea</i> <p>Face mask ventilation prior to laryngoscopy is now a recommendation of the DAS anaesthesia guideline [5]. The wider concept of per-oxygenation is identified in the DAS critical care guideline [6]. This should be with slow gentle inflations.</p>	Strong	Guidelines [5,6]
<ul style="list-style-type: none"> • <i>Continue nasal cannula oxygen delivery if used in pre-oxygenation</i> <p>Discussed in 4.4. It would be appropriate to continue this if started.</p>	Strong	Guideline [6]



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4.9 Intubation	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Use a maximum of three attempts, including videolaryngoscopy <p>Videolaryngoscopy can be considered as an alternative blade. Although recent guidelines propose its use after a single failed attempt [6], the role of videolaryngoscopy in emergency anaesthesia is uncertain with some trials reporting signals of harm [20]. Specific to prehospital emergency anaesthesia by experienced intubators, failure rates may be high [21]. Be aware of the effects of ambient light and secretions [21,22].</p>	Strong	Guidelines [5,6] 1++ [20] 1++ [21] 3 [22]
<ul style="list-style-type: none"> Consider use of bougie: do not use blind nor seek hold up <p>Bougie trauma is a recognised complication of bougie use. The bougie should not be used in a blind situation and hold up should not be sought.</p>	Conditional	Guidelines [5,7]
<ul style="list-style-type: none"> Use waveform ETCO₂ to confirm endotracheal tube placement 	Strong	Guidelines [6,7]

4.10 Failed intubation	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Insert second generation LMA 	Strong	Guidelines [5,6]
<ul style="list-style-type: none"> - transport if insertion successful; keep paralysed 	GPP	
<ul style="list-style-type: none"> Face mask ventilate: consider feasibility of continuing in transport <p>Face mask ventilation should be provided between attempts at LMA placement. If an LMA cannot be sited but face mask ventilation is feasible then an on-scene decision should be made as to the practicalities of continuing for transport or proceeding to cricothyroidotomy.</p>	Strong GPP	Guidelines [5,6]
<ul style="list-style-type: none"> Perform open surgical cricothyroidotomy <p>Use an open scalpel technique. This is detailed in the Emergency Surgery guideline.</p>	Strong	Guidelines [5,6]

4.11 Maintenance	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Use propofol by infusion or boluses of midazolam or ketamine 	GPP	
<ul style="list-style-type: none"> Consider need for maintenance opioids in all patients by bolus or infusion 	GPP	
<ul style="list-style-type: none"> Provide sufficient anaesthesia to prevent awareness <p>This is particularly relevant for patients who were neurologically intact prior to anaesthesia (eg respiratory failure alone). Ensure the sedation level is adequate prior to administration of repeated doses of muscle relaxants.</p>	Strong	Guideline [7]



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5. References

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