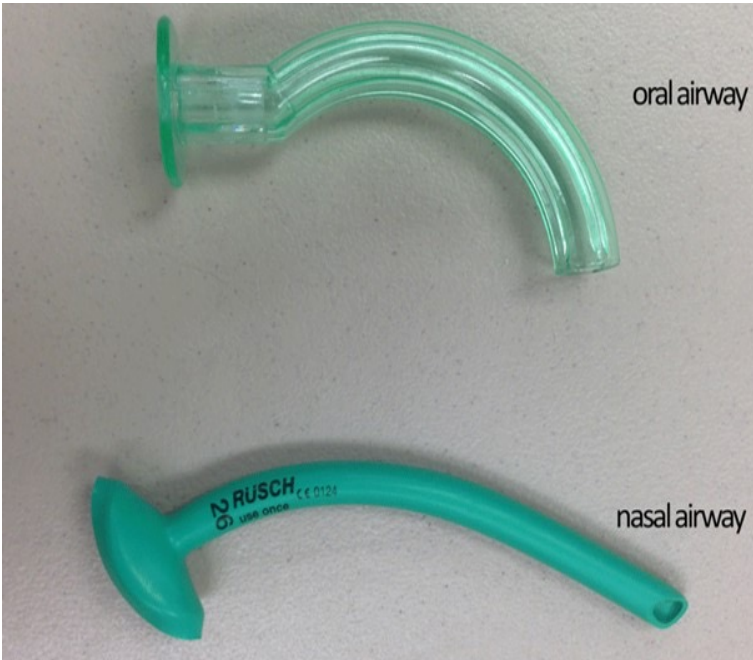


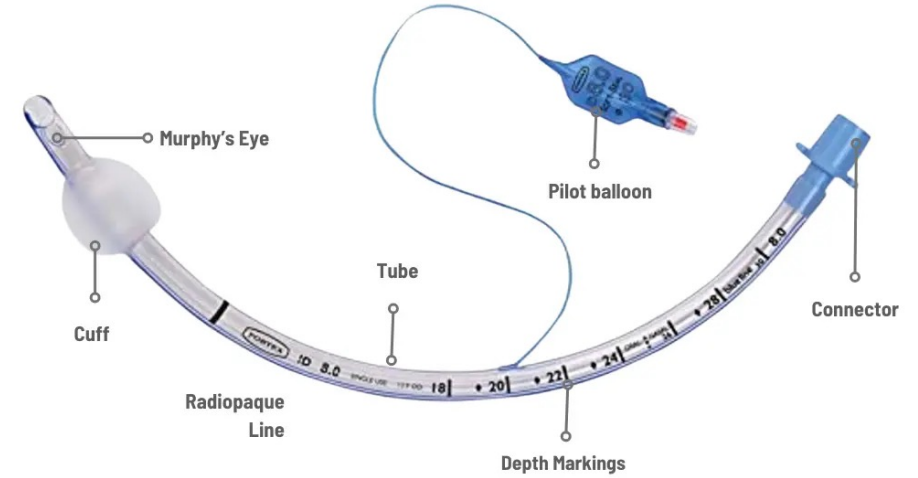
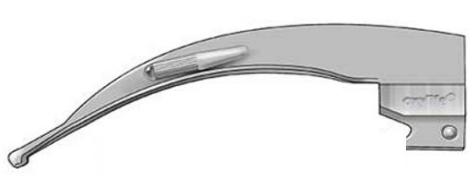
Anaesthesia

INSTRUMENTS



SIZE OF LMA
Child: 3
Female: 4
Male: 5

Intubation & Instruments Needed



Internal diameter:

Resistance

Cuff- Low pressure, High volume

Children:

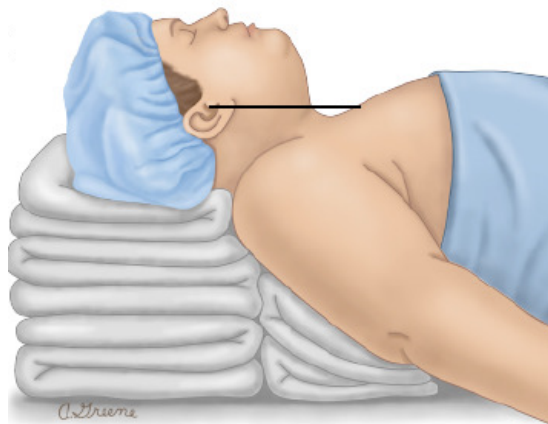
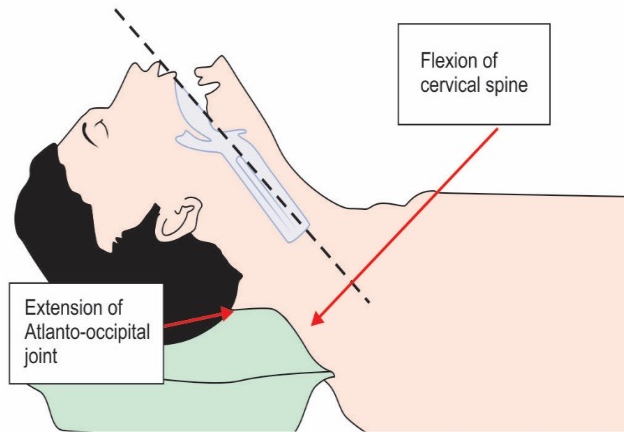
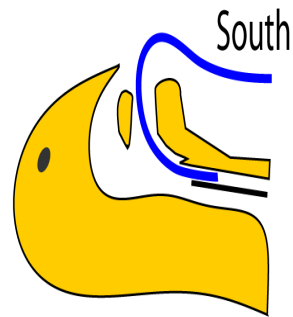
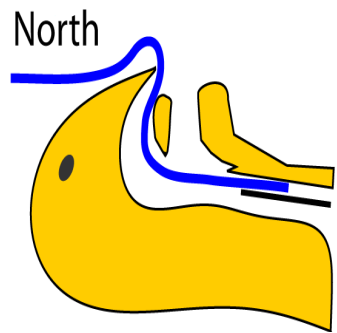
Size of ETT-

- <1200g (<28wk): 2.5
- 1200-2200g (29-34wk): 3
- >2200g (>34wk): 3.5
- Child: 3-4
- Female: 7
- Male: 8

Instruments	Formula
ETT(mm) (Uncuffed)	4 + (Age / 4)
ETT depth (cm)	3 x ETT
NG Tube/ Foley's (Fr)	2 x ETT
Chest Tube (Fr)	4 x ETT

- ▶ Preterm- 0
- ▶ Term- 1
- ▶ Children- 2
- ▶ Female- 3
- ▶ Male- 4

- ▶ Hand:
- ▶ Insert:
- ▶ Pressure:
- ▶ MC injury:
- ▶ BURP:



Difficult Intubation



I



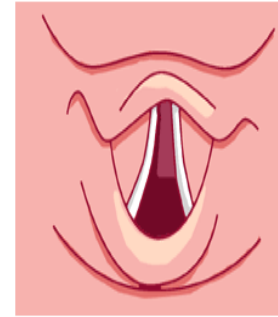
II



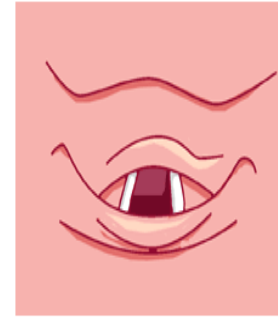
III



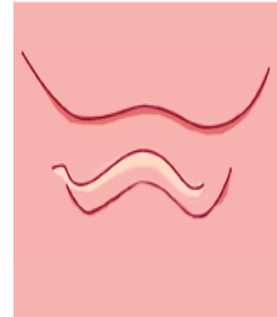
IV



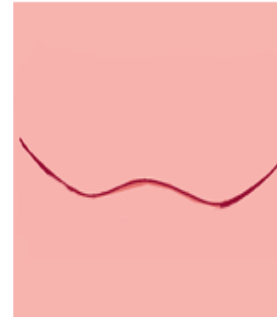
Grade 1



Grade 2



Grade 3



Grade 4

R/F:

- **O**bese
- **B**earded
- **E**dentulous
- **S**norer
- **E**lderly
- **N**eck circumference >40 cm
- ▶ Finger breadth:TMJ
- ▶ Thyro-mental distance-
- ▶ Sterno-mental distance-
- ▶ Lip bite test

Fibreoptic
intubation

Plan A:

- ▶ Face-mask ventilation & Tracheal intubation
- ▶ Direct/ video Laryngoscopy (max. 3 + 1 attempts)

Plan B:

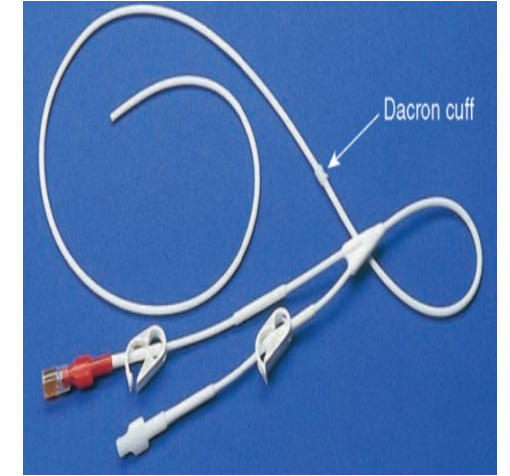
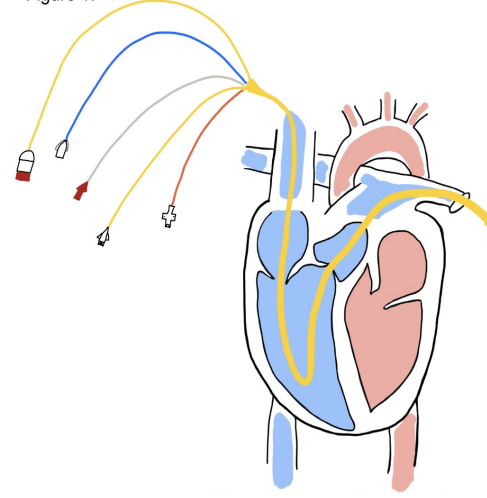
- ▶ 2nd generation SAD insertion
- ▶ Max- 3 attempts

Plan C: Face-mask ventilation

Plan D (CICO):

- ▶ Front Of Neck Access (FONA)
- ▶ Scalpel Cricothyrotomy

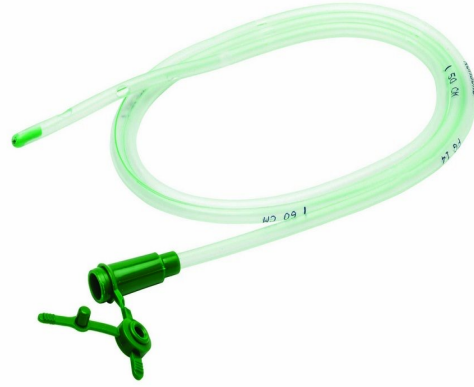
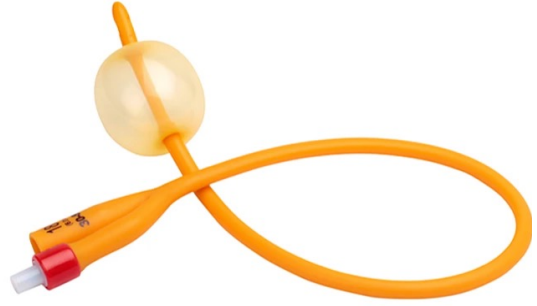
Instruments



- MC vein for central line:
- MC vein for TPN:
- Max risk of pneumothorax:
- Max risk of infection:
- Max risk of thrombosis:

- ▶ Total Parenteral Nutrition (TPN):
- ▶ 20:30:50
- ▶ >1kg/day weight gain:
- ▶ Weight gain after:
- ▶ Refeeding syndrome:
- ▶ Zn, B12 deficiency
- ▶ MC metabolic complication:

Instruments

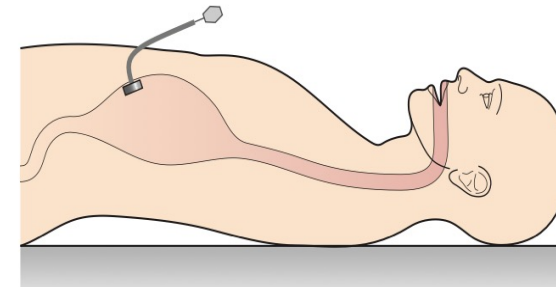
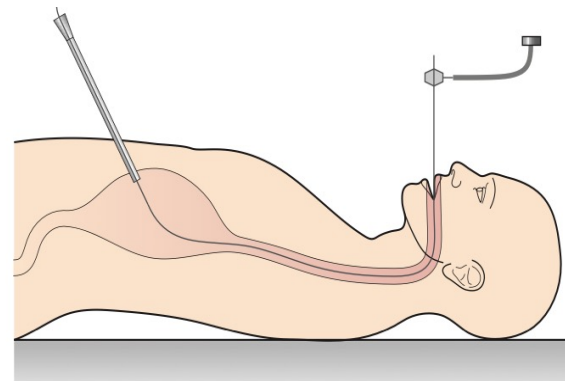
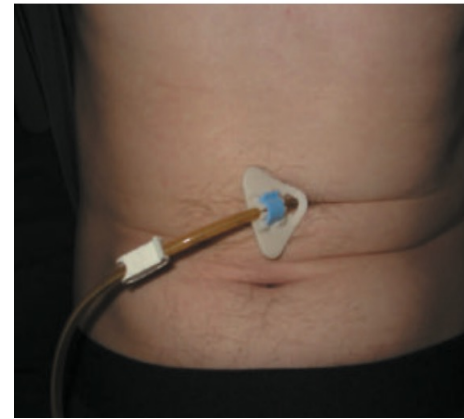


Cl: Skull base #
Esophageal stricture

Length of NG tube:
NEX
NEMU

<u>Colour Code</u>	<u>Size</u>	<u>Flow rate</u>
Orange		
Gray		
White		
Green		
Pink		
Blue		
Yellow		
Violet		

<u>Color Code</u>	<u>French</u>
Green	14
Orange	16
Red	18
Yellow	20
Purple	22
Blue	24



Day Care Anesthesia

Criteria

- Surgery < 2hrs
- Low risk of significant immediate postoperative complications
- Patient able to eat, drink postoperatively
- Post-op pain managed by oral painkillers in conjunction with LA/ Peripheral block
- Patient able to mobilise postoperatively
- BMI (to avoid respiratory distress) <38

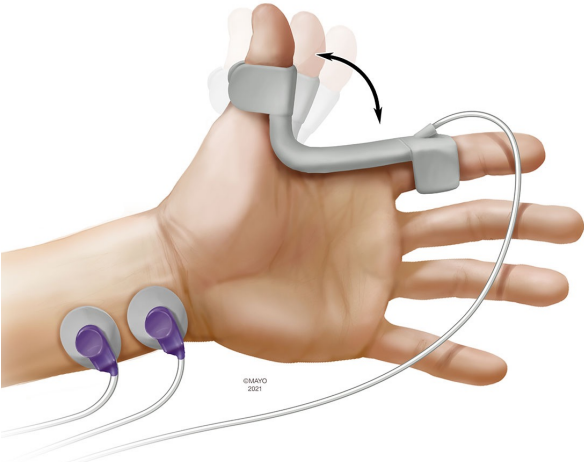
Contra-Indications

- Unstable ASA 3
- ASA 4, 5
- Any poorly controlled comorbidity

- Preferred anesthesia:
- Preferred opioid:
- Preferred MR:
- Leading cause of re-admission:

Aldrete score: Activity/ BP/ Consciousness / Respiration/ o2 saturation

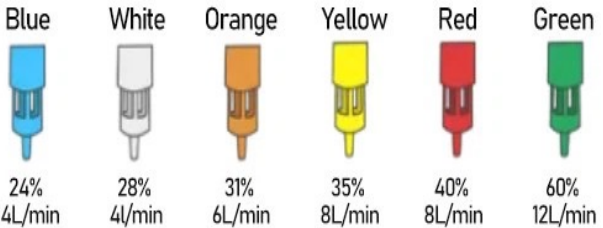
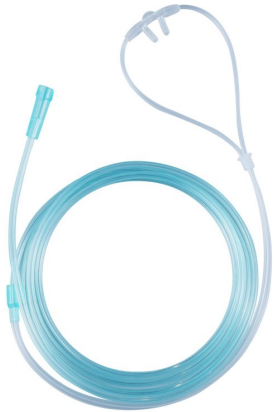
Monitoring during Anesthesia



No drug	Nondepolarizing block	Depolarizing block	
		Phase I	Phase II
Train-of-four TOF-R = 1.0 	Fade TOF-R = 0.4 	Constant but diminished TOF-R = 1.0 	Fade TOF-R = 0.4

- MC nerve:
- 2nd MC nerve:
- MC stimulus:
- Tetanic stimulation:
- Extubation TOF:

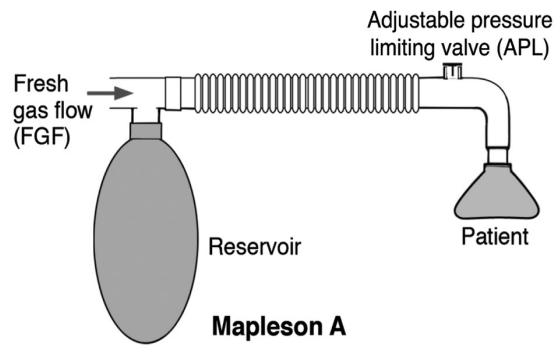
Oxygen Delivery Devices



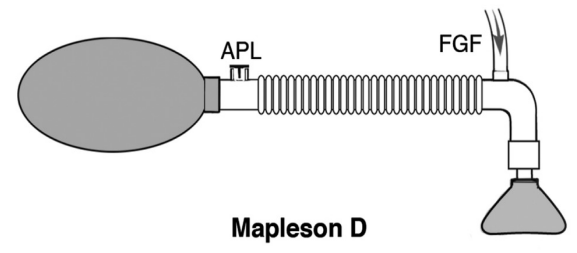
**Humidification, PEEP+
May delay intubation**

Device						
Max Flow Rate (L/min)	5	10	15	15	60	No limit
Max Saturation (%)	40	60	60	85-90	100	100

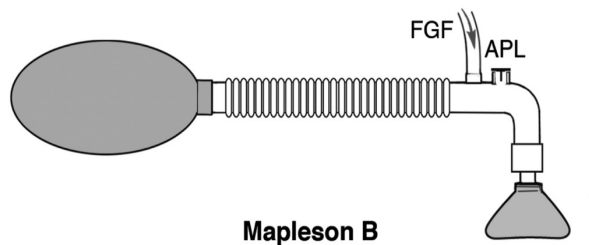
Mapleson circuits



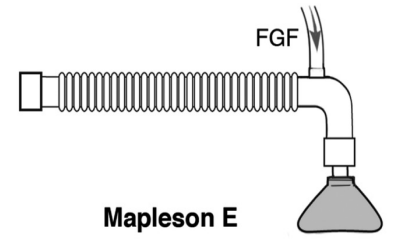
Mapleson A



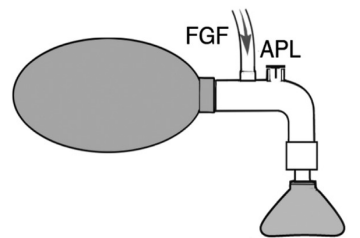
Mapleson D



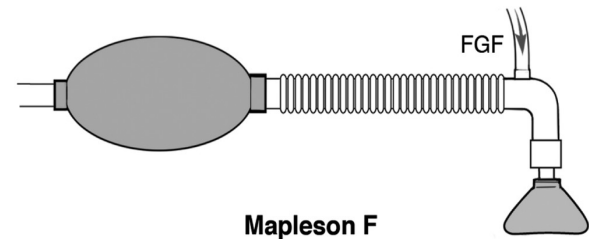
Mapleson B



Mapleson E



Mapleson C



Mapleson F



MC circuit in spontaneous:

MC circuit in controlled:



Anesthesia Workstation



High-pressure system:

- Gas cylinders + Yokes

Size: MC size: Material: MR compatible:

Pressure:

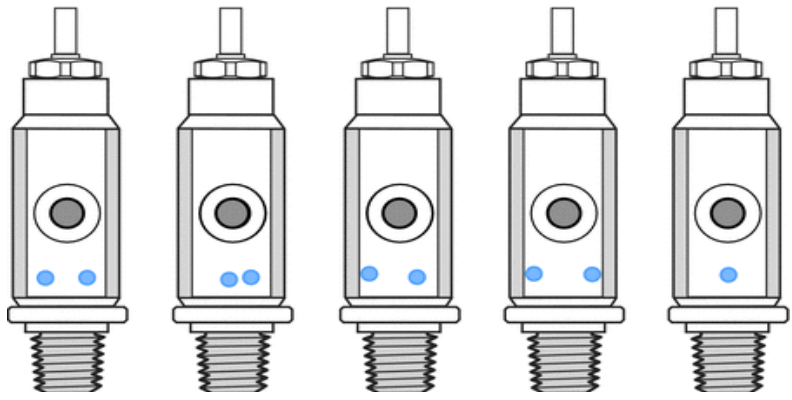
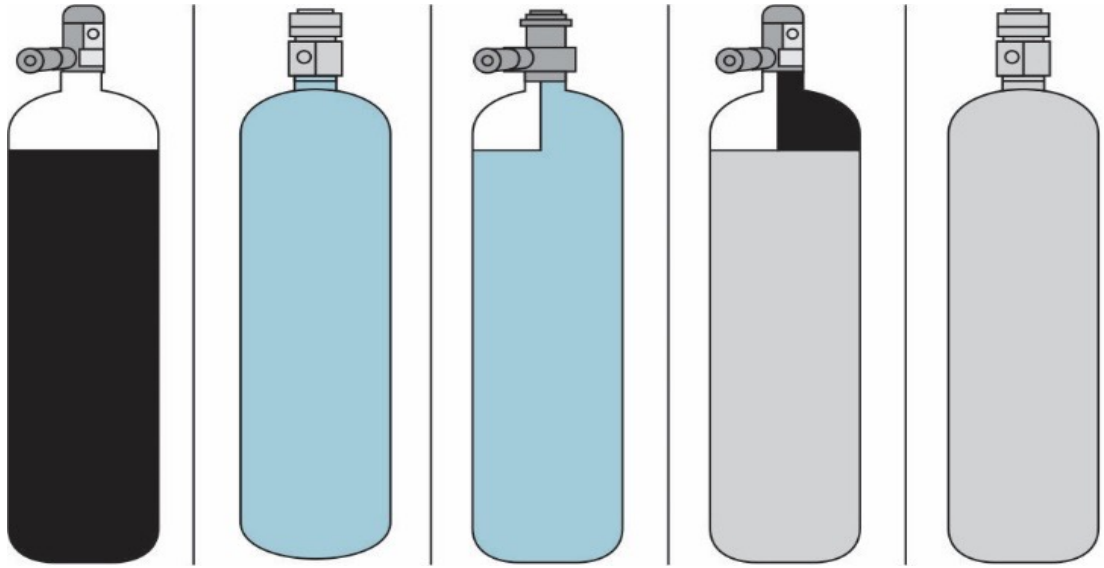
- Cylinder pressure regulators
- Cylinder pressure gauges

Intermediate-pressure system:

- Pipeline gas inlets
- Pipeline pressure gauges
- Oxygen fail safe valve
- Flowmeter valves
- Oxygen flush valve

Low-pressure system:

- Flowmeters (rotameters)
- Vaporizers
- Common gas outlet



Inhalational anesthetics



Compound A
 Fruity odour
 Best for
 Asthma
 Day care Sx
 Liver D

Best for
 cardiac Sx

Min MAC
 Max bronchdil
 AI hepatitis
 Max ICP rise
 Sensitises heart
 to epiN

Tec-6 vaporizer
 Irritant
 CO with dessicated
 soda lime
 Maintenance agent of
 choice
 Best for Renal D,
 Obese

	MAC	BLOOD GAS SOLUBILITY
Methoxyflurane	0.2	12
Halothane	0.75	2.5
Isoflurane	1	1
Sevoflurane	2	0.65
Desflurane	6	0.45 (Xenon min)
N2O	104	0.47

Concentration effect
 Second gas effect
 Diffusion hypoxia
 B12 deficiency

ALL Inhalational agents:
 -Cerebral metabolic O2
 -CBF/ ICP
 -CVS, HR
 -Respiratory drive

ALL IV agents:
 -Cerebral metabolic O2
 -CBF/ ICP
 -CVS,HR
 -Respiratory drive

IV anesthetics

DOC for Day care/ Liver/ Kidney/ NeuroSx/ TIVA/ Malignant Hyperthermia/ Porphyria/Antiemetic :

Infusion syndrome (acidosis, green urine), Painful injection- Soyabean oil, Egg lecithin :

NMDA antagonist, Dissociative anesthesia, DOC in Asthma/ COPD, Cyanotic HD, Shock :

C/I in Hypertension / Epilepsy/ Glaucoma :

DOC in Cardiac surgery, S/E- Adrenal suppressant (11β -hydroxylase) :

DOC in Hyperthyroidism, Seizures, Narcoanalysis, Redistribution S/E- Intra-arterial vasospasm:

Muscle relaxants

Depolarising MR:

Best for RSI, Shortest acting

S/e: Myalgia (MC), Hyperkalemia, Bradycardia, Intra-gastric pressure high

Non-depolarising MR:

Aminosteroid compounds: Rocuronium, Vecuronium, Pancuronium

Longer duration, metabolized in liver & kidneys

Benzylisoquinolinium compounds: Atracurium, Mivacurium

Shorter duration of action

Hofmann elimination & ester hydrolysis- safe in RF/ LF/ pediatrics

May cause more histamine release

By-product of Atracurium:

▶ Most cardiostable, neuroSx (Biliary excretion) :

▶ Shortest acting NDMR:

•Dibucaine No. <30:

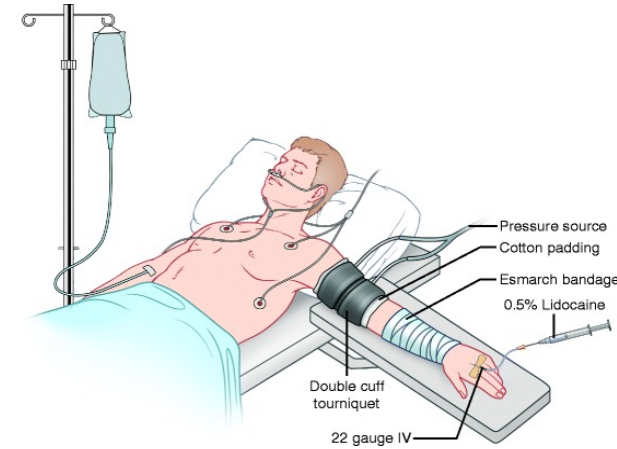
Prolonged paralysis after giving **Succinylcholine & Mivacurium**

▶ Reversal :

▶ Sugammadex :

Local anesthetics

<u>Amides</u>	<u>Esters</u>
Bupivacaine, Lidocaine, Ropivacaine, Prilocaine	Cocaine, Procaine, Benzocaine
Liver – cytochrome P450	Plasma – pseudocholinesterases
Longer action	Shorter action
Less allergy	PABA metabolite- More allergy



- MOA-
- Autonomic > Sensory > Motor
- Causing Hypertension:
- S/E- MethHb:
- Most cardiotoxic:
- Max dose of Lignocaine:
- Proparacaine duration:
- Safest in MH:
- LAST:
- Route:

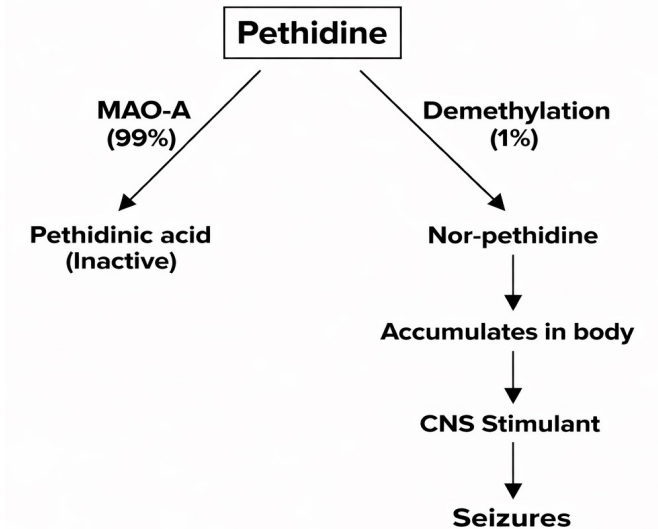
Dose:

DOC:

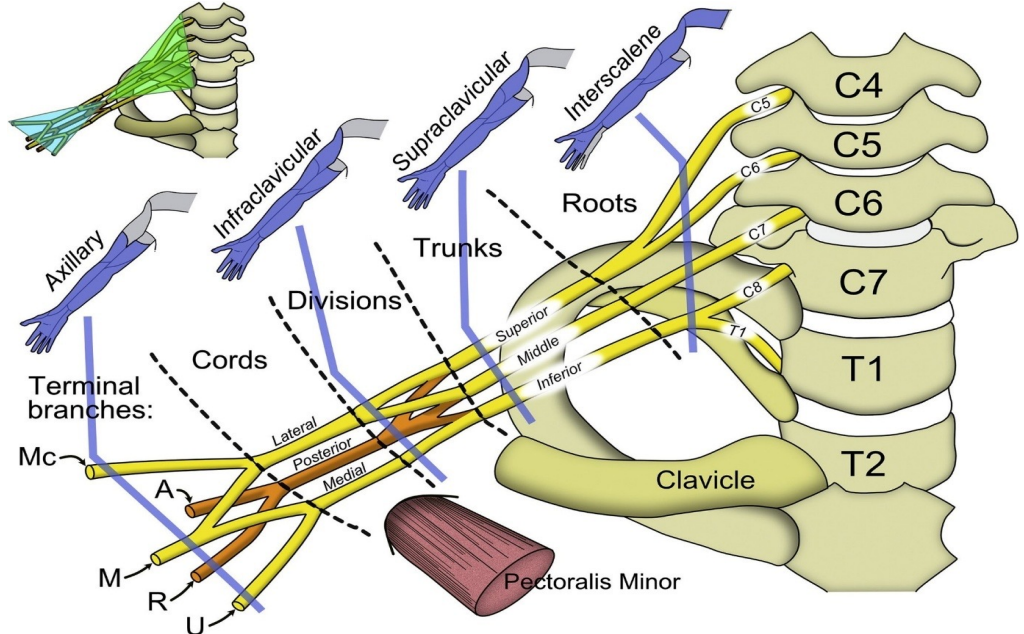
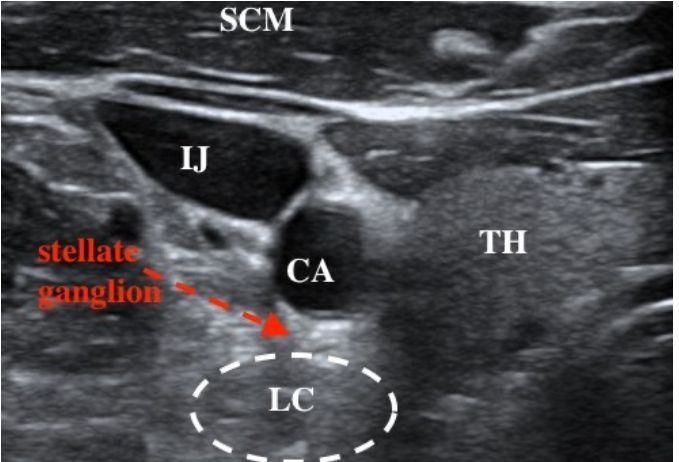
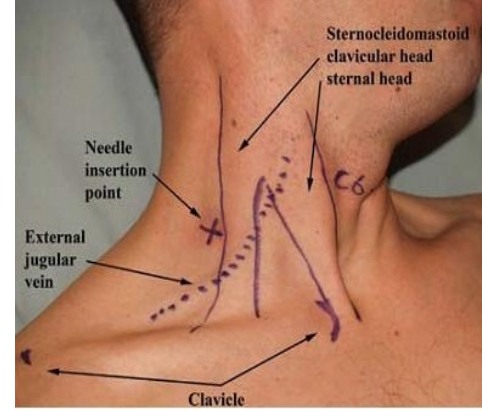
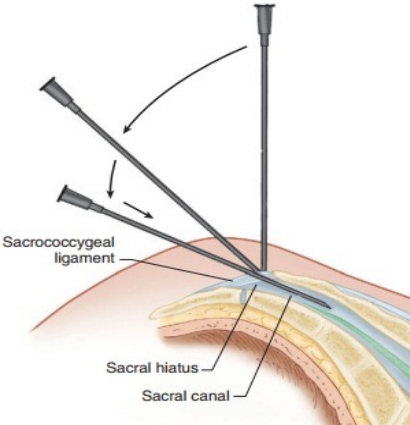
Opioids

- Full agonist: Morphine, Pethidine, Heroin, Meperidine, Methadone, Codeine, Fentanyl
- Partial agonist: Buprenorphine
- Mixed agonist/antagonist: Nalbuphine, Pentazocine, Butorphanol
- Antagonist:

- Avoid Opioids in-
- Mydriasis:
- Pruritus:
- No tolerance to:
- Serotonin syndrome:
- Wooden chest syndrome:
- Prolonged QTc:
- Shortest acting (Day care):

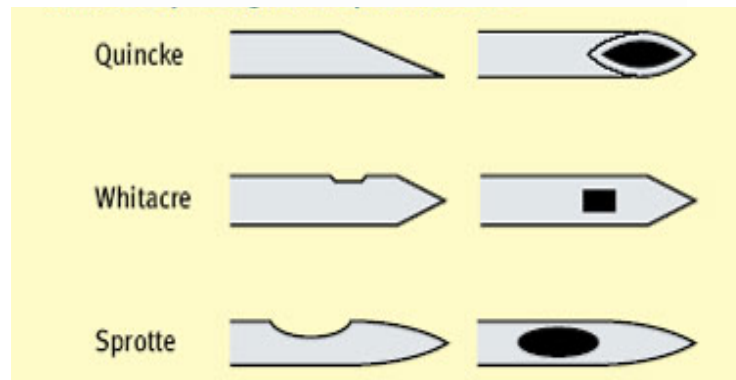


Regional Anesthesia



Neuraxial block

Epidural Anesthesia (EA)	Spinal Anesthesia (SA)
Larger dose of drug	Smaller dose of drug
Anywhere	L3-L4 MC
Not as good as SA	Better quality of anesthesia
Adjustable, prolonged action via a catheter	Single-shot injection; action for ~3hrs



CI:

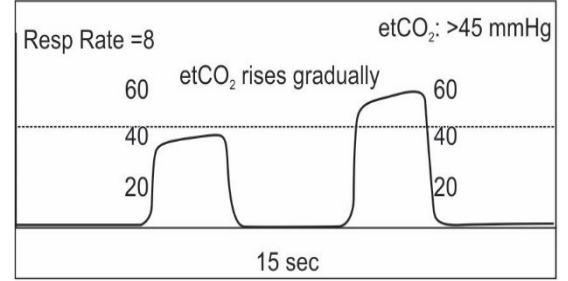
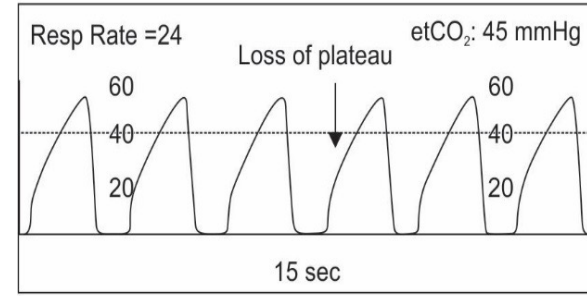
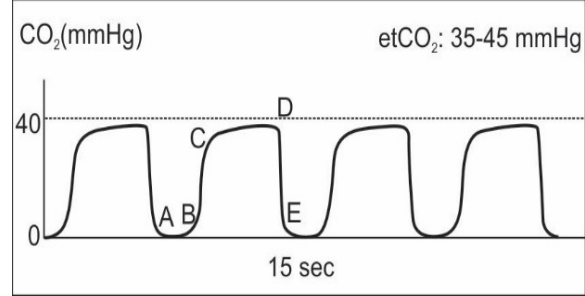
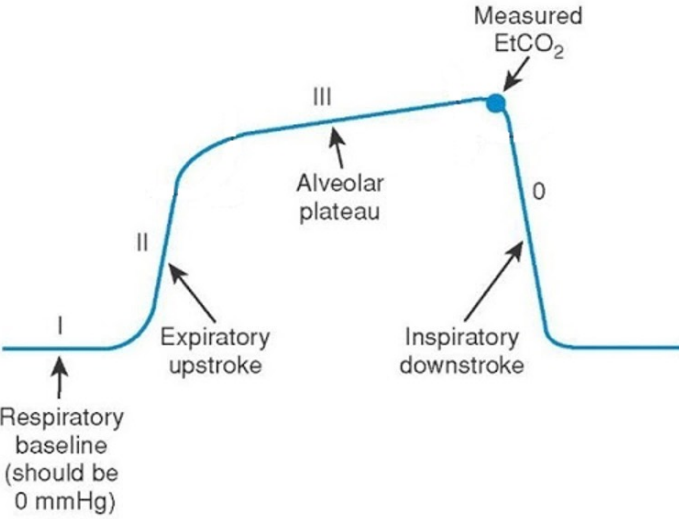
Layers punctured for LP:

Post-dural puncture headache:
 TOC:
 MC Intra-op complication:
 DOC:
 MC post-op complication:

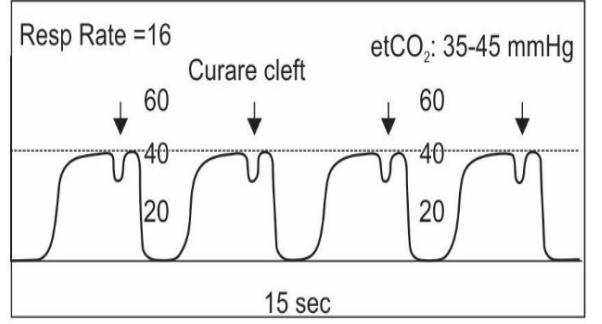
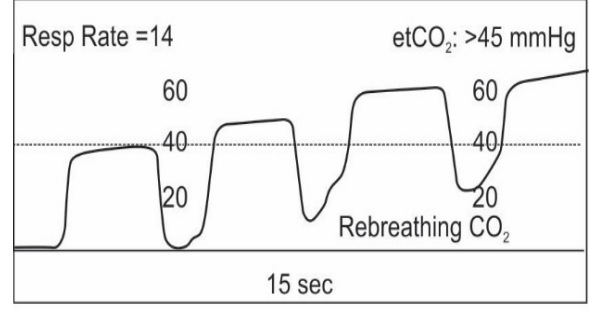
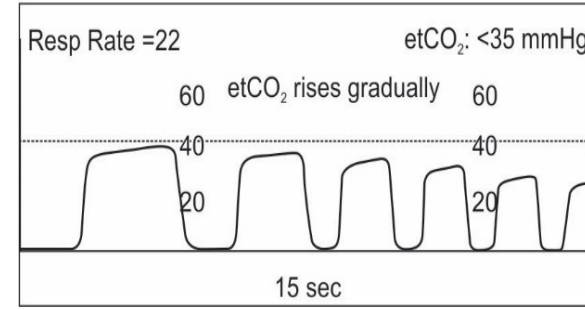
Adult spinal cord-Lower border of L1
 Spinal cords in infants-Upper border of L3
 A/D/Subarachnoid space-Lower border of S2

PIH, Heart ds in pregnancy: Epidural / GA
 Except CoA/ Eisenmenger/ Uncorrected TOF: GA

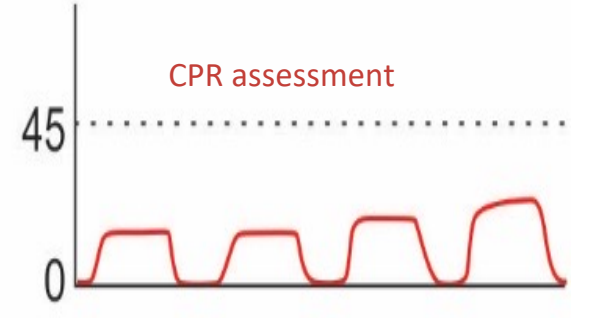
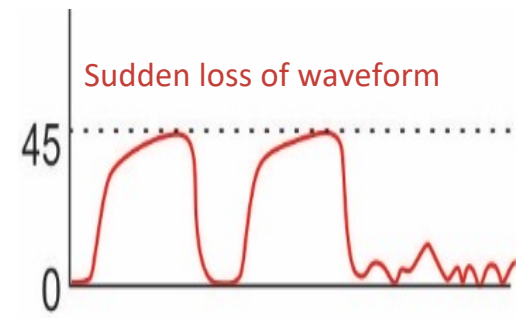
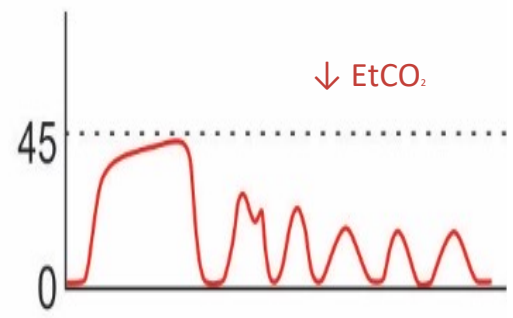
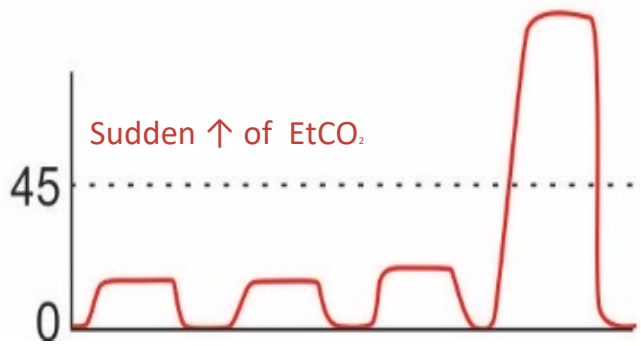
Capnography



Infrared spectroscopy



80% Ca(OH)₂ + NaOH + KOH +15% H₂O
 Ca(OH)₂ + NaOH + CaCl₂
 Ba(OH)₂ + CaSO₄



Sch, Lignocaine, Inhalational agents
Tachycardia + Rigidity
Earliest sign-
Late sign-
RyR/DHPR (Chr 19)-AD
DOC-

Pre-Op Assessment

Pre-op drug DOC to reduce anxiety:
Pre-op drug DOC to reduce secretions:
Pre-op Antibiotic time:
MC nerve injured intra-op-
MC intra-ophthalmic complication-
PONV DOC:
POVL MCC:
MCC of intra-op anaphylaxis:
Min acceptable Hb:
Min acceptable platelet:

Mendelson syndrome
NPO heavy meal:
Light/semi-solid meal/ Formula:
Breastmilk:
Clear liquids:

Goldman Grading system

Stop Drugs before surgery

Clopidogrel: Warfarin: LMWH: UFH: Li: SGLT2-:
ACEi/ ARB/ OHG/ Insulin/ Diuretic (except thiazide):
OCP:
Smoking:

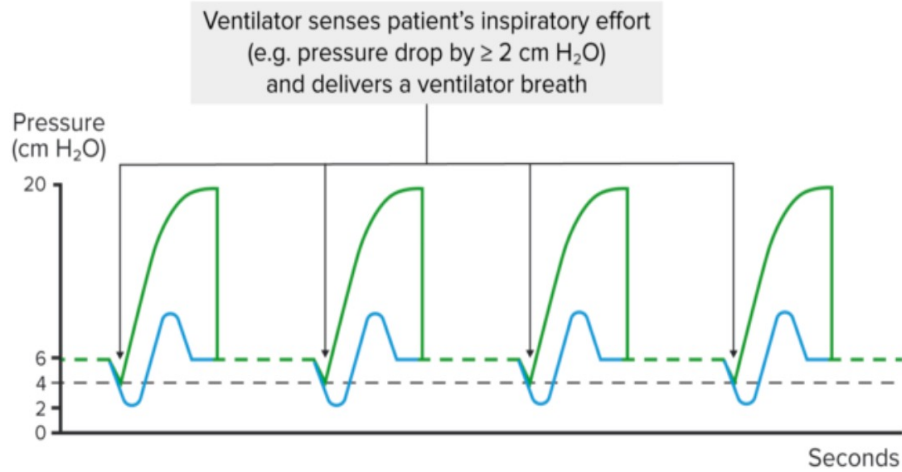
ASA classification

ASA PS	Definition	Examples (including, but not limited to):
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use
ASA II	A patient with mild systemic disease	Current smoker, social alcohol drinker, pregnancy, obesity (BMI 30–40), <u>well-controlled</u> DM/HTN, mild lung disease
ASA III	A patient with severe systemic disease	<u>Poorly controlled</u> DM or HTN, COPD, morbid obesity (BMI ≥ 40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, premature infant PCA < 60 weeks History (>3 months) of MI, CVA, TIA, or CAD/stents
ASA IV	A patient with severe systemic disease that is a constant threat to life	<u>Recent (<3 months)</u> MI, CVA, TIA, or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, sepsis, DIC, ARD, or ESRD not undergoing regularly scheduled dialysis
ASA V	A moribund patient who is not expected to survive without the operation	Ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology, or multiple organ/system dysfunction
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes	Organ donor (brain-dead patient)

Mechanical ventilation modes

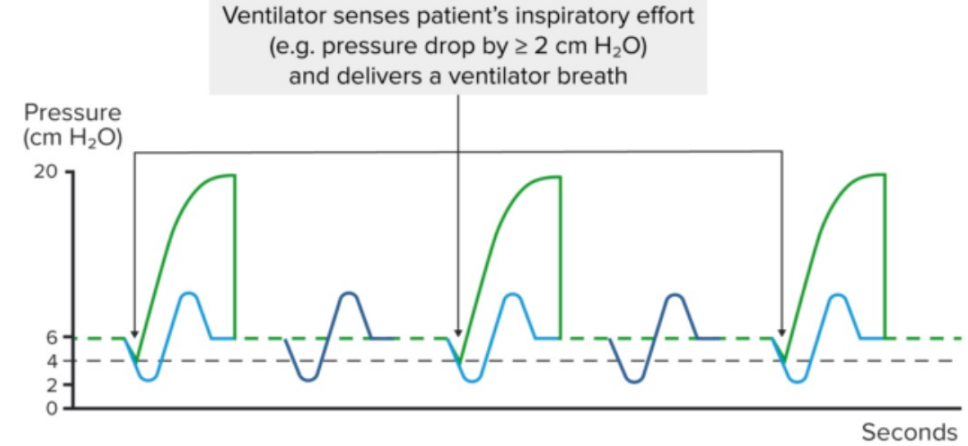
Volume-controlled	<ul style="list-style-type: none">• <u>Controlled mechanical ventilation (CMV)</u>: Breaths all triggered by ventilator, predefined rate and volume set• <u>Assist-controlled ventilation (ACV)</u>: Breath triggered by patient's effort, if no patient breath per unit time, ventilator triggered; predefined tidal volume set• <u>Synchronized intermittent mandatory ventilation (SIMV)</u>: Spontaneous breathing permitted with no ventilator assist; predefined tidal volume set.
Pressure-controlled	<ul style="list-style-type: none">• <u>Pressure support ventilation (PSV)</u>: Triggered by patients inspiration only; assist with pressure limitation provided.
Mixed	<ul style="list-style-type: none">• <u>PS/SIMV</u>: Ensures spontaneous breaths permitted in SIMV receive pressure assist

Modes of Mechanical Ventilation



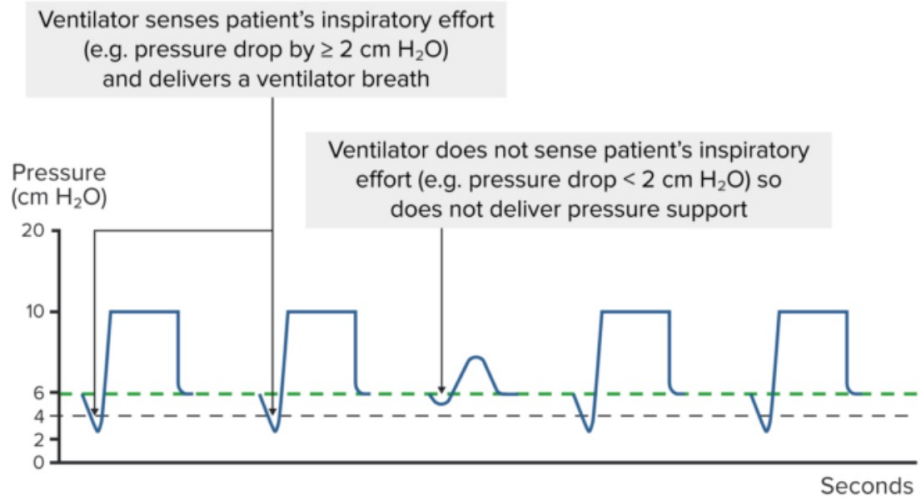
Assist control ventilation (ACV)

Ventilator breaths do not occur at regular intervals and are triggered by patient breaths (all patient breaths are assisted)



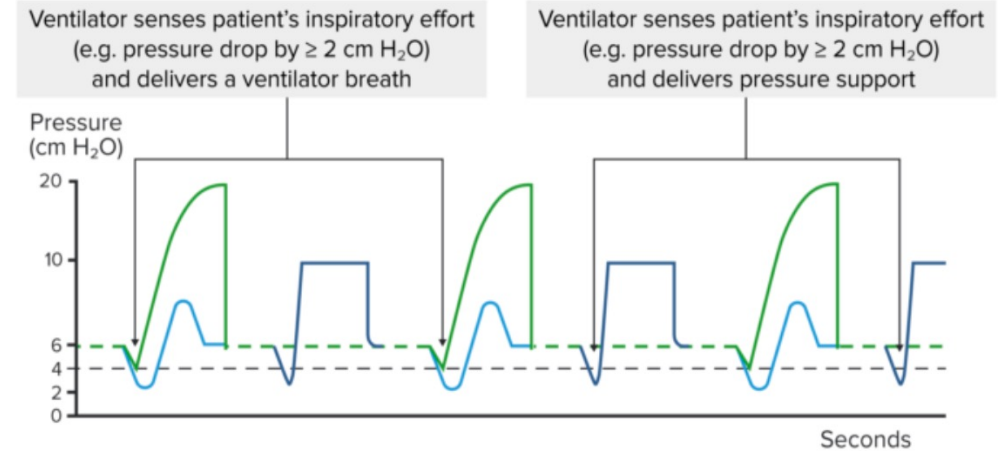
Synchronized intermittent mandatory ventilation (SIMV)

Ventilator breaths occur at regular intervals but are triggered by patient breaths (only some patient breaths are assisted)



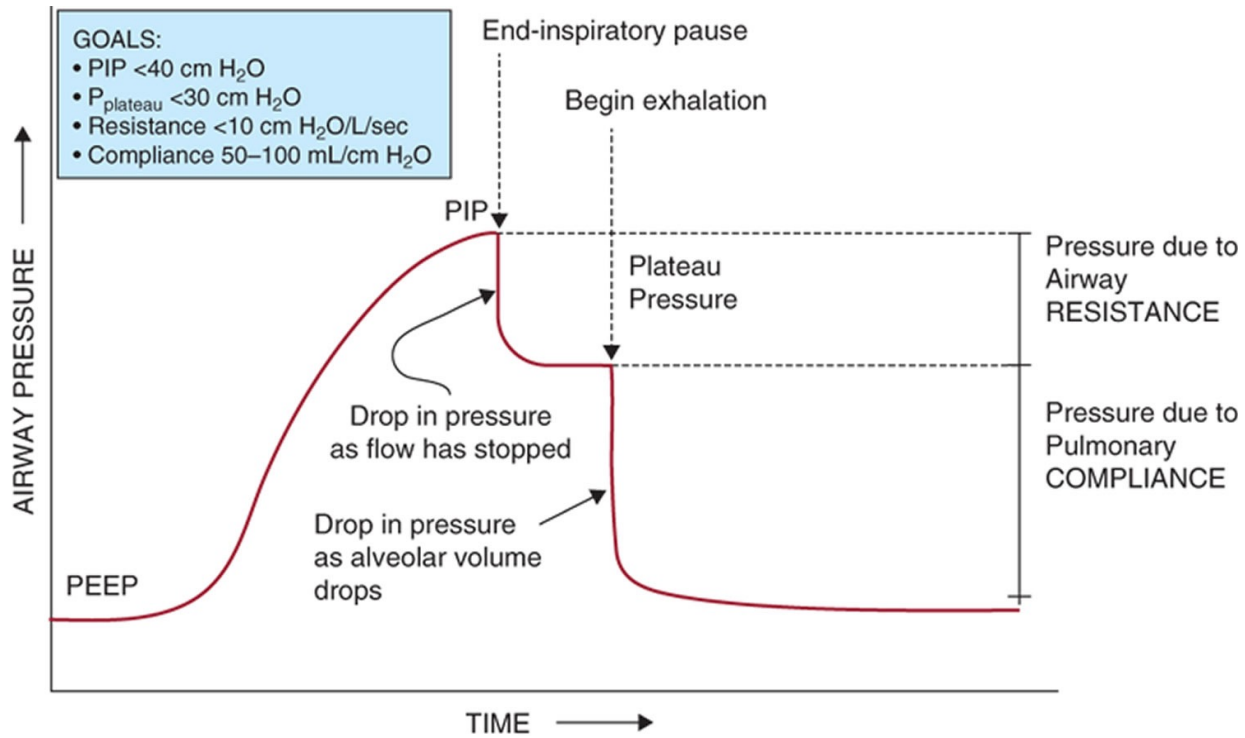
Pressure support (PS)

All sensed patient breaths are supported by pressure



Synchronized intermittent mandatory ventilation (SIMV) + pressure support (PS)

Ventilator breaths occur at regular intervals but are triggered by patient breaths (only some patient breaths are assisted) + unassisted breaths are supported by pressure



Not for weaning:
Best for weaning:
Rapid shallow breathing index:
<105:

PEEP:

- Prevents collapse, Increase recruitment
- Reduce work of breathing
- Barotrauma, Low CO, Raised ICP

GOALS of mechanical ventilation:

Tidal volume:

RR:

FiO₂:

PEEP:

Plateau pressure:

Basics of CPR

PUSH HARD-PUSH FAST

Rate of breathing in CPR

Adults:

Children:

Neonates:

Adrenaline Doses

- Anaphylactic shock / Status Asthmaticus:
- Cardiac Arrest:
- Vasoconstriction:
- With LA for VC:
- Labour Epidural:

Amiodarone Dose:

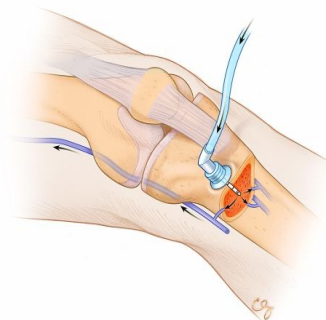
Lignocaine Dose:

Shock energy for defibrillator:

- Monophasic:
- Biphasic:

POST CARDIAC ARREST CARE

1. Optimization of circulation (MAP > 65 mmHg)
2. Optimization of ventilation (SpO₂ > 94%)
3. Targeted temperature management
32–36°C for 24 hours for comatose patients
4. Moderate glycemic control
(Blood sugar 144–180 mg/dL)
5. Coronary intervention (PCI)
If cause is MI (preferably within 90 minutes)
6. Early prognostication of neurologic outcome
(To be assessed after 72 hours)

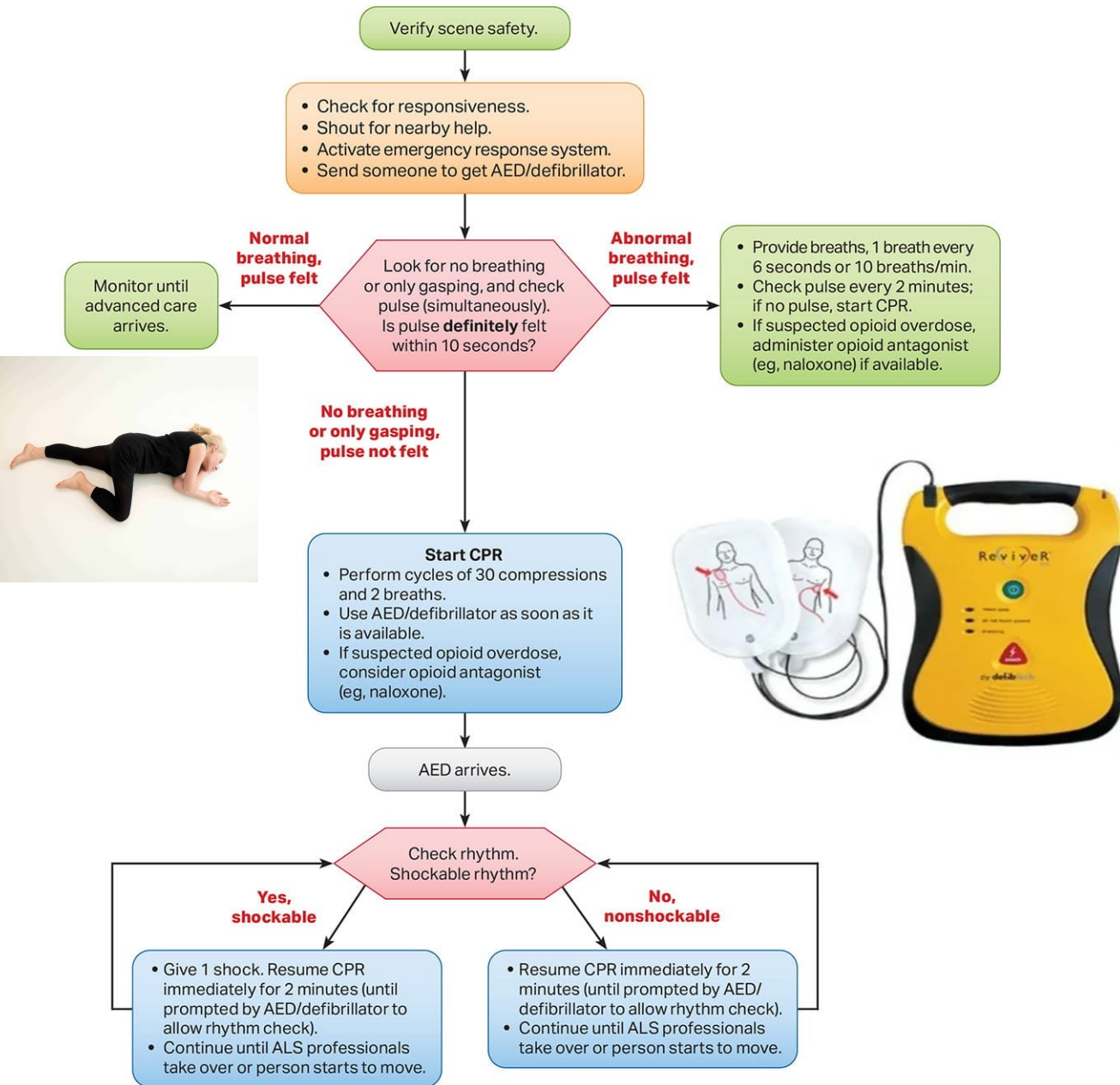


Reversible causes:

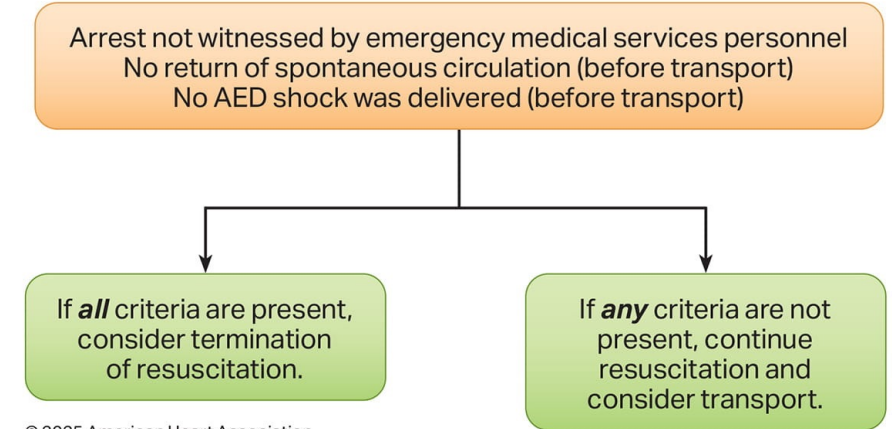
5H

5T

BLS

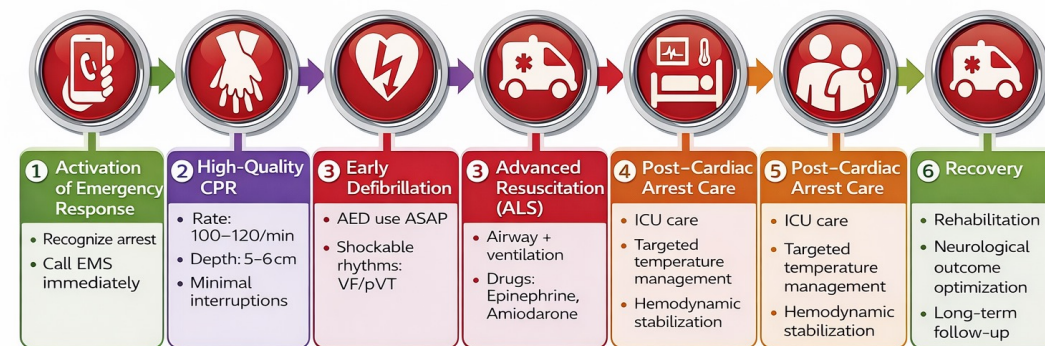


BLS/Universal Termination of Resuscitation Rules

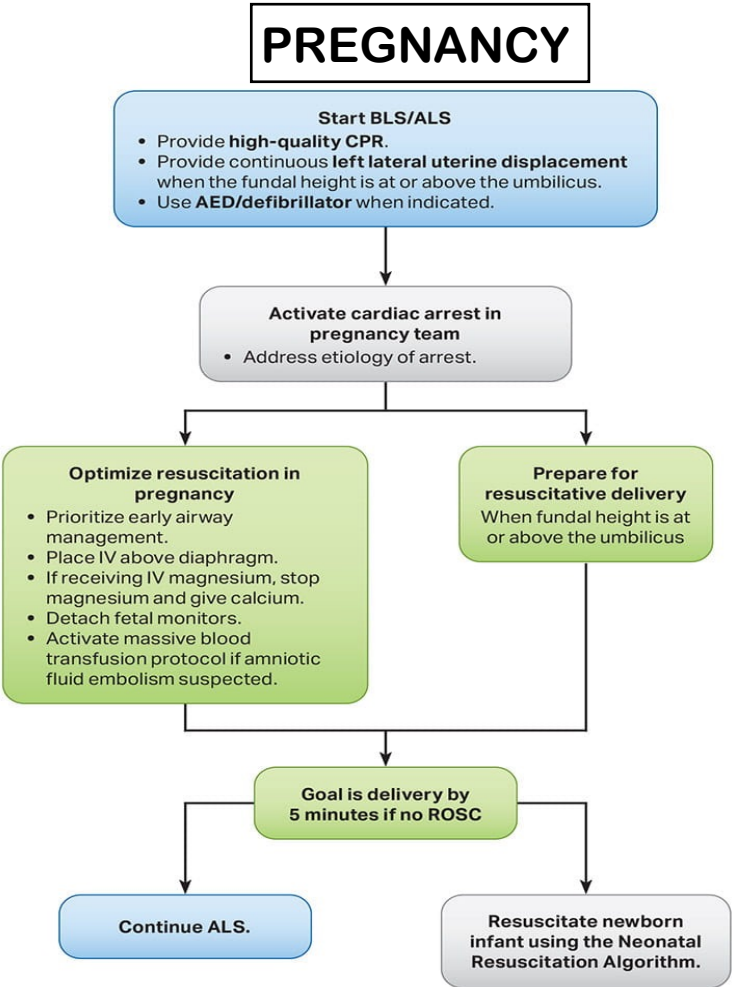
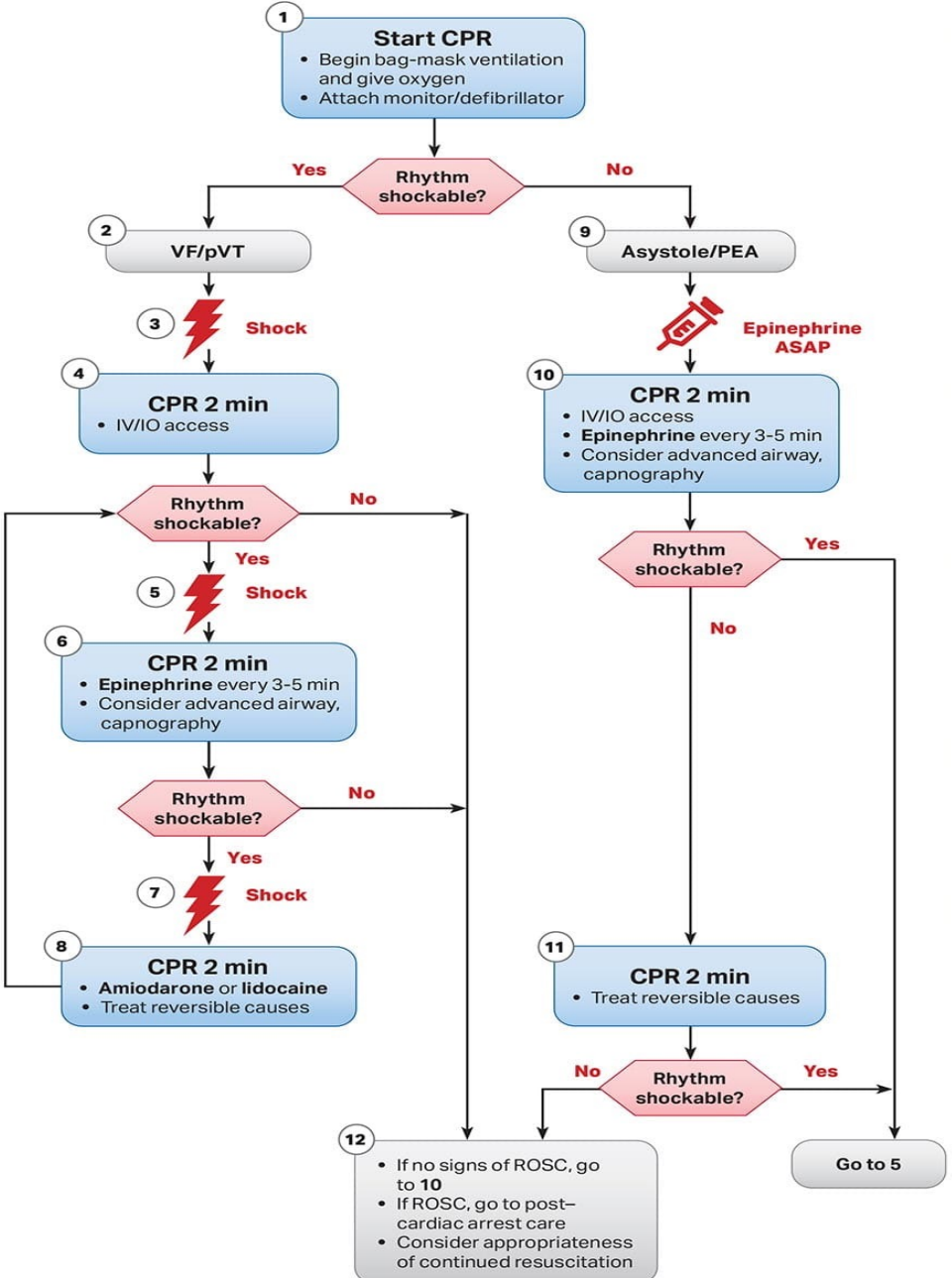
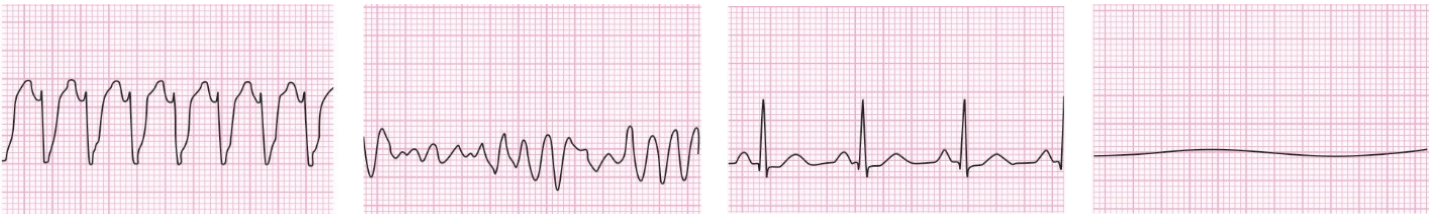


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Out-of-Hospital Cardiac Arrest – CHAIN OF SURVIVAL

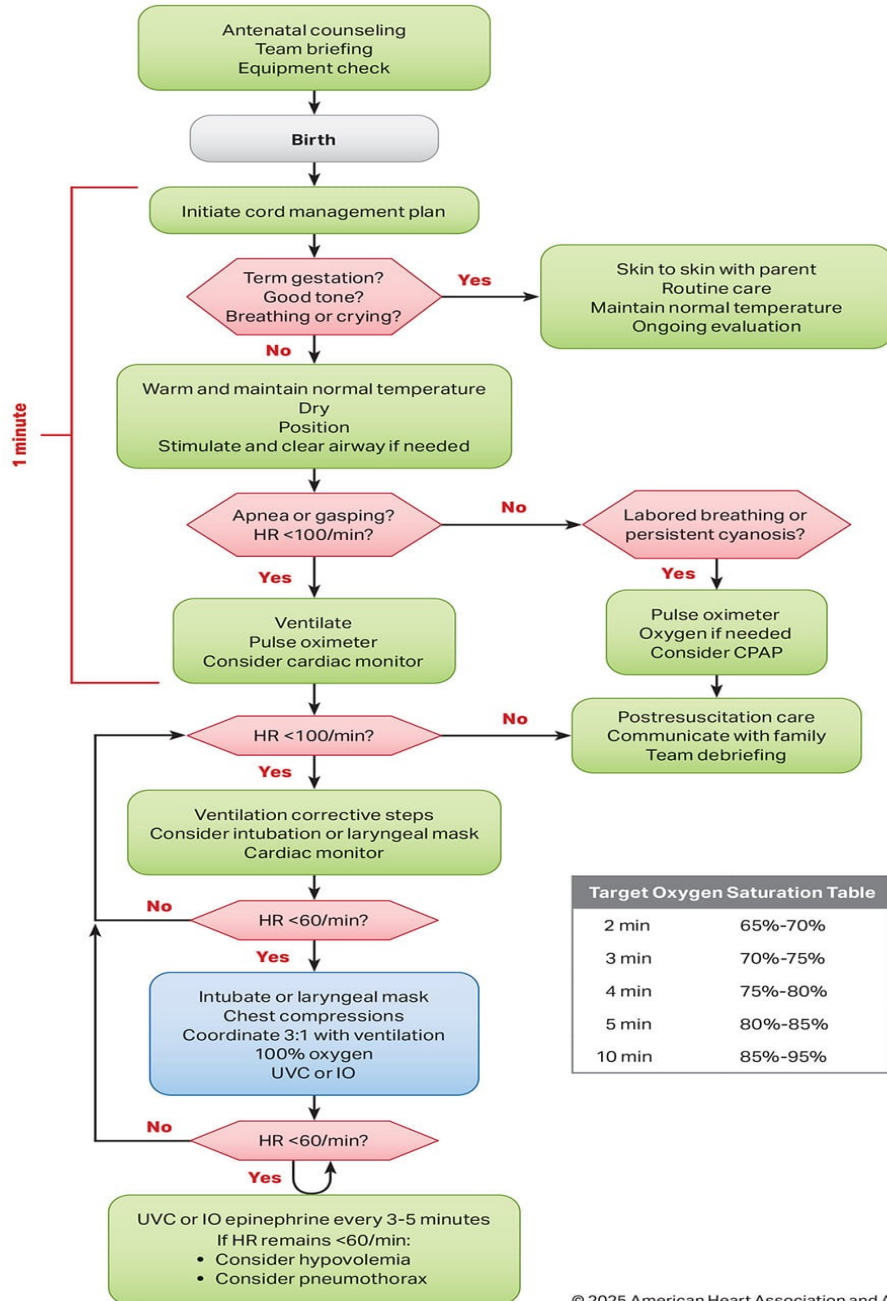


ACLS Algorithm for Cardiac Arrest in Adults



OT?
Pffanelstein?
LSCS?

Neonatal Resuscitation Protocol 2025



Target Oxygen Saturation Table

2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%

MR.SOPA

- M** Mask adjustment
- R** Reposition airway
- S** Suction mouth and nose
- O** Open mouth
- P** Pressure increase
Airway alternative

Order of suction:
 Temperature of room:
 Delayed cord clamping:
 Cord milking:

Bag & Mask Ventilation (BMV)

- Start within:
- Saturation
- >35weeks:
- 32-24 weeks:
- <32 weeks:
- RR:
- C/I:

Saturation monitoring done at:

Chest Compressions(CC)

- 2 thumb
- Lower 1/3 body sternum
- 1/3rd depth of AP
- CC:PPV-