

# MMed and DCH Lectures

## Intensive care of common paediatric problems

June 31<sup>st</sup> 2021

Prof Trevor Duke

“The respite afforded by such measures as the temporary administration of oxygen is...utilized for recuperation”

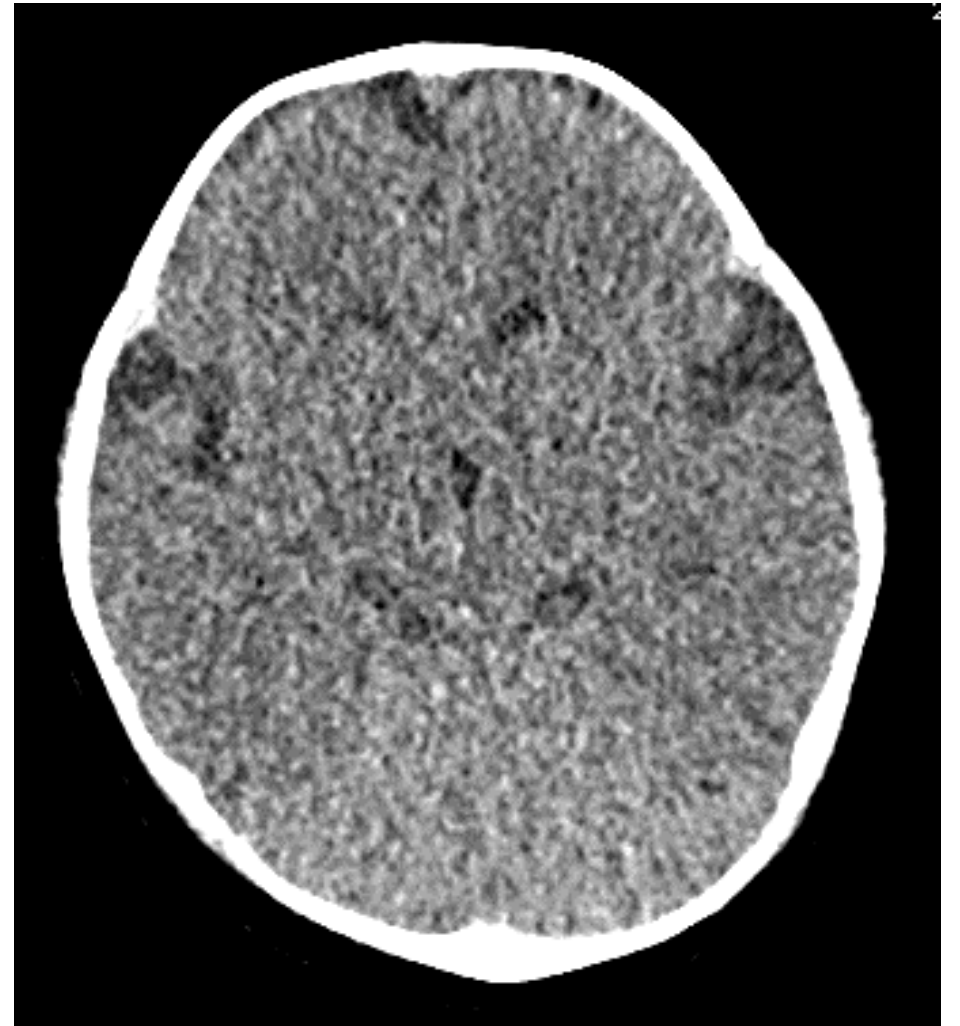
*Haldane JS. The therapeutic administration of oxygen. BMJ 1917; 1:181-183*

# Intensive care

- Vital organ support: a bridge to natural recovery
- Some technology...but meticulous attention to detail
- Time: an old-fashioned therapy
- Avoid bad things happening: a focus on safety
- Multi-system approach to clinical care
- ABC
- Approach to clinical problems based on an understanding of pathophysiology
- Multi-disciplinary

# Case 1: 7-month-old Samoan boy with lethargy, vomiting, seizures for 2 hours

- Poorly conscious
- SpO2 88%, dusky lips
- Tachycardia 190/min
- Cold hands and feet
  
- *S. pneumoniae* in blood cultures

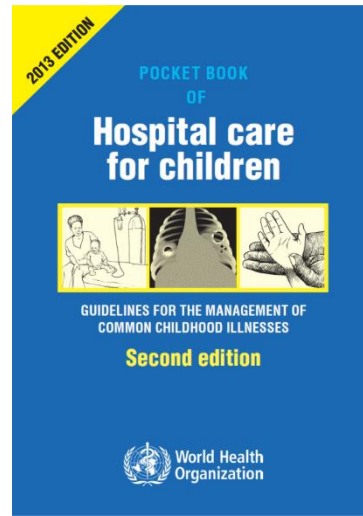


# Which children need high-dependency care?

- Not the “diagnosis”, but severity of illness
- Emergency signs

## Emergency signs?

- Obstructed breathing
- Severe respiratory distress
- Central cyanosis
- Signs of shock
- Coma
- Convulsions
- Severe dehydration



# Meningitis / encephalitis

- **Primary brain injury**

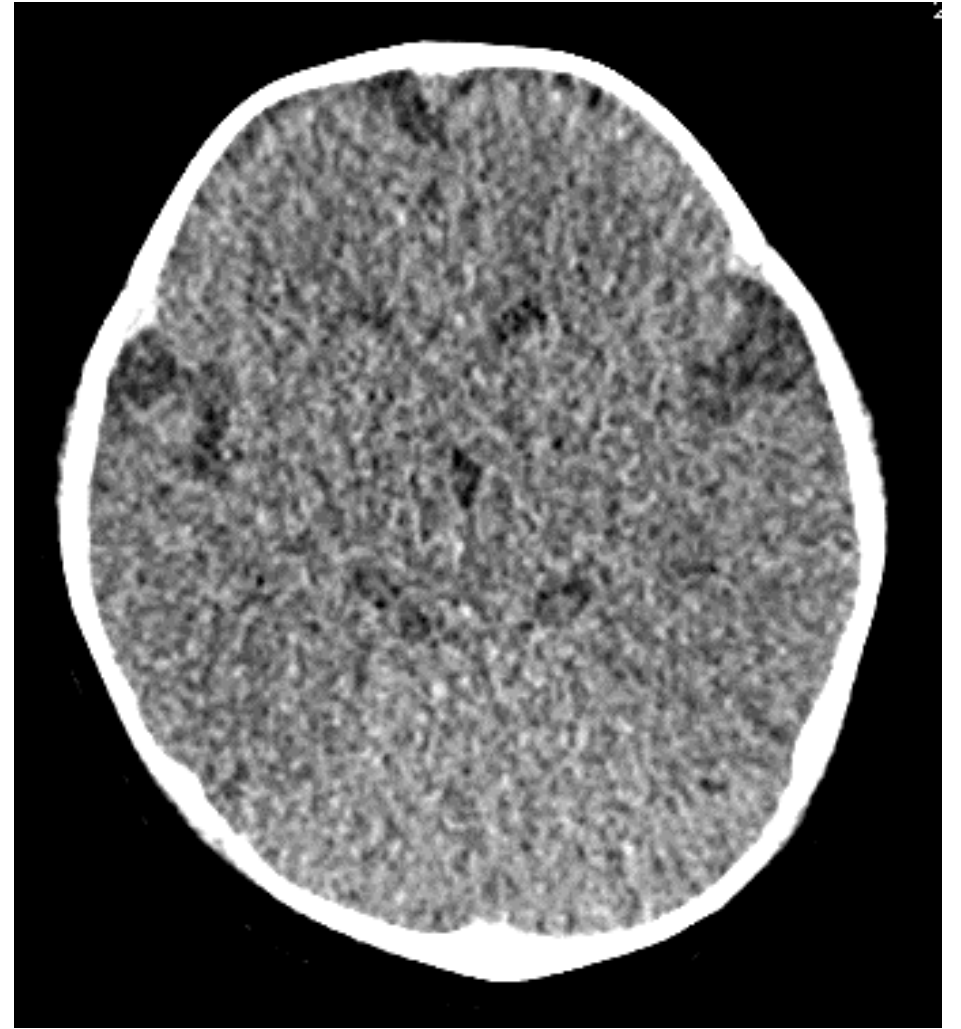
- Inflammation (cerebritis)
- Ischaemia / infarction
- Cellular toxicity

- **Secondary brain injury**

- Hypotension
- Hypoxia
- Hypoglycaemia
- Hypercarbia
- Seizures
- Cerebral oedema
- Hyponatraemia

# Neuroprotection

- 30° head up
- Airway
- Breathing – assess both oxygenation and ventilation
- Circulation
  - Feel the hands and feet: warm or cold, radial pulse volume, capillary refill
  - assume ICP = 20, so aim for MAP 60mmHg
- Avoid fluid overload, only give isotonic fluid, check Na+
- Anticonvulsants



# Indications for ICU: Airway

- Airway obstruction
  - Croup
  - Quinsy / peri-tonsillar abscess
  - Foreign body
- Airway at risk
  - Poor conscious state



# Indications for ICU: Breathing

- Severe respiratory distress / hypoxaemia
  - Pneumonia
  - Asthma
  - TB with complications
  - HIV with pneumocystis / severe pneumonia
  - Post-op respiratory monitoring

# Indications for ICU: Circulation

- Hypovolaemia
  - Sepsis
  - Dehydration
- Cardiac failure
  - Congenital heart disease
  - Pericardial tamponade
  - Pulmonary hypertension
  - Rheumatic heart disease
  - Anaphylaxis

## Case 2: Leg pain and respiratory distress

- 2½ year old boy, one of twins, previously well
- 1-2 week history of reduced activity, refusal to walk, bilateral leg swelling, pale and rapid breathing
- No fever

# Clinical examination

- Lethargic
- Tachycardia and tachypnoea
- Severe pallor, eyelid puffiness
- Pitting pedal oedema, bilateral knee swelling, tender, cannot straighten knee
- Chest – moderate respiratory distress, good air entry, SpO<sub>2</sub> 93%
- CVS – HR 170-180, loud P2
- Abdomen - soft, no organomegaly



Haemoglobin: 5.7 g/dL

MCV: 58.8

MCH: 16.9

RDW: 20.1

Reticulocyte %: 4.6

Platelets: 457

White Cell Count: 6.5

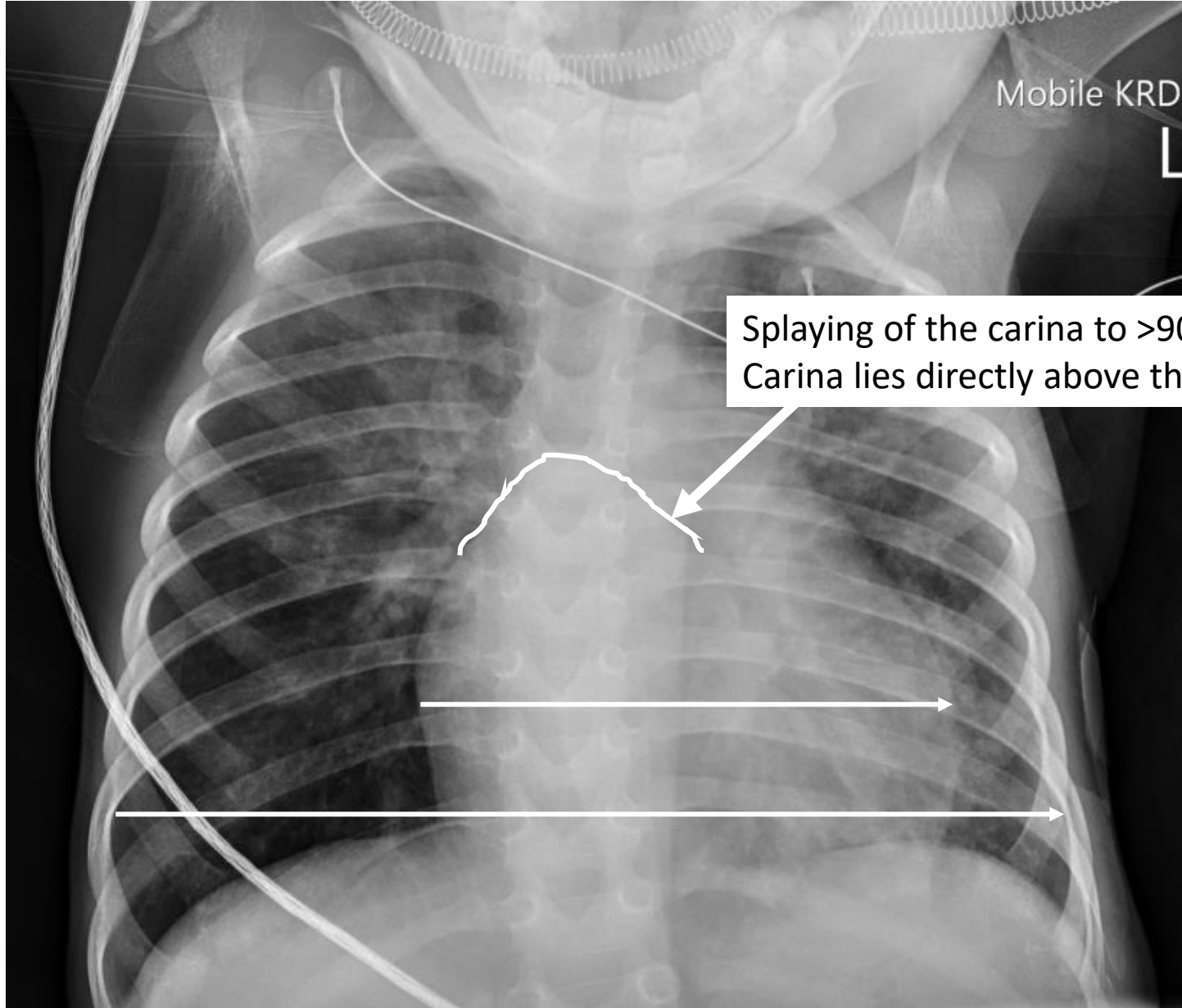
Neutrophils: 4.68

Lymphocytes: 1.24

Monocytes: 0.59

Coagulation normal

- Transfused 140 ml packed cells
- Worsening respiratory distress



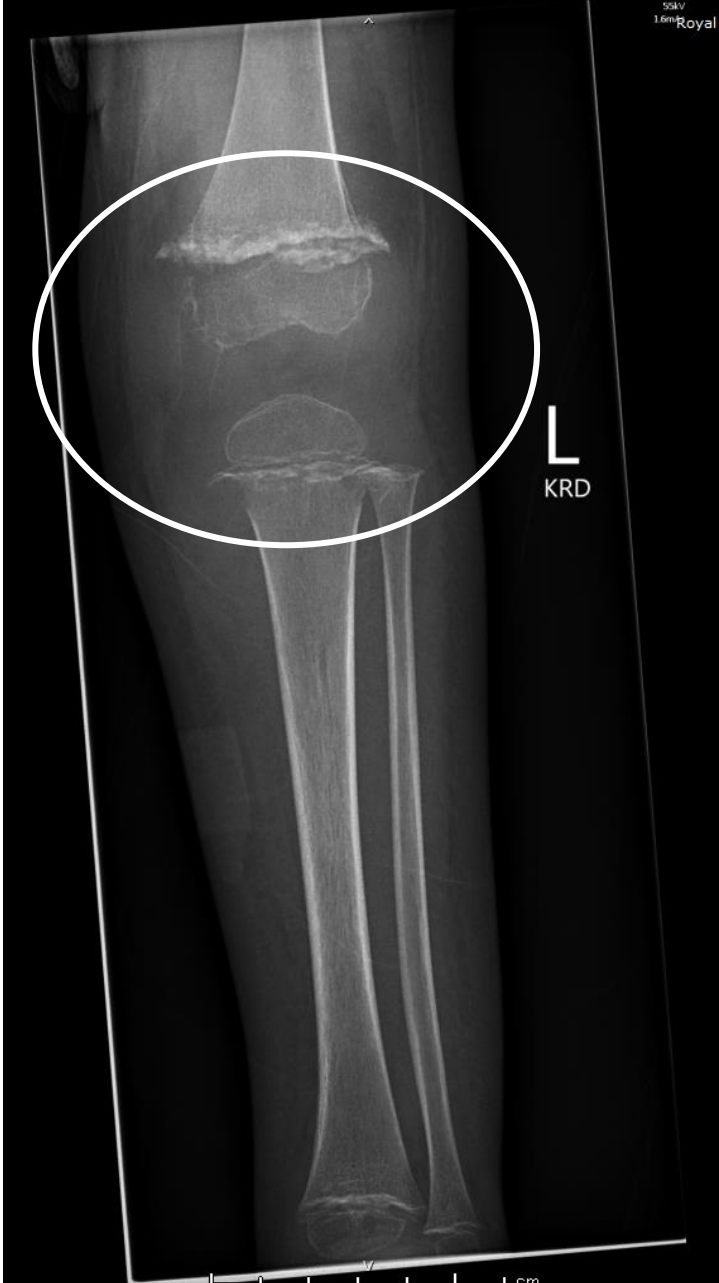
Mobile KRD

Splying of the carina to  $>90^\circ$   
Carina lies directly above the left atrium

- Severe respiratory distress  
+++
- Echo – supra-systemic PA pressures, RV-systolic pressure 75mmHg, dilated ++ and hypertrophied + RV, septal curvature to the left, moderate-severe reduced function, moderate impairment of LV function



Knee swelling and  
tenderness ++





# Joint pains, anaemia, heart failure

- Scurvy
  - Leukaemia
  - Rickets
  - Syphilis
- Scurvy
    - plus acute severe malnutrition (WHL -3 z-scores, WFA -1.4 z-scores, MUAC 14cm, HC 58)
    - plus iron deficiency
    - plus zinc deficiency
    - plus thiamine deficiency

# Treatment

- Oxygen, CPAP 70% O<sub>2</sub>
- Ascorbic acid (vitamin C) 100mg TDS
- Multi-vitamins, thiamine
- Frusemide
- Adrenaline low dose 12 hours
- Iron

# Progress – within 24 hours

- Mild-moderate respiratory distress
- Able to come off CPAP
- 48 hours: PA pressures decreased on echo, good biventricular function, no signs of PHT

Ascorbic acid (vitamin C)

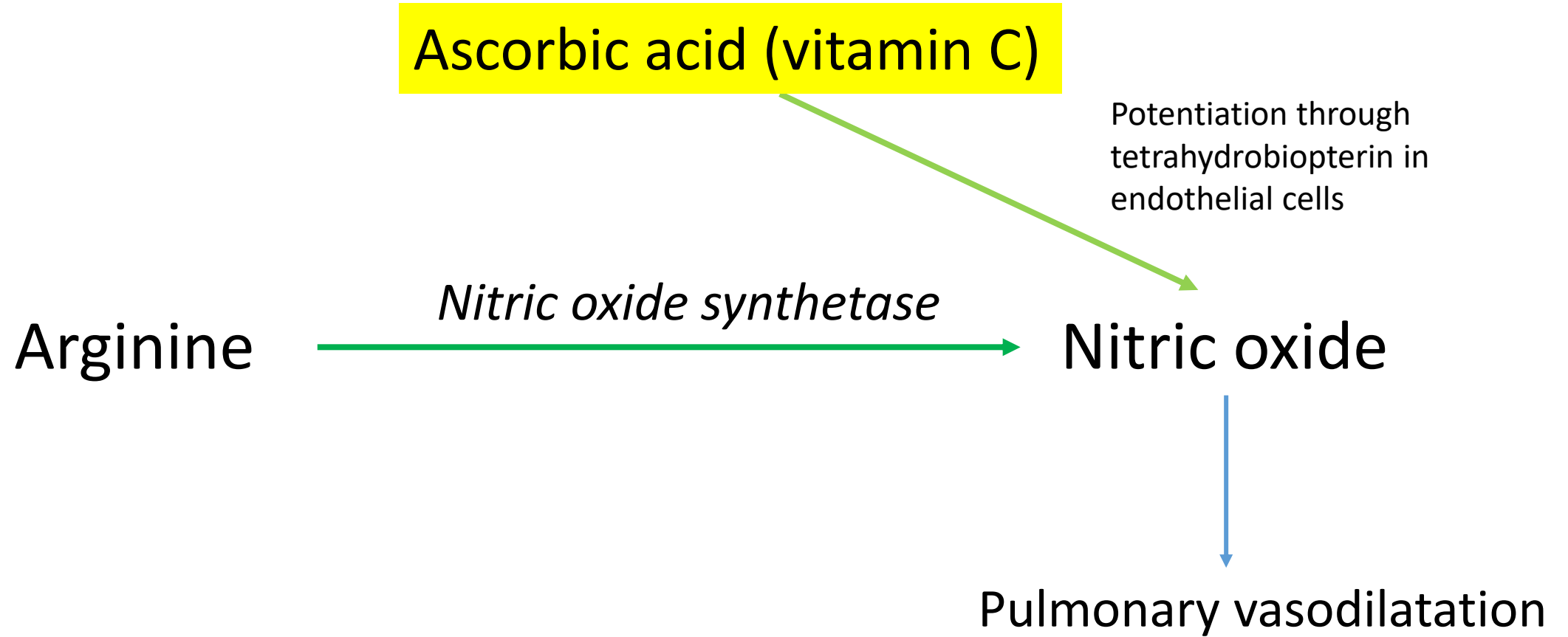
Potentialiation through tetrahydrobiopterin in endothelial cells

Arginine

*Nitric oxide synthetase*

Nitric oxide

Pulmonary vasodilatation



# Ward round assessment of critically ill child

- A – airway, is there stridor, upper airway obstruction
- B – breathing, RR, signs of respiratory distress, SpO<sub>2</sub>, respiratory distress score
- C – circulation, heart rate, blood pressure, pulse volume, capillary refill, cold hands / feet
- D – disability / neurology / GCS response to pain
- D – review all drugs, check doses, what drugs are no longer needed
- E – exposure: temperature / IV cannula / pressure areas
- E – electrolytes, creatinine and urea, if needed
- F – fluids and feeding
- G – glucose, is the BSL normal, is the child on sufficient glucose / feeding, etc
- H – haematology / anaemia / thrombosis risk / signs of infection on FBE
- I – clinical signs of infection