Not intended to be a comprehensive curriculum review, but hopefully a useful collection of:

Scoring systems	Acronyms
Definitions	Algorithms
Guidelines	Recipes

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June 2018

CONTENTS

1 - AIRWAY

Cook Modified Cormac and Lehane

		Frequency	Difficulty
GD I	Full View	68%	<1%
GD IIa	Partial Glottis	24%	4%
GD IIb	Posterior Glottis	6.5%	67%
GD IIIa	Elevated Epiglottis	1.2%	87.5%
GD IIIb	Depressed Epiglottis	RARE	
GD IV	No Epiglottis	VERY RARE	

Laryngeal Masks

LMA	Weight	Cuff Volume	
1	<5 kg	4 mL	Volume = 4 x Size
1.5	5-10 kg	6 mL	
2	10-20 kg	10 mL	Volume = 10 x (size-1)
2.5	20-30 kg	15 mL	
3	30-50 kg	20 mL	
4	50-70 kg	30 mL	
5	70-100 kg	40 mL	
6	>100 kg	50 mL	

Airway Tests (Source = ANZCA Airway Document)

SPIN = Specific Test, + rules in = Low False +

SNOUT – Sensitive Test, - rules out = Low False –

	Sens	Spec
Prognathe	20%	95%
MO	35%	95%
MP	50%	85%
TMD	80%	80%
Arne Score	90%	90%

Arne Score (Source = ANZCA Airway Document)

P - Pathology associated with difficulty
R - ROM of neck
E - Experiences symptoms of airway pathology
D - Difficulty previously
I - Interincisor Gap
C - Class (Mallampati)
T - Thyromental Distance

NAP4 Themes (Source = NAP4 Summary 2011)

F - Failure to plan for failure
A - AFOI was often indicated, but not performed
I - Increased failure seen with cannula cricothyroidotomy
L - Large people are at increased risk
E - Emergence from anaesthesia contributes 1/3 of cases
D - Deaths: ICU = Trache/ no capnography, Anaesthesia = Aspiration

P - Perseverance to intubate
L - LMAs used inappropriately
A - Airway assessment was not performed, or technique not modified to suit
N - Neck/ Facial surgery increases risk
S - Strategies weren't employed, just plans

Fremantle Score (Source = Blue Book 2013)
Grading system for Laryngeal view on videolaryngoscopy

3 Components:
1 **View of Larynx in the absence of cricoid manipulation**
Full, partial, none
2 **Ease of task**
Easy, modified (bougie, cricoid), unachievable
3 **Device used**
Videolaryngoscope and blade

Murphy and Wall Scores - BMV (Source = ANZCA Airway document)
Difficult BMV = **MOANS**
M - Mask seal poor due to beard
O - Obesity, BMI > 26 kg/m^2
A - Age > 55 years
N - No teeth
S - Snoring
OR ~2-3x for each factor, spec/sense ~70% if >2 factors

Murphy and Wall Scores - LMA (Source = ANZCA Airway document)
Difficult LMA = **RODS**
R - Reduced MO
O - Obstruction at or below the larynx
D - Disrupted Airway
S - Stuff lungs/ neck
Difficult LMA = Failure in 3 attempts to achieve
1 Vt = 7 mL/kg
2 Leak Pressure >15cmH2O

Murphy and Wall Scores - ETT (Source = ANZCA Airway document)

Difficult ETT = **LEMONS**

L - Looks difficult externally
E - Examination – TMD <4cm, MO <5cm
M - Mallampati class
O - Obstruction
N - Neck mobility

Murphy and Wall Scores - Cricothyroidotomy (Source = ANZCA Airway document)

Difficult Cricothyroidotomy = **SHORT**

S - Surgery to neck
H - Haematoma or infection
O - Obesity
R - Radiation
T - Tumour

ALSO – Age <8years, Female, C-Spine fixation, deflection deformity

Hans BMV Score (Source = ANZCA Airway document)

	Technique	Frequency
Grade I	Mask	77%
Grade II	Mask + Adjunct	21%
Grade III	2 Person, unstable	1.4%
Grade IV	Can't BMV	0.16%

Grade III+ = Difficult BMV

ANZCA Airway Overview Questions (Source = ANZCA Airway document)

9 questions = **DIFFICULT**

D - Documented previous difficulty?
I - Impact of surgery on airway?
F - Facemask/ BMV difficult?
F - FONA difficult?
I - Intubation difficult?
C - CVS/ Resp physiology altered?
U - Unable to place LMA?
L - Landing phase – Will there be a difficult extubation?
T - Throw up/ Aspiration risk?

Rheumatoid Cervical Spine (Source = CEACCP 2006)

30% have C-Spine involvement
25% of these have unstable C-Spines

Atlanto-Axial Instability

1 - Anterior = 80%
C1 moves anterior on C2
Gap between C1 anterior Arch and Peg >3-4mm
Worse on flexion

2 - Vertical = 10-20%
Superior migration of the Peg due to disruption of the C1 lateral masses

3 - Posterior = 5%
C1 moves posterior over C2
Due to destruction of the Peg

4 - Lateral/ Rotatory
Super rare

Subaxial Subluxation Common. Causes early symptoms of nerve compression

C-Spine Extubation (Source = Blue Book 2017)

For deciding whether to extubate after C-spine surgery, One point for each of **CSPINE**

C - Combined anterior and posterior approach
S - Surgery to ≥3 levels
P - Preoperative Myelopathy
I - In theatre for >5 hours
N - Neck fusion involving C2
E - EBL >300mL

SCORE
1-2 = Extubate at bend of case
2-3 = Consider delayed extubation

Dental Notation (Source = ISO/ WHO)

Permanent

Molars	Premolars	Canines	Incisors	Incisors	Canines	Premolars	Molars
18, 17, 16	15, 14	13	12, 11	21, 22	23	24, 25	26, 27, 28
48, 47, 46	45, 44	43	42, 41	31, 32	33	34, 35	36, 37, 38

Primary

Molars	Canines	Incisors	Incisors	Canines	Molars
55, 54	53	52, 51	61, 62	63	64, 65
85, 84	83	82, 81	71, 72	73	74, 75

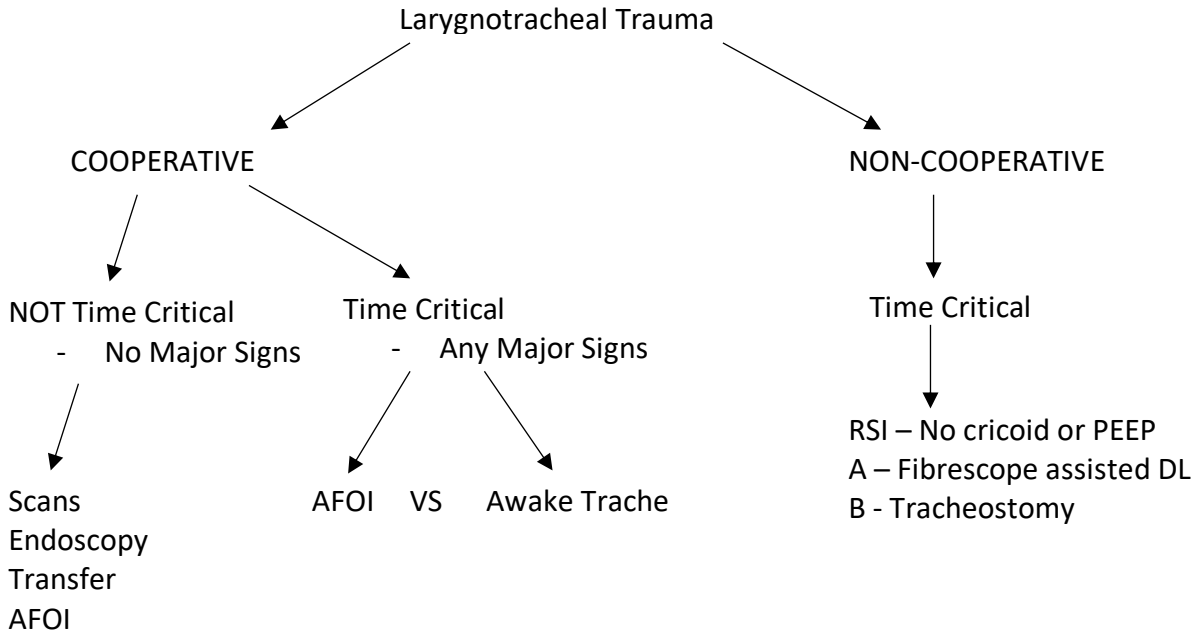
Laryngotracheal Trauma (Source = BJA/ Brisbane ASM 2017/ EMAC)

Major Signs

- Dyspnea, Stridor, Orthopnea, Emphysema

Minor Signs

- Swelling, Haemoptysis, Dysphonia, Dysphagia



LMA for Laparoscopy

Rule of 20's

<20kg over IBW
<20° Head Down
No leak at 20 cmH_2O
<20 minutes duration

2 - CARDIOLOGY

Pulmonary Hypertension Severity (Source = LITFL)

RVSP = Right Ventricular Systolic Pressure
mPAP = Mean Pulmonary Artery Pressure
sPAP = Systolic Pulmonary artery pressure
RVSP = sPAP in the absence of PS

	mPAP
Mild	25 – 40mmHg
Moderate	41 – 55mmHg
Severe	>55mmHg

mPAP = (0.6x RVSP) +2 - If RVSP = 40mmHg, mPAP = 25mmHg
RVSP measured from TR Jet + CVP

Mitral Stenosis Severity
Normal MVA >4cm^2
In MS MVA decreases by 0.2cm^2/year
Gradations for MS and AS severity by area have the same cutoffs
Gradations for MS severity by MG = those for AS/4

	MVA	MG	$Pt_{1/2}$
Mild	1.6 – 2cm^2	<5mmHg	<140ms
Moderate	1 – 1.6cm^2	6 – 10mmHg	140 – 220ms
Severe	<1cm^2	>10mmHg	>220ms

Mitral Regurgitation Severity
Global gestalt, Vena Contracta, Coanda effect

	Fraction	Volume	Orifice
Mild	<30%	<30mL	<0.2 cm^2
Moderate	30-50%	30-60mL	0.2 – 0.4 cm^2
Severe	>50%	>60mL	>0.4 cm^2

Continuity Equation
Used to determine AVA

$SV_{AV} = SV_{LVOT}$
$AVA \times VTI_{AV} = CSA_{LVOT} \times VTI_{LVOT}$

$\therefore \quad AVA = \frac{CSA_{LVOT} \times VTI_{LVOT}}{VTI_{AV}}$

Aortic Stenosis Severity

	AVA	MG	Vmax	Indexed AVA
Mild	>1.5 cm^2	<20 mmHg	2.6 – 2.9 ms^{-1}	>0.85 cm^2/m^2
Moderate	1 – 1.5 cm^2	20 - 40 mmHg	3 – 4 ms^{-1}	0.6 - 0.85 cm^2/m^2
Severe	<1 cm^2	>40 mmHg	>4 ms^{-1}	<0.6 cm^2/m^2
Δ/ Year	0.1 cm^2/ year	10 mmHg/ year	0.3 ms^{-1}/ year	

Other Measures:

- DI = Dimensionless Index <0.25 = Severe
- AVA via planimetry

Aortic Stenosis Mortality

Angina	50% @ 5 years
Syncope	50% @ 3 years
Failure	50% @ 2 years

Diastolic Dysfunction

NORMAL		ABNORMAL	
E/A	= 1-1.5		
e`	> 12cms^{-1}	**e`**	< 8cms^{-1}
E/e`	< 8	**E/e`**	> 15

		E/A	e`	E/e`	DT
GRADE 1	**Impaired Relaxation**	<1	<8cms^{-1}	<8	>240ms
GRADE 1a	**Abnormal Filling**	<1	<8cms^{-1}	>15	160-240ms
GRADE 2	**Pseudonormal**	1 – 1.5	<8cms^{-1}	>15	160-240ms
GRADE 3/4	**Restrictive**	>2	<8cms^{-1}	>15	<160ms

GRADE 3 = Reversible with Valsava GRADE 4 = Irreversible

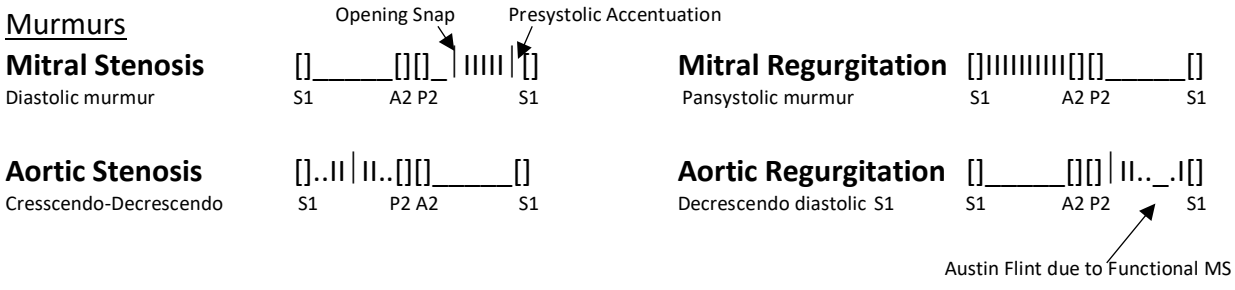
OTHER MEASURES

D/S = Pulmonary Blood flow

A_R = Diastolic Flow Reversal

LA area > 20cm^2

Murmurs



Fontan Circulation

STAGE 1 Norwood Procedure = Palliative Systemo-pulmonary Shunt
Blalock-Thames-Taussig Shunt, Sano Shunt, Hybrid Procedure

STAGE 2 Glenn Bidirectional Shunt = Superior cavo-pulmonary shunt

STAGE 3 Completion Fontan = Total Cavo=Pulmonary Shunt

Lee's Revised Cardiac Risk Index

Published 1999 expanding on Goldman's Cardiac Risk Index

6 Factors

- Ischaemic Heart Disease
- Congestive Heart Failure
- Cerebrovascular Disease
- Diabetes
- Chronic Kidney Disease
- Suprainguinal Vascular/ Thoracic/ Intraperitoneal Surgery

Score:	Risk of Cardiac Event (Cardiac Death, non-fatal MI, non-fatal arrest)
0	0.4%
1	0.9%
2	6.6%
>3	11.1%

NSQIP

American College of Surgeons National Surgical Quality Improvement Programme

Algortihmic risk predictor which utilizes:

18 patient parameters

Procedure being performed

PARAMETERS:

- Age	- Gender	- Functional state	- Emergency	- ASA
- Steroids	- Ascites	- Sepsis	- Ventilator	- Metastases
- Diabetes	- CHF	- Dyspnea	- Smoker	- Severe COPD
- Dialysis	- AKI	- BMI		

+ Procedure

OUTPUTS:

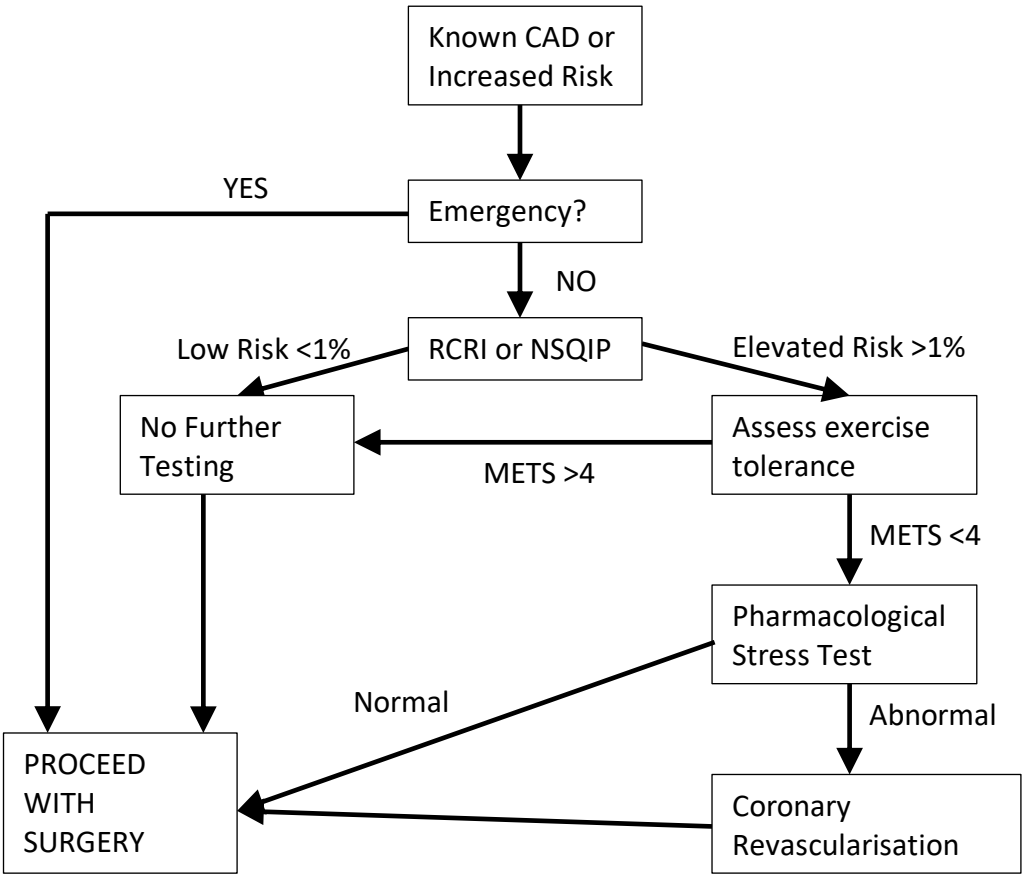
- Serious Complication	- Surgical Infection	- Readmission	- Any complication
- UTI	- Return to OT	- Pneumonia	- VTE
- Death	- Renal Failure	- MACE	- DC to Resthome

EHRA Score (Source = EHRA)

European Heart Rhythm Association score of AF related symptoms

1 - No Symptoms
2 - Mild, daily activities unaffected
3 - Severe, daily activities affected
4 - Disabling, daily activities discontinued

Coronary Artery Disease Assessment (Source = 2014 ACC/AHA)



NSTEMI Types

TYPE I Plaque rupture
TYPE II Supply-demand mismatch
TYPE III Sudden Cardiac Death
TYPE IV Post PCI
TYPE V Post CABG

NYHA Dyspnea

NYHA I	No Limitation of normal activities
NYHA II	Slight limitation of normal activities, comfortable at rest
NYHA III	Marked limitation of normal activities, comfortable at rest
NYHA IV	Severe limitation, dyspneic at rest

CCS Angina

CCS I	No Limitation of normal activities
CCS II	Slight limitation of normal activities, comfortable at rest
CCS III	Marked limitation of normal activities, comfortable at rest
CCS IV	Severe limitation, angina at rest

CHA_2DS_2-VASc Score

Recommended by European Society of Cardiologists (2012) and ACC/AHA (2014)
HAS-BLED = Bleeding Risk Score

Points:

1	**C**	– CHF or LV Dysfunction
1	**H**	– Hypertension
2	**A**	– Age >75 years
1	**D**	– Diabetes
2	**S**	– Stroke/ TIA
1	**V**	– Vascular Disease
1	**A**	– Age 65-74 years
1	**Sc**	– Sexual Category = Female

Score:	Stroke Risk/ year:
0	0.2%
1	1.3%
2	2.2%
3	3.2%
4	4.0%
5	6.7%
6	9.8%
7	9.6%
8	12.5%
9	15.2%

Score:

0	= No anticoagulation
1	= Anticoagulate if male
>2	= Anticoagulate

INR must be therapeutic >70% of time to decrease risk

$CHADS_2$ Score

If previous CVA then automatically risk >8.5%/ year for further CVA

Points:

1	**C**	– CHF
1	**H**	– Hypertension
1	**A**	– Age >75 years
1	**D**	– Diabetes
2	**S**	– Stroke/ CVA

Score:	Stroke Risk/ year:
0	2%
1	3%
2	4%
3	6%
4	8.5%
5	12.5%
6	18%

Perioperative CVA Risk (Source = ANZCA Blue Book 2017)

High Risk = Bridge

Moderate Risk = Risk/ Benefit. Low threshold to bridge

Low Risk = No Bridging

Risk	**CVA %/ Year**	**Valves**	**AF**
High	>10%/ year	All MVRs Mechanical AVR CVA in last 6 months	CHADS 5-6 CVA in last 3 months
Moderate	4-10%/ year	Bileaflet AVR + Chads ≥1	CHADS 3-4
Low	<4%/ year	Bileaflet AVR	Chads ≤2

Post-PCI Thrombotic Risk (Source = ACC 2017)

Consider: Indication, risk of continuing, risk of discontinuing

	30 day risk of MI/CVS death		
	1%	1-5%	>5%
Balloon Angioplasty	>4 weeks	2-4 weeks	<2 weeks
BMS	>6 months	1-6 months	<1 month
DES	>12 months	6-12 months	<6 months

NSPE/ BPEG Pacemaker/ ICD codes

Pacemaker:

Letter 1 = Pacing Chamber
O = None V = Ventricle
A = Atria D = Dual

Letter 2 = Sensing Chamber
O = None V = Ventricle
A = Atria D = Dual

Letter 3 = Sensing Response
O = None I = Inhibited
T = Triggered D = Dual T + I

Letter 4 = Programmability
O = None R = Rate modulation

Letter 5 = Multisite pacing
O = None V = Ventricle
A = Atria D = Dual

ICD:

Letter 1 = Shock Chamber
O = None V = Ventricle
A = Atria D = Dual

Letter 2 = Antitachycardia Pacing Chamber
O = None V = Ventricle
A = Atria D = Dual

Letter 3 = Tachycardia Detection
E = ECG H = Haemodynamic

Letter 4 = Antibradycardia Pacing Chamber
O = None V = Ventricle
A = Atria D = Dual

Stages of Hypertension

Stage	sBP	dBP
1	140-159	90-99
2	160-179	100-109
3	180-209	110-119
4	≥210	≥120

CRT-D Indications (Source = European Society of Cardiology)

Most benefit for Females, non-ischaemic cardiomyopathy

C - Conduction Abnormality
LBBB – QRS >120ms
Non-LBB – QRS >150ms
R - Reduced LVEF ≤35%
T - Treatment optimized medically
D - Dyspnea
AF – NYHA III-IV
SR – NYHA II-IV

MACE Risk in Heart Failure (Source = ACC/AHA)

MACE = Major adverse cardiac event

		30 day MACE in Elective Vascular Surgery
Symptomatic Heart Failure		50%
Asymptomatic	- LV Systolic Dysfunction	25%
	- LV Diastolic Dysfunction	20%
Normal LV Function		10%

3 - CRISIS

Drugs down an ETT
Generally not recommended though

N - Naloxone
A - Adrenaline
V - Vasopressin
A - Atropine
L - Lignocaine

Causes of Cardiac Arrest

H - Hypoxia
H - Hypovaolemia
H - Hypothermia
H - Hyo/ Hyperkalaemia

T - Tension Pneumothorax
T - Tamponade
T - Toxins
T - Thrombus

Adult Anaphylaxis
>12 years of age

(Source = ANZCA)

DR - Danger and Response
Stop procedure, remove trigger

S - Send for help and form a team
Anaphylaxis Box
Leader and a Reader

AB - Airway/ Breathing
FiO2 = 100%, ETT early

C - Circulation
Raise legs
Volume = 2L crystalloid

D - Drugs
ADRENALINE

IM ADRENALINE
If no IV access/ no haemodynamic monitoring
ADRENALINE 1:1000, 0.5mL = 0.5mg
Lateral Thigh

IV ADRENALINE
ADRENALINE 1:10,000, 1mg/10ml, 100mcg/mL
GD II = 0.2mL = 20mcg
GD III = 1-2mL = 100-200mcg
GD IV = ACLS 1mg

ADRENALINE INFUSION
After 3x Adrenaline boluses
ADRENALINE 3mg/ 50mL
3mL/ hr – 40mL/ hr = 3-40mcg/ min

ONGOING HYPOTENSION
NORADRENALINE 3-40mcg/ min
VASIPRESSON 1-2 units, then 2units/ hr
GLUCAGON 1-2mg Q5 min

ONGOING BRONCHOSPASM
SALBUTAMOL 12 puffs/ 100-200mcg IV
MAGNESIUM 2g

EZ-IO (Source – Arch Pathol Lab Med 2010)

Contraindications

- Target bone fracture
- Infection
- Orthopaedic prosthesis
- Osteogenesis imperfecta

15G needle

	Length:	Weight:
Red	15 mm	3-39 kg
Blue	25 mm	≥3 kg
Yellow	45 mm	≥40 kg

Good IV/IO correlation:

- RBCs
- BGL
- Cl^-
- Hb
- Urea
- Cr
- Albumin

Poor IV/IO correlation:

- WCC
- Na^+
- PLT
- K^+
- CO_2
- Ca^{2+}

Crisis Priorities

Immediate:

- Recognise and declare
- Get help
- Temporise and resuscitate
- Mobilise a team
- Assess and diagnose
- Manage

Later:

- Ongoing management
- Referrals/ Disposition
- Document
- M&M
- Debrief/ second victims/ self care
- Open disclosure

MH Manifestations (Source = MHANZ)

Early:

- Masseter spasm
- Ventricular ectopics
- Increased $ETCO_2$
- Tachycardia

Developing:

- T increased 0.5°C/ 15min
- Sweating
- Hyperkalaemia
- CVS instability
- Respiratory acidosis

Late:

- Myoglobinuria
- Coagulopathy
- Renal failure
- Raised CK

MH Team Members (Source = MHANZ)

Need 10 people

- Leader
- Anaesthetists 1 = Resuscitation
- Anaesthetist 2 = Lines
- Nurses – Cooling
- 2x Technicians – Lines, ABG, cooling
- 3x Dantrolene mixers
- Surgeon – IDC, cooling
- Theatre coordinator - Logistics

Trigger-Free Anaesthetics (Sources = MHANZ, Blue Book 2017, EMHG)

Give to patients at risk of MH

- Confirmed/ equivocal MH testing – IVCT + DNA
- RyR Myopathies – King Denborough, Central Core Disease
- Recurrent, unexplained Rhabdomyolysis
- Pregnant woman with MH partner
- Family History
  - + IVCT in a relative
  - - DNA in a relative (but still at risk)
  - Untested relative with an MH reaction

IVCT = In Vitro Contracture Testing (Sources = Blue Book 2017, EMHG)

Halothane 2% = 0.44 mmol/L

Requires a 4x3x1 cm piece of Quads Muscle

Must be >30 kg/ >10 years of age

	Caffeine:	Halothane:	
MHShc	<2 mmol/L	<2%	- Halothane/ Caffeine sensitive
MHSh	>3 mmol/L	<2%	- Halothane Sensitive
MHSc	<2 mmol/L	>2%	- Caffeine Sensitive
MHN	>3 mmol/L	>2%	- Normal

Needlestick Transmission Rates (Source = BMJ)

	Risk:	
Hep B	1/3 – 33%	When HbE +
Hep C	1/30 – 3%	
HIV	1/300 – 0.3%	

Venous Air Embolism

V = 5 mL/kg = Cardiac arrest

Monitoring:	Sensitivity:
Precordial Stethoscope	V = 1.5 mL/kg
$EtCO_2$	V = 0.5 mL/kg
Precordial Doppler	V = 0.05 mL/kg
TOE	V = 0.02 mL/kg

Positioning

- Trendelenburg = Keep LV bubble away from the coronaries
- Left lateral = Traps bubble in RV

Pseudocholinesterase Deficiency

Genotype:	Frequency:	Phenotype:
Homozygous Normal = E_U/E_U	96%	Normal
Heterozygotes = E_U/E_A, E_S, E_F	4%	Block for 10 minutes
Homozygous Abnormal = E_S/E_S, E_A/E_A etc	<1%	Block for 4-8 hours

	Dibucaine Number:	Fluoride Number:
NORMAL	80 = 80% enzyme suppression	60 = 60% enzyme suppression
ABNORMAL	20 = 20% enzyme suppression	36 = 36% enzyme suppression

Infusions

ADRENALINE Anaphlaxis
Adult 3mg /50mL @ 3-40 mL/ hr
Paediatrics 1mg /50mL @ 0.3-6 mL/kg/hr

ISOPRENALINE Life-threatening bradycardia
1 mL 1:5000 = 0.2mg in 50 mL = 4 mcg/mL
Infuse at 1.25 mL/hr

VASOPRESSIN
Adult Bolus = 1-2 units, Infuse @ 1-2 units/hr
Paediatrics 1 unit/kg/50mL. Bolus = 2mL, Infuse @ 1-3 mL/hr

NORADRENALINE
Adult 4 mg/50mL @ 0-40 mL/hr
Paediatric 0.15 mg/kg/50mL @ 0-40 mL/hr

RV Failure
- Reverse precipitant
- Maintain SVR – Metaraminol, Vasopressin
- Maintian CO – Rhythm, Contractility
- Lower PVR
    - Vasopressor – Vasopressin has less effect on PVR
    - Iloprost – Need USS nebulizer, 2.5-5 mg or 2.5 mcg/kg
    - Milrinone – 2 mg (50mcg/kg) nebulized
    - Peep, FiO_2, Increase P_aO_2, lower P_aCO_2, Temperature, pH
    - Analgesia – Morphine/ Ketamine

4 - ENDOCRINE

Steroid Effects

C - Cataracts
U - Ulcers
S - Striae/ Skin thinning
H - Hirsuitism/ Hypertension
I - Immunosuppression/ Infections
N - Necrosis of femoral head
G - Glucose
O - Osteoporosis/ Obesity
I - Impaired Healing
D - Depression/ Mood changes

Phaemochromocytome Optimisation:

Goals:
- Reduce mortality 50-6%
- Reduce cardiac dysfunction
- Reduce BP/SVR
- Volume expansion
- Reduce chance of hypertensive crisis
- Adrenergic resensitisation

Criteria:
- BP <160/90
- No STE on ECG
- Normal BGLs
- Orthostatic Hypotension
- Normal HCT
- Nasal congestion

HPA Axis Suppression (Source = Margo)

Suppression:	Steroid Exposure:	Management:
Nil	- Prednisone <5 mg/day - <3 weeks exposure - Every other day regimens	- Take usual dose - No testing - No supplementation
Maybe	- Prednisone 5-20 mg/day - Inhaled steroid - Topical steroid	Either: - Test = Short Synacthen Test - Empiric supplementation
Definite	- Prednisone >20 mg/day - >3 weeks exposure - Cushingoid	- Supplement steroid

Surgery:	Preoperative:	Intraoperative:	Postoperative:
Minor - Hernia - Colonoscopy - Plastics	Usual	Nil	Usual
Moderate - Cholecystectomy - Arthroplasty	Usual	Hydrocort 50mg	Hydrocort 25mg Q8hr for 24hr then usual
Major - Whipples - Liver	Usual	Hydrocort 100mg	Hydrocort 50mg Q8hr for 24hr then ½ taper to usual

	Potency:	Dose:
Hydrocortisone	1	100 mg
Prednisone	5	20 mg
Dexamethasone	25	4 mg

5 - EQUIPMENT

Electrical Equipment

Class:	Features:
Class I	Metal casing
	Earth (3rd pin)
	Fuse to break circuit
Class II	Double insulation
	No Earth
	Isolating transformer +/- LIM
Class III	Low Voltage <24V AC, <50V DC
	or Internal Power Supply

Electrical Equipment in Contact with Patients

Class:	Features:
Class B	Class I, II or III
	Leak <100 μA
	External use only
Class BF	Class B with a floating circuit
Class CF	Very low leak currents
	Safe to connect to heart

Body Protected Area = Protection from macroshock = RCDs, LIMs
Cardiac Protected Area = Protection from microshock = RCDs, LIMs, Equipotential Earthing

Power Failure
White Plug = Mains electrical, no backup
Red Plug = Generator backup, 15-30s delay
Blue Plug = UPS
UPS = Uninterrupted Power Supply
Emergency Lighting = Low light, battery powered, will last for 90 minutes
Operating Lighting = Battery powered, will last for 90 minutes
Anaesthetic Machine = Inbuilt UPS, will last for 90 minutes
Pumps = Battery, time dependent on charge

Appraisal of Equipment (source = ANZCA Blue Book 2015)

APPRAISE

A	**- Affordability**	Capital, maintenance, disposables
P	**- Portability**	Size, power supply
P	**- Purpose built**	Suitable for use
R	**- Reliability**	Works when needed
A	**- Acceptability**	By users
I	**- Integration**	Works with other equipment
S	**- Sturdy**	Durability
E	**- Environmental Impact**	Ecological cost

5 - HAEMATOLOGY

Transfusion Infections (Source = Transfusion.com.au)

Agent:	Window Period:	Residual Risk/ Unit
HIV	6 days	<1:1000,000
HCV	3 days	<1:1000,000
HBV	15 days	1:700,000
Malaria	10 days	<1:1000,000

Herbs

Echinacea = Hepatotoxic
Garlic = Reduces TXA_2, inhibits platelet aggregation
Ginger = Reduces TXA_2, inhibits platelet aggregation
Gingko = Potent platelet inhibitor
Ginseng = Platelet inhibitor
Kava = Hepatotoxic
St. Johns Wart = Reduces $5HT_3$/NA/DA reuptake, CYP3A4/2C9 inducer (reduces Warfarin/ increases Clopidogrel effect)

Heparin Induced Thrombocytopenia

	Type I	Type II
Timing	<4 days	>4 days
Thrombocytopenia	Mild	>50%
Thrombosis	No	Yes
Life Threatening	No	Yes
Mechanism		IgG anti-Heparin/PF4 Complex

MABL

MABL = Maximal Acceptable Blood Loss. Can be used as a trigger for transfusion

MABL = EBV x $\frac{HCT_{Start} - HCT_{Target}}{HCT_{Target}}$

HCT_{Target} = 25-30%
EBV = 70 mL/kg in children
= 50-60 mL/kg in adults

MABL = 2(age+4) x 0.4 x 70
= 0.8(age+4) x 70
= 50(age+4)

Blood Components (Source = ADHB, Australian Red Cross)

Component	Composition	Volume	Dose	Storage
RBC	Hb 50 g/unit HCT = 0.6 Leuc = $0.3x10^6$/unit	**Adult** = 2-300 mL **Paed** = 50-100 mL	Increase Hb ~10g/L **Adult** = 1 unit **Paed** = 4 mL/kg	42 days at 2-6°C
Platelets	PLT $280x10^9$/unit Leuc = $0.2x10^6$/unit	**Adult** = 2-300 mL **Paed** = 50-100 mL	Increase PLT $20\text{-}40x10^9$/L **Adult** = 1 unit **Paed** = 10 mL/kg	5 days at 20-24°C on an agitator
Cryo	Fibrinogen = 1.2g - Factor VIII - Factor XIII vWF Fibrinonectin	100mL	Increase Fib by 1.0 g/L **Adult** = 1 unit/30 kg **Paed** = 5 mL/kg	12 months at -30°C 4 hrs at 20-24°C
FFP	All Coag Factors Labile Factors - Factor V - Factor VIII Low Fib = 1.6 g/L	**Adult** = 2-300 mL **Paed** = 50-100 mL	Increase Factors by 30% **Adult** = 15 mL/kg **Paed** = 10-15 mL/kg	12 months at -30°C 24 hrs at 2-6°C Extended Life = 5 days at 2-6°C

Transfusion Time Limits (Source = NZBB 2016)

Component:	Commence:	Complete:	Return:	Re-Issue:
RBC	ASAP	<4 hours	<30 min	<30 days
Platelets	ASAP	<1 hour	<1 hours	<5 days
Cryo	ASAP	<4 hours	<30 min	4 hours @ room temp
FFP	ASAP	<4 hours	<30 min	24 hours @ 2-6°C
EL FFP = Extended Life FFP				EL = 7 days @ 2-6°C but with loss of labile factors

Indications for Cell Salvage
- Anticipated blood loss >750 mL/ 20% volume
- Blood loss sufficient to cause anaemia
- Rare blood groups/ JW/ Antibodies
- Surgery that >10% of people require transfusion

Massive Transfusion

Indication:

- Haemorrhage >150 mL/min
- Shock and coagulopathy

Definition:

- >10 units/24 hours - >5 units/4 hours

Principles:

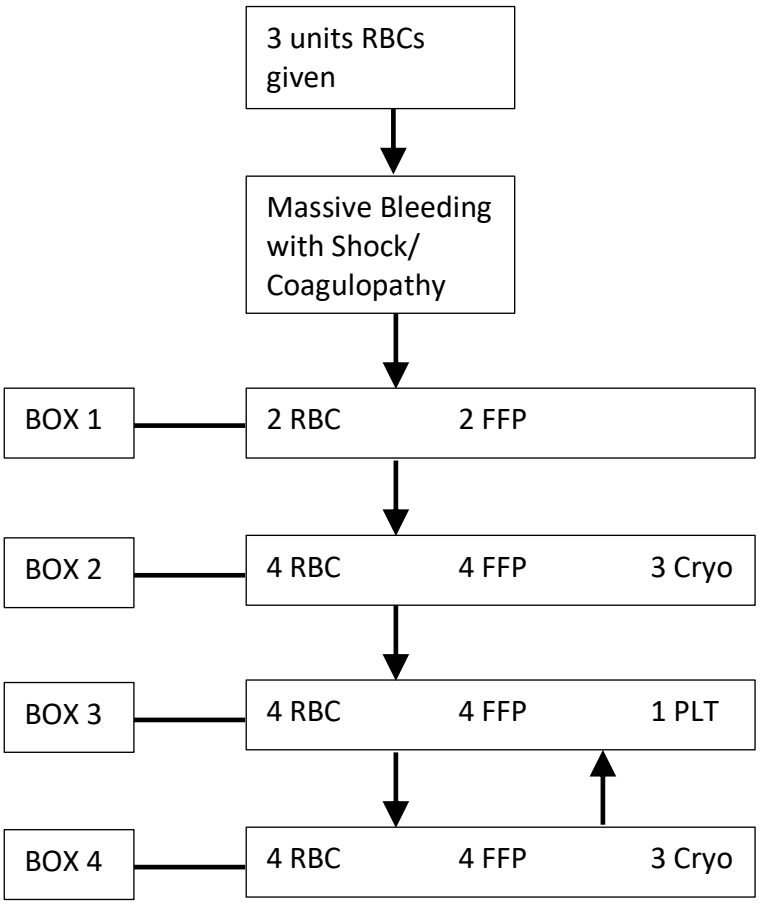
- 1:1 of RBC:FFP - TXA
- Check Coags/ Platelets/ Hb/ Ca^{2+} Q30mins

Thresholds:

- Maintain Ca^{2+} >1.0 mmol/L
- 4 FFP if INR >1.5 or APTT > 40
- 3 Cryo if Fib <2.0 g/L
- 1 Platelets if Plt <75 g/L

Goals:

- T >36°C
- pH >7.2
- Ca^{2+} >1.0 mmol/L
- Hb >70 g/L
- PLT >75 g/L
- Fib >2.0 g/L
- INR <1.5
- APTT <40



6 - INTENSIVE CARE

Organ Ischaemia Times (Sources = ANZICS, nedonation.org)

	Warm	Cold
Heart	30 mins	4 hours
Lungs	90 mins	4-6 hours
Liver	30 mins	6-10 hours
Intestines		6-12 hours
Pancreas	60 mins	12-18 hours
Kidneys	60 mins	24 hours

DBD – Donation after Brain Death

Determination requires:

- Unresponsive coma
- Absence of brainstem reflexes
- Apnea

Prerequisites:

- Evidence of intracranial pathology
- Normothermia T >35°C
- Normotension MAP >60mmHg
- No sedation
- Intact neuromuscular function
- No metabolic cause for coma

Observation period:

- GCS 3 for 24 hours

Formal examination:

- 2 Doctors, 2 separate tests
- Apnea – Preoxygenate and observe
- Absent Brainstem Reflexes Bilaterally
    - Pupils – CN II/III
    - Cornea – CN V/VII
    - Gag – CN IX/X
    - Vestibulocochlear – CN III, IV, VI, VIII

Donor Management:

- Overall aims
    - Optimize organ perfusion
    - Protect organ function
- Temperature
    - Warm/ cool to 36.5-38 °C
- Cardiovascular
    - sBP >100mmHg, MAP>70 mmHg, HR 60-120, Hb >100 g/L
- Respiratory
    - Lung protective ventilation, FiO_2 <0.5, PEEP 5 cmH_2O, P_aO2 >100 mmHg
- Renal/ fluids
    - Manage DI, UO 0.5-3 mL/kg/hr
- Musculoskeletal
    - Relaxation because of spinal reflexes

DCD – Donation after Cardiac Death

- Determination requires:

- Immobility
- Apnea
- No pulse for 2 minutes
- No skin perfusion

Cardiac Death Categories

CATEGORY 1	Dead on arrival
CATEGORY 2	Failed CPR
CATEGORY 3	Withdrawal in ICU
CATEGORY 4	Cardiac arrest post Brain Death certification

Approach to patients with transplanted Organs (Source = Margo)

Consider:

- Indication for transplant
- Function of transplant
- Evidence of rejection
- Consequences of immunosuppression
- Physiological/ pharmacological implications of allograft denervation

Hyponatraemia Correction (Source = BMJ)

Either use 3% Saline or 23.4% Saline

3% Saline $[Na^+]$ = 500 mmol/L
= 0.5 mmol/L
$\therefore$ volume to increase $[Na^+]$Plasma by 1 mmol/L = (2x TBW) mL
= 1 mL/kg

23.4% Saline $[Na^+]$ = 4000 mmol/L
= 4 mmol/L
$\therefore$ volume to increase $[Na^+]$Plasma by 1 mmol/L = (TBW/4) mL

Hypokalaemia Correction

$K^+_{Defecit} = (K^+_{Target} - K^+_{Measured}) x\ Wt(kg) x\ 0.4$

Total Replacement = $K^+_{Defecit} + K^+_{Daily\ Requirement}$

$K^+_{Daily\ Requirement}$ = 1 mmol/kg

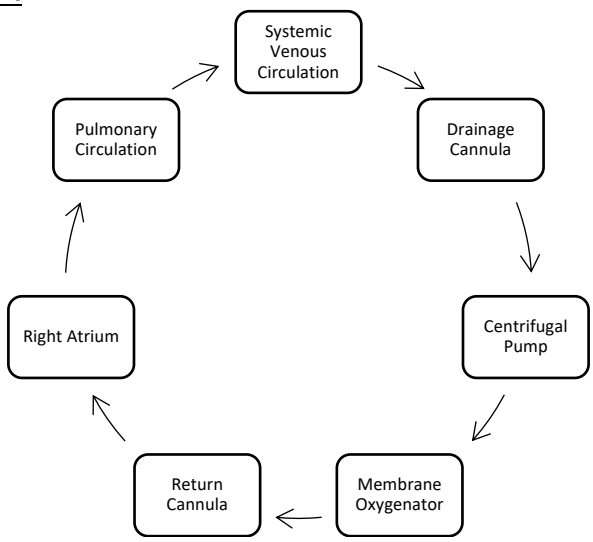
$K^+_{Defecit}$ = 100 mmol for every 0.3 mmol/L fall in K^+_{Plasma}

Berlin Definition

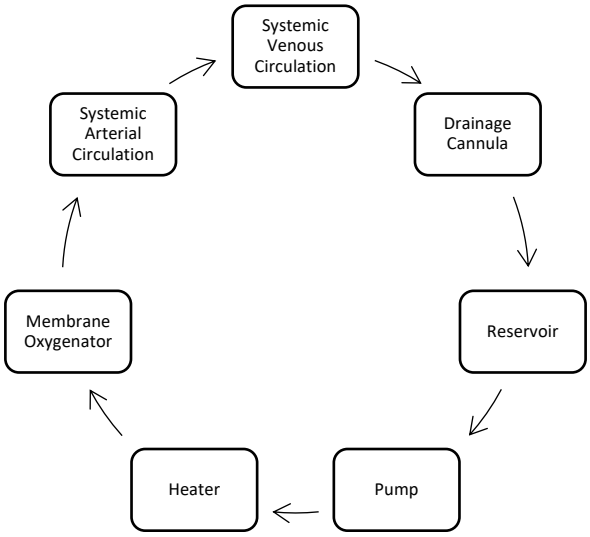
2012 consensus definition for ARDS

TIMING	<1 week from a clinical insult
IMAGING	Bilateral lung opacities
OEDEMA	No due to cardiac causes or fluid overload
OXYGENATION	PF Ratios with PEEP
	- Mild PF 200-300
	- Moderate PF 100-200
	- Severe PF <100

VV-ECMO Circuit



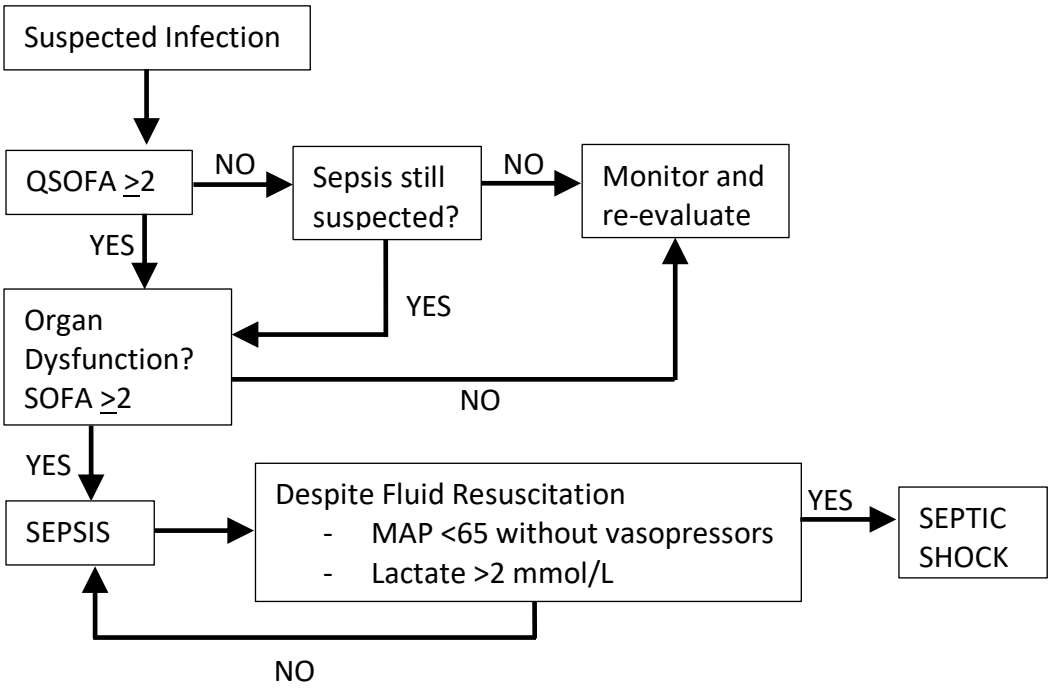
Bypass Circuit



Sepsis III (Source = JAMA 2016)

Sepsis Life threatening organ dysfunction caused by a dysregulated immune system in response to infection

Septic Shock Sepsis in which the underlying circulatory, cellular and metabolic abnormalities are associated with a greater risk of death



SOFA Sequential Organ Function Assessment Score

- CNS – GCS
- CVS – MAP + Vasopressor
- Resp – P/F Ratio
- Liver – Bilirubin
- Renal – Creatinine/ Urine Output
- Haem – Platelets

qSOFA Quick SOFA Score

Score ≥2 = Increased mortality, increased ICU stay

- Low BP – sBP ≤100 mmHg
- High RR – RR ≥22 /min
- Altered mentation – GCS <15

ICU Sieve

F - Feeding
A - Analgesia
S - Sedation
T - Thromboprophylaxis
H - Head up
U - Ulcer prophylaxis
G - Glycaemic control
B - Bowels
L - Lines
A - Antibiotics
M - Medications
E - Equipment

Surgical Sieve

V	- Vascular	**C**	- Congenital
I	- Inflammatory	**D**	- Degenerative
T	- Traumatic	**E**	- Endocrine
A	- Autoimmune	**F**	- Functional
M	- Metabolic		
I	- Iatrogenic/ idiopathic		
N	- Neoplastic		

Lung Protective Ventilation (Source = Blue Book)

* = Poor Evidence

V_T	- 6-8 mL/kg, ARDSNET
PEEP	- 5-20 cmH_20, titrated to:
	- Oxygenation - Nitrogen washout volumes
	- Lung USS - P-V lower inflection point
$P_{Plateau}$	- <30 cmH_2O
P_aCO_2*	- Permissive hypercapnia, <8 kPa
FiO_2*	- As low as possible, Sats >90%
Proning	- PROSEVA, multicenter RCT showed reduced mortality if >16 hours/day
Recruitment*	- Recruitment manouvres
Fluids	- Limit IV fluids

Proning in ICU (Source = PROSEVA, NEJM 2013)

PROSEVA NEJM 2013, multicenter RCT n=500. Proned 16 hours/day, 28 day mortality reduced from 32% to 16%

Benefits:	Risks:
- Increased lung volume	- Feeds intolerance
- Reduced P_{AW} and PEEP	- ETT/ Trache dislodgement
- Reduced over-inflation of aerated lung	- Difficult
- PROSEVA – Mortality benefit	

RIFLE Criteria (Source = LITFL)

		Creatinine	Urine Output
R	- Risk	1.5x	<0.5 mL/kg for 6 hours
I	- Injury	2x	<0.5 mL/kg for 12 hours
F	- Failure	3x	<0.3 mL/kg for 24 hours or Anuria for 12 hours
L	- Loss	Complete loss of renal function for >4 weeks	
E	- ESRD	End stage renal disease	

Approach to Transports (Source = ANZCA)

C - Communicate clearly with both the referring centre and the transport agency
H - Have equipment/ drugs well in excess of requirements
O - Organise your team – Experiences medical practitioner + qualified team
P - Plan the transport – Vehicle, distance, location, weather
P - Predict physiological impact of transport – T, P, FiO_2
E - Establish responsibility via clear handovers
R - Rapidly evaluate and optimize ABCDE
E - Establish monitoring/ infusions. Rationally defer interventions
D - Document everything

7 - NEUROLOGY

SAH Grading

WFNS = World Federation of neurosurgeons, clinical grading

Fisher = Radiological grading

Grade	WFNS	Fisher
I	GCS 15, no motor deficit	No blood on CT
II	GCS 13-14, no motor deficit	<1 mm blood on CT
III	GCS 13-14, motor deficit	Localised clots/ >1 mm blood on CT
IV	GCS 7-12	Intracerebral/ intraventricular blood
V	GCS ≤6, moribund	

Principles of Neuroanaesthesia (Source = J. Hoskins)

B - BP +/- 10%, haemodynamic stability, anticipate stimulation – ETT, pins, local
R - Rapid emergence to assess neurology – Remifentanil, minimal opioid
A - Adequate CPP = 60-70 mmHg
I - Immobility – REMIFENTANIL C_{ET} 2-4 ng/mL, NDMR (Induction Dose/ 2) per hour
N - Neuroprotection – Reduce cerebral metabolism, reduce ICP (Dexamethasone, Mannitol, Strong Salt, ventilation), preserve autoregulation – TIVA>SEVO

Neuro Evidence (Source = Brain Trauma Foundation)

S - Steroids/ cooling have NO evidence
M - Mannitol 0.25-1 g/kg to reduce ICP
A - Airway – Traches reduce ICU stays with no change in mortality or VAP rates
S - Sedatives reduce ICP
H - Hyperventilation reduce ICP in the short-term
E - Enoxaparin – Risk vs. benefit after 48 hours
D - Drain – EVD if GCS <6 in the first 12 hours

B - Bolt/ ICP in all patients with GCS <8
R - Rescue Craniectomy if ICP >25 mmHg increases GOS 2, reduces GOS 1
A - Antiseizure prophylaxis - Phenytoin
I - ICP/ BP/ CPP thresholds/ targets
N - Nutrition – Reduce mortality. Nasojejunal feeds reduce VAP

Myaesthenia Post-Operative Ventilation Prediction

S - Spirometry – VC <40 mL/kg
P - Pyridostigmine - >800 mg/day
L - Lung disease
I - Peak Inspiratory Pressure <-25cmH_2O
T - Time with disease >6 years

ASIA Score

ASIA Score = American Spinal Injury Association Score

Elements assessed:
- 10 muscle groups on each side
- Pin-prick discrimination at 28 sensory locations

AIS = ASIA Impairment Scale
- Impairment based on anal contraction/ sensation

AIS	Neurology
A	= Complete Injury
B	= Complete motor, incomplete sensory
C	= Incomplete motor - >50% muscle groups have <Grade 3 strength
D	= Incomplete motor - >50% muscle groups have >Grade 3 strength
E	= Normal

Canadian CT Head Rules (Source = Lancet 2001)

If any of the following High Risk Factors, get a CT Head
- GCS <15
- Depressed/ open skull fracture
- Basilar skull fracture
- >1 vomit
- Age ≥65 years

If no High Risk Factors, get a CT head if:
- >30 minutes retrograde amnesia
- Dangerous mechanism

Imaging also recommended if:
- Blood thinners
- Unstable observations
- Focal neurology
- Seizures

TBI BP Goals (Source = Brain Trauma Foundation 2016)

Age	sBP
15-49 years	>110 mmHg
50-69 years	>100 mmHg
>70 years	>110 mmHg

Adult CPP	60-70 mmHg
Paeds CPP	40-50 mmHg

Glasgow Outcome Scale

Score 1-5 for outcomes after brain trauma

GOS	Outcome
1	- Death
2	- Persistent vegetative state
3	- Severe disability – Dependent for daily activities
4	- Moderate disability – Independent, but may need equipment
5	- Low disability – Minor neurological and psychological defecits

TBI Prognosis (Source = Brain Trauma Foundation)

GRAPH

G	**- GCS 3**	GOS 1 = 80%	GOS 4/5 = 10%
	- GCS 8	GOS 1 = 10%	GOS 4/5 = 80%
R	**- Radiology**	Mass effect, midline shift, SAH, Basal Cistern effacement	
A	**- Age**	Age 11-20 years = 35% mortality. Mortality increases 5-10%/ decade	
P	**- Pupils**	No standardized approach	
H	**- Hypotension**	2x increase in GOS 1	

	GOS 1	GOS 4/5
Hypotension	50%	33%
No Hypotension	25%	50%

Canadian C-Spine Rules

Exclusions:

- GCS <15
- Unstable observations
- Paralysis
- Preexistent spinal disease

If any of the following High Risk Factors, get a CT C-Spine

- Age ≥65 years
- Dangerous mechanism – Axial load high speed, bicycle collision, rollover, ejection
- Paraesthesia

If no High Risk Factors, clear clinically if a low Risk Factors are present:

- Simple rear-end crash
- Sitting in ED
- Ambulatory
- Delayed neck pain
- No C-Spine midline tenderness

Rotate head to 45° to left and right, if unable, get a CT

If unable to clear clinically, then get a CT

NEXUS C-Spine Rules

NEXUS = National emergency Xray Utiisation Study

Canadian C-spine Rules have better sensitivity and Specificity

No Radiology required if there is NO:

N - Neurology
E - Ethanol
X - Extra distracting injuries
U - Untoward change in level of consciousness
S - Soreness in the midline

Glasgow Coma Scale

	Eye opening		Voice		Motor
1	Nothing	**1**	Nothing	**1**	Nothing
2	To pain	**2**	Incomprehensible	**2**	Extension = Decerebrate
3	To voice	**3**	Inappropriate	**3**	Flexion = Decorticate
4	Open	**4**	Confused	**4**	Withdraws
		5	Orientated	**5**	Localises
				6	Commands

Paediatric Glasgow Coma Scale

	Eye opening		Voice		Motor
1	Nothing	**1**	Nothing	**1**	Nothing
2	To pain	**2**	Inconsolable	**2**	Extension = Decerebrate
3	To voice	**3**	Moaning	**3**	Flexion = Decorticate
4	Open	**4**	Consolable	**4**	Withdraws to pain
		5	Interactive	**5**	Withdraws to touch
				6	Purposeful

8 - OBESITY

AHI

AHI = Apnea Hypopnea Index, number of Apnea/ Hypopnea events per hour of sleep

	AHI	
Normal	<5	In children AHI >1 is abnormal
Mild OSA	5-15	
Moderate OSA	15-30	
Severe OSA	≥30	

STOPBANG

		Risk	Score
S	- Snoring	**Low**	0-2
T	- Tired/ fatigued/ sleepy	**Moderate**	3-4
O	- Observed apneas	**High**	5-8 or 2/4 STOP + B, N or G
P	- Pressure (hypertension)		

B - BMI >35 kg/m^2
A - Age >50 years
N - Neck circumference – Males >43 cm, Females >41cm
G - Gender = Male

Classes of Obesity

Obesity = A state if increased body mass and adiposity with a BMI in excess of >30 kg/m^2

Class	BMI	Risk
Normal	<25 kg/m^2	
Overweight	25-30 kg/m^2	
Class I	30-35 kg/m^2	Low risk
Class II	35-40 kg/m^2	Moderate risk
Class III	>40 kg/m^2	High risk

James Formulae

Used to calculate Lean Body Mass (LBM)

Males:
LBM = 1.1x Wt(kg) – 128x (Wt/Ht)^2

Females:
LBM = 1.07x Wt(kg) – 148x (Wt/Ht)^2

Dose Adjustments (Source = BJA 2010)

Propofol	Induction	- **LBW**
	Maintenance	- **TBW**
Fentanyl/ Remifentanil		- **LBW**
Suxamethonium		- **TBW**
NDMRs		- **IBW**

Obesity Hypoventilation Syndrome

Diagnosis requires:

- BMI - BMI >30 kg/m^2

- ABG - PaCO2 > 6.0 kPa/ 45 mmHg

+ No other explanation for hypercapnea/ Type 2 Respiratory Failure

- Drugs
- Medications
- Hypothyroidism
- Chest wall/ spine disease
- Lung disease

9 - OBSTETRICS

Obstetric Sieve

Causes if obstetric collapse. Consider:

- Patient factors
- Obstetric factors
- Anaesthetic factors

T	- Thrombus	**B**	- Baby – Aortocaval compression, eclampsia
H	- Haemorrhage	**A**	- Anaphylaxis
E	- Ambolus – AFE, PE	**S**	- Sepsis
		I	- Iatrogenic
		C	- Cardiac
		S	- Sugars

Obstetric Drug Safety

Category		Animal Risk	Human Risk	Overall	Examples
A		No	No	No known adverse effects	Amoxicillin Paracetamol
B	Either	Yes	No	No risks in humans	Augmentin
	Or	No	Unknown		Ondansetron
C		Yes	Unknown	Potential risk	NSAIDs, Sulfonamides, Ciprofloxacin, Trimethoprim
D			Yes	Benefits >Risk	SSRIs, Phenytoin, Valproate, ACEi, Aminoglycosides
X			Yes	Risk >> Benefit	Thalidomide, Isotretinoin

Intrauterine Fetal Resuscitation

S	- Syntocinin OFF
P	- Position left lateral tilt
O	- Oxygen
I	- IV Crystalloid
L	- Low BP – Give vasopressor
T	- Tocolysis

PPH Causes

T	- Tone = 70%	**T**	- Tissue = Placenta
T	- Trauma = Tears	**T**	- Thrombin = Coagulopathy

NICE indications for CTG (Source = NICE)

M - Meconium liquor
O - Obstetric bleeding
N - Neuraxial
I - Increased/ decreased fetal Heart Rate
T - Temperature = Maternal Fever
O - Oxytocin
R - Request by mother

Labour PCA Recipes

	Concentration	Bolus	Lockout	1 hr max
REMIFENTANIL	2mg/ 100mL = 20mcg/ mL	0.5 mcg/kg (10-50 mcg)	2 minutes	900mcg
ALFENTANIL	10mg/ 50mL = 200 mcg/ mL	100mcg (100-200 mcg)	3 minutes	1200mcg

C-Section Categories

Category	Delivery Time	
CAT I	<30 minutes	Immediate threat to woman/ fetus
CAT II	60-90 minutes	Early Delivery
CAT III	Earlier than planned	Early Delivery
CAT IV	At a planned time	At a time that suits services

Risk Factors for Preeclampsia

P - Parity = Nulliparous, multiparous
R - Renal disease
E - Endocrine disorders = Thyroid, diabetes
E - Egg/ embryo donor
C - Chronic hypertension
L - Large women = obesity
A - Antiphospholipid antibody syndrome
M - Maternal age >35 years
P - Previous Preeclampsia

Resuscitative Hysterotomy

Aim = Maternal survival, complete by 5 minutes post-arrest

Indications:

- Maternal cardiac arrest
- >4 minutes of CPR
- Gravid Uterus capable of causing aortocaval compression
    - >20/40 pregnant
    - Uterus palpable above level of umbilicus

10 - ORTHOPAEDICS

BCIS

BCIS = Bone Cement Implantation Syndrome

	Patient	Surgical
Risk Factors	- ASA III/IV	- Long stem prosthesis
	- Pulmonary Hypertension	- Pathological fracture
	- Cardiac Disease	- Uninstrumented canal
	- NYHA III/IV	- Intertrochanteric fracture
	- Old age	
	- Osteoporosis	

Grade	Saturations		Systolic Blood Pressure
Grade I	<94%	or	Drop >20%
Grade II	<88%	or	Drop >40%
Grade III	CPR		

Reasons to delay Hip Fracture Surgery (source = AAGBI)

Acceptable	Unacceptable
- Hb <80 g/L	- No staff
- Reversible coagulopathy	- No facilities
- K^+ <2.8 mmol/L or >6.0 mmol/L	- Minor electrolyte abnormalities
- Na^+ <120 mmol/L or >150 mmol/L	- Awaiting an Echocardiogram
- Chest sepsis	
- LV Failure	
- Correctable arrhythmia with HR >120 bpm	
- Uncontrolled Diabetes	
- Palliative	

11 - PAEDIATRICS

APGAR

		0	1	2
A	**- Appearance**	Blue	Blue hands/ feet	Pink
P	**- Pulse**	Absent	<100 bpm	>100 bpm
G	**- Grimace**	Nil	On stimulation	Normal
A	**- Activity**	None	Some flexion	Flexion
R	**- Respiration**	None	Weak	Strong

Gillick Competence (Source = Gillick vs. West Norfolk & Wisbech 1985)

A Child's ability to give consent depends on their capacity to make an informed decision and not their age

McGill Score
Derived from 6 hours+ of overnight oximetry

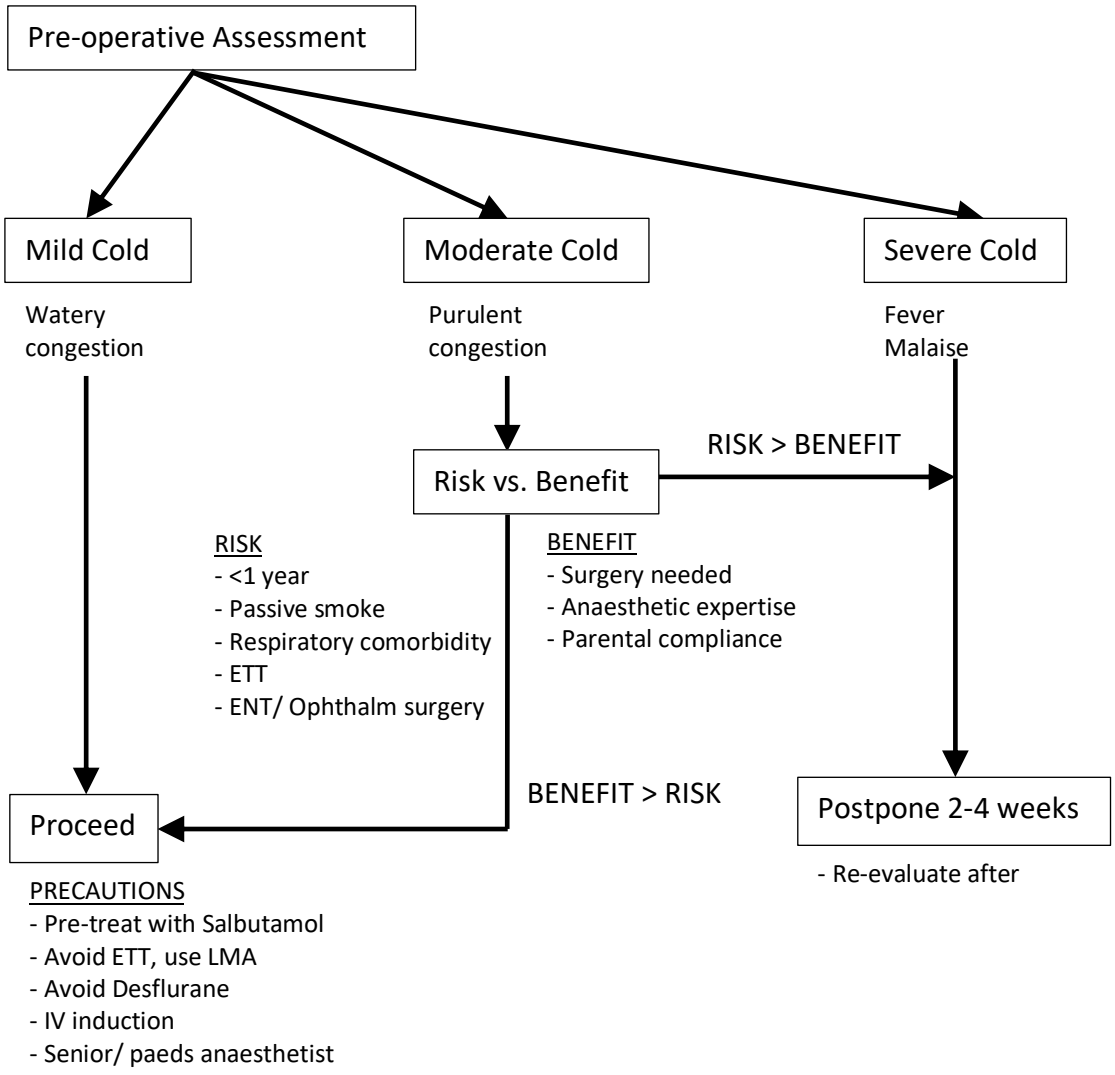
Determines - Tonsillectomy and Adenoidectomy urgency
- Post-operative monitoring requirements
- Appropriateness for day case

	Desaturations		
Score	<90%	<85%	Interpretation
1	1-2	0	**Inconclusive** A+T if clinical suspicion, day case
2	3+	1-3	**Positive** Waitlist for A+T, day case
3	3+	4+	**High risk positive** Urgent A+T, overnight oximetry/ monitoring after

Cravero/ WATCHA Scales
Measures of Paediatric Emergence Delirium
Others – PAED, FLACC, CHIPP

	Cravero Scale		WATCHA Scale
1	Obtunded	**0**	Asleep
2	Asleep but responsive	**1**	Calm
3	Awake and responsive	**2**	Crying but consolable
4	Crying >3 minutes	**3**	Crying inconsolably
5	Needs restraint	**4**	Agitated, thrashin

Child with a Cold (Source = Curr Op in Anaesth 2012)



Paediatric Fasting (Source = ANZCA)

	Food	Formula/ Milk	Breast	COF
Adults	6 hours			2 hours
Children >6 months	6 hours	6 hours	6 hours	2 hours
Children <6 months		4 hours	3 hours	2 hours

Paediatric ETT

Neonatal	ETT	=	Gestational Weeks / 10
	Depth	=	(kg + 6)cm
Paediatric	Uncuffed	=	Age + 4 / 4
	Cuffed	=	Age + 3.5 / 4
	Lip Depth	=	Age + 12 / 2
	Nose Depth	=	Age + 15 / 2

Target Neonatal Saturations (Source = NZCOR 2016)

Time	Interquartile Range	Target
1 min	60-70%	>60%
2 min	65-85%	>65%
3 min	70-90%	>70%
4 min	75-90%	>75%
5 min	80-90%	>80%
10min	85-90%	>85%

Paediatric BP/ HR

Heart Rate

Age	Too Slow	Too Fast
<1 year	<100 bpm	>180 bpm
1-4 years	<90 bpm	>160 bpm
5-12 years	<80bpm	>140 bpm
>12 years	<60bpm	>130 bpm

Blood Pressure

Age	Systolic BP
0-3 months	>50 mmHg
4-12 months	>60 mmHg
1-4 years	>70 mmHg
5-12 years	>80 mmHg
>12 years	>90 mmHg

Paediatric Resuscitation

W - Weight = (Age + 4) x2
E - Energy = 4 J/kg
T - Tube – Cuffed = (Age/4) + 3.5, Uncuffed = (Age/4) + 4, Depth = (Age/2) + 12
F - Fluid = 20 mL/kg
A - Adrenaline = 10 mcg/kg, Amiodarone = 5 mg/kg, Atropine = 20 mcg/kg
G - Glucose – D10W 2.5 mL/kg

Paediatric Anaphylaxis (Source = ANZCA)

<12 years of age

DR - Danger and Response
Stop procedure, remove trigger

S - Send for help and form a team
Anaphylaxis Box
Leader and a Reader

AB - Airway/ Breathing
FiO2 = 100%, ETT early

C - Circulation
Raise legs
Volume = 20 mL/kg crystalloid

D - Drugs
ADRENALINE

IM ADRENALINE Q5 minutes
If no IV access/ no haemodynamic monitoring
ADRENALINE 1:1000, Lateral Thigh
<6 years – 0.15mL = 150 mcg
6-12 years – 0.3mL = 300mcg

IV ADRENALINE Q1-2 minutes
ADRENALINE 1mg/50ml, 20mcg/mL
GD II = 0.1 mL/kg = 2 mcg/kg
GD III = 0.2-0.5 mL/kg = 4-10 mcg/kg
GD IV = ACLS 10 mcg/kg

ADRENALINE INFUSION
After 3x Adrenaline boluses
ADRENALINE 1mg/ 50mL
0.3-6 mL/kg/hr = 0.1-2 mcg/kg/min

ONGOING HYPOTENSION
NORADRENALINE 0.1-2 mcg/kg/min
VASIPRESSON 1 unit/50ml
2 mL, then 1-3 mL/ hr

ONGOING BRONCHOSPASM
SALBUTAMOL <6 years - 6 puffs
>6 years – 12 puffs
MAGNESIUM 50 mg/kg

Paediatric Weight

Weight = (age+4) x 2

Age <9 years Weight = (2x Age) + 9
Age >9 years Weight = Age x 3

Specialist Paediatric Hospitals

- Neonates <28 days
- Ex-prem <37/40 with a post-conceptual age <52 weeks
- History of apneic episodes
- Complex children ASA >3

Paediatric One-Lung Ventilation (Source = BJA Ed, SPANZA)

Age	Technique
0-6 months	SLT bronchial intubation
6 months – 2 years	Parallel blocker
2-8 years	Coaxial blocker
8-18 years	DLT 26F

12 - PAIN

Approach to Regional

CALM, **SOBER**, **PLANS** & **ACTIONS**

C - Consent
A - Assistant
L - Lines
M - Monitoring

S - Sedation
O - Oxygen
B - Block trolley
E - Emergency drugs
R - Resuscitation equipment

P - Probe = Linear f = 8-15 MHz
L - Local anaesthetic
A - Additives
N - Needle
S - Stimulator 0.2 mA

A - Arrange the room
C - Clean = 0.5% Chlorhex + 70% EtOH
T - Two person time out
I - Image
O - Optimise = Depth, gain
N - Note relevant structures
S - Surround nerve with local anaesthetic

Bromage Scale

Grade	Criteria	Block
1	Free movement of feet and legs	Nil = 0%
2	Free movement of feet, just able to flex knees	Partial = 33%
3	Unable to flex knees	Almost complete = 66%
4	Unable to move legs	Complete = 100%

Brachial Plexus

R **- RUGBY** Roots
T **- TEAMS** Trunks
D **- DRINK** Divisions
C **- COLD** Cords
B **- BEERS** Branches

Analgesic Infusions

For each patient, have plans for:
M - Monitoring
O - Ongoing pain
R - Respiratory depression
P - Pain team follow-up
H - Hypotension
I - Itch
N - Nausea and vomiting
E - Emergency management

Institutional Issues:
P - Protocolised care
U - Up-to-date education for staff
M - Management group – GA/QI
P - Pumps – Cost effectiveness etc

Tolerance/ Dependence/ Addiction

Tolerance	Acquired hypoactivity to a drug whereby larger doses are required to achieve the same effect
Dependence	Physiological and psychological need for a drug with potential for withdrawal on cessation
Addiction	Use despite harm
Tachyphylaxis	Rapid reduction in drug effectiveness with repeated doses

WHO Definition of dependence = ≥3/6 of

A - Alternative pleasures rejected
D - Desire to use
D - Detrimental to life
I - Inability to control onset/ offset/ levels
C - Cessation causes withdrawal
T - Tolerance

Budapest Criteria for CRPS

CRPS 1 No nerve injury
CRPS 2 Nerve injury

C - Continuing pain disproportionate to inciting event
R - Reports 3/4 symptoms
P - Presents with 2/4 signs
S - Signs and symptoms have no other explanation

Signs/ symptoms:
- Sensory
- Motor/ trophic
- Sudomotor/ oedema
- Vasomotor

Neuropathic Pain

Dysaesthesia	Spontaneous or evoked unpleasant, abnormal sensation
Paraesthesia	Abnormal sensation with no apparent physical cause
Hyperalgesia	Increased response to a noxious stimulus
Allodynia	Pain due to a non-noxious stimulus (AKA Hyperaesthesia)

13 - PERIOPERATIVE

ASA
E = Emergency

ASA I	Normal healthy patient
ASA II	Mild systemic disease
ASA III	Severe systemic disease
ASA IV	Severe systemic disease that is a constant threat to life
ASA V	Moribund patient who is not expected to survive without operation
ASA VI	Brain dead organ donor

Anaerobic Threshold (Source = Blue Book 2013)
For major abdominal surgery in >60 year old patients

Anaerobic Threshold	Ischaemia on CPEX	Mortality
>11 ml/min/kg	Nil	1%
	Yes	4%
<11 ml/min/kg	Nil	20%
	Yes	40%

Surgical Urgency (Source = AHA/ACC 2014)

	Timeframe	Definition
Emergency	<6 hours	Life/ limb threatening, no time to evaluate
Urgent	6-24 hours	Life/ limb threatening, time to evaluate
Time-sensitive	1-6 weeks	Delay of >1-6 weeks will affect outcome (cancer)
Elective	1 year	Delay of 1 year has no effect

CKD Stages

Stage	Impairment	GFR (ml/min/1.73m^2)
I	Normal	≥90
II	Mild reduction	60-89
IIIa	Mild-moderate reduction	45-59
IIIb	Moderate-severe reduction	30-44
IV	Severe reduction	15-29
V	Kidney Failure	<15

Child-Pugh Score (Source = Blue Book 2017)

Surpassed by MELD score

		1	2	3
L	**- Low Albumin**	>35 g/L	28-35 g/L	<28 g/L
I	**- INR**	1-4	4-6	>6
V	**- Volume/ascites**	None	Mild	Severe
E	**- Encephalopathy**	None	Mild	Severe
R	**- Raised Bilirubin**	<20	20-30	>30

Child Pugh	Score	Perioperative mortality
A	5-6	10%
B	7-9	30%
C	≥10	80%

MELD Score (Source = Blue Book 2017)

MELD = Model for End-stage Liver Disease, Mayo clinic 2000

MELD = 10x (0.96x ln(Creatinine)) + (0.38x ln(Bilirubin)) + (1.1x ln(INR)) + 6.43

Derived from 3 parameters:

B - Bilirubin

I - INR

C - Creatinine

MELD		30 day mortality
10	x2	5%
20	x2	20%
30	x2	40%
40		60%

Produces a score from 6-40

APFEL/ Eberhart Scores

APFEL = Adults PONV risk prediction

Points:	Parameter:
1	Female
1	Post-operative opioids
1	Previous PONV/ motion sickness
1	Non-smoker

Score:	Risk of PONV:	
0	10%	Low risk
1	20%	Low risk
2	40%	Intermediate risk
3	60%	High risk
4	80%	High risk

Eberhart = Paediatric PONV risk prediction

Points:	Parameter:
1	Age ≥3 years
1	Strabismus surgery
1	Previous PONV/ Family History
1	Duration ≥30 minutes

Score:	Risk of PONV:	
0	9%	Low risk
1	10%	Low risk
2	30%	Intermediate risk
3	55%	High risk
4	70%	High risk

Insulin Types

Type:	Name:	Additive:	Onset:	Peak:	Duration:
Fast	Novorapid Adipra Humalog	1x aa changed 2x aa changed Terminal aa changed	10 minutes	1 hour	4 hours
Short	Actrapid Humulin	Regular Insulin Regular Insulin	30 minutes	2 hours	6 hours
Intermediate	Protophane	Protamine	90 minutes	6 hours	12 hours
Long	Levemir Lantus	Fatty acid	90 minutes	-	24 hours

Insulin whilst NBM (Source = Waikato/ AAGBI)

Type:		Day Before:	AM Surgery:	PM Surgery:
Long acting - Lantus, Levemir	AM Dose PM Dose	Usual dose 2/3 dose	2/3 dose -	2/3 dose -
Intermediate - Protophane, Humulin		Usual dose	1/2 Morning	1/2 Morning
Mixed - Novomix, mixtard Penmix, Humalog mix		Usual dose	**Either**: - 1/2 Morning dose - Omit + 0.1 unit/kg Protophane	1/2 Morning dose with breakfast
Fast/ Prandial - Adipra, Novomix, Humalog		Usual dose	Omit while NBM	Usual dose with Breakfast

Oral Diabetes Mediations while NBM (Source = AAGBI)

Class:	Drugs:	Surgery: AM:	PM:
Bisguanides	Metformin	Give/omit	Give/omit
α Glucosidase Inhibitors	Acarbose	Omit	Omit
GLP-1 Analogues	Exenatide	Give	Give
DPP-4 Inhibitors	Sitagliptan, Vildagliptan	Give	Give
Thiazoledinediones	Rosiglitazone, Pioglitazone	Give	Give
Sulfonylureas	Gliclazide, Glipazide	Omit	Omit
Meglitinides	Repaglinide	Omit	Give AM dose

with breakfast

Frailty and Ageing

Frailty A multidimensional syndrome characterized by a loss of homeostatic and physiological reserves that increase vulnerability to adverse events

Ageing A progressive reduction in viability with diminished ability to maintain homeostasis from middle life onwards

Frieds Phenotypes = 5 Phenotypes of Frailty

	Parameter:	Measurement:
F	**Fading**	>4.5 kg weight loss
R	**Reduced strength**	Grip strength in lowest 20%
I	**Inactivity**	Self-reported
E	**Exhaustion**	Self-reported
D	**Decreased speed**	4.5m walk test in lowest 20%

TIVA Indications

I - Intensive care
T - Tone of Uterus – GA C-sections
S - Short/ day stay

T - Thoracics – Reduces shunt, increases P_aO_2 in OLV
I - Inter/ intrahospital transports
V - Vomiting/ PONV prevention
A - Anaesthesia for neurosurgery

T - Trainee teaching
I - Individual patient choice
M - Malignant hyperthermia
E - ENT/ FESS/ Shared airway surgery

Infection Prevention

SPACE

S	**Surgical**	- Sterility	- Minimise drains/ catheters
		- Reduce tissue trauma	- Prevent haematomas/ seromas
P	**Patient**	- Normoglycemia	- MDRO screening
		- Smoking cessation	- Pre-operative Chlorhexidine wash
A	**Anaesthetic**	- ?Opioids/ steroids	- Asepsis/ CLAB prevention
		- Equipment cleaning	- Hand hygiene
C	**Chemo**	- Antibiotics	- WHO timeout confirmation of Abs
		- Skin prep	- Target likely pathogens with Abs
E	**Environment**	- Reduce foot traffic	- Standard precautions
		- Temperature	- Room ventilation

14 - PROFESSIONAL

Mandatory Reporting

MCNZ/ AHPRA notifiable conduct:
- Practicing whilst intoxicated
- Sexual misconduct
- Impaired
- Significant departure from accepted professional standards

Graded Assertiveness

P	**- Probe**	Do you know that…?
A	**- Alert**	Can we reassess…?
C	**- Challenge**	Are you sure…?
E	**- Emergency**	STOP

SUD Major and Minor signs (Source= ACECC 2016

These are indirect signs. Direct signs of SUD is observed misuse = Medical emergency

Major:
- Injection marks/ pills
- IV equipment at home/ in change room
- Increasing sign outs of controlled drugs
- Inconsistent records
- Excessive pain in PACU
- Tremors
- Intoxication
- Bizarre behaviour

Minor:
- Long sleeves
- Blood on clothes
- Absenteeism
- Reduced hygiene
- Poor punctuality
- Frequent job changes
- In Hospital out of hours
- Syringes/ ampules in clothing
- Long toilet breaks
- Mistakes
- Health problems
- Social disruption
- Change in mood
- Working alone
- Refusing breaks

≥1 major sign = Report

Factors that adversely affect decision making (Source = EMAC)

HALT I'M SAFE

H	- Hungry	**S**	- Stress
A	- Angry	**A**	- Alcohol
L	- Late	**F**	- Fatigue
T	- Tired	**E**	- Eating
I	- Illness		
M	- Medications		

Life Problems

Causes = **6 B's**

B	**- Babies** = Children	**B**	**- Bugs** = Illnesses
B	**- Booze** = Substance use	**B**	**- Babes** = Relationships
B	**- Banks** = Finances	**B**	**- Blues** = Mental health

Substance Use Disorder Policies and Interventions

PREPARE and **STONED**

Policies:

P	**- Prevention strategies**	Education, controlled drug sign out processes, SIG
R	**- Recognition**	Education, reporting, audits
E	**- Evidence gathering**	Confidential, welfare SIG
P	**- Planned intervention**	
A	**- Access to treatment**	Immediate rehabilitation
R	**- Return to work**	As appropriate
E	**- Evaluation and monitoring**	

Interventions:

S - Support return to work
T - Take time to listen
O - Outline team roles at outset
N - Notify person about evidence
E - Escort at all times
D - Document everything

Return to work process (Source = ANZCA)

4 stage process based on a learning-needs analysis

Stage:	When:	What:	How:
I	Before/ early	Emergency response CPDs	CICO, ACLS, massive haemorrhage
II	Early	Ability to practice	Level 1 supervision, CPD peer review
III	Variable	Supervision	Audit, logging, MSF, CBDs
IV	End	Completion vs. extension	Supervisors report

SPIKES Protocol

Protocol for breaking bad news

S	**- Setting**	Location, privacy, uniterrupted
P	**- Perception**	What is known already?
I	**- Invitation**	To give information
K	**- Knowledge sharing**	Give information
E	**- Empathy**	Emotional response
S	**- Summary/ strategy**	Where to?

Open Disclosure (Source = ANZCA)

An open discussion of adverse events

Prepare
- Gather all necessary information
- Confirm participants

Perform
- Introduce roles
- Offer a sincere, unprompted apology
- Provide a factual explanation
- Encourage descriptions of personal experiences
- Take care of staff - 1° and 2° victims
- May require several meetings

Follow up
- Senior clinician/ management
- Agree on future care
- Share outcomes of investigations

Can use **SPIKES** protocol as well

Bullying Behaviours (Source = ANZCA)

BULLIES

B - Berating, rude, abusive behaviour
U - Unreasonable timelines
L - Leaving all unpleasant tasks to an individual
L - Limiting or withholding essential information
I - Intimidating, hostile, threatening behaviours
E - Excluding from college activities
S - Sarcasm and insults

Principles of a Complaints Process (Source = ANZCA)

COMPLAIN

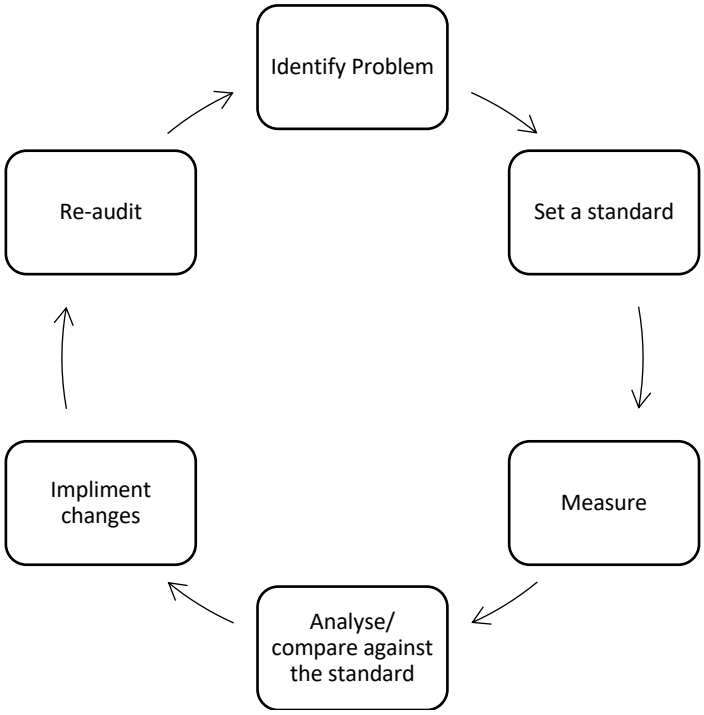
C - Confidentiality
O - Objectivity
M - Malice-free
P - Protect against false accusations
L - Let each party have a support person
A - Allow for independent counselling
I - Impartiality
N - No victimization of complainants

ANZCA Roles in Practice (Source = ANZCA)

CCLAMPS

C - Communicator
C - Collaborator
L - Leader/ manager
A - Advocate
M - Medical expert
P - Professional
S - Scholar

Audit Cycle



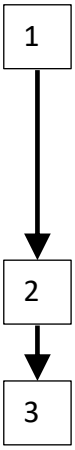
SAC Events

SAC = Severity Assessment Code

SAC 1 Death or permanent severe loss of function
SAC 2 Permanent major loss of function or temporary severe loss of function
SAC 3 Permanent moderate loss of function or temporary major loss of function
SAC 4 Increased level of care or no injury

HQSC Reporting

HQSC = Health Quality and Safety Commission NZ



<15 Days
- SAC 1 and SAC 2 events
- Always report and review events
  - Wrong site
  - Wrong blood
  - Retained object
  - Wrong implant
  - Wrong patient
  - Child abduction

Review Event
- Eliminate, control or accept causal factors

<70 Days
- Submit summary of review to HQSC NZ

Root Cause Analysis

RCA A method of problem solving to identify underlying faulty processes or system errors that led to a harmful event

INSPECT

I	**- Identify**	Identify the event to investigate and gather information - Documents, interviews, investigations
N	**- Nominate**	Nominate a team - Facilitator, members
S	**- Sequence**	Sequence of events - Create a concise timeline
P	**- Propose**	Propose contributing factors for each timeline step - Conditions and factors
E	**- Examine**	Examine the root cause - Ask 5 “why’s” for each factor
C	**- Changes**	Implement changes for each root cause - Immediate = Temporise, Longterm = Control, eliminate, accept
T	**- Test**	Test the success of changes made - Audit, follow up

QA/ QI (Source = ANZCA)

Quality Assurance	Establish processes to meet accepted standards
Quality improvement	Establish processes to achieve better clinical outcomes

3 Goals of QA/QI:
- Improve quality, safety and experience for individual patients
- Improve health and equity for the population
- Achieve best value for available resources

Beauchamp and Childress Medical Ethics (Source = Belmont Report 1979)

Autonomy	Individuals have free will. Those with diminished autonomy need protecting
Beneficence	Research and interventions should aim to maximise benefits
Non-Malificence	Human subjects should not be harmed or injured
Justice	Benefits and risks should be distributed fairly. Also encompasses Human Rights and legal obligations

Informed Consent (Source = Belmont Report 1979)

Informed consent is a direct application of the principles of Autonomy. Competence is assured until proved otherwise

Information	Knowledge must be shared regarding: - Procedure - Alternatives - Purpose - Risks/ benefits With opportunity to ask questions and withdraw consent
Comprehension	The knowledge must be understood
Free Will	Consent must be voluntary

6 Domains or Health Care Quality (Source = Institute of Medicine)

STEEEP

S - Safe
T - Timely
E - Effective
E - Efficient
E - Equitable
P - Patient-centered

Value = Quality / Cost

Errors (Source = BMJ/ ANZCA/ EMAC)

Active Errors Unsafe acts which precede an incident

Slips - Unintended actions
Sequence = wrong order **Description** = Wrong object
Mode = Wrong mode
Lapses - Errors of omission
Fixation - Coning of attention
Violations - Intentional errors
Fumbles - Clumsiness

Latent Errors Resident pathogens in a system. These may be dormant and combine with active errors

Effective Communication (Source = Blue Book 2017)

LAURS

L	**Listen Reflectively**	Listen, reflect, don't interrupt, be comfortable with pauses
A	**Acceptance**	Of beliefs, emotions, experiences, accepting a patient's alternative view/ reality
U	**Utilise Patient's Language**	Use the same visual/ auditory/ kinaesthetic language. Use concerns/ strengths
R	**Reframe**	Reframe a negative thought, perception or behavious in a helpful manner
S	**Suggest**	Suggestibility increases when anxious. Can be verbal or non-verbal suggestions

Performance Shaping Factors (Source = ANZCA)

Individual	Attention, memory, motor skills, training, knowledge
Teams	Leadership, communication, familiarity
Organisation	Staffing, workload, pressure, hours
Resources	Equipment availability
Ergonomics	Size, shape, quality of equipment

Handovers (Source = ANZCA)

Handover for Breaks: **BREAK**

B	**Background**	Medical history of patient
R	**Record**	Chart up to date
E	**Equipment**	Ensure machine/ equipment are working
A	**Anaesthetic**	Technique, drugs, lines, airway & current state
K	**Keep others in the loop**	Notify nurses/ tech/ surgeon

Handover of care: **PISS OFF HOME**

P Prepare for the handover

I	**Individuals**	Who needs to be there?
S	**Setting**	Where should it occur?
S	**Specific paperwork**	Documentation ready for handover

O Optimise the Environment

F	**Facilities**	Facilities and equipment to reduce risk for patient/ staff
F	**Forewarn**	To ensure bed/ staff are available

H Handover

O	**Overview**	Utilise ISOBAR
M	**Members**	Make sure all relevant people are present
E	**Ensure**	Ensure there is a leader accepting responsibility

Culture (Source = ANZCA)

UNESCO 1982 The complex of spiritual, intellectual, material and emotional features which define a social group. Culture defines:
- Thoughts - Communication
- Identity - Values

Cultural Competence Challenges the elements of practice which perpetuate inequity. The attitudes, skills and knowledge to treat people if different cultural backgrounds effectively and respectfully. Improves:
- Patient experience - Clinical outcomes

Principles of cultural competence
- **Respect** Different world views, different health beliefs
- **Communication** Setting, time, family, interpreter
- **Patient Centered** Care tailored to individual needs, avoid generalisations
- **Partnership** Develop a good therapeutic relationship

Debriefing after a Critical Incident
DEBRIEF

D Debriefer chairs the meeting
E Ensure confidentiality
B Before starting, identify and introduce all team members present
R Relate individual experiences and clarify events
I Identify learning points
E Ensure confidentiality once more
F Follow up/ report/ investigate

15 - RESEARCH and STATISTICS

Clinical Trial Phases

Efficacy = Ability to produce a result

Effectiveness = Success in producing a result (therapeutic effect)

Phase	n=	Participants	Purpose
0	10	Healthy	Pharmacokinetics
I	20-100	Healthy	Dose ranging, safety, efficacy
II	100-300	Diseased	Safety, efficacy
III	1000-2000	Diseased	Effectiveness, therapeutic effect, safety
IV	Post-marketing surveillance		

Planning a Study

RESEARCH and **PECOT**

R	Review the literature
E	Establish your aims
S	Study protocol – Design your ptotocol = **PECOT**
E	Ethics approval
A	Apply your protocol to a Pilot Study
R	Review your protocol and modify it as required
C	Conduct the study
H	Hypothesis/ conclude based on your data

P	Population/ sample
E	Exposure
C	Control
O	Outcomes
T	Tests/ time

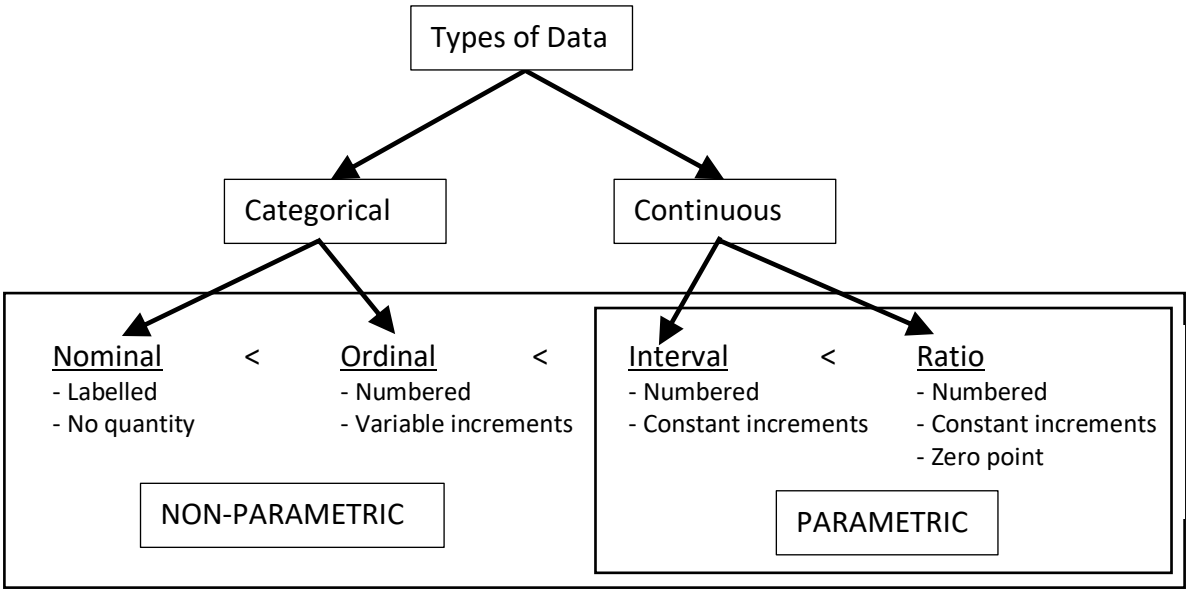
Levels of Evidence (Source = NHMRC 1999)

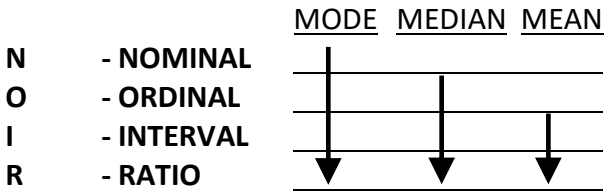
I	Systematic review of RCTs
II	Properly designed RCT
III-1	Pseudorandomised control trials
III-2	Cohort/ case control studies
III-3	Comparative studies
IV	Case series
V	Case reports

Grades of Reccomendation (Source = NHMRC)

A	Evidence can be trusted
B	Evidence can be trusted in most situations
C	Evidence provides some support, but needs care in its application
D	Body of evidence is weak

Types of Data





Statistical Tests

	2 Groups:		**>2 Groups:**	
	Paired	Unpaired	Paired	Unpaired
Parametric	- Paired Students T	- Unpaired Students T	- ANOVA	- ANOVA
Non-Parametric				
- Nominal	- McNemar	- Chi^2	- Cochrane Q	- Cochrane Q
- Ordinal – Ratio	- Wilcoxon Rank Sum	- Mann Whitney U	- Friednman	- Kruskell Wallis

Error

Error	A reduction in data or measurement accuracy as a result of random or systematic purposes
Random Error	Non-directional variation in data accuracy resultant from uncontrollable or poorly controlled factors. Reduces with increased sample sizes
Systematic Error	Bias is the introduction of systematic error. Systematic error occurs with same magnitude and direction. Does not change with sample size

16 - RESPIRATORY and THORACICS

ppoFEV$_1$ = Predicted Post-Operative FEV$_1$
The lung has 42 segments

- **RUL** = 6
- **RML** = 4
- **RLL** = 12
- **LUL** = 10
- **LLL** = 10

ppoFEV$_1$ = preopFEV$_1$ x (1 - $\frac{\%\ \text{Lung Removed}}{100}$)

= preopFEV$_1$ x ($\frac{42 - \#\ \text{Segments Removed}}{42}$)

ppoFEV$_1$	Risk
>40%	Low Risk
30-40%	Moderate Risk
<30%	High Risk

Markers of Asthma Control (Source = National Asthma Education & Prevention)
ASTHMA

A	**Activity**	Exercise capacity
S	**Salbutamol**	Frequency of reliever use
T	**Take Steroids**	Frequency of Prednisone requirement
H	**Has Symptoms**	How often?
M	**Measurements**	FEV$_1$/ PEF
A	**Awakenings**	Nocturnal wakings

FACED Score
Severity assessment tool for Bronchiectasis

		0	1	2
F	**FEV$_1$**	>50%		<50%
A	**Age**	<70 years		>70 years
C	**Colonisation**	Nil	Pseudomonas	
E	**Extent**	1 lobe	2+ lobes	
D	**Dyspnea**	MRC 1	MRC 2+	

Score	Severity
0-2	Mild
3-4	Moderate
5-7	Severe

BODE Index

Severity assessment tool for COPD

		0	1	2	3
B	**BMI**	>21	<21		
O	**Obstruction - FEV_1**	>65%	50-65%	35-50%	<35%
D	**Dyspnea - MRC**	≤1	2	3	4
E	**Exercise - 6 Minute Walk**	>350m	250-350m	150-250m	<150m

Score	4 Year Survival
0-2	80%
3-4	70%
5-6	60%
7-10	20%

CURB 65 (Source = British Thoracic Society)

Points:			Score:	Management:
1	**C**	**Confusion**	0-1	Outpatient
1	**U**	**Urea >7 mmol/L**	2	Inpatient short-stay
1	**R**	**RR ≥30**	3-5	Inpatient +/- ICU
1	**B**	**sBP <90 mmHg**		
1	**65**	**Age >65 years**		

Score:	30 Day Mortality:
0	<1%
1	3%
2	7%
3	14%
4	28%
5	28%

MRC Scale (Source = Medical Research Council)

MRC Scale = Medical Research Council Dyspnea Scale

Stage	Dyspnea
I	Dyspnea on strenuous exercise
II	Dyspnea up a slight hill
III	Walks slow, stops after 1 mile
IV	Stops after 100m
V	Dyspnea on dressing

GOLD COPD Classification (Source = GOLD)

Stage	Severity	FEV_1/ FVC	FEV_1
I	Mild	<70%	>80%
II	Moderate	<70%	50-80%
III	Severe	<70%	30-50%
IV	Very severe	<70%	<30% OR <50% with chronic respiratory failure

Bronchial Blockers:

ETT Size:	Blocker Size:
4.5	5.0 Fr
6.0	7.0 Fr
7.5	9.0 Fr

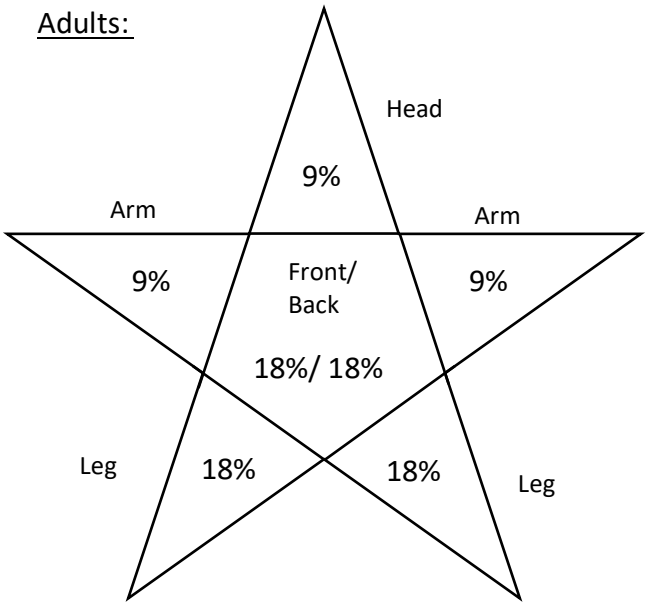
Fr = Diameter(in mm) x3

17 - TRAUMA

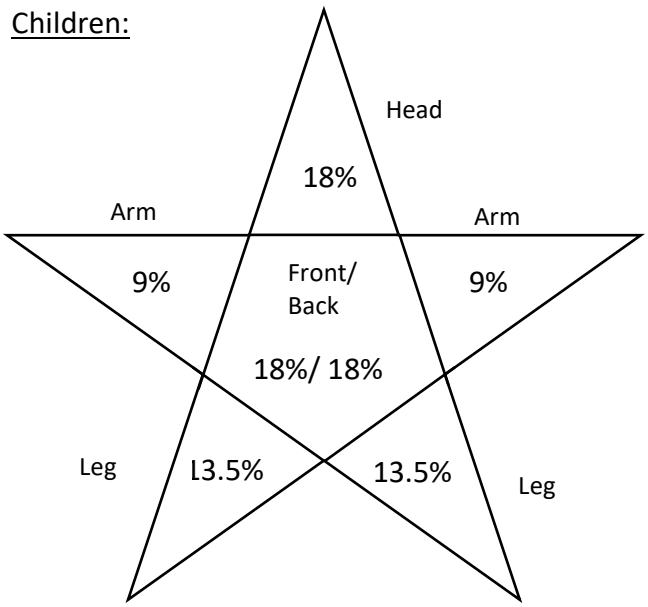
Burns

Lund-Browder Chart Calculation of %TBSA Burns

Adults:



Children:



Parkland Formula Formula for fluid resuscitation in burns. Use Hartmans. In children, add 0.9% NaCl+D5W according to Halliday Segar 4-2-1 rule

Total Volume = 4mL x %TBSA x Weight

First half – First 8 hours

Second half – Second 16 hours

Baux Score Survival Prediction for burns

Baux Score = Age + %TBSA OR = Age + %TBSA + 17 in inhalational burns

Score >120 = 50% Mortality

Criteria for Intubation

- GCS ≤8
- A/B Compromised
- Orpharyngeal Oedema
- Full thickness neck burn
- Combative
- Agitated

Inhalational Burns Maximal swelling occurs 12-36 hours post-burn

Major Signs:	Minor Signs:
- Hoarse Voice	- Singed nasal hairs
- Brassy Cough	- Carbonaceous sputum
- Stridor	
- Facial/ oral burns/ oedema	

Revised Trauma Score

3 parameters:

- GCS - Systolic BP - Respiratory Rate

RTS = (0.94 xGCS) + (0.73 xsBP) + (0.29 xRR)

Score	GCS	sBP	RR
4	13-15	>89 mmHg	10-29/ minute
3	9-12	76-89 mmHg	>29/ minute
2	6-8	50-75 mmHg	6-9/ minute
1	4-5	1-49 mmHg	1-5/ minute
0	3	0 mmHg	0

RTS <4 = Refer to Trauma Centre

Injury Severity Score (Source = Journal of Trauma 2003)

Major Trauma = ISS >15 = 10% mortality

6 Body Regions:	Score	Injury
- Head/ neck	**1**	Minor
- Face	**2**	Moderate
- Chest	**3**	Serious
- Abdomen	**4**	Severe
- Pelvis/ limbs	**5**	Critical
- External	**6**	Untreatable/ lethal

ISS = $A^2 + B^2 + C^2$

A, B, C = Scores for 3 most injured regions

Maximum ISS = 75

ISS	% Trauma Induced Coagulopathy
0-14	10%
15-29	20%
30-44	40%
45-59	60%
60-75	80%

Classes of Shock

Class	Volume lost	Physiology
I	<15%	Normal
II	15-30%	HR 100-120, BP normal or reduced, RR 20-24
III	30-40%	Significantly reduced BP, anxious, altered mental state
IV	>40%	Significantly reduced BP, reduced level of consciousness

Damage Control Resuscitation

Indications - RBC >10units - Coagulopathy - T <35°C
- >90 minutes in OT - pH <7.2 - Lactate >5 mmol/L

3 Components:

1 - Permissive Hypotension
- sBP 80-90 mmHg until source control unless TBI/ spinal injury

2 - Damage Control Surgery – Rapid and definitive source control

3 - Prevention of Hypothermia, Acidosis, Hypocalcaemia

Damage Control Surgery – 4 Phases:

1 - Early recognition of course

2 - Salvage operation

3 - ICU for - Resuscitation
- Correction of coagulopathy
- Physiological stabilization

4 - Re-operation at 24-48 hours if stable and responding to treatment

Carboxyhaemoglobin

HbCO	Clinical Presentation	FiO2	HbCO $t_{1/2}$
>10%	Symptomatic	**0.21**	4 hours
>20%	Consider Hyperbaric Oxygen	**1.0**	45 minutes
>50%	Coma, death	**3ATM 1.0**	20 minutes