Theatre Checklists - Routine & Emergency

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Kangaroo Island, South Australia





Sources

Australian Resuscitation Co*uncil - www.resus.org.au*
Difficult Airway Society UK - *www.das.uk.com*
National Patient Safety Foundation - *www.apsf.net.au*

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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 & aide memoires have been compiled from a variety of sources to be used in theatre or ED both routinely and in an evolving crisis.




GENERAL PRINCIPLES

RAPID SEQUENCE INTUBATION

OBESE / ASTHMA / DSI

DIFFICULT AIRWAY ALGORITHM

UNEXPLAINED HYPOXIA

ELEVATED or DECREASED ETCO2

ELEVATED AIRWAY PRESSURES

BRADYCARDIA

TACHYCARDIA

CARDIAC ARREST

MYOCARDIAL ISCHAEMIA

SEVERE HYPO- or HYPERTENSION

MAJOR HAEMORRHAGE

ANAPHYLAXIS

MALIGNANT HYPERTHERMIA

TURP SYNDROME

OBSTETRIC ANAESTHESIA

OBSTETRIC CRISIS

INFUSION PROTOCOLS

DRUG FORMULARY

KNOW, MODIFY and OPTIMISE THE ENVIRONMENT

establish protocols and procedures
ensure room set up is conducive to crisis - layout, equipment etc
how can things be improved (this includes equipment)

ANTICIPATE and PLAN FOR A CRISIS

patient - procedure - equipment - drugs - personnel - retrieval
- global plans
- specific plans

ENSURE LEADERSHIP and ROLE CLARITY

assign leader
preferably not responsible for tasks ie: has an overview of the situation
leader decides, prioritises and assigns tasks to team

COMMUNICATE EFFECTIVELY

leadership and followership aided by clear communication
eye contact, use names, clear instructions, ensure understanding and report back
close the loop - upstream/downstream communication

CALL FOR HELP or SECOND OPINION EARLY

call for help early - even if not in a crisis
second opinion may be reassurance enough or suggest alternatives
avoid therapeutic inertia

ALLOCATE ATTENTION and USE AVAILABLE INFORMATION

fixation errors common
beware attentional tunnelling / situational overload
if you are stressed you are likely to be missing something

DISTRIBUTE WORKLOAD and USE AVAILABLE RESOURCES

maintain situational awareness
delegate tasks, use external resources (telemedicine/retrieval)
if all else fails, think laterally - improvise/adapt/overcome

PRINCIPLES OF CRISIS MANAGEMENT

	SCARE	SCAN	CHECK	ALERT/READY	EMERGENCY
C	**C**olour, **C**irculation, **C**apnography	BP, HR, Rhythm, ETCO2 SpO2, Colour	Radial pulse, correlate, SPO2 dislodged?	Allocate roles - IV access Arrest trolley	LARGE BORE IVs, FLUIDS, DEFIB, DRUGS
O	**O**xygen Supply & **O2** Analyser	FiO2, Rotameter, O2 analyser matches FiO2	Increase FiO2, watch MAC	FiO2 100% Maintain anaesthesia?	HIGH FLOW OXYGEN AVOID AWARENESS
V	**V**entilation & **V**aporisers	Ventilation - RR, TV Vaporiser & Mix	Check circuit & vaporiser, ventilate by hand	Self-inflating bag, turn off vaporiser (use propofol?)	VENTILATE BY BAG
E	**E**TT tube & **E**liminate Machine	ETT position & security Able to Eliminate (bag)?	Distance in cm? Kinked? Bag and O2 available?	Switch ETT or use LMA Eliminate circuit/machine	ENSURE ETT PLACED OR ALTERNATIVE
R	**R**eview - Monitors & Equipment	Review monitors, update records, review equipment	Review monitors, review equipment - any changes?	Emergency Equipment RETRIEVAL?	DELEGATE OPERATION OF EQUIPMENT
A	**A**irway (face or laryngeal mask), meticulous attention to ETT	Airway position, patent? Distance in cm	Observe & palpate neck, ETT position, cuff	Aspiration, Laryngospasm Obstruction, ETT/LMA	AIRWAY PATENT & PROTECTED
B	**B**reathing (SV/IPPV)	Breathing pattern OK?	Observe, palpate & auscultate chest. ETCO2?	Bronchospasm, Oedema, Hypoxia, Hypoventilatiion	ADDRESS HYPOXIA, HYPOVENTILATION
C	**C**irculation, IV, Blood loss, ECG	Circulation - trends, fluids and blood loss	Cross check BP, IV, losses & response to Rx/surgery	Hypo/Hypertension Arrhythmia, Arrest Algorithm	CRYSTALLOID, BLOOD VASOPRESSORS, CPR
D	**D**rugs - consider all given & not given, check emergency drugs	Drugs given & appropriate response?	Check drugs (error?) and patency IV line. Flushed?	Drug error? Antidote? ANAPHYLAXIS?	ATROPINE 10mcg/kg ADRENALINE 10mcg/kg
A	Be **A**ware of **A**ir and **A**llergy	Awareness - Patient Asleep, Self OK?	Awareness, Air Embolism, Anaphylaxis, Air in Pleura?	Awareness, Air Embolism, Anaphylaxis, Air in Pleura?	MAINTAIN SITUATIONAL AWARENESS
SWIFT CHECK	Check Patient, Surgeon, Processes & Responses	Progress of Surgeon and of Operation	Question surgeon, review old Notes	Notify Surgeon & Mobilise Staff	DEFINITIVE SURGERY OTHER CRISIS?

COVER ABCD - A Swift Check

SAFE SURGERY CHECKLIST

BEFORE INDUCTION

Nurse & Anaesthetist

Has patient confirmed identity, site, surgery and consent?

Yes ❑

Is the surgical site marked?

Yes ❑ Not applicable ❑

Is the anaesthetic machine & medication check complete?

Yes ❑

Are pulse oximeter, BP & ECG on the patient, functioning & acceptable?

Yes ❑ Snapshot taken? ❑

Does the patient have a known allergy?

No ❑ Yes ❑

Difficult airway or aspiration risk?

No ❑ Yes & equipment/help available ❑

Risk > 500ml blood loss (7ml/kg children)?

No ❑ Yes & 2 IVs sited, blood available ❑

BEFORE INCISION

Nurse, Surgeon & Anaesthetist

Confirm all team members name & role

Yes ❑

Confirm patient name & nature of surgery

Yes ❑ Not applicable ❑

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? ❑

Responsible Doctor identified & available? ❑

START HERE Ask 'who will be team leader' & then perform a systematic check of each of following

Prepare Patient

Is position optimal?

- *ear to sternum*
- *ramp if obese*
- *MILS for trauma*

Is preoxygenation adequate?

- *apnoeic oxygenation ready with nasal specs high flow?*

Can this patient's condition be optimised any further prior to intubation?

- *O2, Haemoglobin*
- *Cardiac contractility, rate*
- *Afterload, Preload*
- *PEEP*
- *IV access adequate & secure*

How will anaesthesia be maintained post induction?

- *vaporisers full & checked*
- *adequate IV medications*
- *pump sets available*

Prepare Equipment

Is patient monitoring applied, functioning and values acceptable?

- *SpO2*
- *ECG*
- *BP*
- *ETCO2*
- *BIS required?*

Is equipment checked and immediately available?

- *self-inflating bag*
- *appropriate sized Guedel/NPO*
- *laryngoscope working & spare*
- *ET tube and alternatives*
- *Suction*
- *Bougie*

Do you have all the necessary drugs, including vasopressors?

- *Amnesic and/or Analgesic*
- *Induction agent*
- *Neuromuscular blockade*

Prepare Team

Delegate and brief team :

- *team leader*
- *intubator*
- *assistant*
- *cricoid pressure / OELM*
- *MILS*
- *drug administration*
- *extra assistance required*

ARTICULATE AIRWAY PLAN
Request prompts if difficulty

How do we get further help if required?

- other *theatre staff available?*
- *other doctors available?*
- *retrieval service notified?*

LEMON Assessment

Look - *beard, no neck, dentition*
Evaluate - *thyromental distance*
Mallampati score : *I - IV*
Obstruction or Obesity
Neck Movement - *collar/arthritis*

Anticipate Problems

If airway is difficult, can we wake this patient?

Yes ❑ No ❑

If intubation is difficult, how to maintain oxygenation?

Plan A - Intubate & Ventilate
Plan B - iLMA/VL/Fibreoptic
Plan C - Oxygenation with BMV
Plan D - CICO, Surgical Airway

Is the necessary equipment immediately available?

Yes ❑ No ❑

Are there any specific problems anticipated?

- *awareness, aspiration*
- *profound desaturation*
- *hypotension, arrhythmias*
- *patient positioning/transfer*
- *other?*

RAPID SEQUENCE INTUBATION

START HERE **Ask 'who will be team leader' & then perform a systematic check of each of following**

SET UP

Monitoring - BP, ECG, SpO2, ETCO2	Check ❑
Nasal Cannulae at 15l/min PLUS Mask O2	Check ❑
Pre-oxygenation for FOUR minutes	Check ❑
Suction checked working & available	Check ❑
Position optimised - ear-to-sternum	Check ❑
Ramping needed?	Check ❑
360 degree access to patient & monitors visible	Check ❑
Cricothyroid membrane palpated and marked	Check ❑

IV & DRUGS

IV Cannula connected to fluid & running	Check ❑
NIBP on contralateral arm and BP seen	Check ❑
Spare cannula *in situ*	Check ❑
INDUCTION AGENT drawn up, dose checked	Check ❑
SUX or ROC drawn up, dose checked	Check ❑
VASOPRESSORS drawn up, labelled	Check ❑
POST INTUBATION drugs drawn up & labelled	Check ❑

INTUBATION EQUIPMENT

BVM connected to oxygen	Check ❑
PEEP valve for BMV available	Check ❑
Oropharyngeal and 2 Nasopharyngeal Airways available	Check ❑
Laryngoscope blade selected, light working	Check ❑
ET tube size chosen, cuff tested	Check ❑
Alternate tube size chosen & cuff tested	Check ❑
20ml Syringe for cuff inflation	Check ❑
Stylet straight-to-cuff and/or Bougie with RapiFit connectors	Check ❑
Gooseneck, filter, inline ETCO2 (or EasyCap)	Check ❑
Tube ties & tape available	Check ❑
Ventilator settings determined & set up	Check ❑

TEAM BRIEF

Team roles allocated	Check ❑
Anticipated difficult airway plan's A/B/C/D discussed	Check ❑
Agree prompts if SpO2 < 95% or > 3 intubation attempts	Check ❑
Difficult airway kit immediately available & checked	Check ❑

Medications	Normotensive Dose	Hypotensive Dose
Ketamine	2 mg/kg	0.5mg/kg
Propofol	1-3 mg/kg	0.25mg/kg *or ketamine*
Fentanyl	3 mcg/kg	consider if high ICP
Succinylcholine	1.5-2 mg/kg	2 mg/kg
Rocuronium	1.2 mg/kg	1.6 mg/kg

Roc 1.2 mg/kg - will give same intubating conditions as sux at 60s but not reversible & causes prolonged paralysis - consider RISK/BENEFIT

ADRENALINE 'PUSH DOSE'

draw up 9ml N/saline in 10 ml syringe
to this, add 1ml of 1/10,000 (cardiac arrest) adrenaline
shake syrnge hard & label as 'ADRENALINE 10mcg/ml'

ADRENALINE INFUSION

6mg 1/1000 vial in 100ml N/saline at 2-20ml/hr - aim MAP 70
(use 3mg in 50ml syringe if using Niki T34L syringe driver)

RAPID SEQUENCE INTUBATION

TRAUMA / CRITICALLY ILL PRE-RSI CHECKLIST

(can do this whilst pre-oxygenating)

SET UP

Monitoring - BP, ECG, SpO2, ETCO2	CHECK	❑
Nasal Cannulae at 15l/min PLUS Mask O2	CHECK	❑
Pre-oxygenation for FOUR minutes	CHECK	❑
Suction checked working & available	CHECK	❑
Position optimised	CHECK	❑
Ramping needed?	CHECK	❑

IV & DRUGS

IV Cannula connected to fluid & running	CHECK	❑
NIBP on contralateral arm and BP seen	CHECK	❑
Spare cannula in situ	CHECK	❑
INDUCTION AGENT drawn up, dose checked	CHECK	❑
SUX or ROC drawn up, dose checked	CHECK	❑
VASOPRESSORS drawn up, labelled	CHECK	❑
POST INTUBATION drugs drawn up & labelled	CHECK	❑

INTUBATION EQUIPMENT

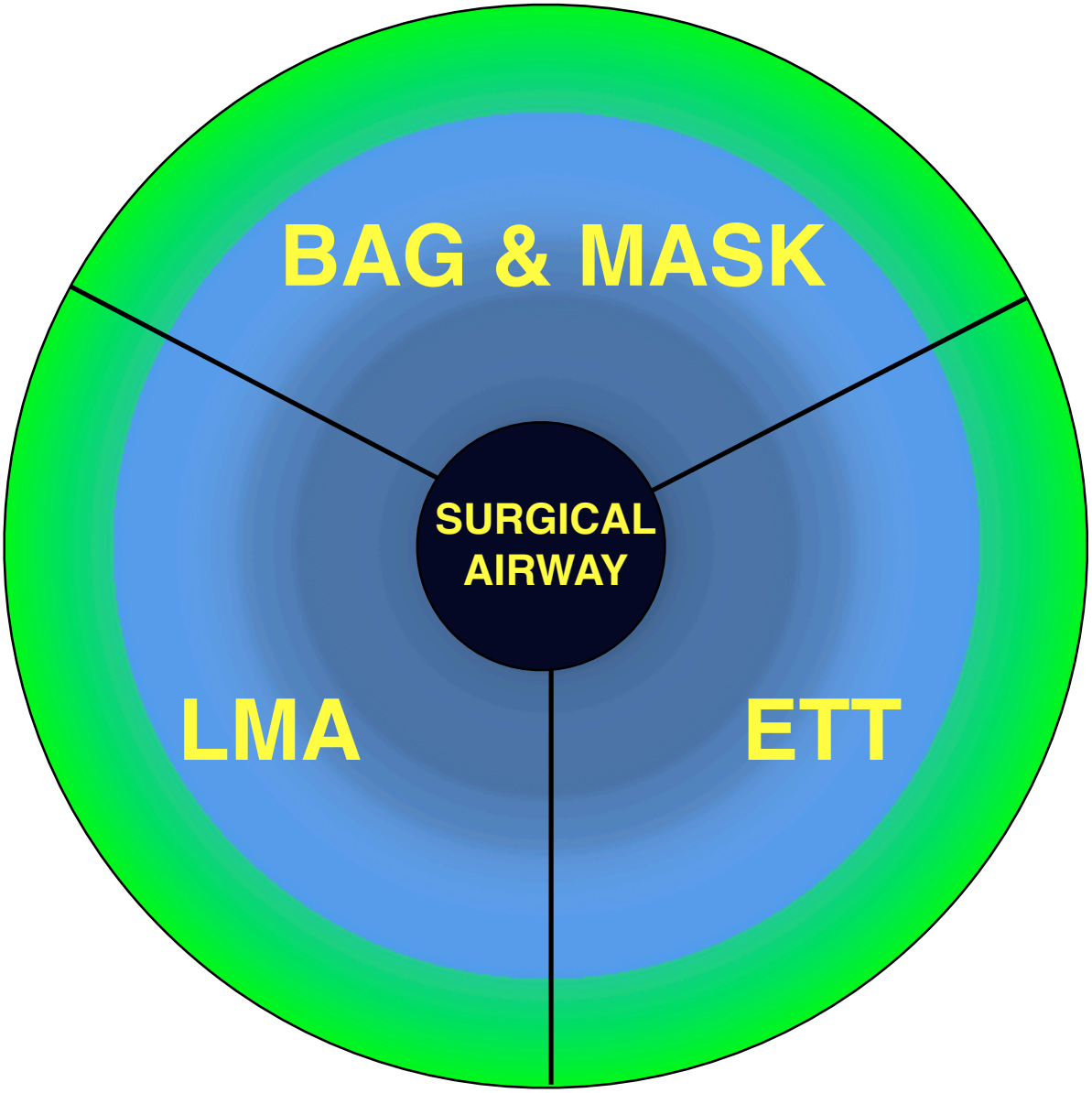
BVM connected to oxygen	CHECK	❑
PEEP valve for BMV available	CHECK	❑
Guedel airways & two NPO airways available	CHECK	❑
Laryngoscope blade chosen, light working	CHECK	❑
ET tube size chosen, cuff tested	CHECK	❑
Alternate tube size chosen & cuff tested	CHECK	❑
Syringe for cuff inflation	CHECK	❑
Stylet & Bougie available	CHECK	❑
Gooseneck, filter, inline ETCO2 (or EasyCap)	CHECK	❑
Tube Tie available	CHECK	❑
Ventilator settings determined	CHECK	❑

TEAM BRIEF

In-line immobilisation person briefed	CHECK	❑
Cricoid pressure person briefed	CHECK	❑
Drug giver briefed	CHECK	❑
Anticipated difficult airway plan's A/B/C/D discussed	CHECK	❑
Post RSI care brief & maintenance of anaesthesia ready	CHECK	❑
Anaesthetic assistant ready	CHECK	❑

DIFFICULT AIRWAY KIT AVAILABLE AND PREPARED TO USE IT?	CHECK	❑

VORTEX AIRWAY CHECKLIST



USE AS COGNITIVE AID IN AIRWAY PLANNING AND CRISIS MANAGEMENT

Start with whichever of the three non-surgical airway supports (mask, LMA, ETT) is appropriate.

No more than THREE attempts at each airway support technique (mask, LMA, ETT) Check ❑

For each airway support, consider whether changes in the following will help :

Manipulation (head/neck, larynx, device) Check ❑
Adjuncts (oro/nasopharyngeal airways, stylet/bougie, videolaryngoscope etc) Check ❑
Size/Type Check ❑
Suction Check ❑
Pharyngeal muscle tone Check ❑

The aim is to ensure alveolar oxygenation and allow the team to rapidly manage an airway crisis. Move from each of the three non-surgical options (BMV-LMA-ETT) attempting to remain in green zone and avoid deterioration into surgical airway as a rescue for ‘can’t intubate, can’t oxygenate’

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

PREOPERATIVE EVALUATION - SLEEP APNOEA & OTHER RISKS?

STOP-BANG > 5

Snore loudly?	Check ❑	BMI > 35?	Check ❑
Tired during daytime?	Check ❑	Age > 50?	Check ❑
Observed to stop breathing in sleep?	Check ❑	Neck circumference > 40cm?	Check ❑
Pressure high (BP)?	Check ❑	Gender male?	Check ❑

OTHER

poor functional capacity,abnormal ECG, uncontrolled BP/IHD,
SpO2<94% air, previous DVT/PE, poorly controlled COPD or asthma
Diabetes control

OPERATIVE MANAGEMENT

CONSIDER

Antacid prophylaxis?	Check ❑
Pre-op analgesia?	Check ❑
DVT prophylaxis?	Check ❑
Careful glucose control?	Check ❑

EQUIPMENT

Bariatric trolley/personnel to lift	Check ❑
Gel padding	Check ❑
Large BP cough	Check ❑
Ramping of patient (pillows)	Check ❑
PEEP for Pre-Ox and BMV	Check ❑
Pressure support ventilation	Check ❑

IDEAL BODY WEIGHT

Men	Height (cm) - 100
Women	Height (cm) - 105

RAMPING

Ear-to-sternum
Reduces difficult ETT
Improves ventilation

TECHNIQUE

Self-position on table	Check ❑
Pre-oxygenate RAMPED	Check ❑
Use PEEP valve on BMV	Check ❑
Minimise induction-ventilation time	Check ❑
Avoid spontaneous ventilation	Check ❑
Desflurane if available or Propofol TCI	Check ❑
Short-acting opioids	Check ❑
Multimodal analgesia	Check ❑
PONV prophylaxis	Check ❑
Ensure full reversal of NMB	Check ❑
Extubate & recover head up	Check ❑
Use IBW (except for sux)	Check ❑

NB for Propofol Infusion, use Servin's formula
Add 40% of excess weight to IBW
ie : IBW + 0.4(TBW-IBW)

ANAESTHESIA for OBESE BMI > 35 kg/m2

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

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 lines, central line / arterial line?* *sedation/paralysis for transfer* *paperwork for transfer*

OBESE INTUBATION

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

STEP ONE

Continuous nebulised salbutamol - use O2 not air for nebs
Nebulised ipratropium - 500mcg x3 20 minutely, then hourly
Hydrocortisone 100mg IV (alternative DXM 20mg IV or IM)
MgSO4 2g (50mg/kg max 2g) IV - given over 20 minutes

if no better, proceed to

STEP TWO

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

if no better, proceed to NIPPV

STEP THREE
AGITATED PATIENT

ketamine 1.5 mg/kg IV over 30 s
then 1 mg/kg/hr titrate to effect

if no IV, 5mg/kg IM

IF WORSENING

NIPPV
iPAP PS 8cm H2O
ePAP PEEP 3 cm H2O

continue nebs through NIPPV

STEP THREE
COOPERATIVE PATIENT

NIPPV
iPAP PS 8cm H2O
ePAP PEEP 3 cm H2O

continue nebs through NIPPV

IF WORSENING

ketamine 1.5 mg/kg IV over 30 s
then 1 mg/kg/hr titrate to effect

if no IV, 5mg/kg IM

Consider differential diagnoses

heart failure, ACS, arrhythmia
pulmonary embolism
PTX, pericardial tamponade,
obstruction, foreign body
anaphylaxis

AVOID INTUBATION IF POSSIBLE

BUT 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%

permissive hypercarbia
Ext chest compression
Pplat < 30cm H2O
Aggressive suctioning of ETT, check K
NGT

LIFE THREATENING ASTHMA

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

Plan A: Initial tracheal intubation plan

Direct laryngoscopy → succeed → Tracheal intubation

failed intubation

Plan B: Secondary tracheal intubation plan

ILMA™ or LMA™ → succeed → Confirm - then fibreoptic tracheal intubation through ILMA™ or LMA™

failed oxygenation

failed intubation

Plan C: Maintenance of oxygenation, ventilation, postponement of surgery and awakening

Revert to face mask Oxygenate & ventilate → succeed → Postpone surgery Awaken patient

failed oxygenation

Plan D: Rescue techniques for "can't intubate, can't ventilate" situation

LMA™ → improved oxygenation → Awaken patient

increasing hypoxaemia

or

Cannula cricothyroidotomy → fail → Surgical cricothyroidotomy

MAXIMUM THREE ATTEMPTS

CHANGE POSITION - BLADE - OPERATOR
USE BOUGIE - CONSIDER STYLET - VL

SECONDARY INTUBATION PLAN

Intubating LMA (iLMA) - FastTrach or AirQ II
KingVision Videolaryngoscope

BAG MASK VENTILATION
USE TWO HANDS

CAN YOU WAKE THE PATIENT ?

RESCUE TECHNIQUES

Declare a CICO Emergency

Continue to use LMA to attempt oxygenation

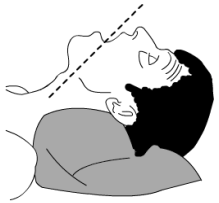
Identify cricothyroid membrane
Needle or Scalpel-Bougie-ETT Technique

Frova (oxygenating bougie) O2 at 2 l/min

DIFFICULT AIRWAY PLAN

PLAN A
TRACHEAL INTUBATION PLAN

max 3 attempts RSI
max 4 attempts ELECTIVE

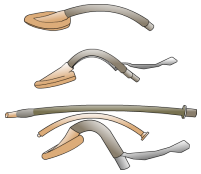


Ramp - Ear to Sternum
Stylet ‘straight-to-cuff’ - Frova Oxygenating Bougie
Change Blade Size
Consider Miller or McCoy
KingVision VL

Re-Position - Use a Bougie - Videolaryngoscope

PLAN B
SECONDARY INTUBATION PLAN

not in RSI
maintain oxygenation & ventilation



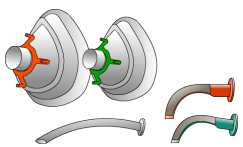
Use LMA - Classic or Supreme

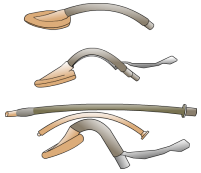
Intubating LMA - FastTrach or Air Q II
Blind intubate thro’ iLMA or fibreoptic assist if available
Use Parker tip ETT if available

ETT via iLMA blind or fibreoptic

PLAN C
AWAKEN

re-group
postpone surgery





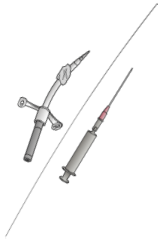
Bag Mask Ventilate
Oropharyngeal &/or Nasopharyngeal Airway
LMA (any)

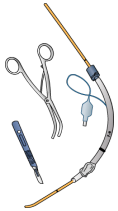
Suggamadex at 4-8mg/kg if available

two handed BMV - Adjuncts - LMA

PLAN D
CICO/CICV

needle or
surgical airway





Consider USS to locate & mark cricothyroid membrane
14 G jelco and O2 connection with 3-way tap
high pressure O2 device
Size 22 scalpel - Bougie - size 6.0 ETT

DIFFICULT AIRWAY - KIT CHECKLIST

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

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

Ensure adequate ventilation:

- *exclude bronchial intubation*
- *look/listen for bilateral AE*
- *assess adequacy of MV*
- *exclude bronchospam*
- *recheck airway pressures*
- *exclude pneumothorax*

Patient Lungs

Consider Gas Exchange :

- *aspiration*
- *pulmonary oedema*
- *consolidation*
- *atelectasis*

Consider Embolism

- *of thrombus, air or fat*

Patient Circulation

Circulation

- *low cardiac output*

Anaemia

- *reduced O2 carriage*
- *high O2 extraction*
- *decreased mixed venous PO2*

Patient Tissues

Tissue Uptake of O2

Increased metabolism

- *fever*
- *thyroid crisis*
- *etc*

UNEXPLAINED HYPOXIA - SpO2 < 90% or decrease > 5% during anaesthesia

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

ELEVATED ETCO2

Inhaled / Exogeneous CO2

Check capnograph for return to baseline ?
Laparoscopic CO2 insufflation ?
NaHCO3 administration ?
Inspired CO2 (soda lime exhausted) ?
Incompetent valves or Patient 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 ?

Malignant Hyperthermia checklist

NB : Apnoea causes rise of PaCo2 8-15mmHg first min, then 3mmHg/min

DECREASED or ABSENT ETCO2

Airway

Exclude inadvertent oesophageal intubation ?

Circuit

Air entrainment (leak) ?
Dilution of gas (sampling problem) ?
Sampling line connected to circuit & monitor ?

Ventilator

Check settings, exclude raised RR ?

Gas Exchange Problem

Profound Hypotension ?
Pulmonary Embolism ?
Cardiac Arrest ?

Hypotension, Myocardial Ischaemia checklists

Decreased Production

Cardiac Arrrest checkiist

Hypothermia
Decreased metabolism

ELEVATED or DECREASED / ABSENT END TIDAL CO2

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

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

Breath sounds?

Bronchospasm, atelectasis, aspiration, pulmonary oedema, endobronchial intubation

Patient pleural space

Consider and exclude :

- *pneumothorax*
- *haemothorax*

14G needle (2nd ICS MCL)

Finger or tube thoracostomy (ant axillary line 5th ICS)

Patient chest wall

Exclude inadequate chest wall relaxation

- *inadequate muscle relaxation*
- *opioid-induced rigidity*
- *malignant hyperthermia*
- *obesity*

Surgical procedure

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)

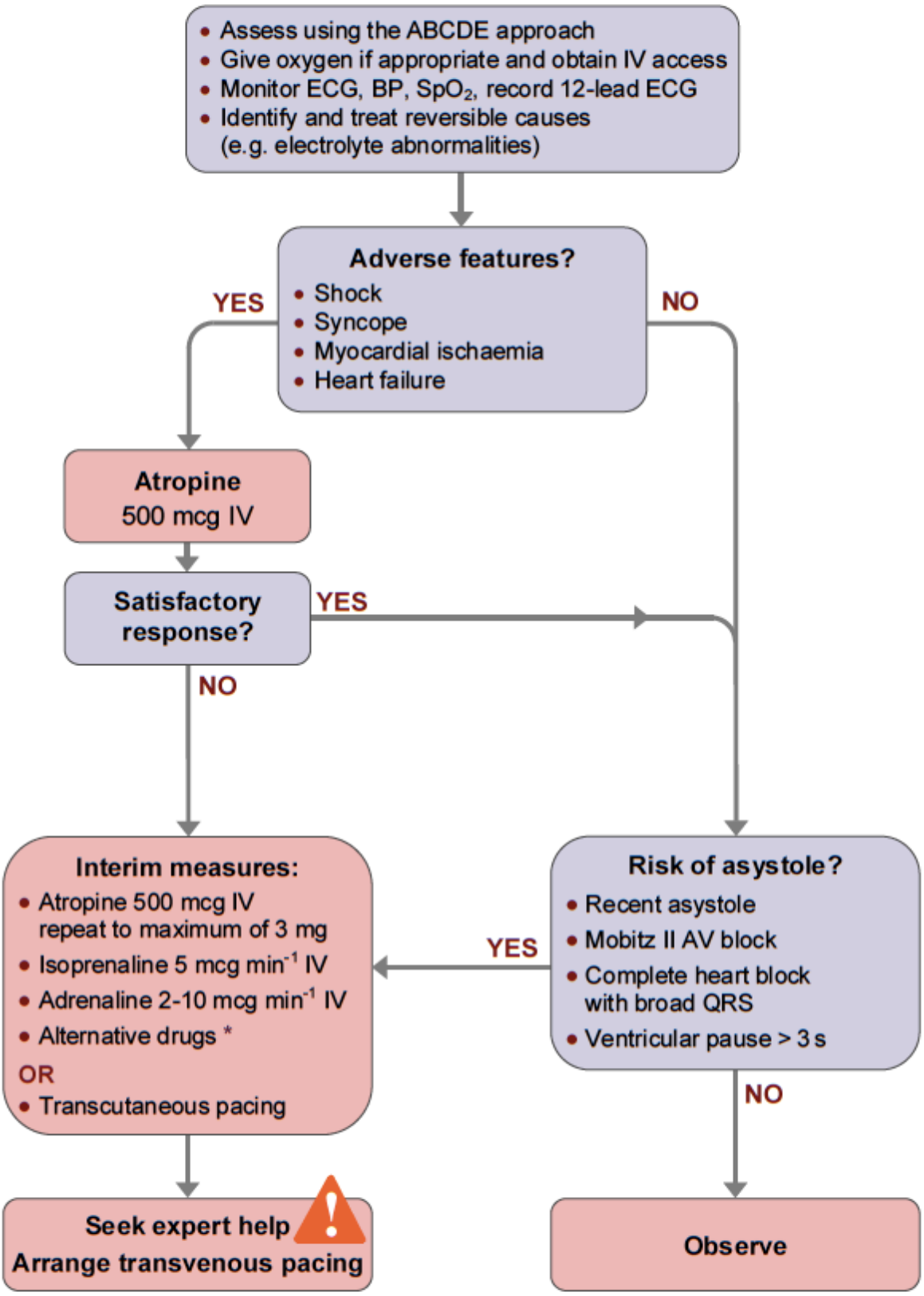
Circulatory collapse
(high intrathoracic pressure)

Tachycardia

ELEVATED AIRWAY PRESSURE

Resuscitation Council (UK)

Adult bradycardia algorithm



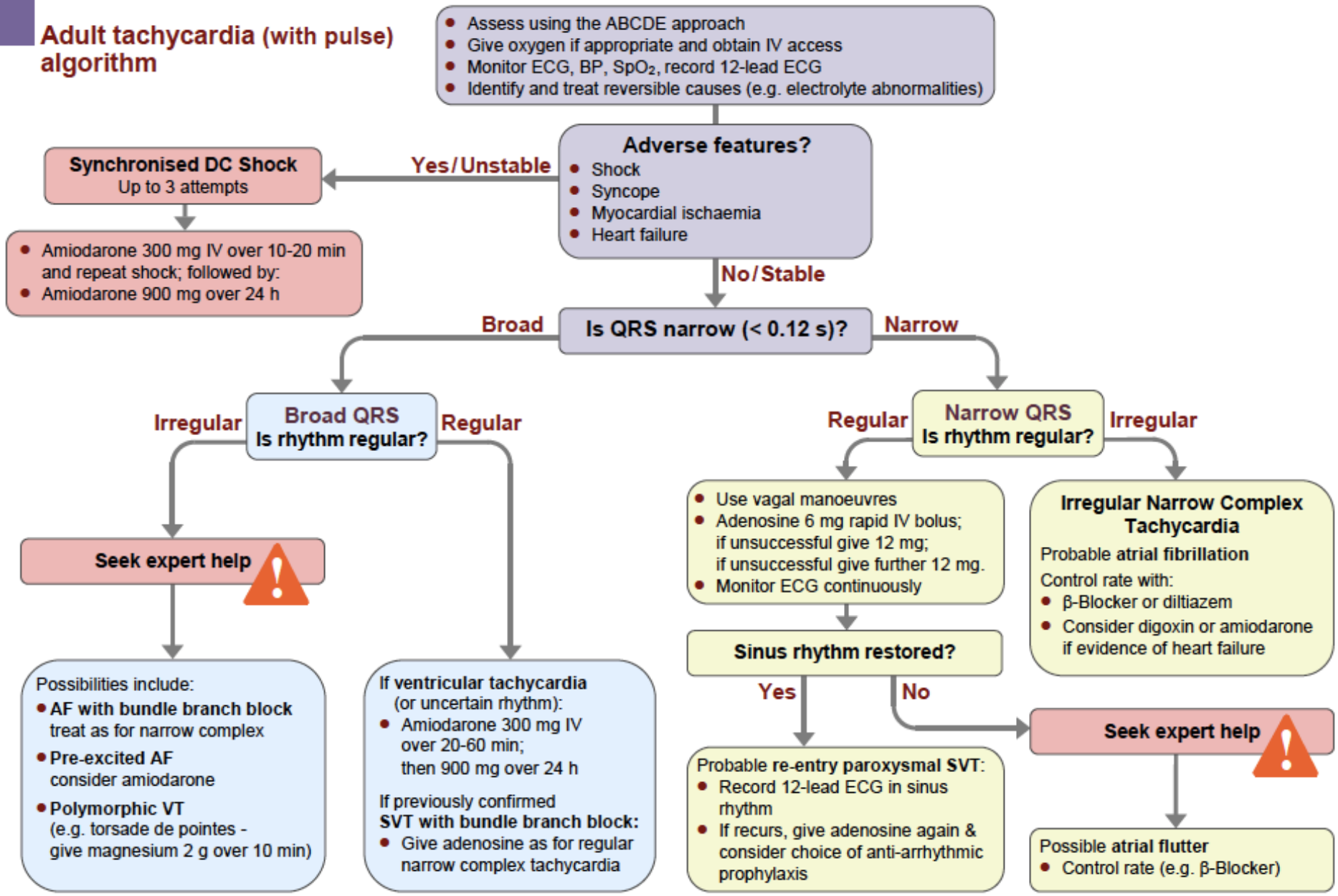
*** Alternatives include:**

- Aminophylline
- Dopamine
- Glucagon (if beta-blocker or calcium channel blocker overdose)
- Glycopyrrolate can be used instead of atropine

2010 Resuscitation Guidelines

Resuscitation Council (UK)

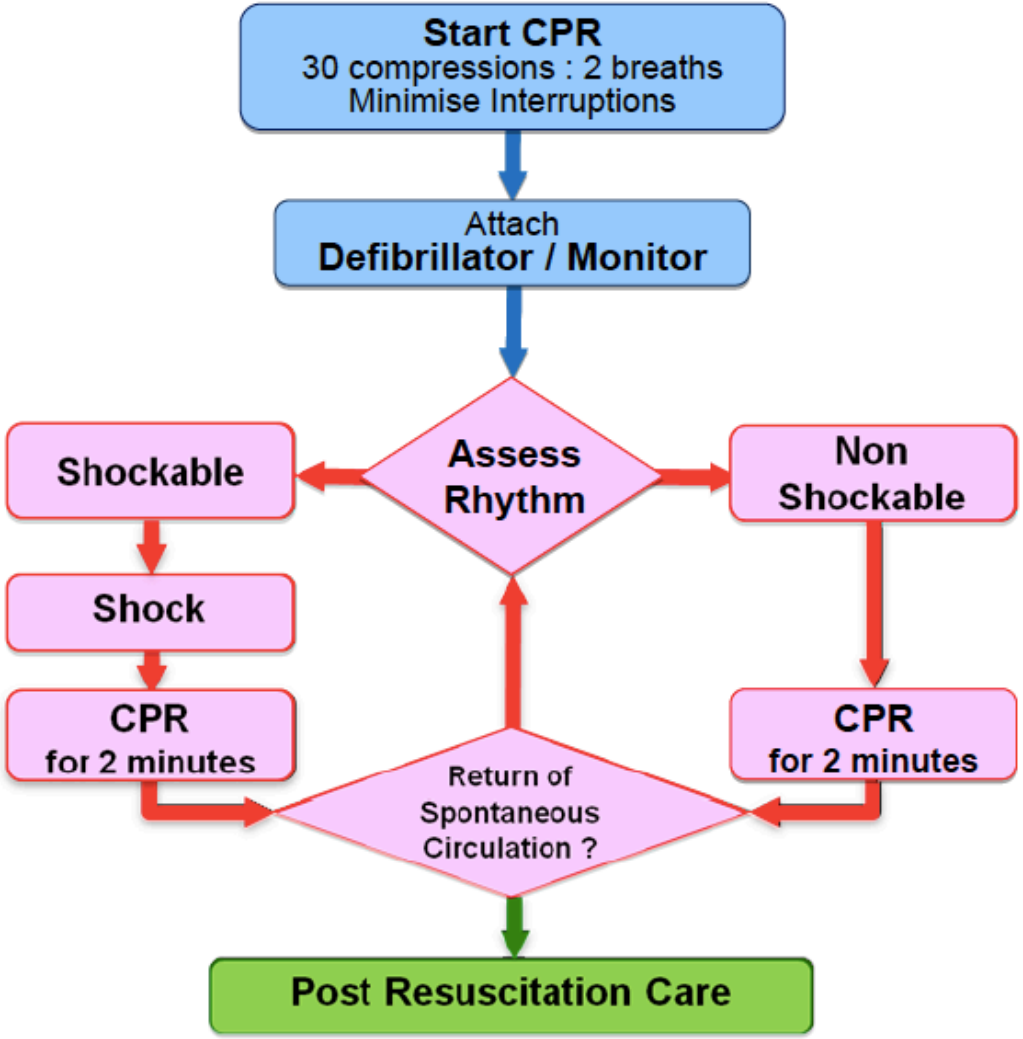
Adult tachycardia (with pulse) algorithm



New Zealand Resuscitation Council

Advanced Life Support for Adults

Australian Resuscitation Council



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)

December 2010

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

AT RISK

Ischaemic heart disease
Hypertension
Fluid losses
Diabetes
Smoker, Lipids, FHx etc.

MITIGATION

Perioperative Beta-block
Hb > 10g/dL
Adequate Oxygenation
BP in 3 digits,
HR 2 digits,
BGL 1 digit
Regional Anaesthesia?

SHOULD THIS ANAESTHETIC BE GIVEN HERE?

TAKE A SNAPSHOT BEFORE START

Lead position "white is right; smoke (black) above fire (red)" on the L side

OH CRAP !

Oxygen, **H**aemoglobin
Contractility, **R**ate, **A**fterload, **P**reload

MANAGEMENT

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

Lead II is best for detecting arrhythmias.
CM5 detects 89% of ST-segment ischaemic changes (right arm electrode on manubrium, left arm electrode on V5 and indifferent lead on left shoulder).

RATE CONTROL

EXCLUDE hypovolaemia, awareness, or raised CO2 as cause of tachycardia — Check ❑

NEXT

BETA-BLOCKADE (aim for HR < 60) — Check ❑

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 — Check ❑

CAUTION USE OF VASOPRESSORS — Check ❑

For hypertension, consider — Check ❑
GTN - sublingual (0.3-0.9 mg)
IVI(0.25 - 4 mg/kg/min - titrate to effect)

Clonidine — Check ❑
(30 mg every 5 minutes up to 300 mg)

CARDIOLOGY ADVICE 13STAR

MYOCARDIAL ISCHAEMIA

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

HYPERTENSION

Pre-existing hypertension

treated or untreated ? Check ❑
medication taken ? Check ❑

Sympathetic reflex response

light anaesthesia? Exclude vaporizer leak, IV disconnect Check ❑
Hypoxia or hypercarbia ? Check SpO2, ETCO2 Check ❑
cerebral event? Check ❑
raised ICP ? Check ❑
ischaemia ? Check ❑
vasospasm ? Check ❑

Sympathomimetic effect?

Exogeneous *ie : administration of vasopressor* Check ❑
Endogeneous *eg: phaeochromocytoma* Check ❑

Surgical

stimulus Check ❑
tourniquet Check ❑
position eg: Trendelenburg Check ❑

HYPOTENSION

Hypovolaemia

blood loss ? Check ❑
fluid deficit ? Check ❑

Cardiogenic

contractility, rate, dysthymia ? Check ❑
anaesthetic agent ? Check ❑
vasodilators? Check ❑

Distributive (vasodilation)

drugs ? Check ❑
sympathetic block ? Check ❑
sepsis ? Check ❑
anaphylaxis ? Check ❑

Obstructive

high intra-thoracic pressures ? Check ❑
tamponade ? Bilateral pneumothorax? Check ❑
pulmonary embolus ? Check ❑
aortocaval compression from 18/40 onwards Check ❑

Whilst vasopressors elevate BP, treatment should be directed to cause

BLOOD PRESSURE

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

ACCESS TO THE CIRCULATION

Two wide bore IVs	Check	❑
Consider intraosseous with Bone Injection Gun	Check	❑
Consider venous cutdown	Check	❑
Consider Rapid Infuser Catheter	Check	❑

PARAMETERS

Permissive hypotension MAP 65-70 mmHg may be acceptable (unless TBI/spinal injury/exsanguination)	Check	❑
t > 35, pH > 7.2, Lactate < 4, BE < -6	Check	❑
Ca > 1.1, Plt > 50, INR < 1.5 Fibrinogen > 1	Check	❑

FIND THE BLEEDING, STOP THE BLEEDING

Minimise time to Surgery	Check	❑
Use tourniquets /direct pressure to control peripheral bleeding		
Tamponade bleeding eg: pelvic binder, direct pressure, sutures	Check	❑
Tranexamic acid 1g load in first 4 hrs	Check	❑
If PPH - Uterine massage, oxytocin infusion, ergometrine, misoprostol, TXA	Check	❑
Transfuse blood at a 1:1 ratio of PRCs : FFP	Check	❑
Crystalloid 250 ml bolus titrate to radial pulse	Check	❑
Send FBE, X-Match, Venous Gas, Calcium, Coags	Check	❑
Arterial line, consider Calcium (citrate toxicity)	Check	❑

WARM FLUIDS / WARM THE ROOM / CATHETERISE THE BLADDER Check ❑

USEFUL MEDICATIONS

Hartmanns 250ml bolus
Packed calls or Whole Blood
Tranexamic acid 1g load

PPH

Oxytocin 5 U IV or 10 U IM
Oxytocin Infusion 40 U / litrl @ 250 ml/hr
Ergometrine 250 mcg IV or 500 mcg IM
Misoprostol 200 mcg x 5 PR (1mg)

see also PPH checklist

MASSIVE HAEMORRHAGE in RURAL HOSPITAL

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

EXCLUSIONS

Anaesthetic circuit obstruction

- filter
- kinked ETT
- cuff herniation
- tube migration

Disconnect circuit and ventilate directly with self-inflating bag

Check ❑

if pressure still high, problem is in airway or ETT

Foreign body in airway?

Air embolism?

Tension PTX?

Severe bronchospasm?

IMMEDIATE MANAGEMENT CHECKLIST

STOP TRIGGERS
colloids/latex/antibiotic/blood/NMB — Check ❑

MAINTAIN ANAESTHESIA with **INHALATIONAL AGENT** if possible — Check ❑

Call for **HELP**, note **TIME** — Check ❑

Give 100% **OXYGEN**, give **FLUIDS** — Check ❑ Check ❑

ADRENALINE 50-100mcg IV (0.5ml-1ml of 1/10,000)
titrate to response or
0.5mg IM (thigh) if no IV access — Check ❑

ANTIHISTAMINE, HYDROCORTISONE 200mg 6/24 — Check ❑

SALBUTAMOL 250 mcg IV or 2.5-5mg nebuliser into circuit — Check ❑

ADRENALINE INFUSION

1:1000 ADRENALINE
vial (1 mg / ml)

Add 3 mg (3 vials 1:1000)
to total 50 mls N Saline (60 mcg/ml)

Run at 2 - 20 ml / hr aim MAP > 70

PRESENTATION

Wide range of possible presentations
Most common include :

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

ADRENALINE CONCENTRATIONS

1ml of 1/1000 = 1mg
10ml of 1/10,000 = 1mg

IV BOLUS DOSE
50 - 100 mcg

IM DOSE
0.5mg IM

ANAPHYLAXIS

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

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

IMMEDIATE MANAGEMENT

DISCONTINUE VOLATILES Check ❑

and give

100% OXYGEN VIA HIGH FLOW Check ❑

CALL FOR HELP - MH BOX Check ❑

ALLOCATE TASK CARDS Check ❑

MAINTAIN ANAESTHESIA with **PROPOFOL** and **OPIOID** Check ❑

EXPEDITE SURGERY Check ❑

DANTROLENE 2.5mg/kg IV until hypermetabolism resolved Check ❑

COOLING - AXILLA / GROIN / NECK Check ❑

COLD FLUSH NGT and IDC Check ❑

MOBILISE ALL AVAILABLE STAFF
NOTIFY medSTAR 13STAR
MH EMERGENCY KIT & TASK CARDS

MALIGNANT HYPERTHERMIA

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

TURP SYNDROME

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 ❑
- ONGOING 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 FROM SPINAL TRAY ❑
- LOCAL ANAESTHETIC 2% XYLOCAINE/ADRENALINE ❑
- 2.5ML BUPIVACAINE 0.5% with OPIATE ❑
- FENTANYL 20-25 mcg or MORPHINE 125 mcg ❑
- SKIN INFILTRATION ❑
- INTERSPINOUS LIGAMENT IDENTIFIED ❑
- CLEAR CSF then INJECT & BARBOTAGE ❑
- OXYTOCIN available post-delivery ❑
- 40 UNITS / 1000ml @ 250ml/hr if needed ❑
- NEONATAL RESUS ANTICIPATED? ❑

CAESAREAN SECTION

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

Prepare patient & partner

IV access 16G, warm IV fluids on pump set ☐
Sodium citrate drink ☐
Left lateral tilt to avoid aorto-caval hypotension ☐

Consider need for extra help for **neonate** ☐
Consider need for **extra blood**
Position of placenta, Previous LSCS/scarring, Multiparous
Gestational DM, Sepsis, Traumatic delivery, Other ☐

Prophylactic antibiotics 30 mins before KTS ☐

Documentation

Time called & time arrived ☐
Consent to anaesthesia ☐
Time anaesthesia initiated ☐
GGMG, Prep, Drape, asepsis ☐
Positioning ☐
Time of KTS ☐
Time of delivery ☐
Time of drugs ☐
If conversion to GA offered, document risks, time and specify if declined ☐

Any complications? ☐

Post-op DVT prophylaxis and analgesia charted ☐
SC heparin withheld for 24 hrs after spinal ☐
Epidural catheter tip sighted & intact ☐

NEURAXIAL SECTION

Spinal 2.5ml 0.5% bupivacaine + 25mcg fentanyl
(or 125mcg spinal morphine)
Top up existing epidural (T10) to T4 for LSCS
supplemental nitrous if needed 50:50 N20/O2

GA SECTION

Preoxygenate - 100% oxygen
Anticipate difficult airway and rapid desaturation
Cricoid pressure
RSI : Propofol - Suxamethonium - ET Tube

Once sux wears off use nondepolarising NMB

Give antibiotics unless contraindication
Oxytocin 3-5 U IV once baby out (check not twins!)
Oxytocin infusion - 40U/1000ml @ 250ml/hr

Postoperative Analgesia & DVT Prophylaxis

NEONATAL RESUS

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

PPH

Consider *Tone - Trauma - Tissues - Thrombin*

Oxytocin for all - 5 U IV once uterus empty
Oxytocin infusion 40U @ 10U/hr

Check placenta
Fundal rub to uterus
Ergometrine 250mcg IV
or 500mcg IM

Misoprostol 1000mcg PR

Tranexamic acid 1g load

Check Chem 8, INR

CONSIDER SURGICAL OPTIONS?

Pre-Eclampsia

4g $MgSO_4$ over 15 mins,
then 1g/hr IVI
Labetalol 50mg IV
+/- Hydralazine 5mg IV

LSCS CHECK LIST

EPIDURAL CHECKLIST

- IV ACCESS, SECURED & FLUIDS PRELOADED? ❑
- VALID INDICATION, RECENT VE & CONSENT? ❑
- APPROPRIATE POSITION? ❑
- L4-5 INTERSPACE IDENTIFIED? ❑
- PREP - DRAPE - GOWN - GLOVES (8) - MASK - HAT ❑
- ANTISEPTIC REMOVED FROM EPIDURAL TRAY ❑
- SALINE AVAILABLE if LORTS APPROACH ❑
- EPIDURAL CATHETER PRIMED with LA ❑
- SKIN LA 2% XYLOCAINE with 1/200,000 ADRENALINE ❑
- INTERSPINOUS LIGAMENT IDENTIFIED ❑
- SLOW ADVANCE WITH TUOHY NEEDLE ❑
  8cm, 16G/18G slow advance to LORTS(A) in epidural space
- Note CATHETER DEPTH advance CATHETER +5cm ❑
- SECURE, TEST DOSE 3ml LA 2% Xylo 1/200,000 Adr ❑
- BUPIVACAINE 0.125%/100mcg fentanyl (20ml premix) ❑
- TEST ADEQUACY OF BLOCK : LT > COLD, IDC ❑
- TOP UP for LSCS - 2% xylo with 1/200,000 10-20ml ❑

EMERGENCY SPINAL LSCS CHECKLIST

- ANTIBIOTICS & CITRATE GIVEN? ❑
- IV ACCESS, SECURED & FLUIDS PRELOADED? ❑
- CONSIDER EPHEDRINE or PHENYLEPHRINE ❑
- TABLE POSITION, may need L lateral to open interspace ❑
- L4-5 INTERSPACE IDENTIFIED? ❑
- PREP - DRAPE - GOWN - GLOVES - MASK - HAT ❑
- ANTISEPTIC REMOVED FROM SPINAL TRAY ❑
- LOCAL ANAESTHETIC 2% XYLOCAINE/ADRENALINE ❑
- INTERSPINOUS LIGAMENT IDENTIFIED ❑
- CLEAR CSF, SWIFT INJECTION with BARBOTAGE ❑
- 2.5ML BUPIVACAINE 0.5% with FENTANYL 20-25MCG ❑
  (or spinal morphine 125mcg)
- TEST ADEQUACY OF BLOCK : LT > COLD ❑
- CALF COMPRESSORS and INDWELLING CATHETER ❑
- OXYTOCIN 3-5 U post-delivery (+/-40U/L @ 250ml/hr) ❑
- POST-OP MULTIMODAL ANALGESIA ❑
- CLEXANE 40mg sc OD > 4 hrs post spinal or catheter out ❑

NEURAXIAL BLOCKADE - Labour EPIDURAL & SPINAL for LSCS

START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

CONSIDER POTENTIAL CAUSES & SUGGEST TO MIDWIFE & OBSTETRICIAN

Abnormalities of uterine contraction	**TONE**	**70%**
Retained products of conception or invasive placenta	**TISSUE**	**10%**
Genital tract trauma	**TRAUMA**	**10%**
Abnormalities of coagulation	**THROMBIN**	**1%**

Resuscitate A - B - C
Oxygen 15 l/min NRBM and IV Access 16G x 2
5 minutely Obs HR/BP/RR/SpO2
Mobilise OBS Dr - ANAES Dr - MW - RN - EN - Consider need for THEATRE TEAM, BLOOD, WARMED FLUIDS, INFUSION PUMPS x 2

INITIAL MEASURES
Basic resus as above, also ensure :

- Fundal pressure / rub up contraction ☐
- Check uterus not inverted ☐
- Check placenta is intact ☐
- Lay flat, reverse Trendelenburg ☐
- Set up EnFlow fluid warmer ☐
- Infuse Hartmann's ☐
- Consider need for BLOOD ☐
- Syntocinon 5U IV / 10U IM ☐
- Ergometrine 250mcg IV / 500mcg IM ☐
- Oxytocin IVI 40u/L @ 250ml/h ☐
- Misoprostol 5 x 200mcg PR ☐

BLEEDING despite CONTRACTED UTERUS?
Look for other causes :

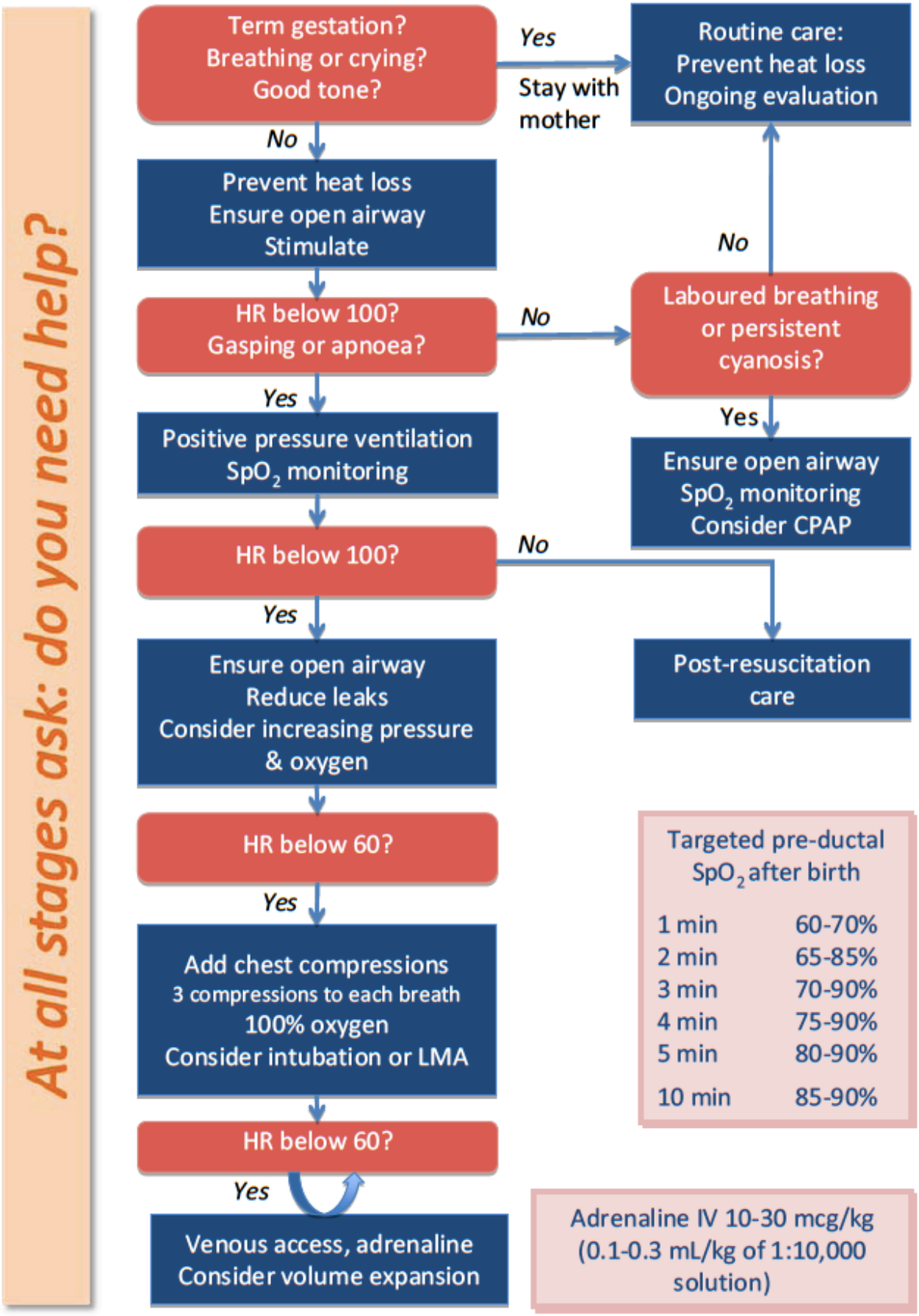
- Move to theatre ☐
- Ensure adequate anaesthesia ☐
- Lithotomy position, IDC ☐
- Adequate light, equipment ☐
- Inspect looking for genital tract trauma ☐
- Exclude uterine rupture ☐
- Suture & repair as necessary ☐
- Consider need for BLOOD ☐
- Consider coagulopathy & sepsis (GBS) ☐
- Check Chem 8, INR, Hb, Lactate ☐
- Warm OT, Bair Hugger, EnFlow warmer ☐
- TRANEXAMIC ACID 1g load over 10' ☐

STILL BLEEDING?
Consider operation & Retrieval

- Bimanual compression ☐
- Expert advice 13STAR ☐
- RSI GA ☐
- Anticipate difficult airway - get DAE kit ☐
- Pass a NGT ☐
- Intramyometrial prostaglandin-F2a 5mg dilute up to 10ml 6ml in fundus ☐
- Consider need for BLOOD ☐
- Bakri balloon tamponade ☐
- Explore uterine cavity ☐
- B-lynch suture ☐
- Hysterectomy / ligate int iliacs ☐

POST PARTUM HAEMORRHAGE

Newborn Life Support



START HERE

Ask 'who will be team leader' & then perform a systematic check of each of following

ADRENALINE

Preparation 1:10,000 = 100 mcg/ml

IV Dose 10 - 30 mcg/kg = 0.1 - 0.3 ml/kg
Via ETT 50 - 100 mcg/kg = 0.5 - 1.0 ml/kg

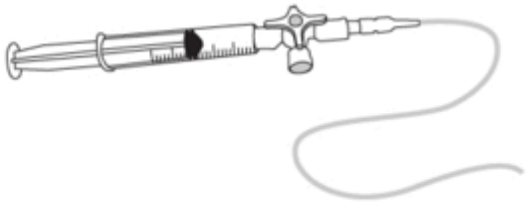
FLUIDS

Saline or *blood*, depending on circumstances

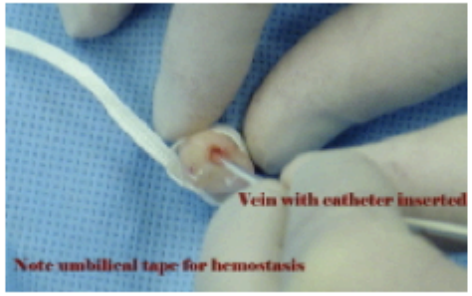
10 - 20 ml/kg via IV or Umbilical Vein Catheter

INTRAOSSEOUS
(quicker than UVC)

SYRINGE & 3-WAY
(to administer fluid bolus / drugs)



Umbilical Vein Catheter
(2 arteries, 1 vein!)



ADENOSINE
first dose 0.05mg/kg
second dose 0.10mg/kg
then 0.20mg/kg
GIVE VIA FAST FLUSH

ADRENALINE

IM : < 6 yr 150mcg (0.15ml)
6-12 yr 300mcg (0.3ml)
> 12 yr 500mcg (0.5ml)

IV : CAUTION WITH DOSE
0.01 mg/kg (10mcg/kg)
1/10,000 - 0.1 ml/kg IV

ETT : 1/1000 - 0.1ml/kg

ADRENALINE INFUSION
0.3mg/kg in 100ml N-saline
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 teeth
Diameter >1yr - Age/4 + 4 mm

FENTANYL
1 mcg/kg IV (0.5mcg/kg IN)

KETAMINE SEDATION
2-4 mg/kg IM
0.25 - 0.5 mg/kg IV
repeat as needed
INTRANASAL - see over

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

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
Load 20mcg/lg first dose
then 15 mg/kg 6hrly

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

SALBUTAMOL
Undiluted 5mg/5ml
5mcg/kg over 1 min IV

SUXAMETHONIUM
2 mg/kg IV
3mg'kg neonate
4 mg/kg IM

THIOPENTONE
4 mg/kg IV

VECURONIUM
0.1 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

EMERGENCY

Adrenaline 10mcg/kg IV
IM preferred in anaphylaxis

Atropine 20mcg/kg

Metaraminol 10mcg/kg

Propofol 2mg/kg

Sux 2mg/kg

Thio 4mg/kg

Fluids 20ml/kg

2-4J/kg Biphasic

PAEDIATRIC EMERGENCY FORMULARY

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,
then 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
01.-0.2 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
then
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

FORMULARY

ADRENALINE 1mg/1ml amp	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	100 mcg/2ml or 500 mcg/50ml premix	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 titrate 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
ISOPRENALINE	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

INSULIN SLIDING SCALE
50U/50ml = 1U/ml

BGL mmol	RATE U/hr = ml/hr
< 4	0 - STOP IVI
4.1 - 9	2
9.1 - 13	3
13.1 - 17	4
17.1 - 28	6
> 28	8
	check running

(see Sliding Scale above)

INFUSIONS

Ideally use dedicated syringe driver (10 - 50ml capacity) eg Niki T34L

CONSIDER	ANAESTHETIC RISK		
MENTAL HEALTH SAFETY/RISK	**LOW** thin, fit, fasted	**MEDIUM** ASA II - III	**HIGH** old, sick, difficult airway OSA etc
LOW flat, depressed, no Hx violence, low risk suicidal patient "happy" drunk thought disordered but compliant	low risk reassurance mild anxiolytic	restraint monotherapy longer acting agents 1:1 nursing	avoid drugs if possible orientation reassurance 1:1 nursing
MEDIUM intoxicated / disinhibited unpredictable delusional with poor insight anxious +++	sedation needed single agent antipsychotic (+/- benzo)	as above heavier sedation airway adjuncts to hand	airway risk non-pharmacy preferred short acting BDZ tincture of time
HIGH violence /weapons physical threats persecutory delusions around care "big guy" you whom cannot restrain	as above then ketamine sedation or RSI/ETT	as orange but delay until fasted await retrieval?	balance of minimal sedation & own airway vs GA/ETT

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
benztropine 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 antisialogogue 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!**

LIAISE WITH RETRIEVAL TEAM

RAPID ASSESSMENT ACUTE AGITATION

AIRWAY?
BREATHING?
CIRCULATION
DISABILITY, DRUGS?
ENVIRONMENT, ECG
FULL BLADDER?
GLUCOSE?
HEAD INJURY?

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

SAFE PSYCH SEDATION MATRIX

RICHMOND AGITATION SEDATION SCALE

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

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

TARGET RASS is 0 to -3

AIRWAY EQUIPMENT and MONITORING must be available

1:1 NURSING, 10 minutely obs

LIAISE WITH RETRIEVAL SERVICE

RICHMOND AGITATION SEDATION SCALE

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. HR 90 BP 100/70 Bleeding likely from HTX, abdomen and pelvis (binder on)
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 L ACF
M - Micro	Has been given ADT
N - Notes/NOK	His notes are in this envelope, including copies of plain X-rays Next Of Kin (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.