Theatre Checklists - Routine & Emergency

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Although not a fan of ‘cookook medicine’, there is no doubt that checklists can help eliminate simple errors or oversight in even the most experienced doctor - particularly when task-loaded in an emergency. These checklists and aide memoires have been compiled from a variety of sources and should be used in theatre both routinely and in an evolving crisis.

Sources
Australian Resuscitation Council - www.resus.org.au
Difficult Airway Society UK - www.das.uk.com
National Patient Safety Foundation - www.apsf.net.au
INTRODUCTION

PRINCIPLES OF CRISIS MANAGEMENT
COVER ABCD A SWIFT CHECK
SAFE SURGERY CHECKLIST

CONTENTS

Please notify any errors, omissions or suggestions for improvement.

Responsibility for drug doses remains with the prescriber. If in doubt, check.

No liability is accepted for errors in this compilation of checklists & algorithms

APPENDICES

FORMULARY
PSYCHIATRIC SEDATION
RETRIEVAL HANOVER
ANAESTHESIA & AVIATION

EMERGENCY INDUCTION
HYPOXIA
AIRWAY PRESSURES
HYPO/HYPERCAPNIA
DIFFICULT AIRWAY

HYPOTENSION
MASSIVE BLOOD LOSS
MYOCARDIAL ISCHAEMIA
ARRHYTHMIAS & ARREST

NEURAXIAL BLOCKADE
CAESAREAN SECTION
GA & Spinal emLSCS

ANAPHYLAXIS
LOCAL ANAESTHETIC TOXICITY
TURP SYNDROME
MALIGNANT HYPERTHERMIA

PAEDIATRIC CARDIAC ARREST
NEONATAL RESUSCITATION
PAEDIATRIC CHEAT SHEET
<table>
<thead>
<tr>
<th><strong>PRINCIPLES OF CRISIS MANAGEMENT</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>KNOW, MODIFY and OPTIMISE</strong></td>
</tr>
<tr>
<td>THE ENVIRONMENT</td>
</tr>
<tr>
<td>establish protocols and procedures</td>
</tr>
<tr>
<td>ensure room set up is conducive to</td>
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<tr>
<td>crisis - layout, equipment etc</td>
</tr>
<tr>
<td>how can things be improved (this</td>
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<tr>
<td>includes equipment)</td>
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<tr>
<td><strong>ANTICIPATE and</strong></td>
</tr>
<tr>
<td><strong>PLAN FOR A CRISIS</strong></td>
</tr>
<tr>
<td>patient - procedure - equipment -</td>
</tr>
<tr>
<td>drugs - personnel - retrieval</td>
</tr>
<tr>
<td>- global plans</td>
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<tr>
<td>- specific plans</td>
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<tr>
<td><strong>ENSURE LEADERSHIP and</strong></td>
</tr>
<tr>
<td><strong>ROLE CLARITY</strong></td>
</tr>
<tr>
<td>assign leader</td>
</tr>
<tr>
<td>preferably not responsible for</td>
</tr>
<tr>
<td>tasks ie: has an overview of the</td>
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<tr>
<td>situation</td>
</tr>
<tr>
<td>leader decides, prioritises and</td>
</tr>
<tr>
<td>assigns tasks to team</td>
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<tr>
<td><strong>COMMUNICATE EFFECTIVELY</strong></td>
</tr>
<tr>
<td>leadership and followship</td>
</tr>
<tr>
<td>aided by clear communication</td>
</tr>
<tr>
<td>eye contact, use names, clear</td>
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<tr>
<td>instructions, ensure understanding</td>
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<tr>
<td>and report back</td>
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<tr>
<td>close the loop - upstream/downstream communication</td>
</tr>
<tr>
<td><strong>CALL FOR HELP or</strong></td>
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<tr>
<td><strong>SECOND OPINION EARLY</strong></td>
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<tr>
<td>call for help early - even if not</td>
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<tr>
<td>in a crisis</td>
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<tr>
<td>second opinion may be reassurance</td>
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<tr>
<td>enough or suggest alternatives</td>
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<tr>
<td>avoid therapeutic inertia</td>
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<tr>
<td><strong>ALLOCATE ATTENTION and</strong></td>
</tr>
<tr>
<td><strong>USE AVAILABLE INFORMATION</strong></td>
</tr>
<tr>
<td>fixation errors common</td>
</tr>
<tr>
<td>beware attentional tunnelling /</td>
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<tr>
<td>situational overload</td>
</tr>
<tr>
<td>if you are stressed you are likely</td>
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<tr>
<td>to be missing something</td>
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<tr>
<td><strong>DISTRIBUTE WORKLOAD and</strong></td>
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<tr>
<td><strong>USE AVAILABLE RESOURCES</strong></td>
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<tr>
<td>maintain situational awareness</td>
</tr>
<tr>
<td>delegate tasks, use external</td>
</tr>
<tr>
<td>resources (telemedicine/retrieval)</td>
</tr>
<tr>
<td>if all else fails, think laterally</td>
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<tr>
<td>- improvise/adapt/overcome</td>
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</table>
**SCARE**
- Colour, Circulation, Capnography
- Oxygen Supply & O2 Analyser
- Ventilation & Vaporisers
- ETT tube & Eliminate Machine
- Review - Monitors & Equipment
- Airway (face or laryngeal mask), meticulous attention to ETT
- Breathing (SV/IPPV)
- Circulation, IV, Blood loss, ECG
- Drugs - consider all given & not given, check emergency drugs
- Be Aware of Air and Allergy
- Check Patient, Surgeon, Processes & Responses

**SCAN**
- BP, HR, Rhythm, ETCO2, SpO2, Colour
- FiO2, Rotameter, O2 analyser matches FiO2
- Ventilation - RR, TV Vaporiser & Mix
- ETT position & security Able to Eliminate (bag)?
- Review monitors, update records, review equipment
- Airway position, patent? Distance in cm
- Breathing pattern OK?
- Circulation - trends, fluids and blood loss
- Drugs given & appropriate response?
- Awareness - Patient Asleep, Self OK?
- Progress of Surgeon and of Operation

**CHECK**
- Radial pulse, correlate, SPO2 dislodged?
- Increase FiO2, watch MAC
- Check circuit & vaporiser, ventilate by hand
- Distance in cm? Kinked? Bag and O2 available?
- Review monitors, review equipment - any changes?
- Observe & palpate neck, ETT position, cuff
- Observe, palpate & auscultate chest. ETCO2?
- Cross check BP, IV, losses & response to Rx/surgery
- Check drugs (error?) and patency IV line. Flushed?
- Awareness, Air Embolism, Anaphylaxis, Air in Pleura?
- Question surgeon, review old Notes

**ALERT/READY**
- Allocate roles - IV access
- Arrest trolley
- FiO2 100%
- Maintain anaesthesia?
- Self-inflating bag, turn off vaporiser (use propofol?)
- Switch ETT or use LMA
- Eliminate circuit/machine
- Emergency Equipment RETRIEVAL?
- Aspiration, Laryngospasm
- Obstruction, ETT/LMA
- Bronchospsam, Oedema, Hypoxia, Hypoventilation
- Hypo/Hypertension
- Arrhythmia, Arrest Algorithm
- Drug error? Antidote? ANAPHYLAXIS?
- Awareness, Air Embolism, Anaphylaxis, Air in Pleura?
- Notify Surgeon & Mobilise Staff

**EMERGENCY**
- LARGE BORE IVs, FLUIDS, DEFIB, DRUGS
- HIGH FLOW OXYGEN
- AVOID AWARENESS
- VENTILATE BY BAG
- ENSURE ETT PLACED OR ALTERNATIVE
- DELEGATE OPERATION OF EQUIPMENT
- AIRWAY PATENT & PROTECTED
- ADDRESS HYPOXIA, HYPOVENTILATION
- CRYSTALLOID, BLOOD VASOPRESSORS, CPR
- ATROPINE 10mcg/kg
- ADRENALINE 10mcg/kg
- MAINTAIN SITUATIONAL AWARENESS
- DEFINITIVE SURGERY OTHER CRISIS?

**COVER ABCD - A Swift Check**
BEFORE INDUCTION

Nurse & Anaesthetist

- Has patient confirmed identity, site, surgery and consent? Yes
- Is the surgical site marked? Yes
- Is the anaesthetic machine & medication check complete? Yes
- Are pulse oximeter, BP & ECG on the patient, functioning & acceptable? Yes
- Does the patient have a known allergy? No
- Difficult airway or aspiration risk? No
- Risk > 500ml blood loss (7ml/kg children)? No

BEFORE INCISION

Nurse, Surgeon & Anaesthetist

- Confirm all team members name & role Yes
- Confirm patient name & nature of surgery Yes
- Confirm antibiotic prophylaxis given Yes

ANTICIPATED CRITICAL EVENTS

To Surgeon
- What are critical or non-routine steps? How long will case take? Anticipated blood loss?

To Anaesthetist
- Any patient-specific concerns? Eyes taped, pressure points protected?

To Nursing Team
- Has sterility been confirmed? Any equipment issues or any concerns? Is appropriate imaging displayed?

BEFORE LEAVE OT

Nurse, Surgeon & Anaesthetist

- Nurse verbally confirms:
  - Name of the procedure
  - Equipment, sponge & sharp counts correct
  - Specimens labelled?
  - Any equipment issues arising?

To surgeon, anaesthetist & nurse
- What are the key concerns for this patient in recovery and ongoing management?

Recovery staff
- Patient awake & adequate ventilation?
- Drug chart completed?
- Antibiotics and analgesia addressed?
- DVT thromboprophylaxis?
<table>
<thead>
<tr>
<th>Prepare Patient</th>
<th>Prepare Equipment</th>
<th>Prepare Team</th>
<th>Anticipate Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Is position optimal?</strong>&lt;br&gt;- ear to sternum&lt;br&gt;- ramp if obese&lt;br&gt;- MILS for trauma</td>
<td><strong>Is patient monitoring applied, functioning and values acceptable?</strong>&lt;br&gt;- SpO2&lt;br&gt;- ECG&lt;br&gt;- BP&lt;br&gt;- ETCO2&lt;br&gt;- BIS</td>
<td><strong>Delegate and brief team:</strong>&lt;br&gt;- team leader&lt;br&gt;- intubator&lt;br&gt;- assistant&lt;br&gt;- cricoid pressure&lt;br&gt;- MILS&lt;br&gt;- drug administration&lt;br&gt;- extra assistance required</td>
<td><strong>If airway is difficult, can we wake this patient?</strong>&lt;br&gt;Yes ☐  No ☐</td>
</tr>
<tr>
<td><strong>Is preoxygenation adequate?</strong></td>
<td><strong>Is equipment checked and immediately available?</strong>&lt;br&gt;- self-inflating bag&lt;br&gt;- appropriate sized Guedel/NPO&lt;br&gt;- laryngoscope working &amp; spare&lt;br&gt;- ET tube and alternatives&lt;br&gt;- Suction&lt;br&gt;- Bougie</td>
<td><strong>How do we get further help if required?</strong>&lt;br&gt;- other theatre staff available?&lt;br&gt;- other doctors available?&lt;br&gt;- retrieval service notified?</td>
<td><strong>If intubation is difficult, how to maintain oxygenation?</strong>&lt;br&gt;Plan A - Intubate &amp; Ventilate&lt;br&gt;Plan B - iLMA/ VL/Fibreoptic&lt;br&gt;Plan C - Oxygenation with BMV&lt;br&gt;Plan D - CICO, Surgical Airway</td>
</tr>
<tr>
<td><strong>Can this patient's condition be optimised any further prior to intubation?</strong>&lt;br&gt;- O2, Haemoglobin&lt;br&gt;- Cardiac contractility, rate&lt;br&gt;- Afterload, Preload&lt;br&gt;- PEEP&lt;br&gt;- IV access adequate &amp; secure</td>
<td><strong>Do you have all the necessary drugs, including vasopressors?</strong>&lt;br&gt;- Amnesic and/or Analgesic&lt;br&gt;- Induction agent&lt;br&gt;- Neuromuscular blockade</td>
<td><strong>LEMON Assessment</strong>&lt;br&gt;Look - beard, no neck, dentition&lt;br&gt;Evaluate - thyromental &gt; 6cm&lt;br&gt;Mallampati score : I - IV&lt;br&gt;Obstruction - stridor/burns&lt;br&gt;Neck Movement - collar/arthritis</td>
<td><strong>Is the necessary equipment immediately available?</strong></td>
</tr>
<tr>
<td><strong>How will anaesthesia be maintained post induction?</strong>&lt;br&gt;- vaporisers full &amp; checked&lt;br&gt;- adequate IV medications&lt;br&gt;- pump sets available</td>
<td></td>
<td><strong>Are there any specific problems anticipated?</strong>&lt;br&gt;- awareness, aspiration&lt;br&gt;- profound desaturation&lt;br&gt;- hypotension, arrhythmias&lt;br&gt;- patient positioning/transfer&lt;br&gt;- other?</td>
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</table>
## Hypoxia

### Oxygen Supply
- **Check:**
  - Pressure gauges
  - Flow meters
  - FiO2
  - Vaporizer housing

### Anaesthetic Machine
- **Check Ventilator:**
  - VT
  - Rate
  - Airway Pressures
  - Mode

### Anaesthetic Circuit
- **Check Circuit:**
  - Connections
  - One-way valves
  - Filter
  - Soda lime

### Patient Airway
- **Check Airway:**
  - Exclude obstruction
  - In native airway
  - In filter
  - In airway devices
  
  Exclude secretions/plugging - pass suction catheter beyond end of ETT

### Ventilation of Patient

### Patient Lungs
- **Ensure adequate ventilation:**
  - Exclude bronchial intubation
  - Look/listen for bilateral AE
  - Assess adequacy of MV
  - Exclude bronchospasm
  - Recheck airway pressures
  - Exclude pneumothorax

### Consider Gas Exchange:
- **Aspiration**
- **Pulmonary oedema**
- **Consolidation**
- **Atelectasis**

### Consider Embolism:
- **Of thrombus, air or fat**

### Patient Circulation
- **Circulation:**
  - Low cardiac output

### Consider Embolism:
- **Of thrombus, air or fat**

### Tissue Uptake of O2
- **Increased metabolism:**
  - Fever
  - Thyroid crisis
  - Etc

### Patient Tissues

### SpO2 < 90% or SpO2 falling by > 5%
INCREASED ETCO2

Inhaled / Exogeneous CO2

Inhaled
Check capnograph for return to baseline

Exogeneous
Laparoscopic CO2 insufflation
NaHCO3 administration
Inspired CO2 (soda lime exhausted)
Incompetent valves
Re-breathing

Hypoventilation

Respiratory depression
Increased mechanical load on lungs
(decreased compliance, increased resistance in system)
Inadequate IPPV - check TV/RR/PEEP
Increased dead space - anatomical/physiological

Increased Production of CO2

Fever
Parenteral nutrition
Malignant hyperthermia

DECREASED ETCO2

Airway
Consider oesophageal intubation, accidental extubation

Circuit
Air entrainment (leak),
Dilution with circuit gases (sampling problem)

Ventilator
Ventilator settings,
Overenthusiastic bagging

Gas Exchange Problem
Pulmonary embolism,
Cardiac failure/arrest,
Severe hypotension

Decreased Production

Hypothermia
Hypothyroidism
Decreased metabolism

END TIDAL CO2

Apnoea causes rise of PaCO2 8-15mmHg in first minute, then 3mmHg/min
HIGH AIRWAY PRESSURES

**Gas supply**
- Check Gas Supply:
  - check O2 bypass
  - ensure O2 flush not jammed
  - eliminate other high pressure source

**Anaesthetic circuit**
- Check Circuit:
  - bag / ventilator switch?
  - obstruction to expiration in circuit/ventilator/scavenger system?
  - PEEP valve & settings?
  - exclude circuit & machine by ventilating with bag

**Patient airway**
- Exclude Obstruction:
  - filter
  - airway
  - ETT
  - secretions / foreign body

**Patient lungs**
- Bilateral chest expansion?
  - Endobronchial intubation, PTX

**Patient pleural space**
- Breath sounds?
  - Bronchospasm, atelectasis, aspiration, pulmonary oedema, endobronchial intubation

**Patient chest wall**
- Consider and exclude:
  - pneumothorax
  - haemothorax
  - 14G needle (2nd ICS MCL)
  - Finger or tube thoracostomy (ant axillary line 5th ICS)

**Surgical procedure**
- Exclude inadequate chest wall relaxation
  - inadequate muscle relaxation
  - opioid-induced rigidity
  - malignant hyperthermia
  - obesity

- Raised intrathoracic pressure
  - surgical intervention
  - insufflation
  - patient position
  - assistant leaning on chest!

- HIGH AIRWAY PRESSURES
  - Difficulty ventilating patient
  - decreased compliance in bag
  - poor chest expansion
  - reduced tidal volume
  - high airway pressure alarm

  - Hypoxia
    - (due to hypoventilation)

  - Circulatory collapse
    - (high intrathoracic pressure)

  - Tachycardia
DIFFICULT AIRWAY - OVERVIEW

MAXIMUM THREE ATTEMPTS
CHANGE POSITION - BLADE - OPERATOR
USE BOUGIE - CONSIDER STYLET - VL

SECONDARY INTUBATION PLAN
FastTrach iLMA
KingVision Videolaryngoscope
Ambu Ascope through dedicated iLMA

BAG MASK VENTILATION
WAKE THE PATIENT

RESCUE TECHNIQUES
Declare a CICO Emergency
Continue to use LMA to attempt oxygenation
Identify cricothyroid membrane
Needle or Scalpel-Bougie-ETT Technique
Consider Frova (oxygenating bougie)
DIFFICULT AIRWAY - FAILED RSI

Plan A: Initial Endotracheal Intubation Plan

- Tracheal Intubation

Plan B: Rescue Techniques

- Failed ventilation and oxygenation
  - Oxygenate and ventilate
  - LMAMA
    - Failed oxygenation
      - Use face mask, oxygenate and ventilate
      - O2: SpO2  < 90% with FIO2 1.0 via face mask
      - Ventilation during intubation
        - Consider reducing oral force if
          - with oral intubation
        - 1 or 2 person mask technique
        - Use face mask, oxygenate and ventilate

Plan C: Maintenance of ventilation & oxygenation

- Postoperative or OXYGENATION/VENTILATION
- Failed intubation
  - Failure in double take intubation
  - Examine gag reflex
  - Examine vocal cords

- Failed intubation
- Failed ventilation
- Failed oxygenation

For help call

Induction of anaesthesia in non-obstetric adult patient
Unanticipated difficult tracheal intubation - during rapid sequence

Direct laryngoscopy

Any problems

Call for help
DIFFICULT AIRWAY - KIT

**MAX 4 ELECTIVE**
**MAX 3 RSI**

**Plan A:**
Initial tracheal intubation plan
- Direct laryngoscopy
  - succeeded → Tracheal intubation
  - failed intubation

**Plan B:**
Secondary tracheal intubation plan
- ILMA™ or LMA™
  - succeeded → Confirm - then fiberoptic tracheal intubation through ILMA™ or LMA™
  - failed intubation
  - failed oxygenation

**Plan C:**
Maintenance of oxygenation, ventilation, postponement of surgery and awakening
- Revert to face mask
  - Oxygenate & ventilate
  - failed oxygenation
  - succeed → Postpone surgery
  - Awaken patient

**Plan D:**
Rescue techniques for "can't intubate, can't ventilate" situation
- Cannula cricothyroidotomy
  - increasing hypoxaemia
  - or
  - succeed → Awaken patient
  - Surgical cricothyroidotomy
  - fail

**INTUBATE THE TRACHEA**
Re-Position - Use a Bougie - Videolaryngoscope

**LMA as a CONDUIT TO ETT**
LMA, ProSeal/Supreme iLMA FastTrach or AmbuAscope via iLMA

**AWAKEN & POSTPONE or RE-GROUP**
BMV - NPO & Guedels - LMA - Consider Suggamadex

**CICV RESCUE TECHNIQUES**
Cannula - Jet Insufflation - Melker Dilatation
Scalpel - Bougie - ETT
DIFFICULT AIRWAY - KIT CHECKLIST

**PLAN A**
TRACHEAL INTUBATION PLAN
max 3 attempts RSI
max 4 attempts ELECTIVE

Re-Position - Use a Bougie - Videolaryngoscope

**PLAN B**
SECONDARY INTUBATION PLAN
not in RSI
maintain oxygenation & ventilation

ETT via iLMA blind or fiberoptic

**PLAN C**
AWAKEN
re-group
postpone surgery
two handed BMV - Adjuncts - LMA

**PLAN D**
CICO/CICV
needle or surgical airway

Ramp - Ear to Sternum
Bougie - Aintree Catheter - Frova Oxygenating Bougie
Change Blade Size
Consider Straight Blade / McCoy / Kessel
AirTraq - KingVision VL

Use LMA - ProSeal or Supreme
FastTrach iLMA
Ambu Ascope2 via iLMA

Bag Mask Ventilate
Guedels - Nasopharyngeal Airway
LMA inc iGel
Suggamadex at 4-8mg/kg

Consider USS to locate and mark cricothyroid membrane
14 G jelco and O2 connection with 3-way tap
Manu-Jet
Size 22 scalpel - Bougie - size 6.0 ETT
| B | Buy time | *Sit up, use non-rebreather, increase FiO2, NIV, PEEP (BMV or vent)* |
| I | Indication | *Do we really need to intubate? Can it wait?*
|   |   | *Options : wait for help - videolaryngoscopy - iLMA or Proseal - awake intubation* |
| G | Get help | *Extra hands. Talk to retrieval.* |
| R | Ramp | *Use pillows, ear to sternum, flat on top - RAMP RAMP RAMP!*
| A | Apnoeic O2 | *Oxygenation via nasal specs at 10-15 l/min during RSI* |
| M | Minimal drugs | *Nebulise lignocaine & spray the cords!*
|   |   | *Ketamine/Propofol (100mg each in 20ml syringe)* |
| P | Preoxygenate | *With NIV for 3-5 mins max* |
| P | Paralysis | *Only if needed. Sux 1mg/kg or Roc 1.2mg/kg* |
| P | Plan for failure | *Plan B - Plan C - Plan D (CICV)* |
| P | Post intubation | *NGT, IDC, IV, sedation/paralysis*
|   |   | *paperwork for transfer* |
**VENTILATOR ASSISTED BMV**
SIMV MODE - PEEP 10 - PS 5-10 above PEEP
TV 5-7ml/kg ideal body weight - RR12 - FIO2 100% - Flow 15-30 l/min - ETCO2 in line

**RSI**
- IV induction agent & paralysis
- position once obtunded
- connect vent to mask (settings as above)
- cricoid, two handed mask seal
- ETT once OXYGENATION OPTIMAL

**RSA**
- IV induction agent & paralysis
- position once obtunded
- connect vent to mask (settings as above)
- cricoid, two handed mask seal
- SGA once PARALYSED
- decompress stomach via SGA
- optimise oxygenation
- consider iLMA as conduit for ETT
- else remove LMA and place ETT

**DSI**
- ketamine induction 1.5 - 2.0 mg/kg
- position once obtunded
- patient should remain spont vent
- connect vent to mask (settings as above)
- two handed seal, cricoid
- allow vent to deliver assisted breaths
- ETT once OXYGENATION OPTIMAL

**REMEMBER CLIFF REID’S PROPOFOL ASSASSINS !**
*The pretty white stuff drops SV and SVR without incr. in heart rate*
*Drop in BP can add to cerebral hypoperfusion - BAD BAD BAD*
Consider KETAMINE 1.5 - 2 mg/kg or FENTANYL 100-200 mcg

**CRICOID**

**ETT - size above/below**
- KingVision Videolaryngoscope
- iLMA - FastTrach
- AirQ and scope *(AmbuAscope or Levitan)*

SICK COMBATIVE RSI - RSA - DSI
**STEP ONE**
Continuous nebulised salbutamol
Nebulised ipratropium bromide
Methylprednisolone 125mg (1.5 mg/kg) IV
MgSO4 2g (50mg/kg max 2g) IV

**DOSES**
Use O2 for nebs, not room air
500mcg 20min x 3 then hourly
Alternative DXM 20mg IM or IV
Give MgSO4 over 20 mins

**STEP TWO**
Adrenaline 0.5mg IM (0.01mg/kg) = 0.5ml 1:1000
Fluid bolus 20 ml/kg
CXR, ECG, VBG, Electrolytes, FBC

**IF NO IMPROVEMENT**
Agitated Patient
ketamine 1.5 mg/kg IV over 30 secs
then 1 mg/kg/hr titrate to effect
if no IV, 5mg/kg IM

NIPPV
iPAP PS 8cm H2O
ePAP PEEP 3 cm H2O
continue nebuliser through NIPPV

**IF NO IMPROVEMENT - ABLE TO TOLERATE NIV?**

**NO**

**YES**
Cooperative Patient
NIPPV
iPAP PS 8cm H2O
ePAP PEEP 3 cm H2O
continue nebuliser through NIPPV

**IF YOU HAVE TO INTUBATE**
Indications - fatigue, resp distress, deterioration, arrest
Maximise preoxygenation
Optimise first pass success
Largest ETT possible
Beware breath stacking
Ketamine 2mg/kg IV
Rocuronium 1.2 mg/kg or Sux 2mg/kg IV
Assist control / Volume control
RR 8 TV 5-7 ml/kg IBW
PEEP 2cm H2O IE 1:5 FiO2 100%
pervasive hypercarbia
Ext chest compression
Pplat < 30cm H2O
Aggressive suctioning, check K

**AVOID INTUBATION IF POSSIBLE**

**Consider the differential**
heart failure, ACS, arrhythmia
pulmonary embolism
PTX, pericardial tamponade,
obstruction, foreign body
anaphylaxis
Pre-existing hypertension
- treated or untreated?
- medication taken?

Sympathetic reflex response
- light anaesthesia? Exclude vaporizer leak, IV disconnected
- hypoxia
- hypercarbia
- check SpO2, ETCO2
- cerebral event?
- raised ICP?
- ischaemia?
- vasospasm?

Sympathomimetic effect?
Exogeneous ie: administration of vasopressor
Endogeneous eg: phaeochromocytoma

Surgical
- aortic clamp
- tourniquet
- position eg: Trendelenburg
- stimulus

Hypertension

Hypotension

Hypovolaemia
- blood loss
- fluid deficit

Cardiogenic
- contractility, rate, dysrhythmia
- anaesthetic agent
- vasodilators

Distributive (vasodilation)
- drugs
- sympathetic block
- sepsis
- anaphylaxis

Obstructive
- high intrathoracic pressures
- tamponade (cardiac, bilateral tPTX)
- pulmonary embolus
- AORTOCAVAL COMPRESSION @ 18/40 weeks onwards

CIRCULATION - BP

Whilst vasopressors elevate BP, treatment should be directed to cause
MASSIVE BLOOD LOSS

Control Bleeding
Minimise time to Surgery
Use tourniquets to control peripheral
Tamponade bleeding eg: pelvic binder, direct pressure, sutures
Uterine massage, oxytocin, misoprostol, haemabate

Consider Massive Transfusion Protocol (MTP)
ABC Score
Anticipate needs, if > 4 units/2hrs

Mobilise Resources
Lab staff, Porters, Nursing, Theatre Staff
Retrieval Service & Blood Bank

Empirical Treatment
Transfuse at a 1:1 ratio of PRCs : FFP
Permissive hypotension MAP 65-70 mmHg
(unless TBI/spinal injury/exsanguination)
Send FBE, X-Match, Venous Gas, Calcium, Coags
Arterial line, consider Calcium (citrate toxicity)
WARM FLUIDS/WARM THEATRE

ABC SCORE
penetrating injury
positive FAST exam
HR > 120/min
systolic BP < 90mmHg
[no lab results - purely clinical]
0/4 = 1% risk of MTP
1/4 = 10% risk of MTP
2/4 = 41% risk of MTP
3/4 = 48% risk of MTP
4/4 = 100% risk of MTP
[Activate MTP if 3 + criteria met]

IV ACCESS - LARGE BORE IV x 2 (14G)
CONSIDER USE OF RAPID INFUSER KIT (7Fr)

CONSIDER USE OF INTEROSSEOUS DEVICE
CONSIDER VENOUS CUTDOWN

TRANEXAMIC ACID - give 1g stat in first 3 hrs for TRAUMA
WARM FLUIDS - level I infuser/water bath
CRYSTALLOID - 250ml boluses titrate to MAP/radial pulse

AIM FOR
$\text{t} > 35; \text{pH} > 7.2; \text{Lactate} < 4; \text{BE} < -6$
$\text{Ca} > 1.1; \text{Plt} > 50; \text{INR} < 1.5 \text{ Fibrinogen} > 1$
AT RISK
Ischaemic heart disease
Hypertension
Fluid losses
Diabetes
Smoker, Lipids, FHx etc.

OH CRAP !
Oxygen, Haemoglobin
Contractility, Rate
Afterload, Preload

MANAGEMENT
Are SpO2, BP, HR, Hb, PEEP optimised? ❑
Changes verified with ECG? ❑
Surgeon aware of problem? ❑
Defibrillator & Pacing available? ❑
RATE CONTROL (box) addressed? ❑
BLOOD PRESSURE (box) addressed? ❑
CARDIOLOGIST CONSULTED? ❑
Specific therapy agreed - ASPIRIN, HEPARIN, NITRATES etc ❑
Plan for Extubation & Recovery? ❑

RATE CONTROL
Exclude hypovolaemia, awareness, CO2 as cause of tachycardia

NEXT
BETA-BLOCKADE (aim for HR < 60)
Esmolol - 0.25-0.5 mg.kg bolus
25-300 mg/kg/min infusion
Metoprolol - 1-15 mg titrated over 15 mins
If beta-blockade contra-indicated use verapamil - 2.5 mg - repeat if needed

FILLING
Optimise filling, consider need for PEEP ❑
CAUTION USE OF VASOPRESSORS
For hypertension, consider GTN - sublingual (0.3-0.9 mg)
IVI(0.25 - 4 mgm/kg/min - titrate to effect)
Clonidine (30 mg every 5 minutes up to 300 mg)

RECOVERY
Plan Plan for Extubation & Recovery? ❑
CARDIOLOGY ADVICE? 13STAR ❑

MYOCARDIAL ISCHAEMIA
BRADYCARDIA

Medications
Electrolyte disturbance
Hypoxia
Ischaemia

Give OXYGEN - exclude HYPOXIA

First line is Atropine (1.2mg vial) - 300-500mcg bolus to total 3mg

TACHYCARDIA

Wide-complex tachycardias
Narrow-complex tachycardias
Atrial fibrillation

Adrenaline Bolus (1mg/ml 1/1000 - 1mg/10ml 1/10,000)
50-100mcg bolus IV titrated to effect
Infusion 3mg in 50ml (60mcg/ml) run 5ml/hr to effect

Isoprenaline (1mg in 50ml 5% Dex or 1mg/500ml)
Give 20mcg (1ml) then infuse at 1-4mcg/min (3-12 ml/hr)
or 30-120ml/hr if using 500ml bag

Transcutaneous Pacing
Pads AP over L sternum & L spine
Start at 60mA, increase to 10% over capture, rate 80bpm
Don't forget sedation!

<table>
<thead>
<tr>
<th></th>
<th>Wide</th>
<th>Narrow</th>
<th>A/Fib</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Amiodarone</td>
<td>Adenosine</td>
<td>Esmolol Amiodarone</td>
</tr>
<tr>
<td>2nd</td>
<td>Lignocaine</td>
<td>Amiodarone Esmolol Digoxin</td>
<td>Diltiazem Amiodarone Digoxin</td>
</tr>
</tbody>
</table>

Atropine 10-20 mcg/kg kids (300-600 mcg bolus adults) IV
Metaraminol 0.5mg bolus IV (10mg in 20ml, 1ml = 0.5mg)
Ephedrine 3-6mg bolus IV
Esmolol 500micrograms/kg IV
100mg/ml dilute in 10ml = 10mg/ml
70kg=35mg=3.5ml, 100kg=50mg=5ml

Amiodarone 300mg load then 0.5mg/kg/hr IV
Adenosine 6mg/12mg/18mg bolus IV, fast running drip
Diltiazem 0.25mg/kg IV
Digoxin 250 to 500 mcg IV
Metoprolol 2.5-5 mg bolus IV
DC shock - SYNC MODE - 100J

CARDBIAC ARRHYTHMIAS
Advanced Life Support for Adults

Start CPR
30 compressions : 2 breaths
Minimise Interruptions

Attach Defibrillator / Monitor

Assess Rhythm

Shockable

Shock

CPR for 2 minutes

Non Shockable

CPR for 2 minutes

Return of Spontaneous Circulation ?

Post Resuscitation Care

---

During CPR
- Airway adjuncts (LMA / ETT)
- Oxygen
- Waveform capnography
- IV / IO access
- Plan actions before interrupting compressions (e.g. charge manual defibrillator)
- Drugs
  - Shockable
    * Adrenaline 1 mg after 2nd shock (then every 2nd loop)
    * Amiodarone 300 mg after 3rd shock
  - Non Shockable
    * Adrenaline 1 mg immediately (then every 2nd loop)

Consider and Correct
- Hypoxia
- Hypovolaemia
- Hyper / hypokalaemia / metabolic disorders
- Hypothermia / hyperthermia
- Tension pneumothorax
- Tamponade
- Toxins
- Thrombosis (pulmonary / coronary)

Post Resuscitation Care
- Re-evaluate ABCDE
- 12 lead ECG
- Treat precipitating causes
- Re-evaluate oxygenation and ventilation
- Temperature control (cool)

CIRCULATION - ADULT ARREST

December 2010
ANAPHYLAXIS

PRESENTATION
Wide range of possible presentations
Most common include:

- cardiovascular collapse / hypotension (88%)
- erythema (48%)
- bronchospasm (40%)
- angioedema (24%)
- cutaneous rash (13%)
- urticaria (8%)

EXCLUSIONS
- Anaesthetic circuit obstruction
- filter, kinked ETT, cuff herniation, tube migration

Disconnect circuit and ventilate directly with self-inflating bag

if pressure still high, problem is in airway/ETT

Foreign body in the airway?
Air embolism?
Tension PTX?
Severe bronchospasm?

RISK FACTORS
- History of previous exposure not reliable to exclude.
- Worse in asthma, beta-blockade, hypovolaemia, neuraxial blockade (reduced endogenous catecholamine)

INVESTIGATIONS
Draw blood for mast-cell released tryptase at 0, 1hr, 24hrs
Store at - 20 degrees C
Refer to regional allergy centre

REMEMBER - ADRENALINE CONCENTRATIONS
1ml of 1/1000 = 1mg
10ml of 1/10,000 = 1mg

IMMEDIATE MANAGEMENT

STOP TRIGGERS
colloids/latex/antibiotic/blood/NMB

MAINTAIN ANAESTHESIA
with INHALATIONAL AGENT if possible

Call for HELP, note TIME, give 100% OXYGEN, give FLUIDS

ADRENALINE 50-100mcg IV
(0.5ml-1ml of 1/10,000)
titrate to response

or 0.5mg IM (thigh) if no IV access

ANTIHISTAMINE, HYDROCORTISONE 200mg 6/24

SALBUTAMOL 250 mcg IV or 2.5-5mg nebuliser into circuit
### TURP SYNDROME

**PRESENTATION**

Excess absorption of fluid during TURP

**EARLY MANIFESTATIONS**

- **CVS**
  - bradycardia, hypertension

- **GI**
  - nausea & vomiting, abdominal distension

- **CNS**
  - anxiety/confusion, headache, dizziness, slow waking GA

**LATE MANIFESTATIONS**

- **CVS**
  - hypotension, angina, cardiac failure

- **RESP**
  - dyspnoea, tachypnoea, cyanosis

- **CNS**
  - twitching, visual changes, seizures, coma

- **GU**
  - renal tubular acidosis, reduced urine output

**EXCLUSIONS**

- Congestive cardiac failure
- All other causes of confusion

**RISK FACTORS**

- Absorption 1-2 litres fluid per 40 mins operating
- Large prostate
- Prolonged operation > 60 mins
- Hypotonic fluids given IV
- Volume of irrigation > 30 litres
- Inexperienced surgeon
- Height of irrigation > 60cm above patient
- Comorbidities - liver disease, renal stones, UTI

**Immediate Management**

- High index of suspicion

- **ABC - 100% Oxygen**

- Stop irrigation fluid infusion, catheterise

- Check Na and Hb regularly & correct them

- **Frusemide** 40mg IV
### LA Concentrations

- 0.5% = 5mg/ml
- 1% = 10mg/ml
- 2% = 20mg/ml

### Toxicity

Initially CNS agitation, peri-oral tingling, seizures then CNS depression, coma, myocardial depression

### Table: Local Anaesthetic Onset, Duration, and Toxic Dose

<table>
<thead>
<tr>
<th>DRUG</th>
<th>ONSET (minutes)</th>
<th>DURATION (hrs)</th>
<th>TOXIC DOSE mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amethocaine</td>
<td>2 mins</td>
<td>1 hr</td>
<td>1.5</td>
</tr>
<tr>
<td>Prilocaine</td>
<td>5-10 mins</td>
<td>1-2 hrs</td>
<td>6</td>
</tr>
<tr>
<td>Bupivacaine plain</td>
<td>10-15 mins</td>
<td>3-12 hrs</td>
<td>2</td>
</tr>
<tr>
<td>Bupivacaine with Adrenaline</td>
<td>10-15 mins</td>
<td>4-12 hrs</td>
<td>2</td>
</tr>
<tr>
<td>Ropivacaine</td>
<td>10-15 mins</td>
<td>3-12 hrs</td>
<td>3.5</td>
</tr>
<tr>
<td>Lignocaine plain</td>
<td>5-10 mins</td>
<td>1-2 hrs</td>
<td>3</td>
</tr>
<tr>
<td>Lignocaine with Adrenaline</td>
<td>5-10 mins</td>
<td>3-4 hrs</td>
<td>7</td>
</tr>
</tbody>
</table>

### Immediate Management

- DISCONTINUE INJECTION
- HIGH FLOW OXYGEN
- INTUBATE AND VENTILATE IF NOT ALREADY DONE
- MIDAZOLAM 3-10mg for SEIZURES
- CARDIOPULMONARY RESUSCITATION
- INTRALIPID 20% 1.5ml/kg over one minute (100ml for 70kg) then infuse at 0.25ml/kg/min

---

**LOCAL ANAESTHETIC TOXICITY**
PRESENTATION

masseter spasm
tachypnoea in spontaneous breathing patient
rise in ETCO2 in ventilated patient
unexplained tachycardia, progressing to hypoxaemia
raised temperature
arrhythmias

EXCLUSIONS

Inadequate anaesthesia / analgesia
Infection / Sepsis
Tourniquet Ischaemia
Anaphylaxis (exclude hypotension)
Phaeochromocytoma or Thyroid Storm

RISK FACTORS

Family history
Death under anaesthesia in family
Volatiles and Suxamethonium

INVESTIGATIONS

ABG, U&Es, CK, FBC, Clotting
Muscle biopsy

MOBILISE RESOURCES

Surgeon - Theatre Staff - Ward Staff - ICU will be needed

Immediate Management

DISCONTINUE VOLATILES
and give
100% OXYGEN VIA HIGH FLOW

CALL FOR HELP - MH BOX

ALLOCATE TASK CARDS

MAINTAIN ANAESTHESIA with PROPOFOL and OPIOID

EXPEDITE SURGERY

DANTROLENE 2.5mg/kg IV until hypermetabolism resolved

COOLING - AXILLA / GROIN / NECK

COLD FLUSH NGT and IDC
**SPINAL ANAESTHETIC**

- Tuffier’s line intersects spinous process L4-5
- Cord ends L2
- Prep/Drape/Gown/Gloves/Hat/Mask
- LA infiltrate
- Midline until CSF
- Inject LA with Opiate, Barbotage
- LSCS T4-6
  - ~2.5ml 0.5% bupivacaine + 25mcg fentanyl
- TURP T8-10
  - ~3.2ml 0.5% bupivacaine with opiate
  - 100-200mcg morphine or 15-25mcg fentanyl
- FLUID BOLUS
- METARAMINOL or EPHEDRINE BOLUSES

**EPIDURAL ANAESTHETIC**

- Explanation and consent
- Prep/Drape/Gown/Gloves/Hat/Mask
- 2% xylocaine with 1/200,000 adrenaline for both local infiltrate to skin & initial test dose
- Note depth of LORTS or LORTA
- Thread catheter 3-5cm further
- Aspirate (CSF or blood?)
- Test dose 3ml 2% xylo 1/200,000 adrenaline
- If no block, proceed with premix
  - 20ml 0.125% bupivacaine/200mcg fentanyl
- If inadvertent spinal either reinsert or thread catheter & top up with spinal dose 3ml of 2% xylo 1/200,000 adrenaline **ONLY by SELF**

**BROMAGE SCORE**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria</th>
<th>Block</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Free movement legs/feet</td>
<td>0%</td>
</tr>
<tr>
<td>II</td>
<td>Flex knees, move feet</td>
<td>33%</td>
</tr>
<tr>
<td>III</td>
<td>Can’t flex knees, move feet</td>
<td>66%</td>
</tr>
<tr>
<td>IV</td>
<td>Can’t move legs or feet</td>
<td>100%</td>
</tr>
</tbody>
</table>

**ANTICOAGULANTS**

- Aspirin/NSAIDS no contraindication
- Clopidogrel cease 7 days before
- Heparin > 6hrs between insertion/removal
- Clexane > 12 hrs between insertion/removal
- Warfarin INR < 1.5

**COMPLICATIONS**

- Hypotension - Itching - Backache 1/10
- Failure 1/25
- Headache 1/100
- Transient nerve damage 1/2000
- Cardiac arrest 1/3000
- Unexpected high spinal 1/5000
- Permanent nerve damage 1/60,000
- Spinal abscess 1/100,000

**NEURAXIAL BLOCKADE**
DO I NEED BLOOD?
Position of placenta
Previous LSCS/scarring
Multigravid
Multiparous
Gestational DM
Sepsis
Traumatic delivery
Prolonged labour

PREPARE PATIENT AND PARTNER
IV access 16G, IV fluids on pump set
Consider need for Paediatrician
Sodium citrate drink
Left lateral tilt to avoid aortocaval syndrome

GA SECTION
Preoxygenate - 100% oxygen
Anticipate difficult airway and rapid desaturation
Cricoid pressure
RSI : Propofol - Suxamethonium - ET Tube
Once sux wears off paralyse with nondepolarising NMB

NEURAXIAL SECTION
Spinal 2.5ml 0.5% bupivacaine with 25mcg fentanyl
or top up existing epidural (T10) to T4 for LSCS
supplemental nitrous if needed 50:50 N2O/O2

Give antibiotics unless contraindication
Oxytocin 5 U IV once baby out (check not twins!)
Oxytocin infusion - 40U/1000ml @ 250ml/hr
Postoperative Analgesia & DVT Prophylaxis

MANAGEMENT OF PPH
Tone - Trauma - Tissues - Thrombin
Oxytocin for all - 5 U IV once uterus empty
Oxytocin infusion 40U @ 10U/hr for 4 hrs
Fundal rub to uterus
Misoprostol 1000mcg PR
Haemabate 0.25mg IM
Up to five doses, min 15 min gap between
LARGE BORE IV - WARM FLUIDS - BLOOD

CONSIDER SURGICAL OPTIONS
Pre-Eclampsia
4g MgSO4 over 15 mins, then 1g/hr IVI
Labetalol 50mg IV
Hydralazine 5mg IV

NEONATAL RESUS
HR 60-100 assisted ventilation
HR < 60 start CPR 3:1
Adrenaline 10mcg/kg IV (use the 1V, not 2A)

RECORD KEEPING
Positioning
Time called
Time arrived
Time anaesthesia initiated
Time of KTS
Time of delivery
Time of drugs
Specify risks/consent
GGHM Prep/Drape
LA/Strict asepsis

Document if offered conversion to GA and if this was declined
Any complications?
Epidural catheter tip

CAESAREAN SECTION
Emergency GA LSCS CHECKLIST

- CITRATE GIVEN?
- LARGE BORE IV ACCESS AND SECURED?
- FLUIDS PRELOADED?
- TABLE IN LEFT LATERAL TILT?
- PREOXYGENATED 100% O2 > 4 MINUTES?
- ETT - STYLET - BOUGIE - TAPE
- SUCTION - ETCO2 - MONITORING
- FAILED RSI PLAN DISCUSSED?
- RSI
- CRICOID
- PROPOFOL 2mg/kg
- SUXAMETHONIUM 1mg/kg
- ETT PLACEMENT CONFIRMED WITH ETCO2
- VOLATILE
- NEUROMUSCULAR BLOCKADE
- OXYTOCIN available post-delivery
- 40 UNITS / 1000ml @ 250ml/hr if needed
- NEONATAL RESUS ANTICIPATED?

Emergency SPINAL LSCS CHECKLIST

- CITRATE GIVEN?
- LARGE BORE IV ACCESS AND SECURED?
- FLUIDS PRELOADED?
- TABLE IN LEFT LATERAL TILT?
- L4-5 INTERSPACE IDENTIFIED?
- PREP - DRAPE - GOWN - GLOVES - MASK - HAT
- ANTISEPTIC REMOVED FORM SPINAL TRAY
- LOCAL ANAESTHETIC 2% XYLOCAINE/ADRENALINE
- 2.5ML BUPIVACAINE 0.5% with FENTANYL 20-25MCG
- SKIN INFILTRATION
- INTERSPINOUS LIGAMENT IDENTIFIED
- CLEAR CSF
- SWIFT INJECTION WITH BARBOTAGE
- OXYTOCIN available post-delivery
- 40 UNITS / 1000ml @ 250ml/hr if needed
- NEONATAL RESUS ANTICIPATED?
Advanced Life Support for Infants and Children

Start CPR
15 compressions : 2 breaths
Minimise Interruptions

Attach
Defibrillator / Monitor

Assess Rhythm

Shockable

Shock
(4 J/kg)

CPR for 2 minutes

Return of Spontaneous Circulation?

Post Resuscitation Care

Non Shockable

Adrenaline 10 mcg/kg
(immediately then every 2nd loop)

CPR for 2 minutes

During CPR
Airway adjuncts (LMA / ETT)
Oxygen
Waveform capnography
IV / IO access
Plan actions before interrupting compressions
(e.g. charge manual defibrillator to 4 J/kg)

Drugs

Shockable
* Adrenaline 10 mcg/kg after 2nd shock
  (then every 2nd loop)
* Amiodarone 5mg/kg after 3rd shock

Non Shockable
* Adrenaline 10 mcg/kg immediately
  (then every 2nd loop)

Consider and Correct

Hypoxia
Hypovolaemia
Hyper / hypokalaemia / metabolic disorders
Hypothermia / hyperthermia
Tension pneumothorax
Tamponade
Toxins
Thrombosis (pulmonary / coronary)

Post Resuscitation Care
Re-evaluate ABCDE
12 lead ECG
Treat precipitating causes
Re-evaluate oxygenation and ventilation
Temperature control (cool)

December 2010

PAEDIATRIC CARDIAC ARREST
At all stages ask: do you need help?

Venous access, adrenaline Consider volume expansion

Yes

Umbilical venous access (one vein, two arteries)

Add chest compressions 3 compressions to each breath 100% oxygen

Consider intubation or LMA

No

Yes

Consider increasing pressure

Ensure open airway

Reduce leaks

HR below 60?

HR below 100?

Positive pressure ventilation

SpO₂ monitoring

Gasping or apnoea?

No

Yes

HR below 100?

Prevent heat loss

Stimulate

Ensure open airway

Gasping or apnoea?

No

Yes

Term gestation? Breathing or crying? Good tone?

Stay with mother

Yes

Routine care: Prevent heat loss Ongoing evaluation

Targeted pre-ductal SpO₂ after birth

1 min 67-70%

2 min 75-85%

3 min 70-90%

5 min 80-90%

8 min 90%

NEONATAL RESUSCITATION
### ADENOSINE
- First dose 0.05mg/kg
- Second dose 0.10mg/kg
- Then 0.20mg/kg
- **Give via Fast Flush**

### ADRENALINE
- IV: 0.01 mg/kg (10mcg/kg)
- 1/10,000 - 0.1 ml/kg IV
- ie. 10kg - 1ml
- ETT - 1/1000 - 0.1ml/kg

### ADRENALINE INFUSION
- 0.3mg/kg in 100ml N-saline
- Start at 1ml/hr
- = 0.05mcg/kg/min
- Range 1-20ml/hr

### AMIODARONE
- 5 mg/kg load
- Infuse 0.5mg/kg/hr

### ATRACURIUM
- 0.5mg/kg

### ATROPINE
- 20mcg/kg IV (max 600 mcg)
- Dilute 0.6 mg to 6 mls
- = 100 mcg/5 mls
- So give 1 ml per 5kg IV

### CODEINE
- 1mg/kg

### DEFIBRILLATION
- 2-4 J/kg – Biphasic

### DEXTROSE
- 0.5 gm/kg
- 10% - 5 ml/kg IV
- 50% - 1 ml/kg IV

### ETT Length
- Age/2 + 12cm to teeth

### ETT Diameter
- >1yr - Age/4 + 4

### FENTANYL
- 1 mcg/kg IV (0.5mcg/kg IN)
- Run at 10mcg/kg/min

### KETAMINE SEDATION
- 2-4 mg/kg IM
- 0.25 - 0.5 mg/kg IV
- Repeat as needed

### KETAMINE - ANAES
- 5-10 mg/kg IM
- 1-2 mg/kg IV
- Repeat as needed

### KETAMINE INFUSION
- 0.3mg/kg in 100ml N-saline
- Start at 1ml/hr
- = 0.05mcg/kg/min
- Range 1-20ml/hr

### METARAMINOL
- 0.01 mg/kg IV
- 10mg in 20 mls=0.5 mg/ml

### MIDAZOLAM
- 0.1 - 0.2 mg/kg IV

### MORPHINE
- 0.1 mg/kg IV

### NEOSTIGMINE
- 0.05 mg/kg IV

### PARACETAMOL
- 15 mg/kg

### PROPOFOL
- 1-3.5 mg/kg IV

### REMIFENTANIL
- 1mg/20ml = 50 mcg per ml
- Run at 10mcg/kg/min

### ROCURONIUM
- 0.6-1.2 mg/kg IV STAT
- 0.1 mg/kg boluses

### SUXAMETHONIUM
- 2 mg/kg IV, 3mg/kg neonate
- 4 mg/kg IM

### THIOPENTONE
- 4 mg/kg IV

### VOLUME EXPANSION
- 20mls/kg N/saline

### WEIGHT (kg)
- Infants < 12 months
  - (age in months + 9) / 2
- Children 1-5 years
  - 2 x (age in years + 5)
- Children 5-12 years
  - 4 x age in years

---

### PAEDIATRIC CHEAT SHEET

**EMERGENCY**
- Adrenaline 10mcg/kg
- Atropine 20mcg/kg
- Metaraminol 10mcg/kg
- Propofol 2mg/kg
- Sux 2mg/kg
- Thio 4mg/kg
- Fluids 20ml/kg
- 4J/kg Biphasic
Adrenaline IM 1/1000
0.01ml/kg to max 0.5ml
IM lateral thigh, repeat 5 minutely

Adrenaline IV 1,10,000
1mg/10ml 1/10,000 IV
10mcg (0.1ml) per kg of 1/10,000

Adrenaline Infusion
1/1,000 = 1mg/ml
3mg in 50ml N saline
0.3mg/kg - 60mcg/ml
2mcg/min = 2ml/hr to
20mcg/min = 20ml/hr

Amiodarone
5mg/kg over 20 min
can push over 2 mins
central access IV

Amiodarone Infusion
600mg in 50mls 5% dextrose
0.5mg/kg/hr central access

Atracurium
0.5 mg/kg (0.3-0.6mg/kg) IV induce,
than 1/3rd dose subsequently

Atropine
600mcg in 6ml NS
10-20mcg/kg kids
300-600mcg adults

Cis-atracurium
0.15mg/kg IV

Dextrose
0.5 gm/kg
10% - 5 ml/kg IV
50% - 1 ml/kg IV

Ephedrine
3-6mg bolus IV

Esmolol
0.5mg/kg
100mg/ml dilute in 10ml = 10mg/ml
100kg=50mg=5ml

ETT Length
Age/2 + 12cm to teeth

ETT Diameter
>1yr - Age/4 + 4

Fentanyl
100mcg/2ml
2-3 mcg/kg IV
0.5-1 mcg/kg intranasal

GTN Infusion
50mg in 50ml 5% dextrose
1mg/ml at 3-12ml/hr

Heparin Infusion
25,000 units in 500ml (50U/ml)
1000U/hr = 20ml/hr

Insulin IVI
50 units in 50ml
5-10 U/hr = 5-10ml/hr

Isoprenaline
1mg in 50ml 5% dextrose
Give 20mcg (1ml)
then infuse at 1-4mcg/min
(3-12 ml/hr)

Ketamine Induction
1-2 mg/kg IV
5-10mg/kg IM

Ketamine Sedation
0.2-0.5 mg/kg IV sedation
2-4mg/kg IM sedation

Ketamine Infusion
0.25mg/kg/hour

Ketamine/Midazolam Infusion
200mg Ketamine : 50mcg fentanyl
in 50ml run @ 2-5ml/hr

Magnesium Sulphate Infusion
4 ampoules (2.47g x 4 = 9.88g) to
100ml N saline = 120ml
Load 4g (50m) over 20 mins
(150ml/hr over 20 mins)
then 1g/hr (12ml/hr)

Metaraminol
0.5mg bolus

Midazolam
0.1 mg/kg IV

Morphine
0.1 mg/kg IV

Morphine/Midazolam Infusion
50mg each in 50ml NS
1mg/ml (1mg/10ml)
at 10mcg/kg/hr
= 2.5 - 15ml/hr

Naloxone
0.1 to 0.2 mg IV 2-3 minutely to
desired degree of reversal

Neostigmine
005mg/kg IV

Paracetamol
20mg/kg first dose	hen
15mg/kg PO

Propofol
2mg/kg titrate

Remifentanil
1mg/20ml = 50 mcg per ml
Run at 0.1mcg/kg/min

Rocuronium
0.6-1.2 mg/kg IV STAT
(get same intubating conditions as
sux if use roc 1.2mg/kg)
0.1 mg/kg boluses thereafter

Salbutamol IV
10mcg/kg IV bolus over 10 mins

Sodium Bicarbonate 8.4%
1-2 ml/kg

Suxamethonium
1 mg/kg adult
2 mg/kg paed

Thiopentone
3-5 mg/kg

Vecuronium
0.1 mg/kg load
bolus every 30m with 5-10mg vec

Vecuronium Infusion
0.1 mg/kg/hr

Volume Expansion
20mls/kg N/saline
ADRENALINE

3mg in 50ml N/saline = 60mcg/ml

run at 2 - 20 ml/hr

incr. to keep MAP > 70

AMIODARONE

150mg/3ml amp
dilute 600mg (12ml) up to 50ml 5% DEX

= 12mg/ml

run at 0.5mg/kg/hr

central access

ESMOLOL

100mg/10ml

load 500 mcg/kg over 60secs

maintain 50mcg/kg/min

100kg = 5ml (100mg/10ml)

100kg = 30ml/hr

FENTANYL

100mcg/2ml or 500 mcg/50ml premix

dilute 50mcg up to 50ml 5% DEX

= 1mg/ml

run at 0 - 100 mcg/hr

GTN

50mg/10ml amp
dilute 50mg up to 50ml 5% DEX

= 1mg/ml

run at 3 - 12 ml/hr

titrated to BP/pain

HEPARIN

25,000 U in 50ml

500 U/ml

load 5000 U IV

then 2ml/hr, titrate APTT

INSULIN IVI

50U in 50ml = 1 U/ml

load 10U IV (not kids)

then run @ 5-10 ml/hr

INSULIN SLIDING SCALE

50U/50ml = 1U/ml

<table>
<thead>
<tr>
<th>BGL mmol</th>
<th>RATE U/hr = ml/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 4</td>
<td>0 - STOP IVI</td>
</tr>
<tr>
<td>4.1 - 9</td>
<td>2</td>
</tr>
<tr>
<td>9.1 - 13</td>
<td>3</td>
</tr>
<tr>
<td>13.1 - 17</td>
<td>4</td>
</tr>
<tr>
<td>17.1 - 28</td>
<td>6</td>
</tr>
<tr>
<td>&gt; 28</td>
<td>8</td>
</tr>
</tbody>
</table>

check running

INSULIN IVI

50U in 50ml = 1 U/ml

load 10U IV (not kids)

then run @ 5-10 ml/hr

(see Sliding Scale above)

ISOPRENALENE

1mg in 50ml 5% DEX = 20mcg/ml

1 ml bolus to response

then 3-12 ml/hr

KET/MIDAZ

200mg ketamine /50 mcg fent in 50ml

run at 2-5 ml / hr

MgSO4 (eclampsia)

Add 4 amps (2.47g) to 100ml N/saline

= 120 ml total volume (1g/12ml)

bolus 50ml (4g) over 20mins ie : 150ml/hr for 20 mins

then 1g/hr (12 ml/hr)

MORPH/MIDAZ

50mg each to 50ml with N/saline (1mg/ml)

run 100 mcg/kg/hr (2.5-15 ml/hr)

PROPOFOL

1-4 mg/kg 500mg/50ml (10mg/ml)

dose range 0.5 mg/kg/hr (use body wt = ml/hr eg 70kg = 70ml/hr)

REMIFENTANIL

1mg in 20ml = 50mcg/ml

run at 0.1 mcg/kg/min (100kg = 12ml/hr)

VECURONIUM

1mg/ml reconstitute in water for injection

0.1 mg/kg/hr eg: 8mg/hr in 80kg patient

INFUSIONS

Ideally use dedicated syringe driver (10 - 50ml capacity) eg Niki T34
GENERAL PRINCIPLES

Use the minimum volume, and strongest strength of drug

Use an atomiser where possible

Administer half to each nostril to maximise mucosal area

Standard monitoring inc. SpO2 and supplemental O2

Warn that may sting initially.

Be aware will wear off so consider ongoing needs and method of delivery (repeat IN, IV, oral etc)

ANALGESIA

Fentanyl 2 micrograms/kg
Ketamine 0.5 - 1mg/kg
Lignocaine 2% (topical) 5ml

SEDATION

Fentanyl 1.5 - 3 micrograms/kg
Ketamine 10 mg/kg
Midazolam 0.5 mg/kg

SEIZURES

Midazolam 0.2 - 0.3 mg/kg (use 10mg in adults)
Use concentrated 5mg/ml preparation

OPIATE WITHDRAWAL

Naloxone 2mg (2ml)

TOPICALISING THE AIRWAY

There are many different methods. Here is my preferred method for AFOI:

Use an anti-sialogogue (glycopyrrolate 0.2 – 0.4 mg IV or IM (4 – 5 mcg/kg, 4 – 8 mcg/kg in children). If require sedation then consider that your topicalisation has failed and risk inching towards a true GA!

3-5mg/kg of lignocaine (2% = 20mg/ml) administered using cannula jet opposite

Examples of MAD (Mucosal Atomisation Devices) from PACMED

USE

10 ml syringe
3 way tap
20 G cannula
Oxygen flow to drive
SAFE PSYCH SEDATION MATRIX

<table>
<thead>
<tr>
<th>CONSIDER</th>
<th>ANAESTHETIC RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>MENTAL HEALTH SAFETY/RISK</td>
<td>LOW thin, fit, fasted</td>
</tr>
<tr>
<td>LOW</td>
<td>flat, depressed, no Hx violence, low risk suicidal patient “happy” drunk thought disordered but compliant</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>intoxicated / disinhibited unpredictable delusional with poor insight anxious +++</td>
</tr>
<tr>
<td>HIGH</td>
<td>violence / weapons physical threats persecutory delusions around care “big guy” you whom cannot restrain</td>
</tr>
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</table>

**SUGGESTED ALGORITHM**

<table>
<thead>
<tr>
<th>NO IV ACCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>oral olanzapine 10-20mg stat and/or IMI midazolam 5-10mg and/or IMI ketamine 4mg/kg</td>
</tr>
<tr>
<td>IV ACCESS OBTAINED</td>
</tr>
<tr>
<td>IV midazolam 2-5mg and/or IV haloperidol 5-10mg and/or IV ketamine 1-1.5mg/kg</td>
</tr>
<tr>
<td>repeat every 5-10 mins, target RASS 0 to -3</td>
</tr>
</tbody>
</table>

**CONSIDER**

- **MENTAL HEALTH SAFETY/RISK**
  - LOW
    - flat, depressed, no Hx violence, low risk suicidal patient “happy” drunk thought disordered but compliant
  - MEDIUM
    - intoxicated / disinhibited unpredictable delusional with poor insight anxious +++
  - HIGH
    - violence / weapons physical threats persecutory delusions around care “big guy” you whom cannot restrain

**ANAESTHETIC RISK**

- LOW thin, fit, fasted
- MEDIUM ASA II - III
- HIGH old, sick, difficult airway OSA etc

**SUGGESTED ALGORITHM**

- **NO IV ACCESS**
  - oral olanzapine 10-20mg stat and/or IMI midazolam 5-10mg and/or IMI ketamine 4mg/kg
  - IV ACCESS OBTAINED
  - IV midazolam 2-5mg and/or IV haloperidol 5-10mg and/or IV ketamine 1-1.5mg/kg
  - repeat every 5-10 mins, target RASS 0 to -3

**Olanzapine**
- first line oral antipsychotic; wafer 10-20mg oral, rapid onset

**Quetiapine**
- second line oral antipsychotic; mania, behavioural-based agitation or previous use

**Haloperidol**
- 5mg ORAL or 10mg IM to max 50mg; 5-10mg IV up to max 20mg
- benzotropine 1-2mg IV should be available to treat acute dystonia

**Midazolam**
- IM 5-20mg, IV 0.1-0.2mg/kg in aliquots, IN 0.2mg/kg, ORAL 0.5mg/kg
- flumazenil 0.2-0.5mg IV should be available if acute reversal required

**Ketamine**
- PRE-KETAMINE SEDATION ESSENTIAL to MINIMISE DELIRIUM ie : BDZ
  - IM 5mg/kg, IV 0.5-1.5mg/kg sedation. Ketamine infusion has been used for transport. Consider antisialagogue adjunct (atropine or glycopyrrolate)
  - See also : Minh Le Cong et al. *Ketamine sedation for patients with acute agitation and psychiatric illness requiring aeromedical retrieval* EMJ May 2011 - ketamine sedation used to avoid RSI/ETT of red/black patients in risk matrix above

**MINIMUM SEDATION MONITORING** - SpO2, ECG, NIBP. Consider ETCO2 via HM. SUPPLEMENTAL OXYGEN AT ALL TIMES RFDS restraints or net, 45 degree head up to maximise SV and minimise aspiration risk. CHECK BGL!
**Procedure**

(i) observe patient - patient is alert, restless, agitated or combative (0 to +4)

(ii) if not alert, state patient’s name and say to open eyes and look at speaker
- -1 if awakens with sustained eye contact to voice > 10s to voice
- -2 if awakens with eye contact to voice < 10s
- -3 if moves or opens eyes to voice but no eye contact

(iii) if no response to voice, use physical stimulus (shoulder shake, trapezius squeeze, jaw thrust)
- -4 if any movement to physical stimulation
- -5 if no response to physical stimulation

**RICHMOND AGITATION SEDATION SCALE**

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMBATIVE</td>
<td>overtly combative, violent, immediate danger to self/others</td>
<td>+4</td>
</tr>
<tr>
<td>VERY AGITATED</td>
<td>pulls or removes tube(s), catheter(s), aggressive</td>
<td>+3</td>
</tr>
<tr>
<td>AGITATED</td>
<td>frequent non-purposeful movement, fights ventilator</td>
<td>+2</td>
</tr>
<tr>
<td>RESTLESS</td>
<td>anxious but movements not aggressive or vigorous</td>
<td>+1</td>
</tr>
<tr>
<td>ALERT &amp; CALM</td>
<td>Doctor or Nurse</td>
<td>0</td>
</tr>
<tr>
<td>DROWSY</td>
<td>Not fully alert, but sustained awakening to voice (eyes open &gt; 10s)</td>
<td>-1</td>
</tr>
<tr>
<td>LIGHT SEDATION</td>
<td>briefly awakens with eye contact to voice &lt; 10s</td>
<td>-2</td>
</tr>
<tr>
<td>MODERATE SEDATION</td>
<td>movement or eye opening to voice but no eye contact</td>
<td>-3</td>
</tr>
<tr>
<td>DEEP SEDATION</td>
<td>no response to voice, but movement or eye opening to physical stimulation</td>
<td>-4</td>
</tr>
<tr>
<td>UNROUSABLE</td>
<td>no response to voice or physical stimulation</td>
<td>-5</td>
</tr>
</tbody>
</table>

**TARGET RASS is 0 to -3**

**AIRWAY EQUIPMENT and MONITORING must be available**

**1:1 NURSING, 10 minutely obs**

**LIAISE WITH RETRIEVAL SERVICE**
TRANSFER INFORMATION

Sometimes important details can get forgotten. I use the ABC approach to handover to retrieval team, as follows: “Thank God you’re here! OK, this is John Doe age 21 involved in a motor vehicle accident with prolonged extrication and transferred via ambulance to us. He needs transfer to a trauma centre for a laparotomy for internal bleeding. In terms of summary, here’s his ABC…”

| A - Airway | Intubated on arrival for GCS M3V1E1 - grade I view. Airway now patent, protected with size 8.5 ETT tube 22cm teeth and tied. Cervical collar in situ. |
| B - Breathing | Paralysed with vecuronium and on volume control TV 600 RR 12 R sided HTX and a 34Fr intercostal catheter in place, drained 400ml blood. SpO2 96% |
| C - Circulation | Haemodynamically stable after 750ml crystalloid titrated to radial pulse in 250ml aliquots (permissive hypotension). HR 90 BP 74/50 Bleeding likely from HTX, abdomen and pelvis. |
| D - Disability/ Drugs | M3V1E1 PEARLA initially, now M1V1E1 on propofol/vecuronium infusion. |
| E - Exposure | R HTX drained as above. Abdomen tense and tender in LUQ, suspect splenic injury. No other injuries on log roll, pelvic binder applied. Warm blankets and Bair hugger |
| F - Fluids | 3 x 250ml crystalloid aliquots titrated to radial pulse (SBP 70) IDC in situ and drained 300ml clear urine |
| G - Gut | Last ate 7pm. NG passed and on free drainage. |
| H - Haematology | Hb 114 on iStat, INR 1.1 No ACoTS. |
| I - Infusions | Not needed vasopressors On propofol and vecuronium infusions for transport |
| J - JVP | Not elevated - no signs tPTX/tamponade. |
| K - Kelvin | Temp is 36 degrees with active warming |
| L - Lines | 14G IV R wrist 8Fr rapid infuser LACF |
| M - Micro | Has been given ADT |
| N - Notes/NOK | His notes are in this envelope, including copies of plain X-rays NOK are aware and here are their contact details. |

The above would take 90 seconds and is an ordered summary of the patient for handover.
Parallels are often drawn between anaesthesia and aviation. This is not always in a good light, with the oft-repeated comment that “giving an anaesthetic is like flying an airplane - 99% boredom and 1% sheer terror” alluding to the relative safety of anaesthesia and the infrequency of crises - but the severity of those crises if they occur demands swift action else disaster awaits. More recently, anaesthesia has borrowed concepts of crew resource management from the aviation industry, applicable in a crisis. Checklists are mandatory in aviation and are beginning to be used in the Operating Theatre to aid safety.

### Interesting Parallels

<table>
<thead>
<tr>
<th>Pre-operative Evaluation</th>
<th>Preflight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaesthetic machine &amp; Equipment check</td>
<td>Aircraft and Preflight checklist</td>
</tr>
<tr>
<td>Induction</td>
<td>Take off</td>
</tr>
<tr>
<td>Deepening anaesthesia</td>
<td>Ascent</td>
</tr>
<tr>
<td>Intraoperative period</td>
<td>Cruising altitude</td>
</tr>
<tr>
<td>Lightening anaesthetic</td>
<td>Descent</td>
</tr>
<tr>
<td>Emergence &amp; Recovery</td>
<td>Landing and Taxiing</td>
</tr>
</tbody>
</table>
If one more person tells me that giving an anaesthetic is like flying a plane, I will swing for them, I really will. Look - the whole point of a plane is that it is designed to fly, and if it's not working properly then you don't take it off the ground. And you certainly don't try to fly the damn thing whilst an Engineer (surgeon) is taking bits off it and doing on-the-spot repairs. Human beings, in contrast, are not designed to be anaesthetised, and are often not working properly when the occasion arises. They are also rather poorly provided with back-up systems and spares, and frequently have long histories of inadequate servicing.

So if giving an anaesthetic is like flying a plane, then this must be what flying a plane is like:

Captain James Bigglesworth stepped out into the thin sunlight and took a deep breath of the damp air. It was good to be alive. He was taking up a new crate today, and he relished the little knot of mixed tension and anticipation that always formed at the pit of his stomach under such circumstances. He strode briskly towards the hangar.

The Junior Engineer was waiting next to the aeroplane. He handed Biggles a single sheet of paper, on which he had scrawled a haphazard note of his work on the craft. "Is this all?" asked Biggles, "Where is the service record?"

"It seems to be lost. The filing department say it may still be at the previous airfield."

"And the manual?"

The Junior Engineer looked startled. "I don't think there is one. We thought you knew how to fly a plane."

A cloud drifted slowly across the sunny sky of Biggles' mind. He began his walk-round. "Where's this oil coming from?"

The Junior Engineer frowned seriously. "I don't know."

Biggles sighed. But he too, long ago, had once been a Junior Engineer. "Where do you think it might be coming from?"

"The engine?" hazarded the youth.

"Of course. So what's the oil level in the engine?"

"I don't know."

"Have you checked the oil level?"

"No."

Biggles could feel his voice becoming a little tight, a little cold. "So could you check it now, please?"

"But you're just going to take off. The Chief Engineer wants you to take off right away."

"Not without an oil level. And this undercarriage strut is broken. And the port aileron is jamming intermittently."

At that moment, the Chief Engineer arrived. "Biggles, old chap! Ready to take her up? Good man."

"She's not remotely airworthy. I need an oil level and some basic repairs."

The Chief Engineer sighed. "What do you want an oil level for? You know it's going to be low. We've got to get her into the air before we can control the leak. And that undercarriage and aileron aren't going to get any better while we stand here. She needs to be in flight before I can properly assess them. Come on, old chap - the tower's given us a slot in ten minutes' time. If we don't take off then, we'll be waiting all day." He eyed the plane despondently, and tapped a tyre with the toe of his boot. "And, frankly, I don't think she'll last much longer."

Biggles rippled the muscles of his square jaw. The Bigglesworths had never balked at a challenge, but this... well, there seemed to be no way out of it. He was going to have to take the old crate into the air, just as she stood. Deuced bad luck, of course, but no point in whining.
Twenty minutes later, they were aloft. The plane kept trying to fly in circles, and the engine temperature gauge was sitting firmly in the red. The Engineer was out on the cowling with a spanner. "Just turn her off for a bit," he bawled over the clattering roar of the sick engine.

Biggles was astonished. "What?"

"Turn off the engine. There's nothing I can do about this leak until the engine's stopped."

Reluctantly, Biggles turned off the engine, and trimmed the aircraft for a shallow glide. The weight of the Engineer, out there on the nose, was not helping matters at all.

Four minutes passed in eerie silence, as the treetops swam up to meet them. "I'm going to need power again soon." There was no response from the Engineer. Another thirty seconds passed. "I need power." No answer. "I'm turning on now." The engine roared, and the Engineer recoiled, cursing, in a cloud of black smoke.

"What's your game, Biggles, old man? I almost had the bally thing fixed, and now we'll need to start all over again!"

Biggles bit back an angry retort, and concentrated on guiding the crippled plane upwards. This time, now that he knew what was going on, they would start their glide from a lot higher.

After another protracted glide, the Engineer clambered back into the cockpit, beaming. "All fixed!"

Biggles tapped the oil pressure gauge. "Pressure's not coming up," he said. "It will, it will," said the Engineer breezily. "Don't be such a fusspot. Now let's get the aileron sorted." He crawled out onto the wing, and began to strike the recalcitrant aileron with a hammer.

A minute later, the plane rolled violently to the right. Biggles struggled momentarily for control, his lips dry. By crikey, they'd almost lost it completely, there. "Don't do that!" he called hoarsely to the Engineer.

"Do what?"

"Whatever you did, just then."

"I wasn't doing anything, old man."

Almost at that moment the plane lurched again, more fiercely, and rolled through forty-five degrees. "That!" screamed Biggles, fighting the controls for his very life. "Don't do that!"

"Fair enough," said the Engineer, cheerily. A minute later he did it again, and the plane was inverted for ten long seconds before a sweating Biggles regained any vestige of control.

"Fixed! Undercarriage next!" called the Engineer, and clambered out of sight below the fuselage.

Ten minutes later, Biggles caught brief sight of a set of wheels dropping away earthwards. "Couldn't save 'em," said the Engineer matter-of-factly when he regained the cockpit. "Better off without them, frankly."

"I still have very little oil pressure," said Biggles, worriedly.

The Engineer pursed his lips and tapped the pressure gauge reflectively. "Well, the leak's fixed, old man. Must be something about the way you're flying her." He reached under his seat and pulled out a parachute. "Look, I'm most frightfully sorry about this, but the nice men from Sopwith are taking me out to dinner tonight, so I've got to dash. Be a brick, Biggles old fellow, and just put her down anywhere you like. I'll cast an eye over her in the hangar tomorrow morning."

And with that, he was gone.

Biggles thought longingly of his own parachute. But he couldn't abandon the old girl now. It wasn't her fault, after all. Black, oily smoke was already billowing out of the engine cowling, however - he needed to put her down soon. He began to peer around for a flat place to land and, almost immediately, he spotted a distant grassy field.

He moved the controls a little so that he could take a closer look - it certainly looked flat enough. Oddly, someone had painted huge white letters across the level green grass - ICU, it read. He had no idea what that meant, but it seemed vaguely comforting, for some reason. The engine coughed once, and then stopped. He could see a fitful orange glow beneath the cowling. This rummy ICU field would just have to do, it seemed.

As he swung the ailing aircraft around to make his final approach, he realised that the landing field was just a little too short for comfort. He licked his lips, and prayed that there would be enough room....,
DIY Kit for topicalising the airway

Size 20 cannula (trocar removed) attached to a three way tap and also connected to O2 at 10l/min.

Inject local anaesthetic (2 or 4% xylocaine) to topicalise the nasal passages/oropharynx as a nebuliser.

Surgical Airway Kit

Size 20 scalpel
Tracheal hook (optional)
Tracheal dilators or artery forceps to dilate trachea

I also use a bougie then railroad a size 6 ETT

Novel suction apparatus

I still need to wet test this, but the idea is simple

In case of torrential bleeding/vomit, can use a swivel adaptor (bronchoscope adaptor) to the end of an ETT, and attach a meconium aspirator to the suction tubing and outlet. Then can use the ETT as a sucker - once placed, if the trachea is soiled then exchange with Aintree for a fresh ETT
DIFFICULT AIRWAY - KIT PHOTOS

**Intubating stylet** eg: Bonfils, Levitan

**AirTraq Optical Laryngoscope** - cheap at $90 each, but lose situational awareness as optical only and needs practice to place ETT

**McGrath Videolaryngoscope**
Good image quality, but poor in glare, flimsy and no video out. The blade is sheathed in a disposable protective sleeve. Mid range price

**Pentax AWS Videolaryngoscope**

**C-MAC Videolaryngoscope**
Like other VLs, it accelerates the learning curve of laryngoscopy as the monitor allows others to see what the intubator sees. Playback is good for teaching

EXPENSIVE at $15K cf KingVision

**KingVision Videolaryngoscope**
The dogs nuts as far as I am concerned - cheap, video out to PC/monitor and easy laryngoscopy (bit of a learning curve - common mistake is to advance ETT too soon)

$800 for screen/handle and blades $30 each
Range of ETT tips

The Parker (third form left) and FastTrach iLMA tipped ETTs are particularly suited to difficult intubation and use with VL as less likely to get ‘hooked’ on the right arytenoid cartilage

Worth getting a few Parker tip ETTs for difficult airways

The CombiTube

Easy obturation of oesophagus and tracheal ventilation
Probably the most under used piece of kit - many hospitals don’t even carry them, but easy to use

FastTrach iLMA

Allows ventilation via iLMA then blind placement of an ETT
May need Chandy maneouvre
Not always successful.
A newer VL version allows confirmation of ETT placement
Ambu Ascope 2

An affordable alternative to expensive fibreoptic systems. At $2500 for five, this is a disposable system.

Would allow awake fibreoptic intubation (see excellent video on youtube at http://www.youtube.com/watch?v=c9pAQ3DUKVM&feature=related)

Perhaps for the rural GP it is better as a bail out tool under Plan B in DAS algorithms - can drop in the cheap Aura-i iLMAs ($5 each) and then intubate through this with the Ascope - hence ventilating and then intubating. In the absence of this, there is NO REAL alternative option at PLAN B for the rural doctor (the FastTrach iLMA is a bit hit and miss)

It doesn't have a suction port - but even the top range fibreoptic devices have piss weak suction. It does have a ‘park’ for the ETT which is a neat concept and not available on the more expensive fibreoptic devices that I have played with. It also has a port to allow oxygen at 2l/min and/or to squirt local anaesthetic down to topicalise the airway.

I thin this is a ‘must have’ along with the KingVision VL

Would need to use occasionally on elective list or sacrifice one for training purposes. If enough rural hospitals have them, can re-cycle stock between health units (including MedSTAR) if not used.