Workshop: Emergency Medicine

Airway and Breathing – "*acute respiratory diseases*"

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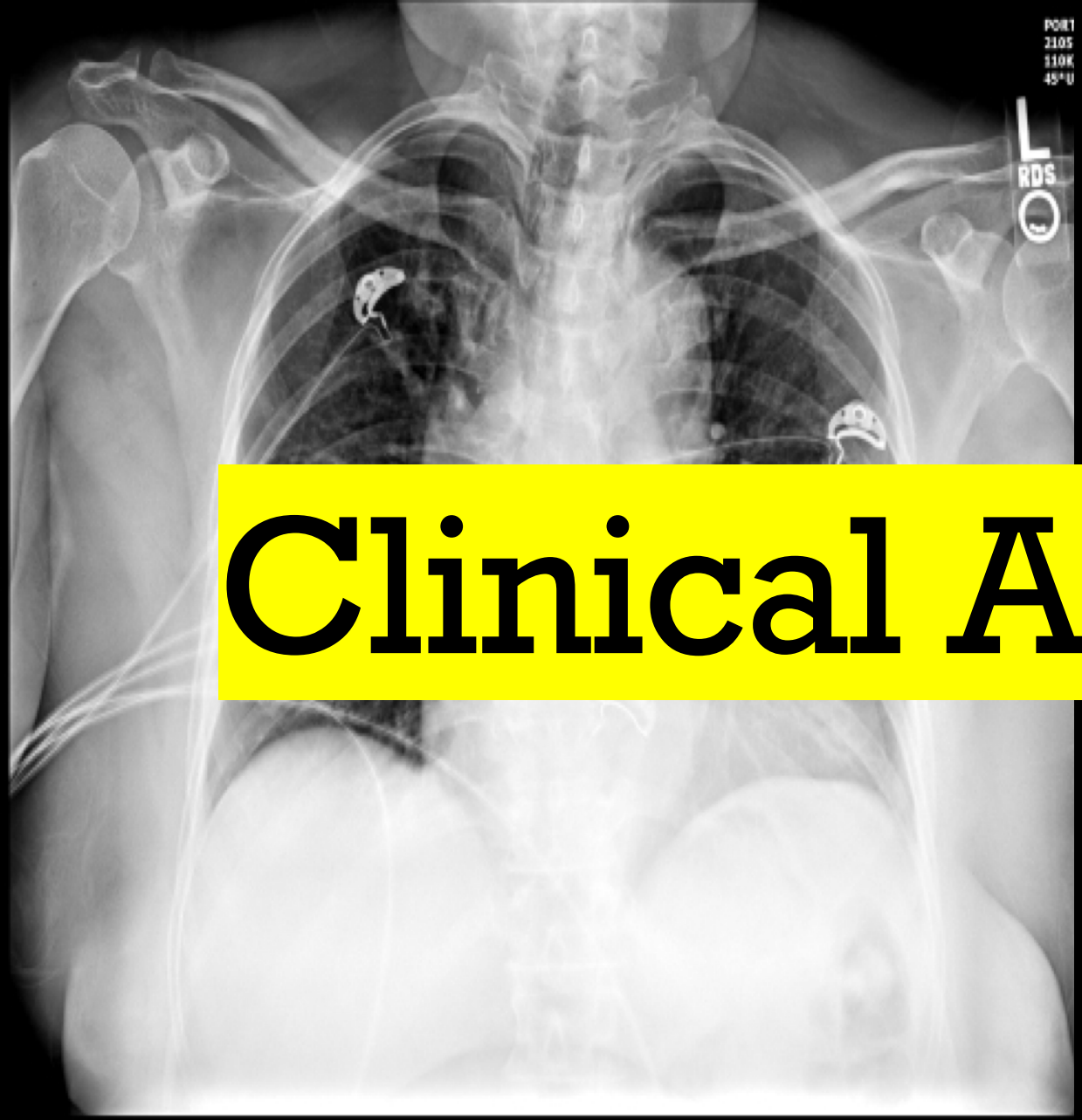
Compulsory Disclosure

- I do not receive contributions from any 3rd party
- Views are my own (not necessarily those of my employer)

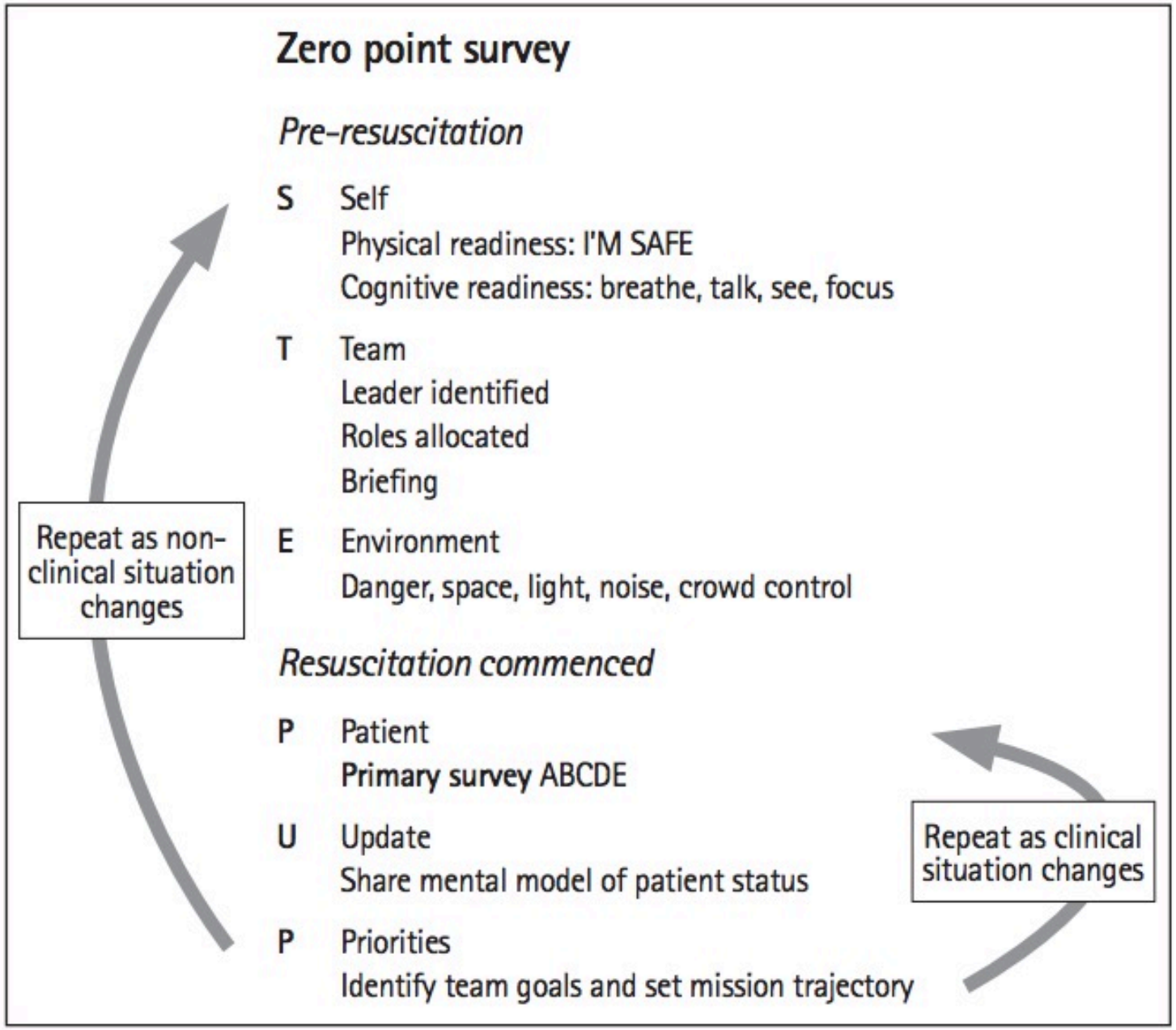
Learning Objectives Summary

- **Assessment** and monitoring of 'airway and breathing'
- Emergency Drug Facilitated **Intubation** (RSI)
  - *Pros and cons*
  - *Drug choices*
- Common 'airway and breathing' **pathologies**
- Common 'airway and breathing' **management** strategies
- Use of **oxygen** and **ventilation** (pharmacy context)



Clinical Assessment

Zero Point Survey



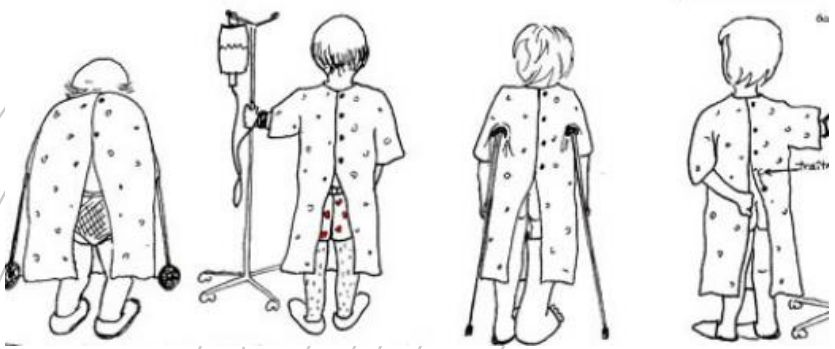
https://www.ceemjournal.org/upload/pdf/ceem-17-269.pdf

Assessment (Traditional)

- History
- Examination
- Investigations
  - Bedside
  - Imaging
  - Laboratory

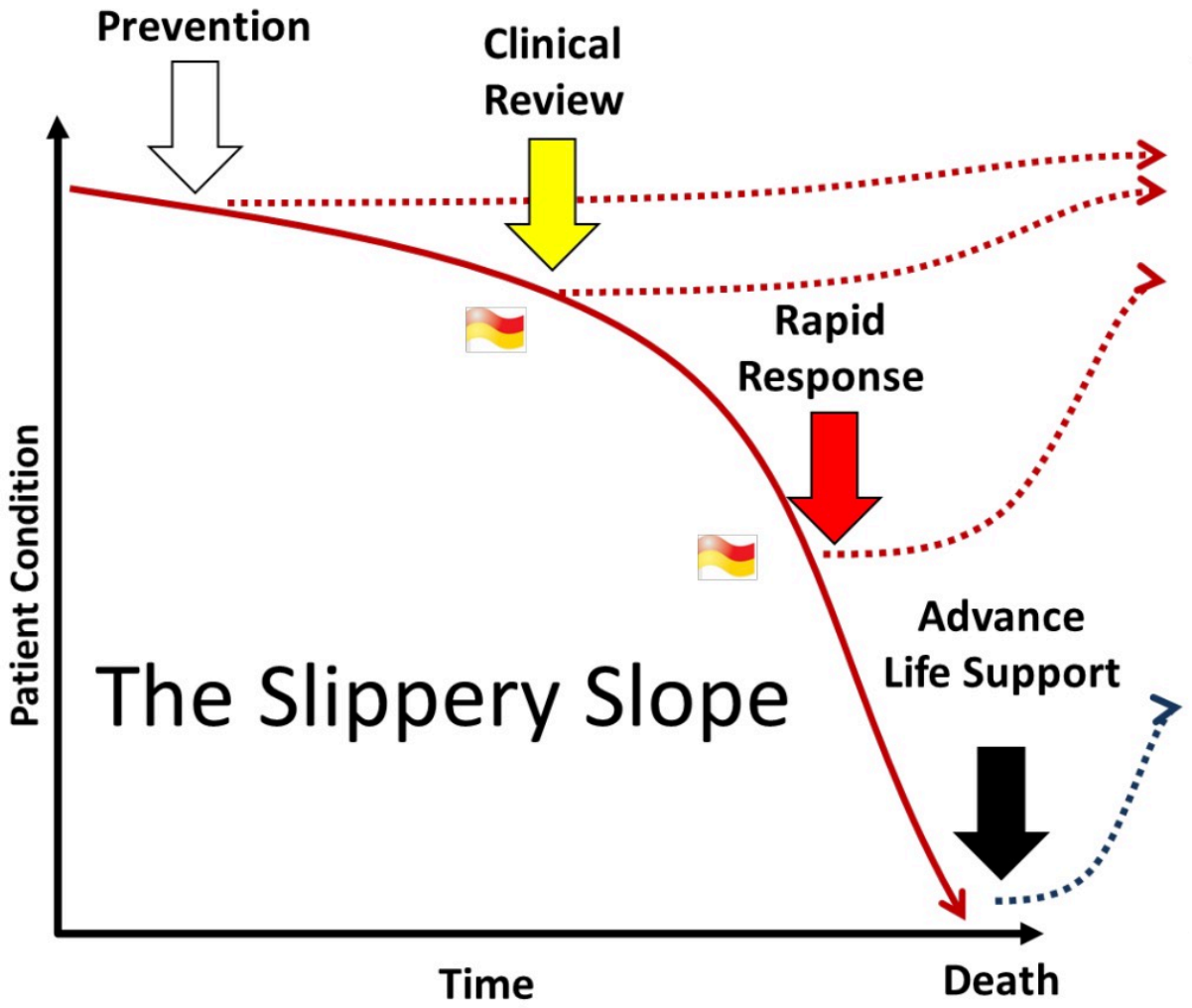
Emergency Approach: "A-G Survey"

- In a recent survey of nurses:
  - Most respondents that they only attend a formal assessment once in a shift
  - 54% do not do an "A-G" with observations
- 70% believe that a formal assessment using "A-G" will improve their assessment.



What is the A-G assessment?

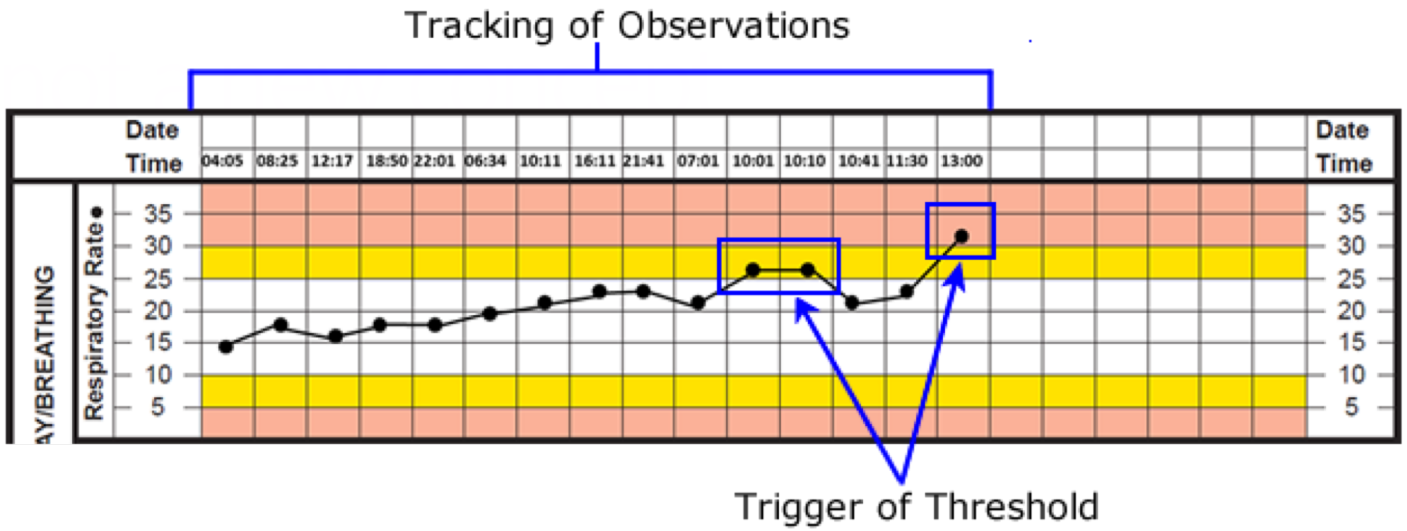
- **Simple yet comprehensive** assessment of a patient
- Used in both **STABLE** and **DETERIORATING** patients
- Designed to be **fast** and easy to follow

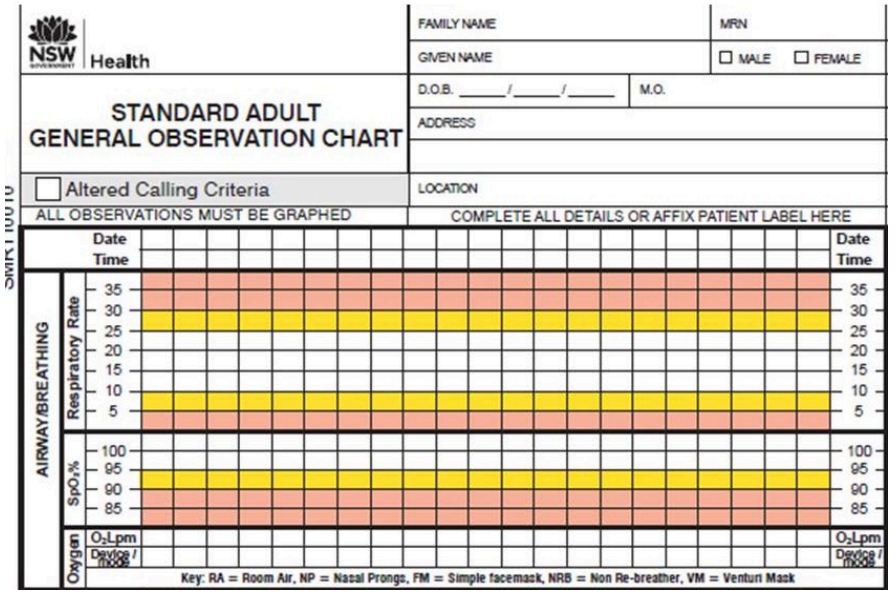

Prevention
Clinical Review
Rapid Response
Advance Life Support
The Slippery Slope
Patient Condition
Time
Death

What are the advantages?

- Early detection
- Empower ALL staff
- Clearer clinical handover
- Nursing-medical communication

The SAGO chart is designed around the A-G!





LOOK
LISTEN
FEEL

It has become too easy to complete patient observations without touching the patient

Airway

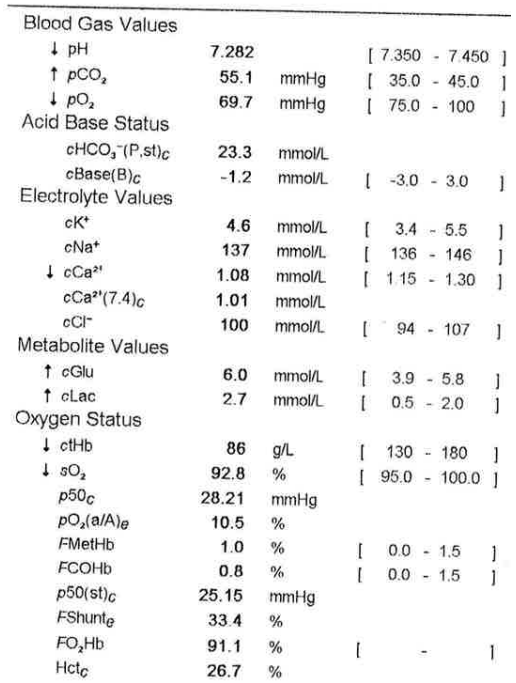
- Speech
- Conscious
  - enough to talk?
- Extra sounds
  - wheezing or stridor?
- Visual airway obstruction?

Breathing

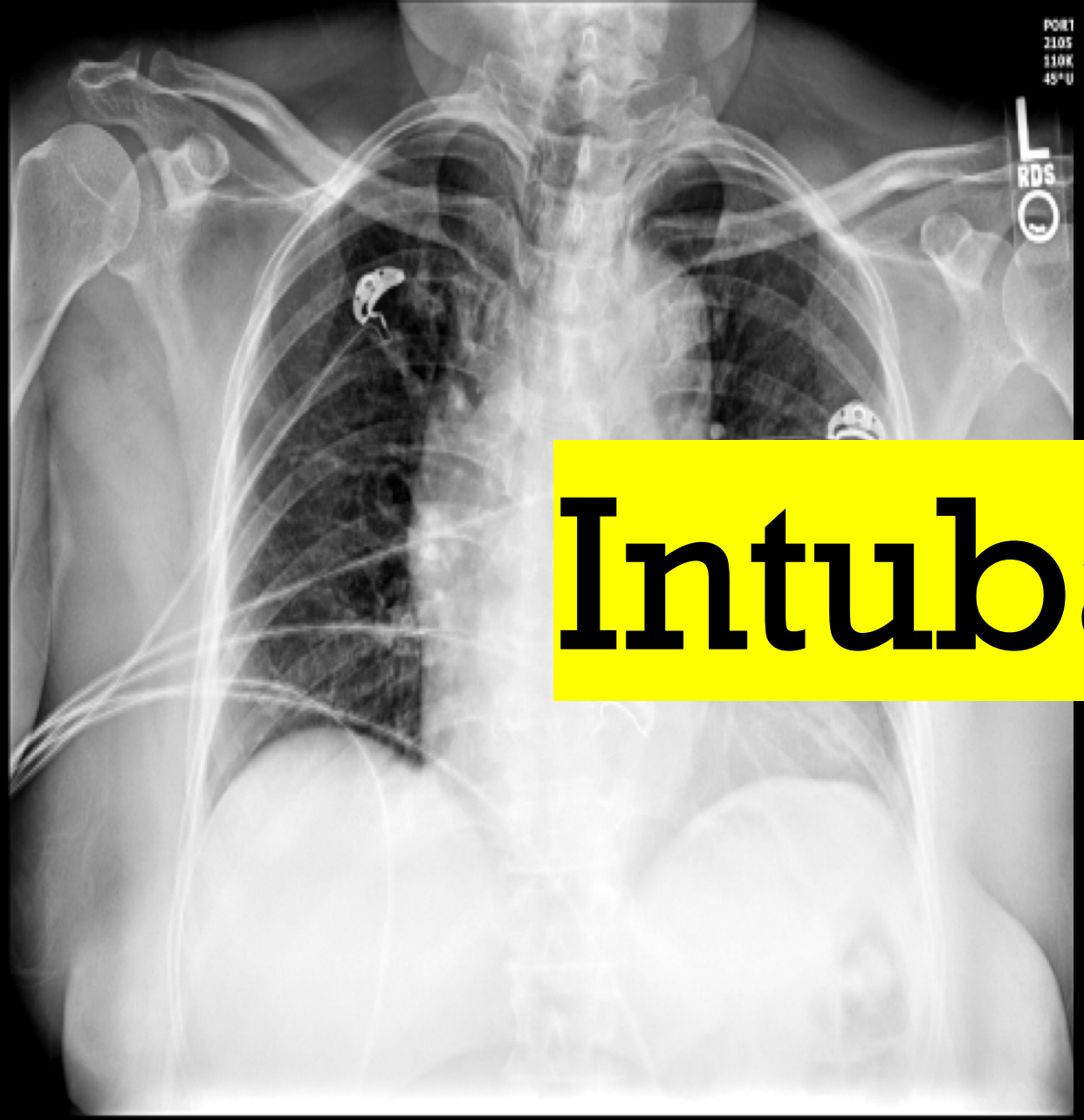
- Chest rise and fall
- Respiratory rate
- Auscultation
- SpO2
- Supplemental O2?

Tests

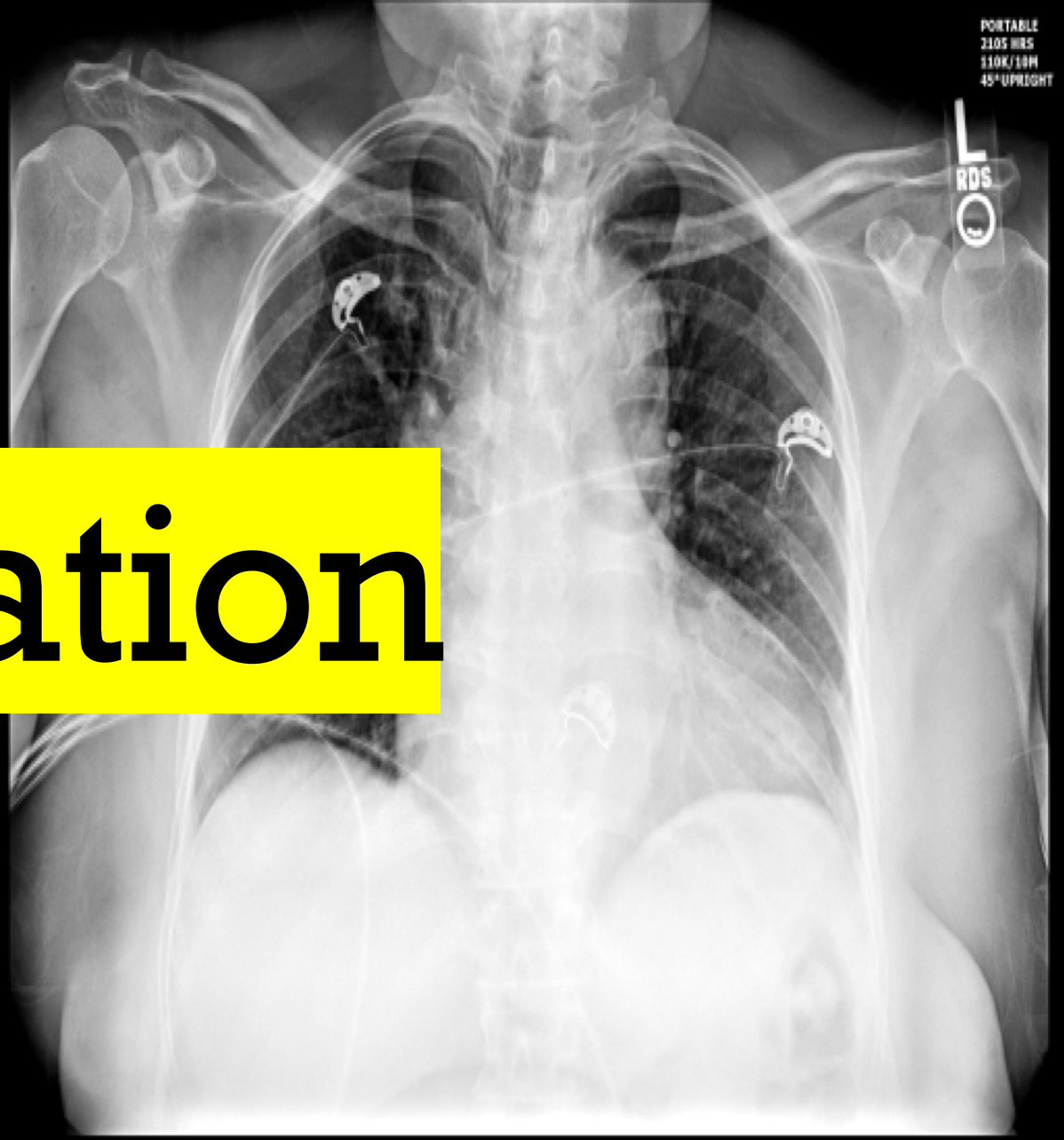
- Chest x-ray
- Blood gas
- ECG



Blood Gas Values			
↓ pH	7.282		[7.350 - 7.450]
↑ pCO_2	55.1	mmHg	[35.0 - 45.0]
↓ pO_2	69.7	mmHg	[75.0 - 100]
Acid Base Status			
$cHCO_3^-(P,st)_c$	23.3	mmol/L	
$cBase(B)_c$	-1.2	mmol/L	[-3.0 - 3.0]
Electrolyte Values			
cK^+	4.6	mmol/L	[3.4 - 5.5]
cNa^+	137	mmol/L	[136 - 146]
↓ cCa^{2+}	1.08	mmol/L	[1.15 - 1.30]
$cCa^{2+}(7.4)_c$	1.01	mmol/L	
cCl^-	100	mmol/L	[94 - 107]
Metabolite Values			
↑ cGlu	6.0	mmol/L	[3.9 - 5.8]
↑ cLac	2.7	mmol/L	[0.5 - 2.0]
Oxygen Status			
↓ ctHb	86	g/L	[130 - 180]
↓ sO_2	92.8	%	[95.0 - 100.0]
$p50_c$	28.21	mmHg	
$pO_2(a/A)_e$	10.5	%	
FMetHb	1.0	%	[0.0 - 1.5]
FCOHb	0.8	%	[0.0 - 1.5]
$p50(st)_c$	25.15	mmHg	
$FShunt_e$	33.4	%	
FO_2Hb	91.1	%	[-]
Hct_c	26.7	%	


PORT
2105
110K
45°U
L
RDS

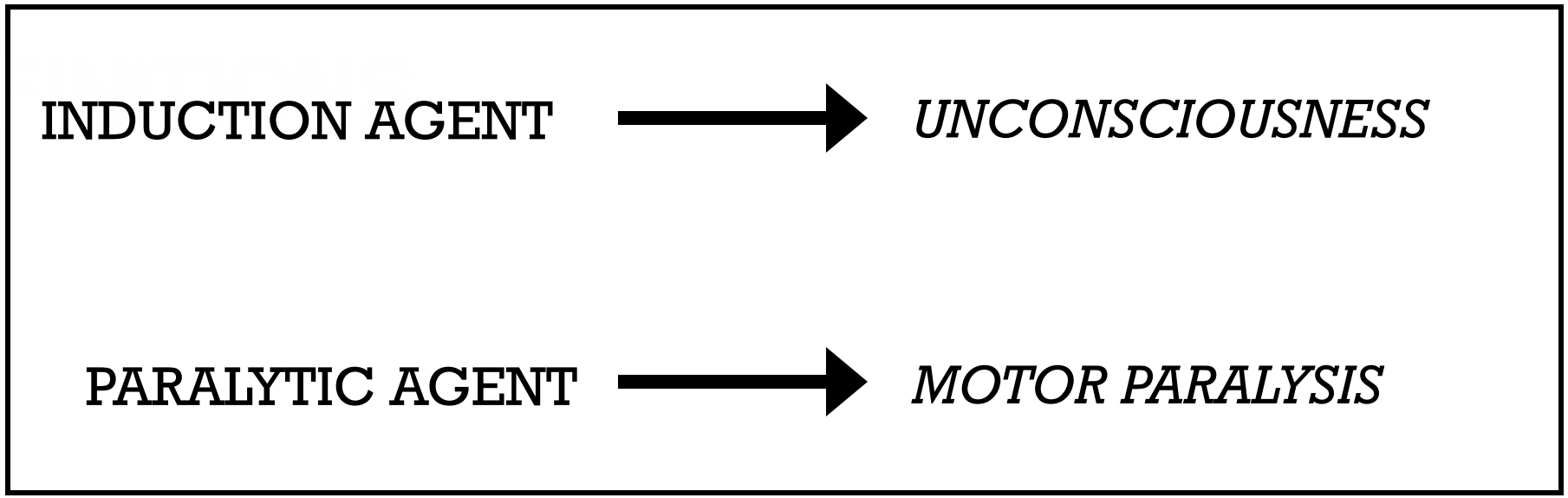
Intubation


PORTABLE
2105 HRS
110K/10M
45° UPRIGHT
L
RDS

Emergency Intubation facilitated by drugs

C-MAC USB video

Rapid Sequence Intubation (RSI)



RSI reasoning - major

Decreased aspiration

Increased success

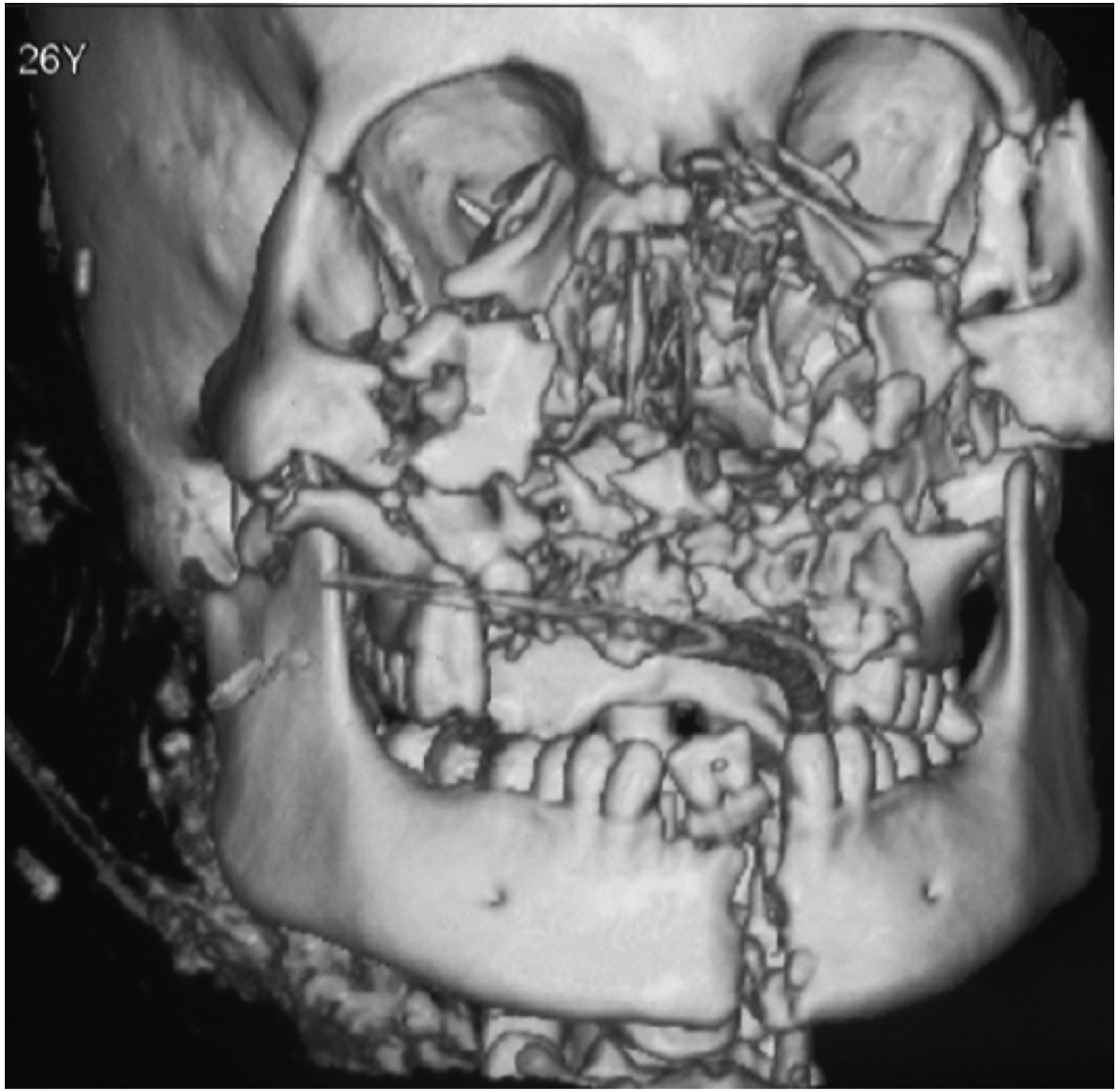
RSI reasoning - other

Better
C-spine
control

RSI reasoning - other

Blunting of
↑ ICP / IOP

RSI reasoning - other



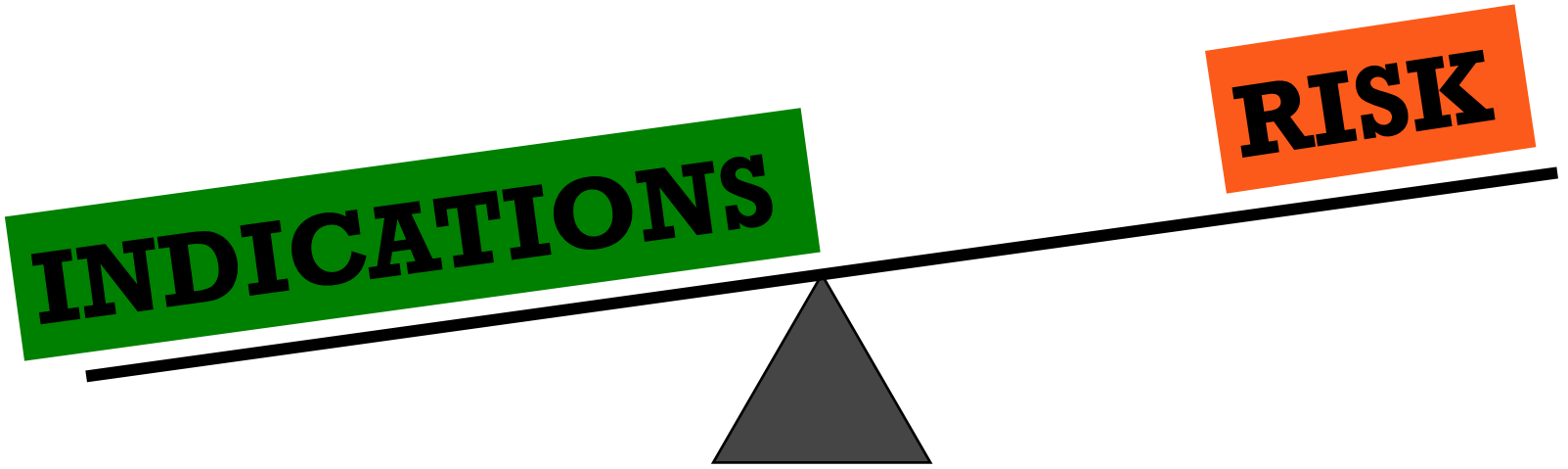
Avoid airway and dental trauma

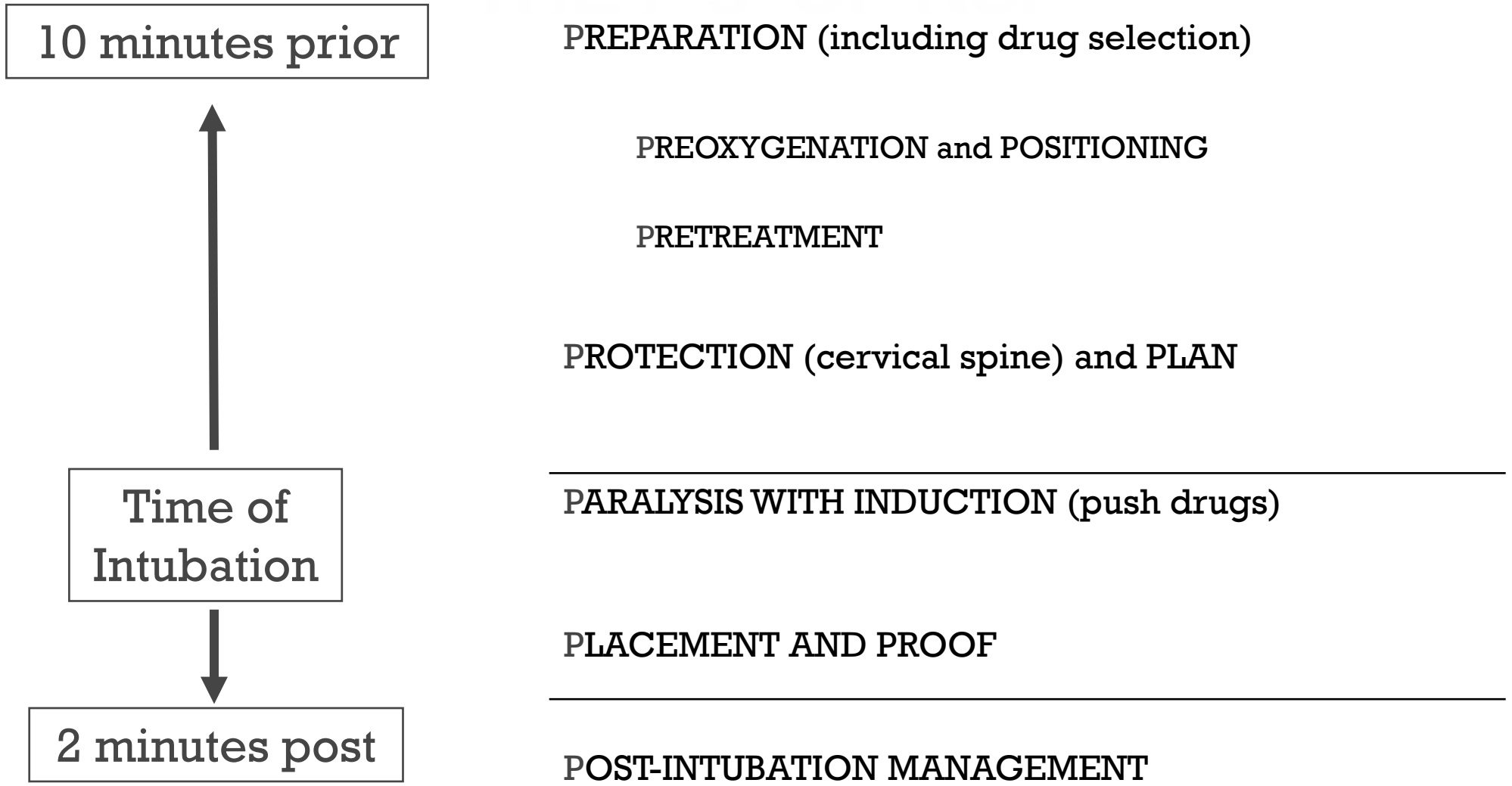
Indications for RSI

Intubation is indicated with significant failures of:

- *Oxygenation*
- *Ventilation*
- *Airway protection*
- *Humanitarian indications*
- *Case control / diagnosis*

NOT indicated for airway patency issues (stridor, Ludwig's angina)




10 minutes prior
Time of Intubation
2 minutes post
PREPARATION (including drug selection)
PREOXYGENATION and POSITIONING
PRETREATMENT
PROTECTION (cervical spine) and PLAN
PARALYSIS WITH INDUCTION (push drugs)
PLACEMENT AND PROOF
POST-INTUBATION MANAGEMENT

Pre-intubation RSI drugs

- Lignocaine
- Opiates
- Atropine
- Defasciculating agent

Intubation agents

- Ketamine

(versus Others)

- Rocuronium

(versus Suxamethonium)

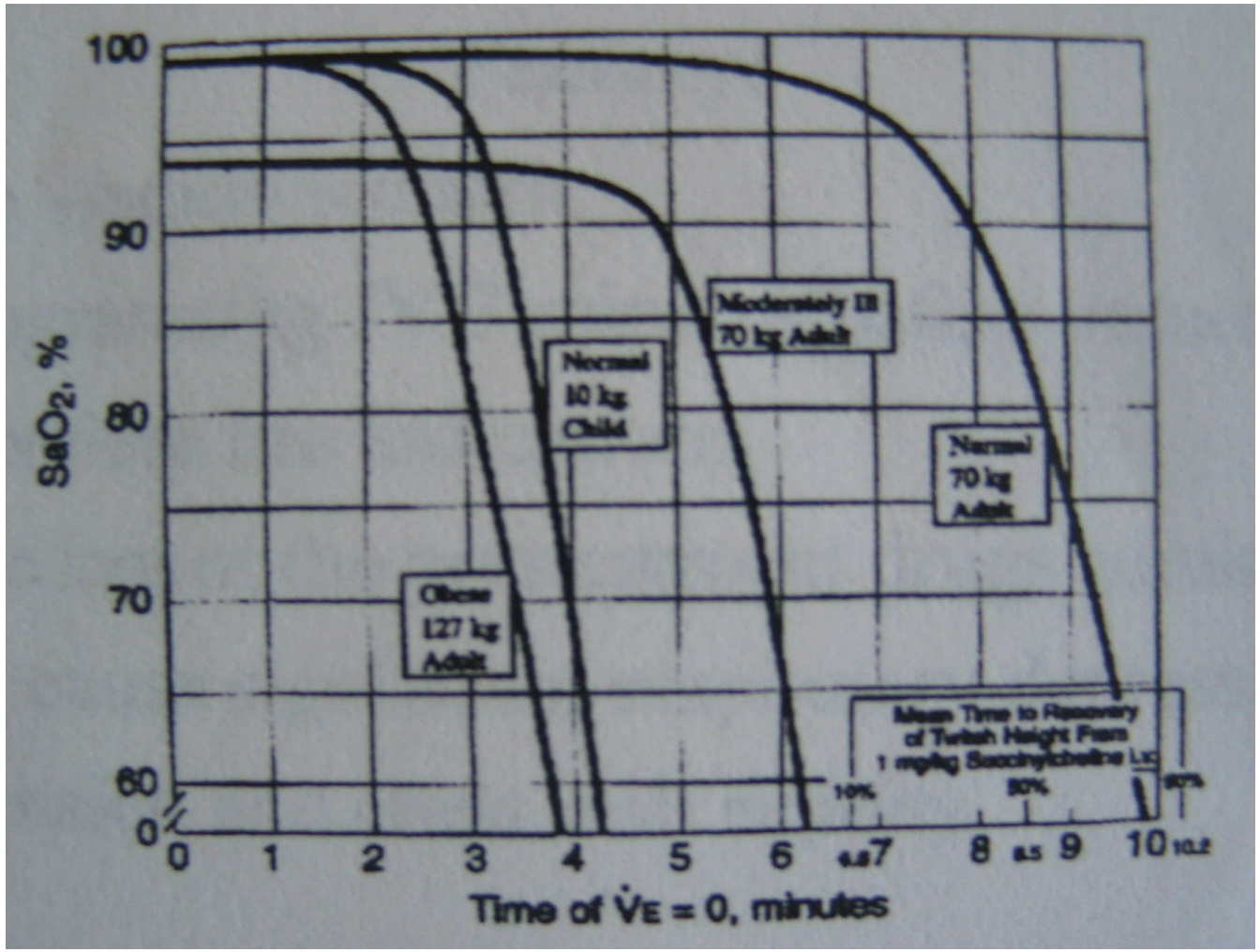
- Fentanyl

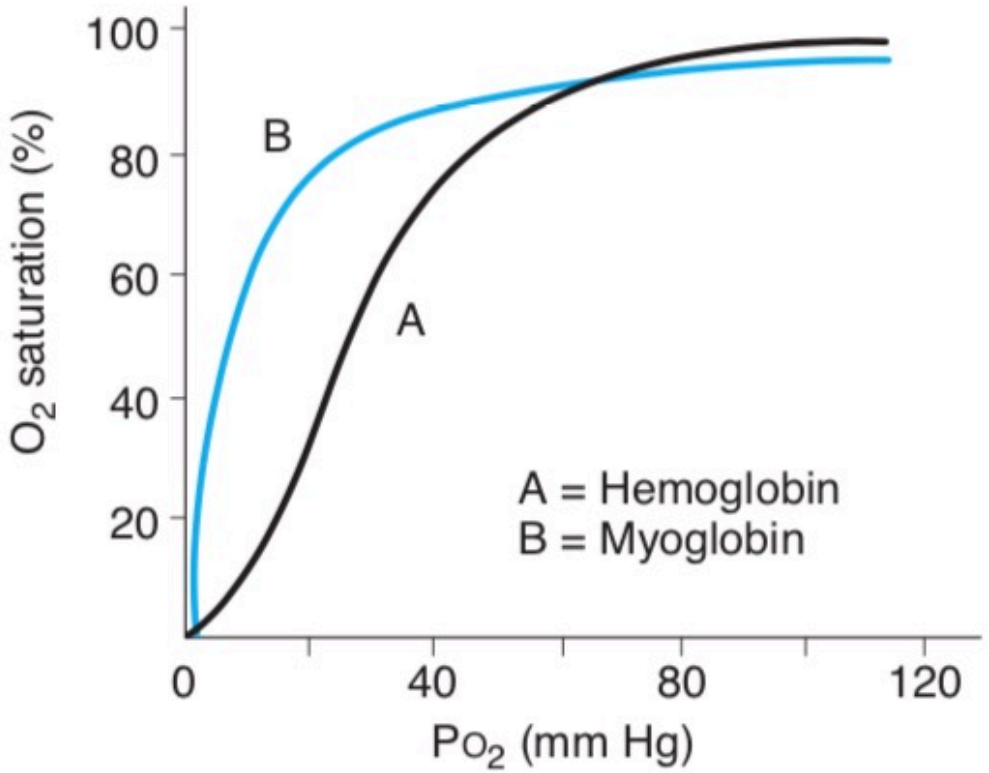
Post-intubation drugs

- Propofol
- Fentanyl
- Inotropes

Problems with RSI

- PPE
- Delayed Tube
- Failed Tube
- Adverse Drug Events


100
90
80
70
60
0
SaO2, %
Moderately Ill
70 kg Adult
Normal
10 kg
Child
Normal
70 kg
Adult
Obese
127 kg
Adult
Mean Time to Recovery
of Twitch Height From
1 mg/kg Succinylcholine I.V.
95%
10%
95%
0 1 2 3 4 5 6 7 8 9 10
Time of V̇E = 0, minutes


100
80
60
40
20
O2 saturation (%)
B
A
A = Hemoglobin
B = Myoglobin
0
40
80
120
PO2 (mm Hg)

Problems with RSI

The Emergency Airway Cognitive Tool

A Intubation

1st look direct C-Mac
Stylet/bougie

B SAD

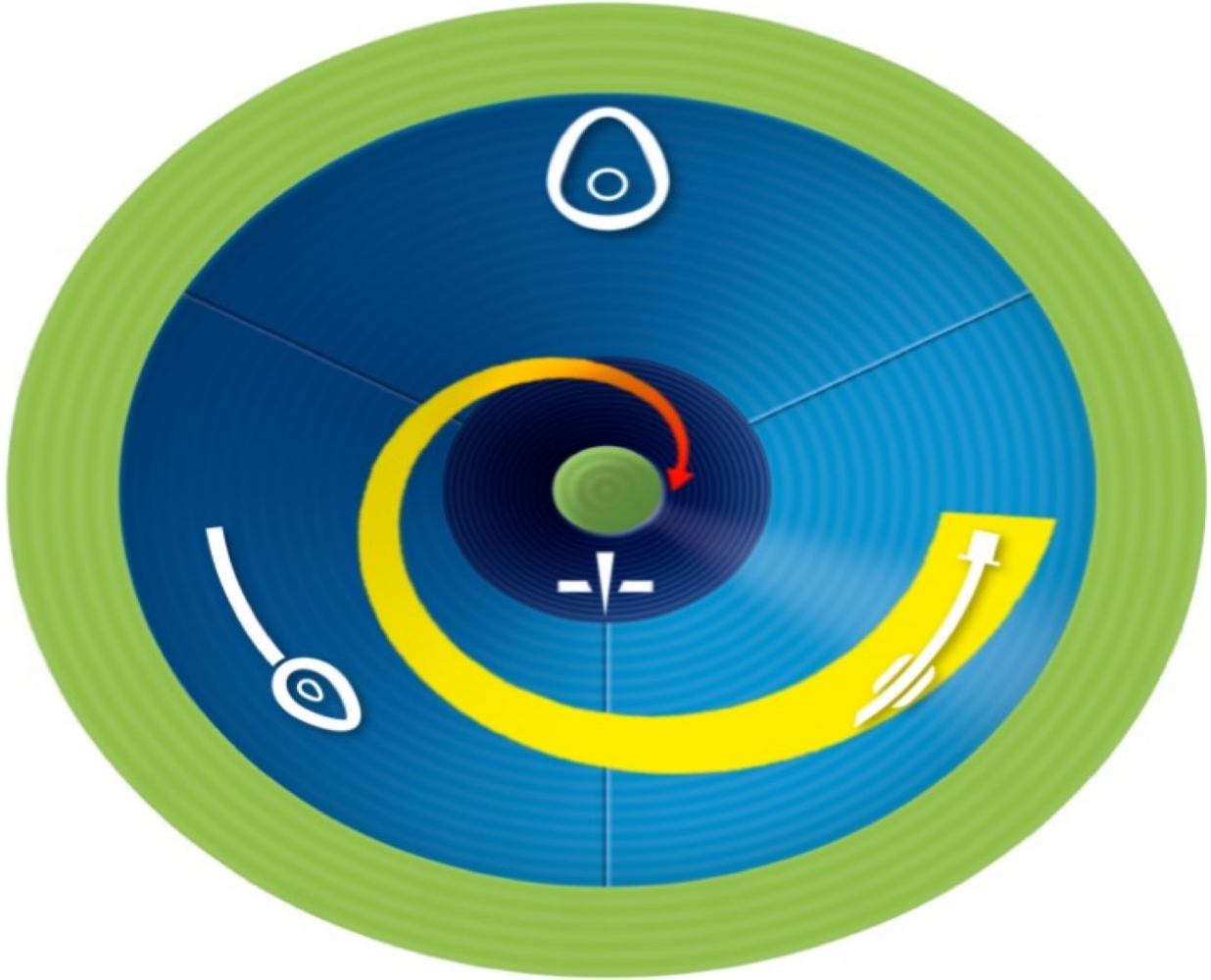
2nd generation
Supraglottic Airway Device

C Face Mask

2 person technique
Oral +/- Nasal airway

D Can't Intubate, Can't Oxygenate

Needle or Surgical Cricothyroidotomy



MANIPULATIONS:
- HEAD & NECK
- LARYNX
- DEVICE

ADJUNCTS

SIZE / TYPE

SUCTION / O_2 FLOW

MUSCLE TONE

VortexApproach.org

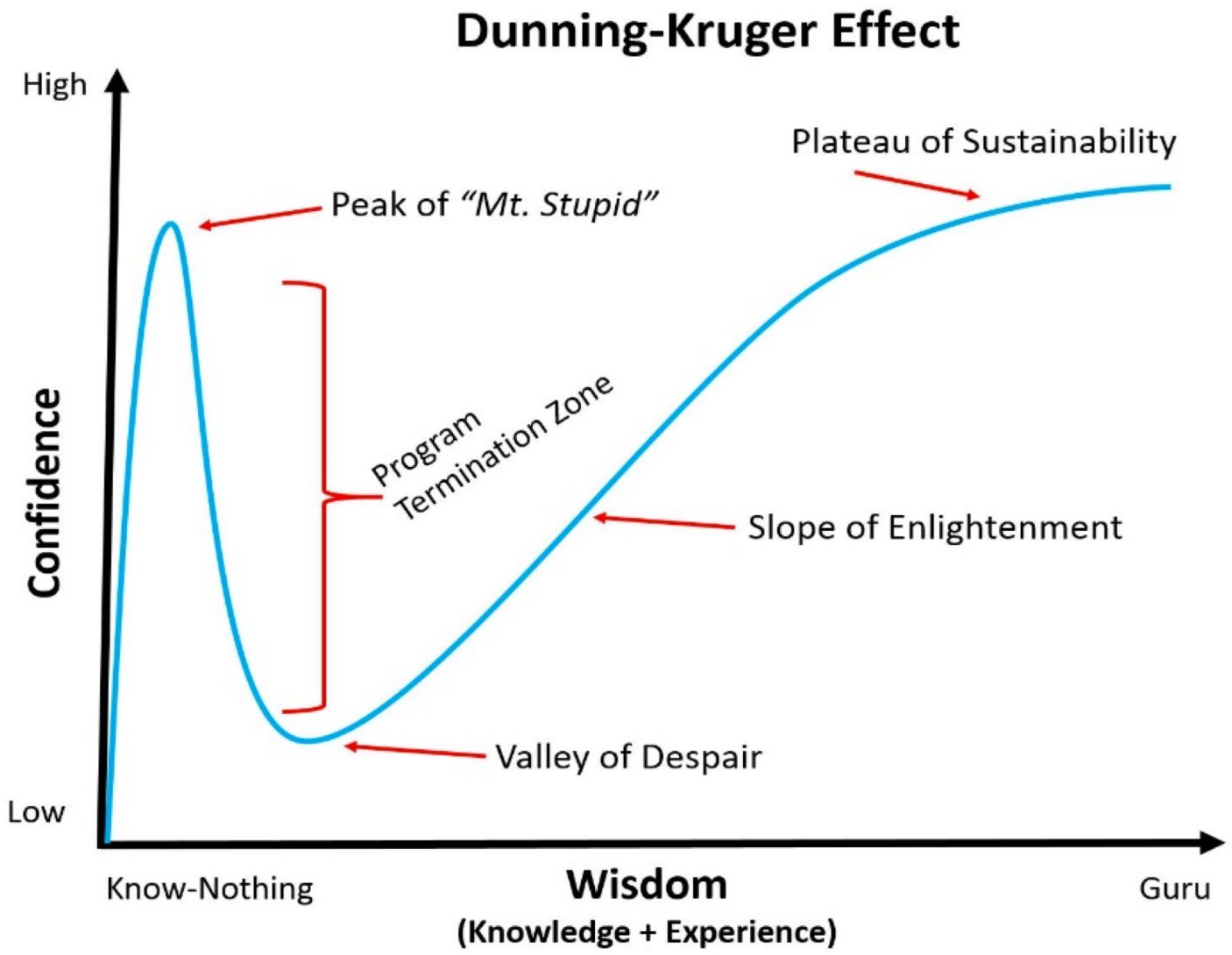
RNSH Airway

RSI Priorities

- Maximise your First Attempt
- Pre-oxygenation
- Safe Induction
  KISS (Keep it Simple Stupid)
- Back-up Plan
- Teamwork (Teaming: it should be a verb)
- Checklist

Your role is important..

The Dunning Kruger Curve



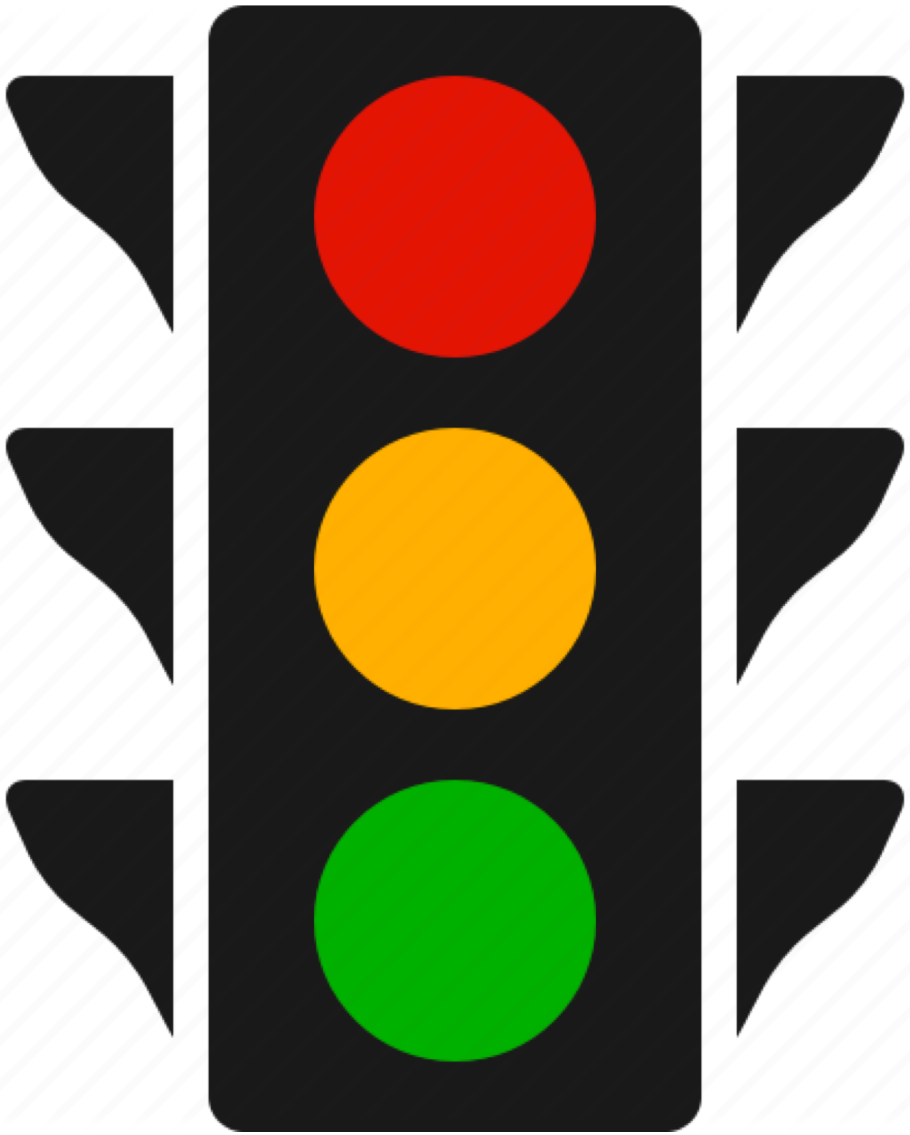
Essential Pathology and Management


ASTHMA

Severe Asthma

Clinical Assessment

- Look
  - Tachypnoea, S of B, positioning, W of B, ?muscle usage, fatigue
  - Agitated, confused, combative
  - Vital signs
- Listen
  - Auscultation: wheezes, silent, speech
- Feel
  - Tachycardia, BP



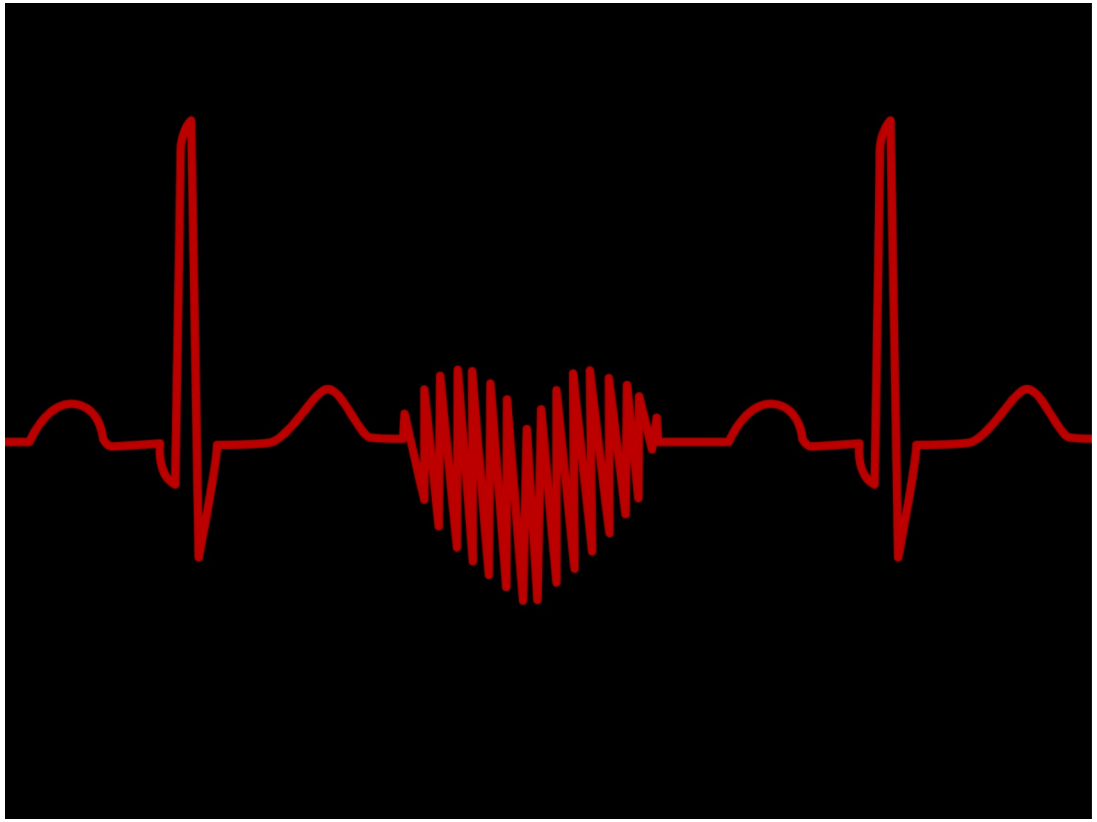
Near-fatal asthma	Raised $PaCO_2$ and/or requiring mechanical ventilation with raised inflation pressures[391-393]	
Life threatening asthma	Any one of the following in a patient with severe asthma:	
	- PEF <33% best or predicted	- bradycardia
	- SpO_2 <92%	- arrhythmia
	- PaO_2 <8kPa	- hypotension
	- normal $PaCO_2$ (4.6 – 6.0 kPa)	- exhaustion
	- silent chest	- confusion
	- cyanosis	- coma
	- feeble respiratory effort	
Acute severe asthma	Any one of: - PEF 33-50% best or predicted - respiratory rate ≥25/min - heart rate ≥110/min - inability to complete sentences in one breath	
Moderate asthma exacerbation	- Increasing symptoms - PEF >50-75% best or predicted - no features of acute severe asthma	
Brittle asthma	- Type 1: wide PEF variability (>40% diurnal variation for >50% of the time over a period >150 days) despite intense therapy - Type 2: sudden severe attacks on a background of apparently well controlled asthma	

Severe Asthma

Management

- Assessment (ABCDEFG)
- Oxygen (lots)
- Salbutamol (route)
- Ipratropium (available)
- Steroids (route)
- *Are they improving*? – if no get help, ABG/CXR
- *Differentials*?
  - Pneumothorax, PE, LVF

Signs of impending arrest

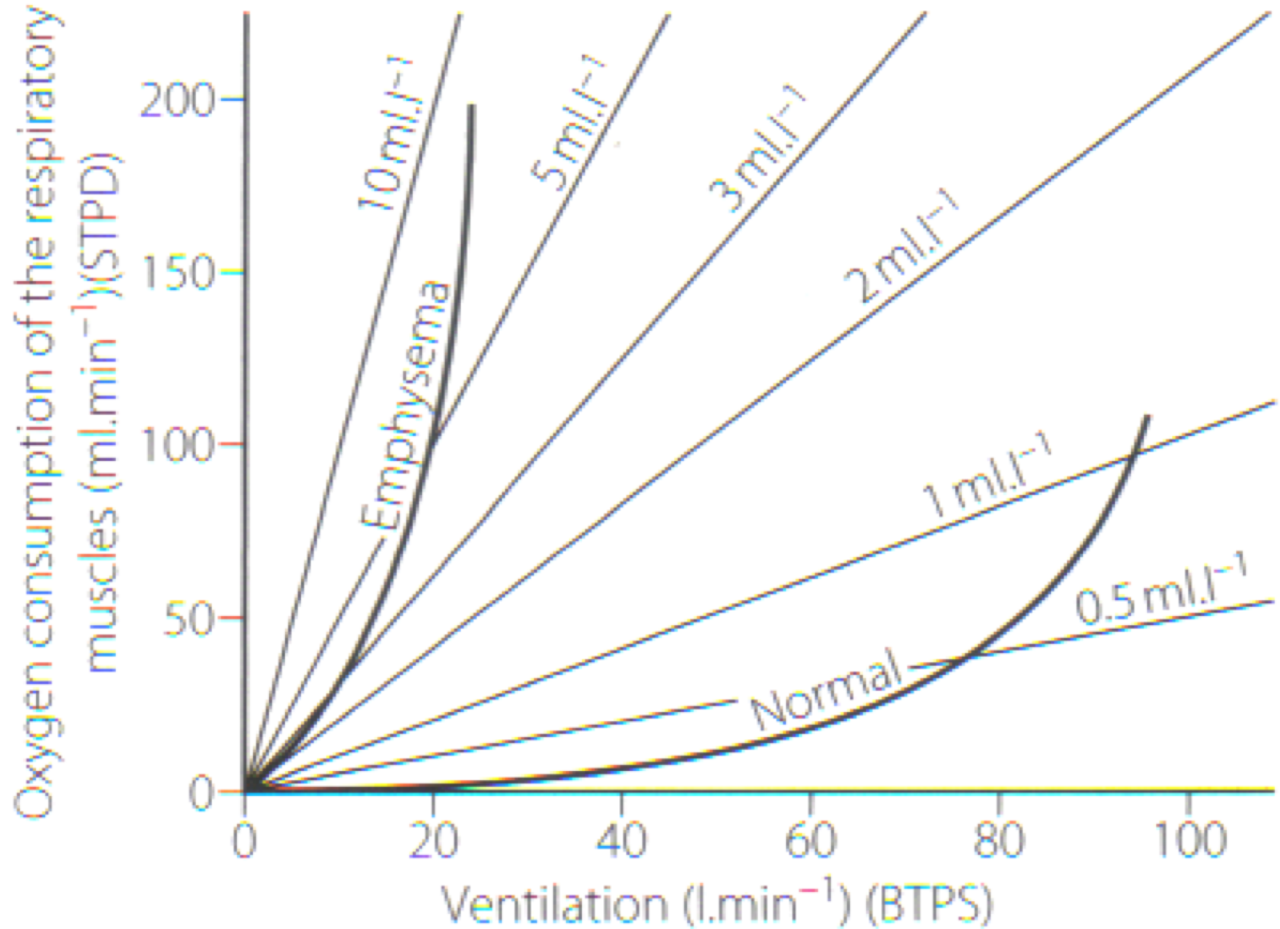


- Exhaustion
- Unable to speak
- Confusion, agitation, reduced level of consciousness
- Rapid shallow breathing
- Feeble respiratory effort
- Silent chest
- Mottled skin

Severe asthma

- Adjunctive therapies
  - Call ICU
  - CPAP
  - Magnesium
  - Aminophylline
  - Ketamine
  - Heliox
  - Volatile anaesthetic gases

COPD Exacerbations

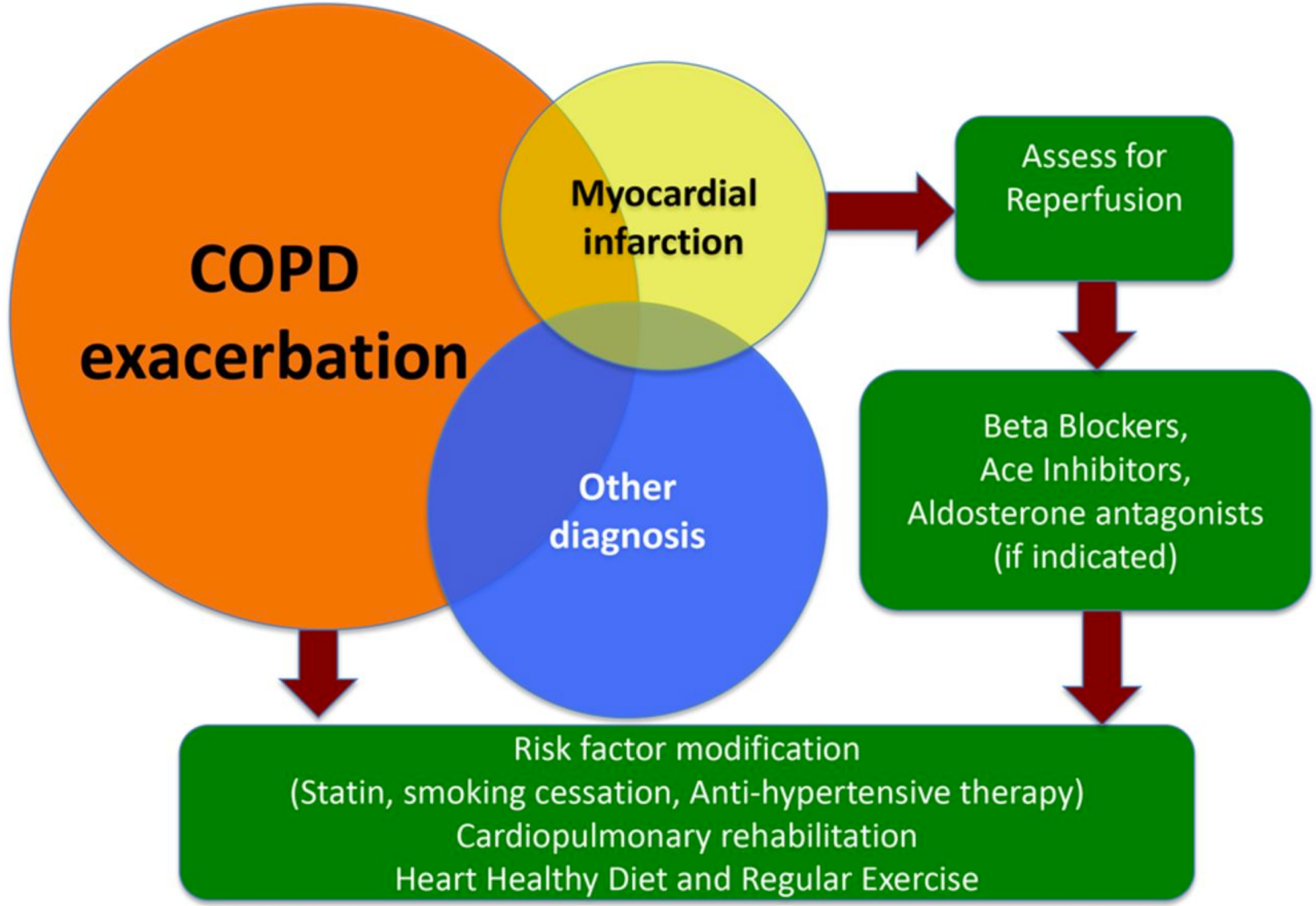

Oxygen consumption of the respiratory muscles (ml.min⁻¹)(STPD)
200
150
100
50
0
0
20
40
60
80
100
Ventilation (l.min⁻¹) (BTPS)
10 ml.l⁻¹
Emphysema
5 ml.l⁻¹
3 ml.l⁻¹
2 ml.l⁻¹
1 ml.l⁻¹
0.5 ml.l⁻¹
Normal

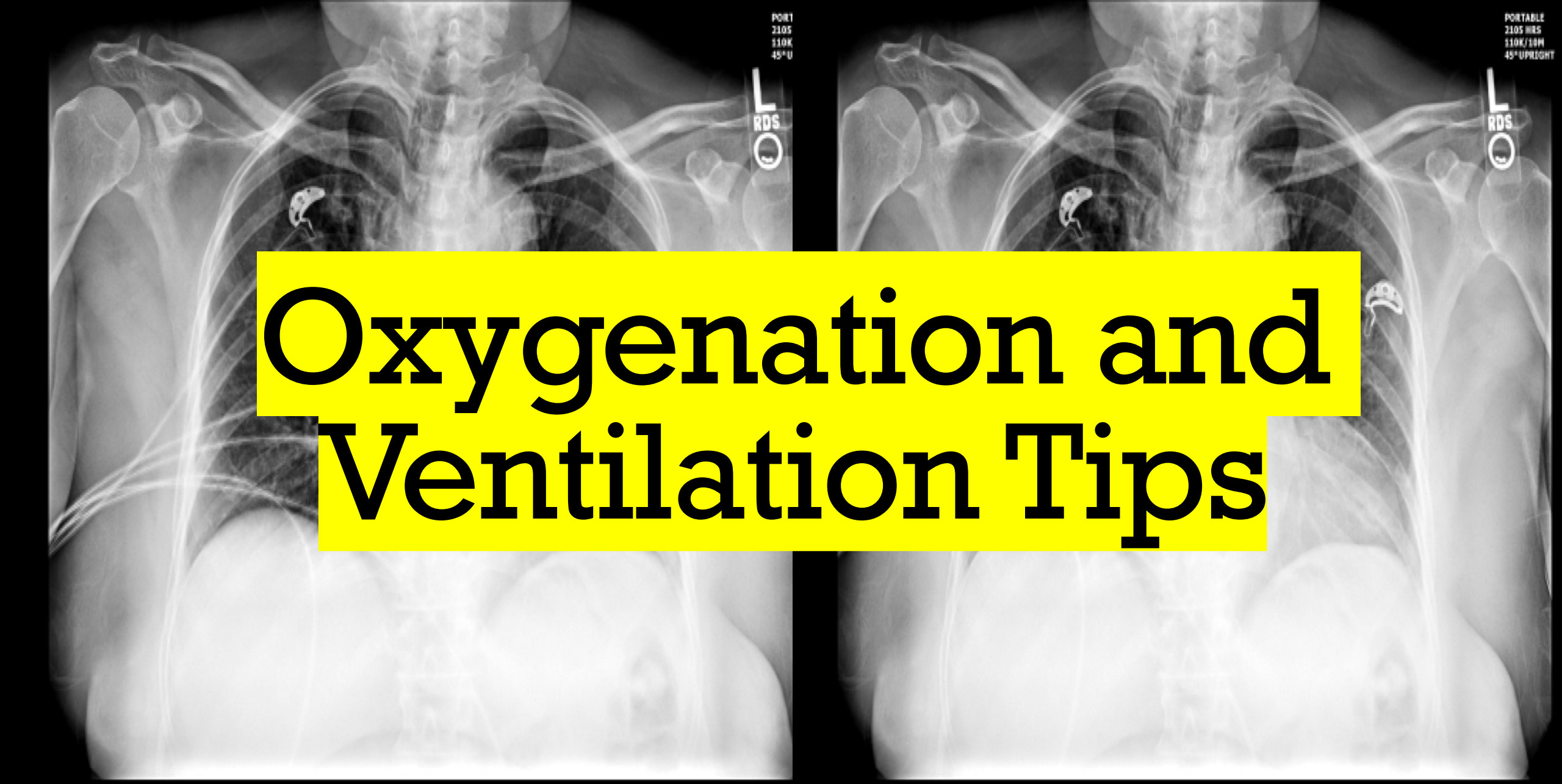
Severe COPD

- Tachypnoea
- Pursed lip breathing
- Use of accessory muscles at rest
- Acute confusion
- New cyanosis
- New peripheral oedema
- Marked reduction in ADL

COPD pitfalls

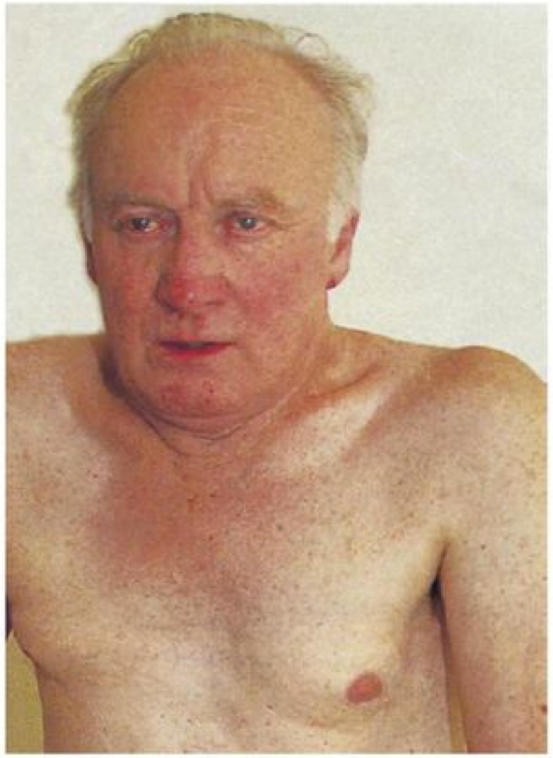
- Up to 1/5 of patients with a severe unexplained exacerbation of COPD will have a co-existing PE
- Usually don't need high FiO_2 to correct hypoxia in acute exacerbation
- If treatment fails, consider:
  - CCF
  - MI
  - PE
  - Pneumonia, Flu
  - Aspiration

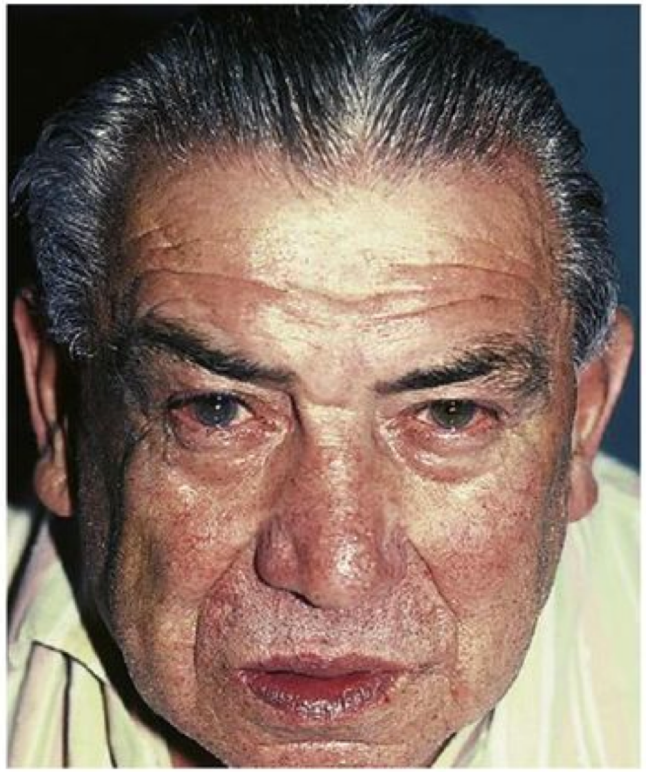

COPD exacerbation
Myocardial infarction
Other diagnosis
Assess for Reperfusion
Beta Blockers,
Ace Inhibitors,
Aldosterone antagonists
(if indicated)
Risk factor modification
(Statin, smoking cessation, Anti-hypertensive therapy)
Cardiopulmonary rehabilitation
Heart Healthy Diet and Regular Exercise



Oxygenation and Ventilation Tips

Oxygen therapy in COPD





If CO_2 rises do <u>not suddenly</u> remove the O2 - Sudden severe hypoxia may result…

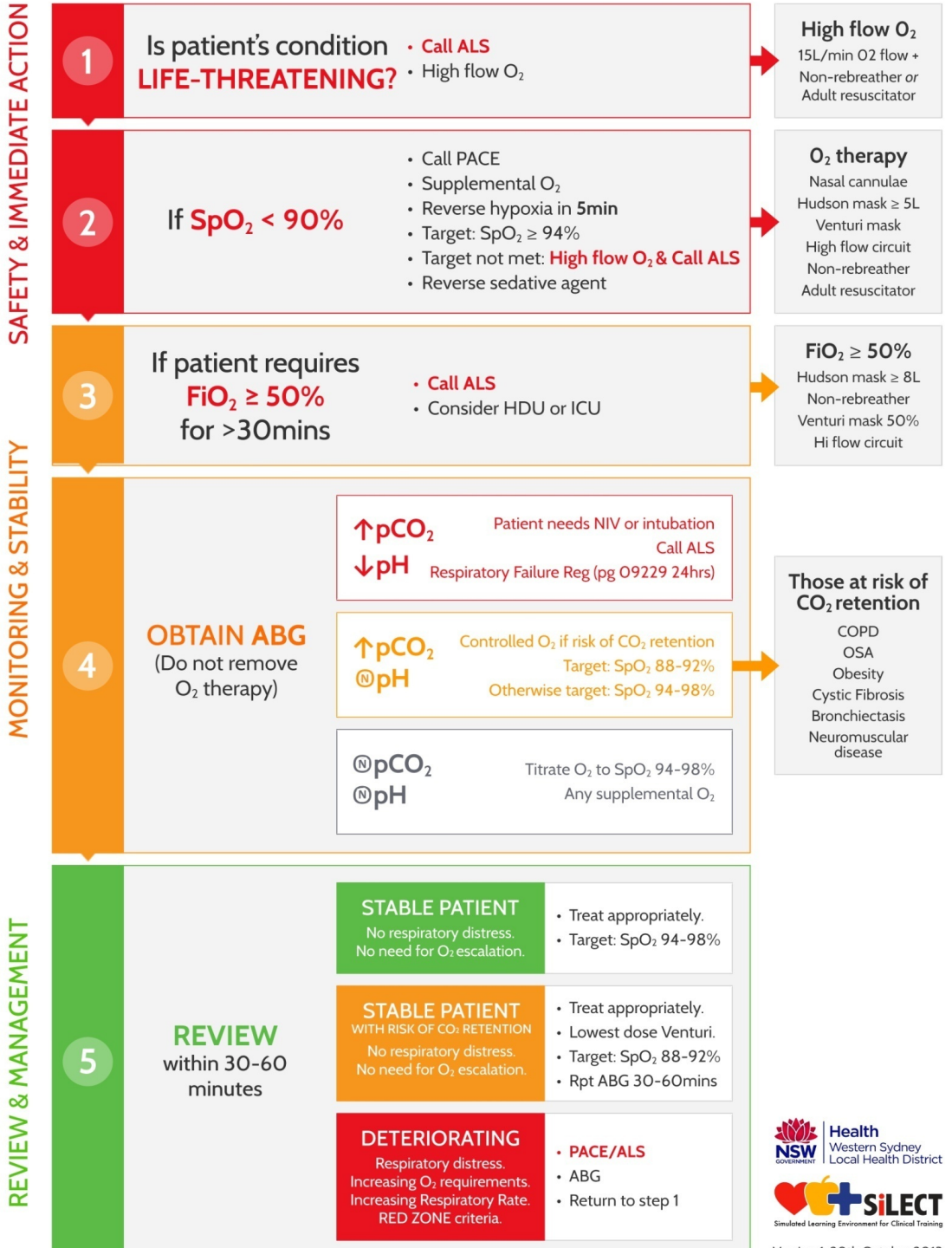
Chronic Hypoxia

- SaO_2 88-92%
- Nasal Prongs 1-4ltr/min
- *Start FiO_2 low*; O_2 to maintain SaO_2
- Beware Co_2
- NEVER *abruptly* remove O_2

Acute Hypoxia

- SaO2 94-98%
- Venturi 50% or Hudson 6-8ltr
- O_2 to maintain SaO_2
- Beware 'fogging' mask
- Beware Co_2 = exhaustion HELP
- NEVER *abruptly* remove O_2

Managing Hypoxia



Ventilation post intubation

- D – Dislodged Tube/Disconnect
- O – Obstructed system
- P - Pneumothorax
- E – Equipment Failure
- (S – Stacked breaths, if asthmatic)

Using drugs to help oxygen and ventilation problems

- **Oxygen**
  - Reverse any opioids with naloxone
    - (caution with methadone)
  - Withhold any sedatives
  - Consider renal function when prescribing

- **Ventilation**
  - If NOT intubated:
    - Reverse any opioids with naloxone
    - Use BiPAP
  - If intubated
    - Paralyse and Sedate the patient
    - Consider anaphylaxis = adrenaline
    - Consider bronchospasm = salbutamol