MMed and DCH Lectures

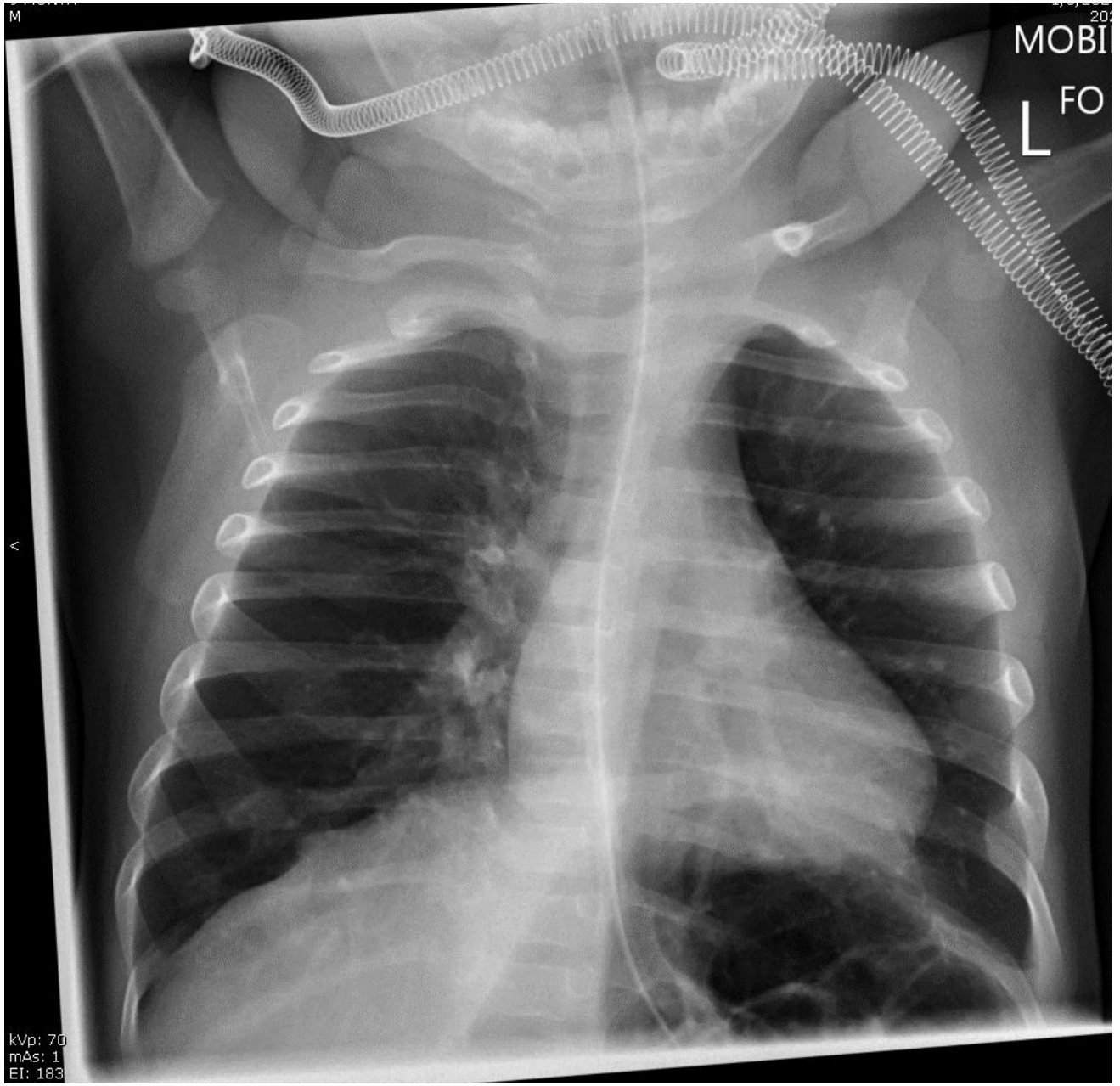
Intensive care management of common paediatric problems II

June 6, 2022

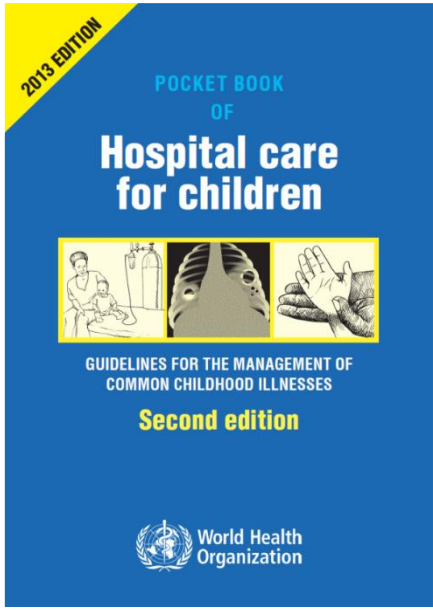
Prof Trevor Duke

Case 1: 9-month-old

- 2 days cough, fever and respiratory distress
- Episode of severe egg allergy at 7 months, wheeze and rash
- RR 80, severe chest indrawing, HR 170, SpO_2 82%
- Prolonged expiratory phase. Wheeze +++ crackles +

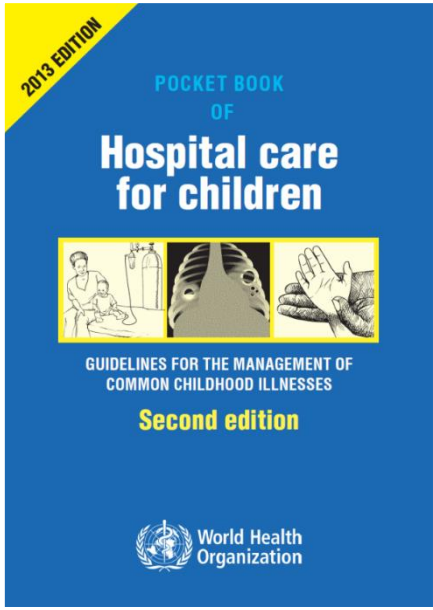


Stages in management of any sick child



- Triage
- Emergency treatment
- History and examination
- Laboratory investigations, if required
- Main diagnosis and other diagnoses
- Treatment
- Supportive care
- Monitoring
- Discharge planning
- Follow-up

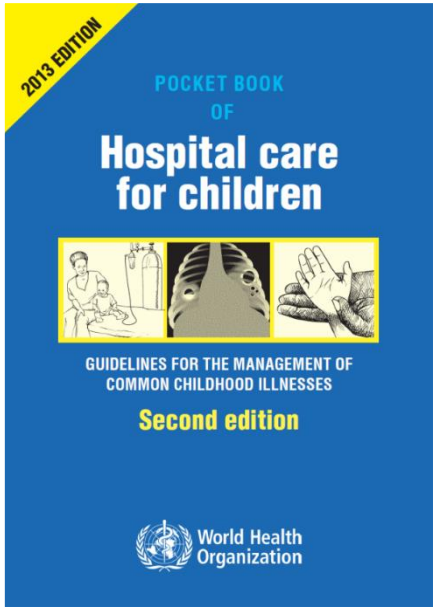
Triage



- Take a brief history of the presenting problem
- Take temperature and weigh the child
- A. Listen for stridor or obstructed breathing
- B. Look for cyanosis and for signs of respiratory distress (chest indrawing, tracheal tug), check SpO_2
- C. Feel the skin temperature of the hands and feet, feel the pulse for volume, check capillary refill time
- D. Assess for lethargy and level of interaction.

Emergency signs

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



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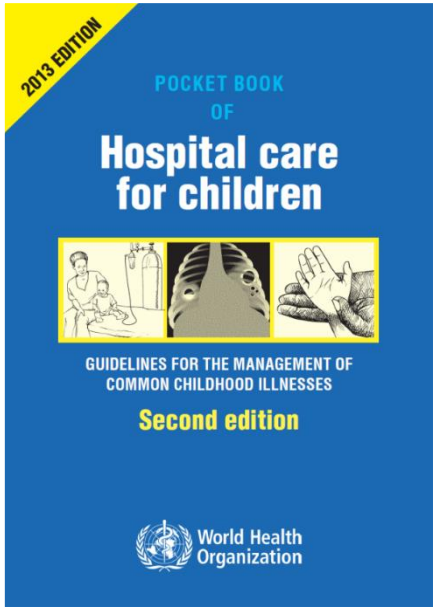


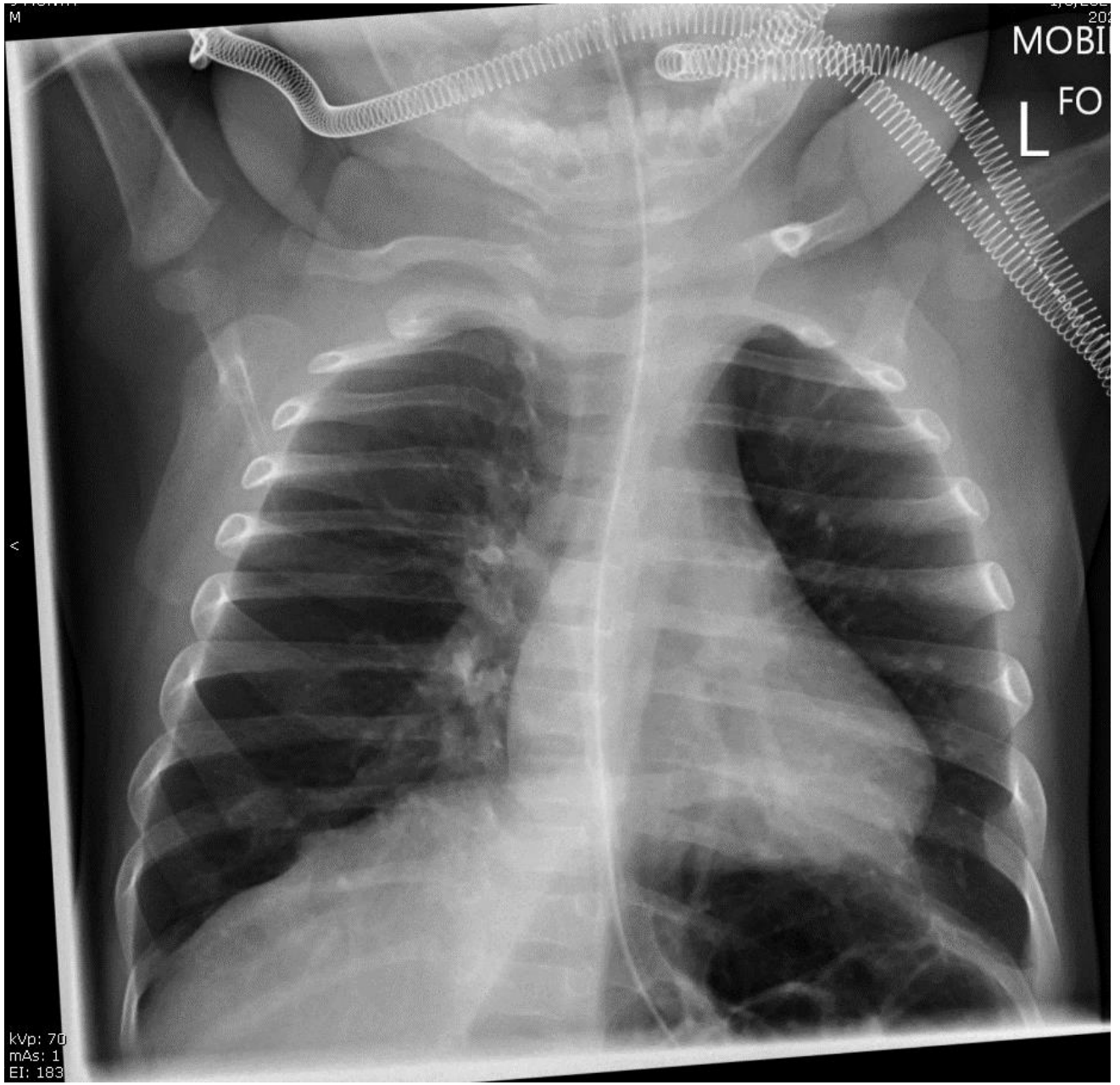
Emergency treatment

- Oxygen
- Salbutamol
- Antibiotics

Causes of lung hyperinflation

- Asthma
- Bronchiolitis
- Foreign body
- Congenital obstruction

- Distressed and tachycardic with salbutamol, severe respiratory distress despite oxygen
- Prolonged expiratory phase
- Wheeze +++ crackles +



Therapies for bronchoconstriction

- Salbultamol (Ventolin)?
- CPAP?
- Adrenaline?
- Steroids?
- Nebulised saline
- Magnesium?

Hypertonic saline in bronchiolitis (3%-6% NaCl)

- 28 trials, 4195 infants
- Improved clinical severity scores
- Reduced hospitalisation by 14% when used in ED
- Helps infants shift secretions which can block small airways

What about normal saline in bronchiolitis?

Nebulised normal saline in moderate acute bronchiolitis and pneumonia in a low- to middle-income country: a randomised trial in Papua New Guinea

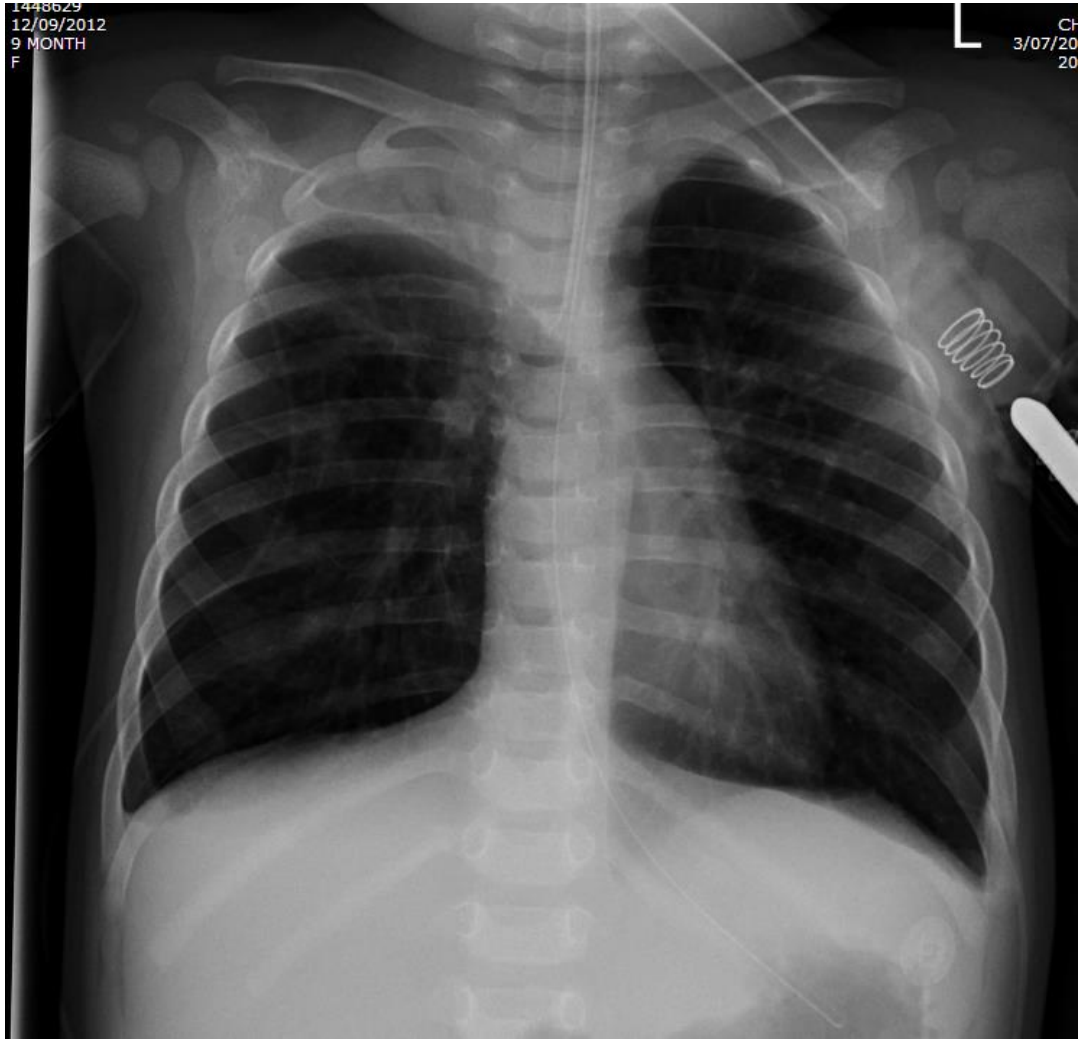
Gordon Pukai[a,b] and Trevor Duke[b,c,d]

PAEDIATRICS AND INTERNATIONAL CHILD HEALTH
https://doi.org/10.1080/20469047.2020.1725338

- 199 patients with bronchiolitis / moderate pneumonia <2 years, randomized to nebulized NS or standard care
  - Improved Respiratory Distress Score at 4 hours
  - Improved SpO_2
  - Higher safe discharge rate

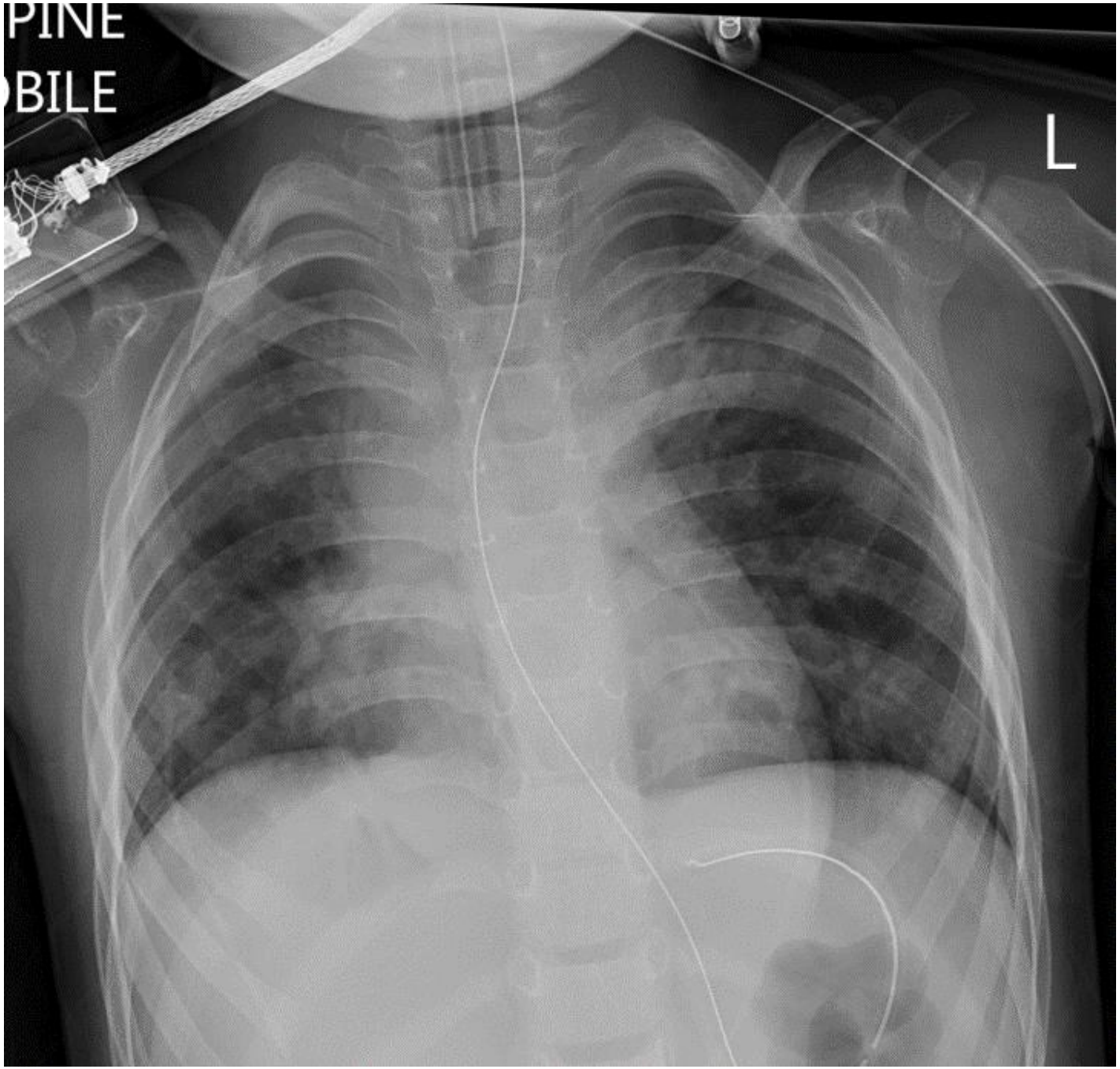
Magnesium?

- Inhibits contraction of bronchial smooth muscle:
  - Blocks acetylcholine release from cholinergic nerve terminals (Ach mediator of bronchial smooth muscle constriction)
  - Blocks NMDA receptors – (why ketamine also works in asthma)
  - Blocks calcium influx into cells
- Anti-inflammation
  - Decreases glandular mucus production
  - Decreases histamine release from mast cells
  - Reduces neutrophil activation, anti-inflammatory processes?
- Highly effective in asthma, but not proven effective in bronchiolitis
- **Dose: 0.2ml/kg IV over 30 minutes**


1448629
12/09/2012
9 MONTH
F
L

2-year-old girl

- 3 days of cough, fever, respiratory distress
- History of stridor every time she runs - longstanding
- Severe respiratory distress, crackles, cyanosis
- Very prolonged expiratory phase



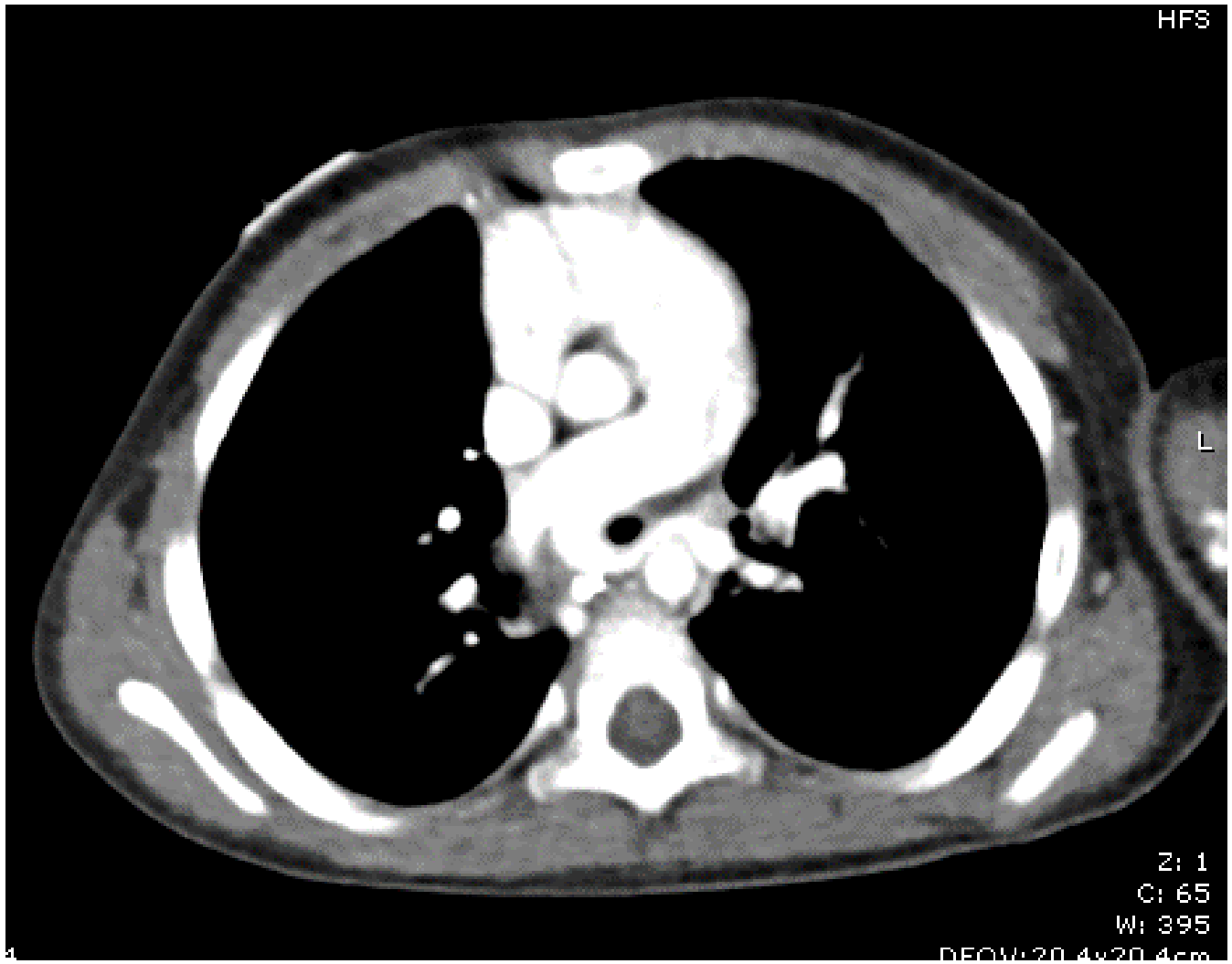
Differential diagnosis

- Laryngomalacia
- Asthma
- Recurrent croup
- Pneumonia
- Inhaled foreign body
- A cardiac problem?


357
Chandi, Saige
3 Jun 17:54
RCH 1 - 4 yrs
6 Wave Trend
ART Change Scale
SV Tach
HR
190
85
180
Pulse
181
PVC
0
Resp
10hm
ART
90
75
60
ART
Mean
100
50
77/55
(66)
RR
40
20
28
Pleth
SpO2
100
93
97
CO2
etCO2
50
30
42
awRR
29
NBP
Man
TimerA
30min
15min

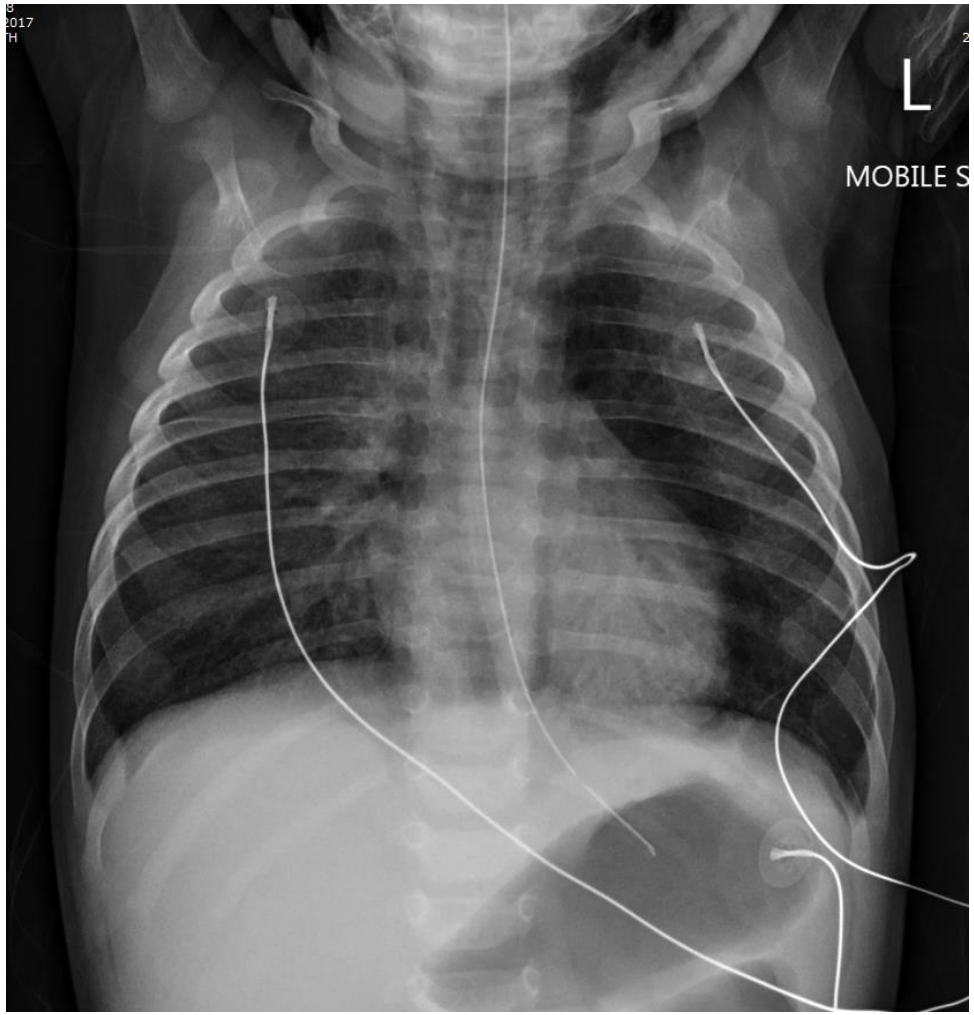
PA sling

Instead of arising from the main pulmonary artery, the left pulmonary artery arises from the right pulmonary artery and runs posteriorly between the esophagus and trachea.



4 month old boy with failure to thrive

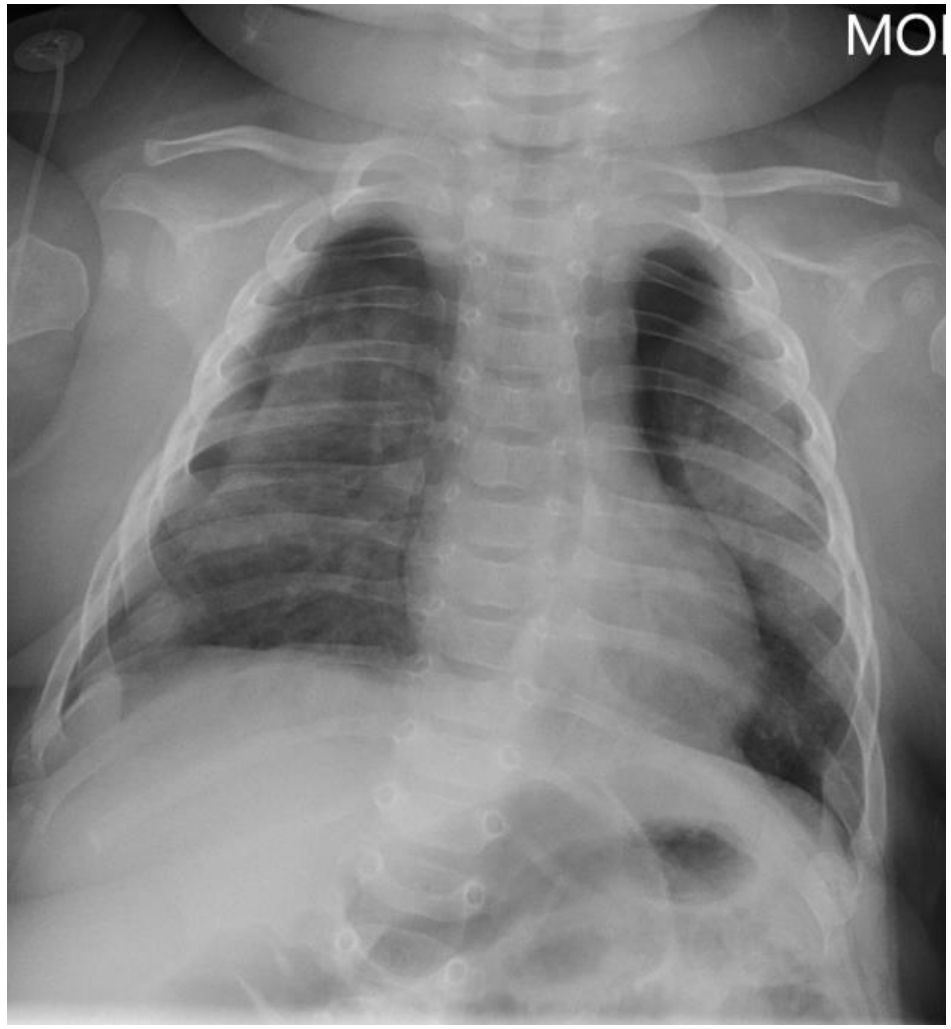
- 4 month old boy
- Failure to thrive, persistent diarrhoea
- Respiratory distress, fever and tachypnoea, SpO_2 65-70%
- Temp 38.8, RR 70, HR 180
- Hb 11.8, WCC 6.1, N=5.5, L=0.6, Platelets 130
- Oxygen



What could cause air-leak?

- Anything that causes sudden increase in intra-airway pressure
  - Expiratory airflow obstruction (asthma, foreign body)
  - A bout of heavy coughing (pertussis, pneumocystis, RSV)
- A medical problem leading to airway / alveolar fragility (blebs, cysts)
  - Tuberculosis, Pneumocystis

✓Severe hypoxia
✓Air leak
✓Lymphopenia
✓Failure to thrive
= Pneumocystis

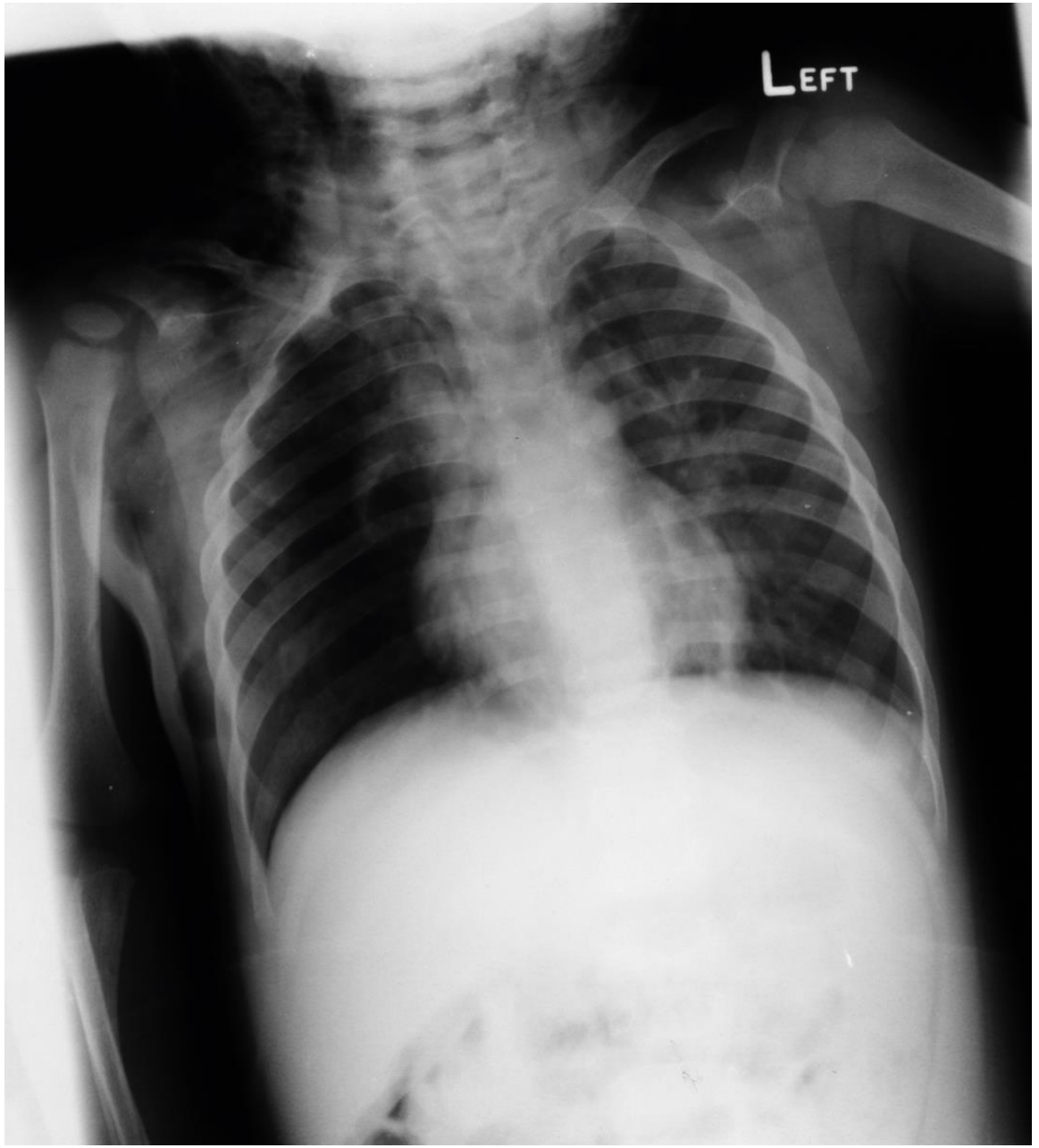


Other causes

- RSV
- Trauma (fractured larynx, oesophageal perforation)

Air leak in asthma

Air leak in tetanus

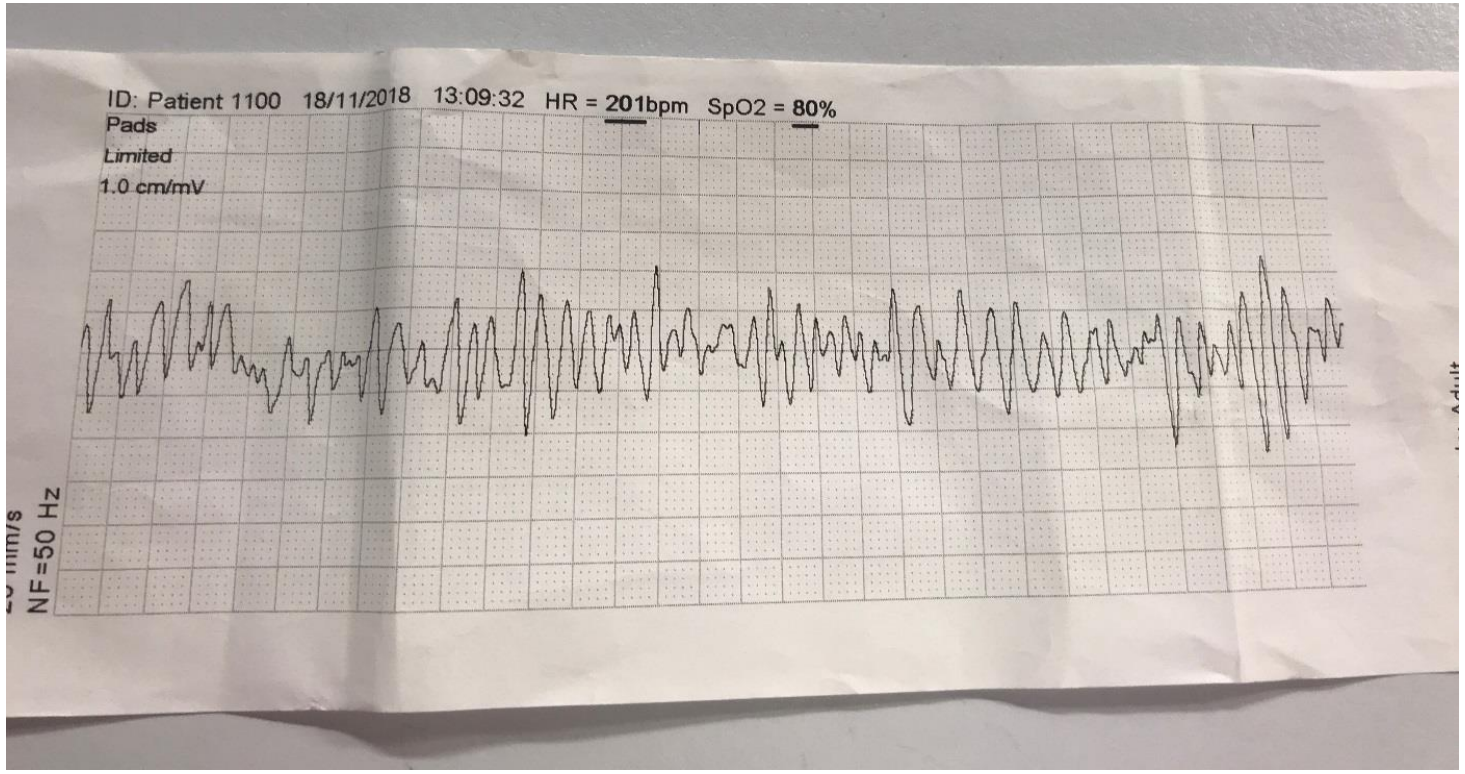


Lymphopenia definitions in children

- Normal levels for age
  - 0-2 years – 3000+
  - 2-6 years – 2000+
  - 6-18 years – 1500+

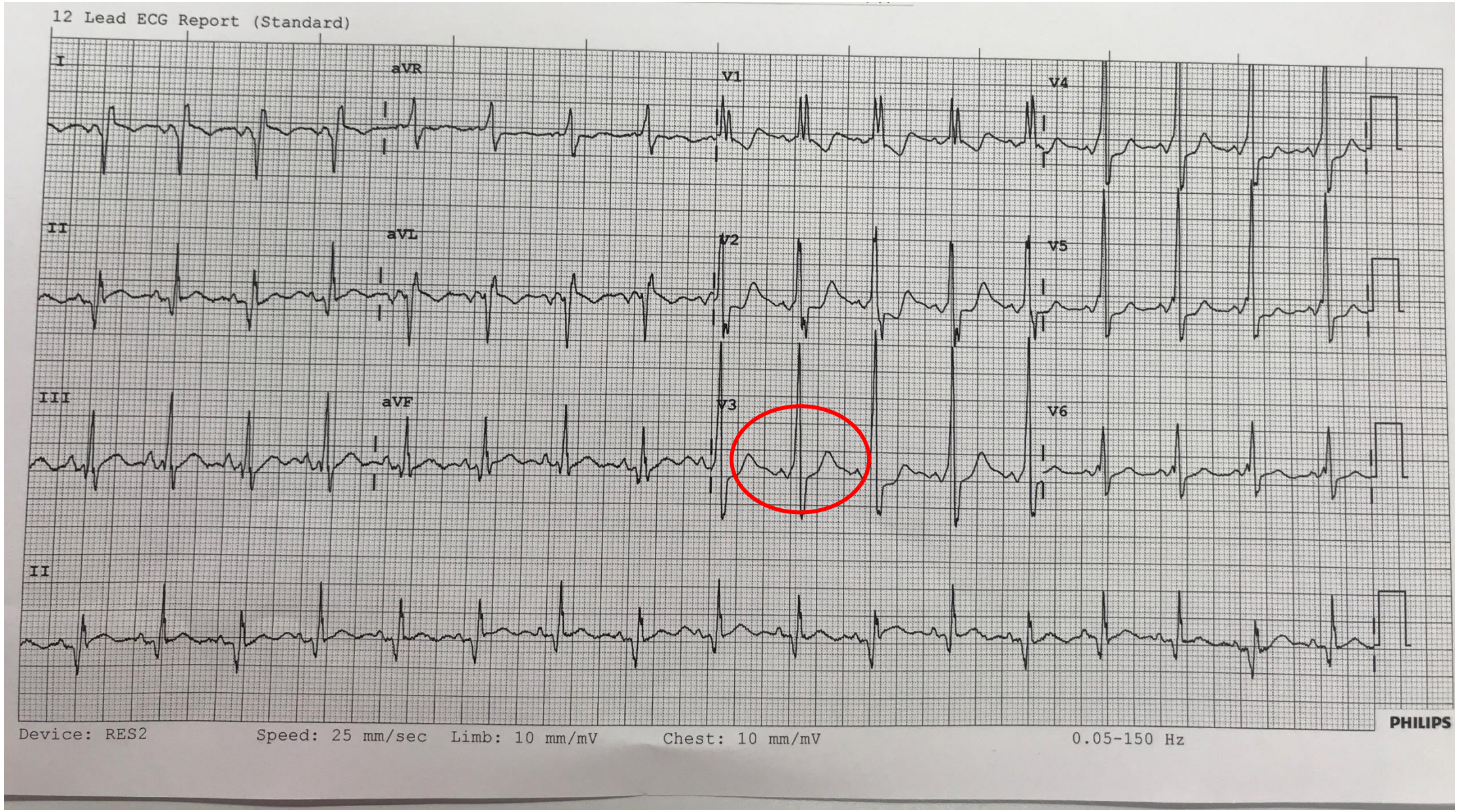
12 year old boy who collapsed at soccer

- 12 year old boy, previously well, weight 35kg
- While playing soccer, sudden collapse (not struck)
- CPR given by father
- Ambulance arrived - defibrilated



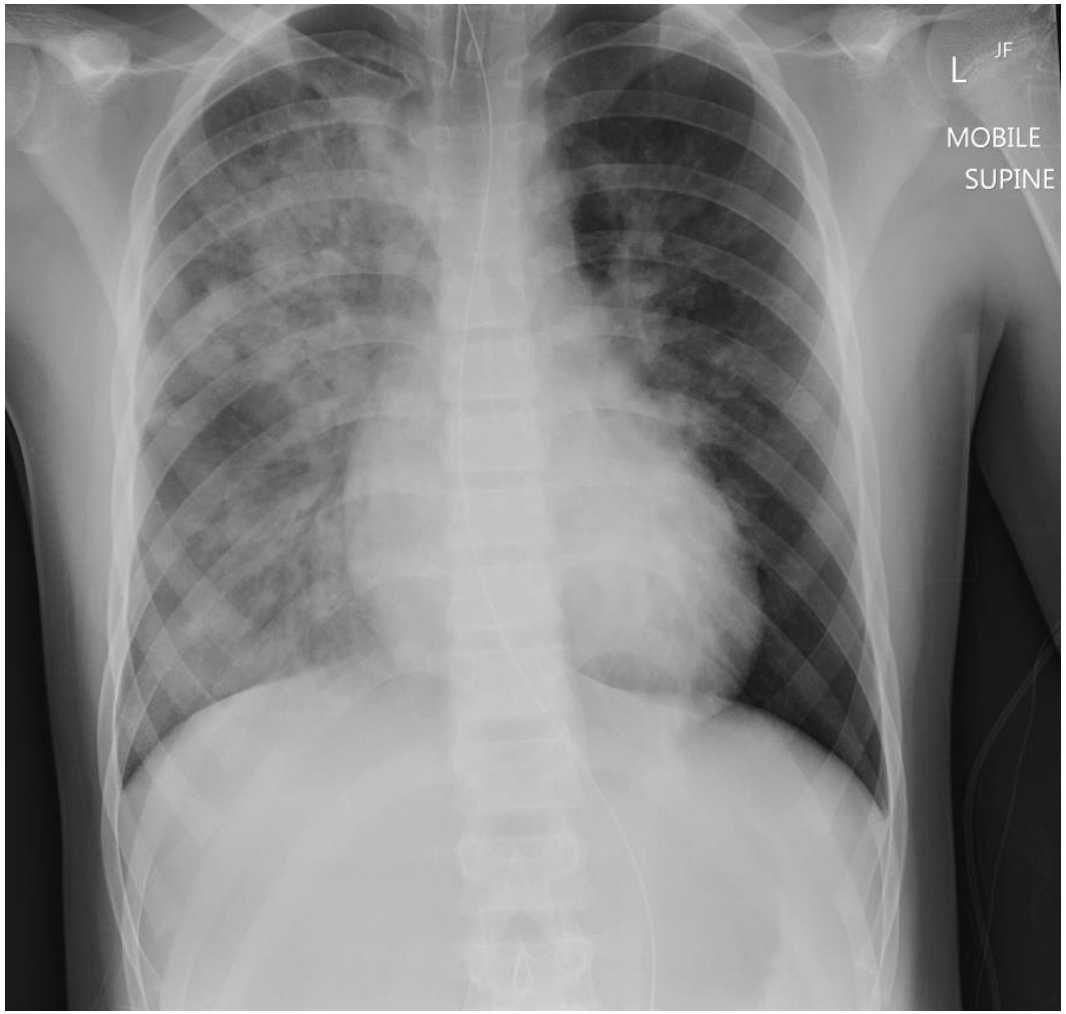
What is the rhythm?

- VF with *Torsade de points*
- ? ↓↓ Magnesium
- ? Wolf-Parkinson-White Syndrome


12 Lead ECG Report (Standard)
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Device: RES2
Speed: 25 mm/sec
Limb: 10 mm/mV
Chest: 10 mm/mV
0.05-150 Hz
PHILIPS

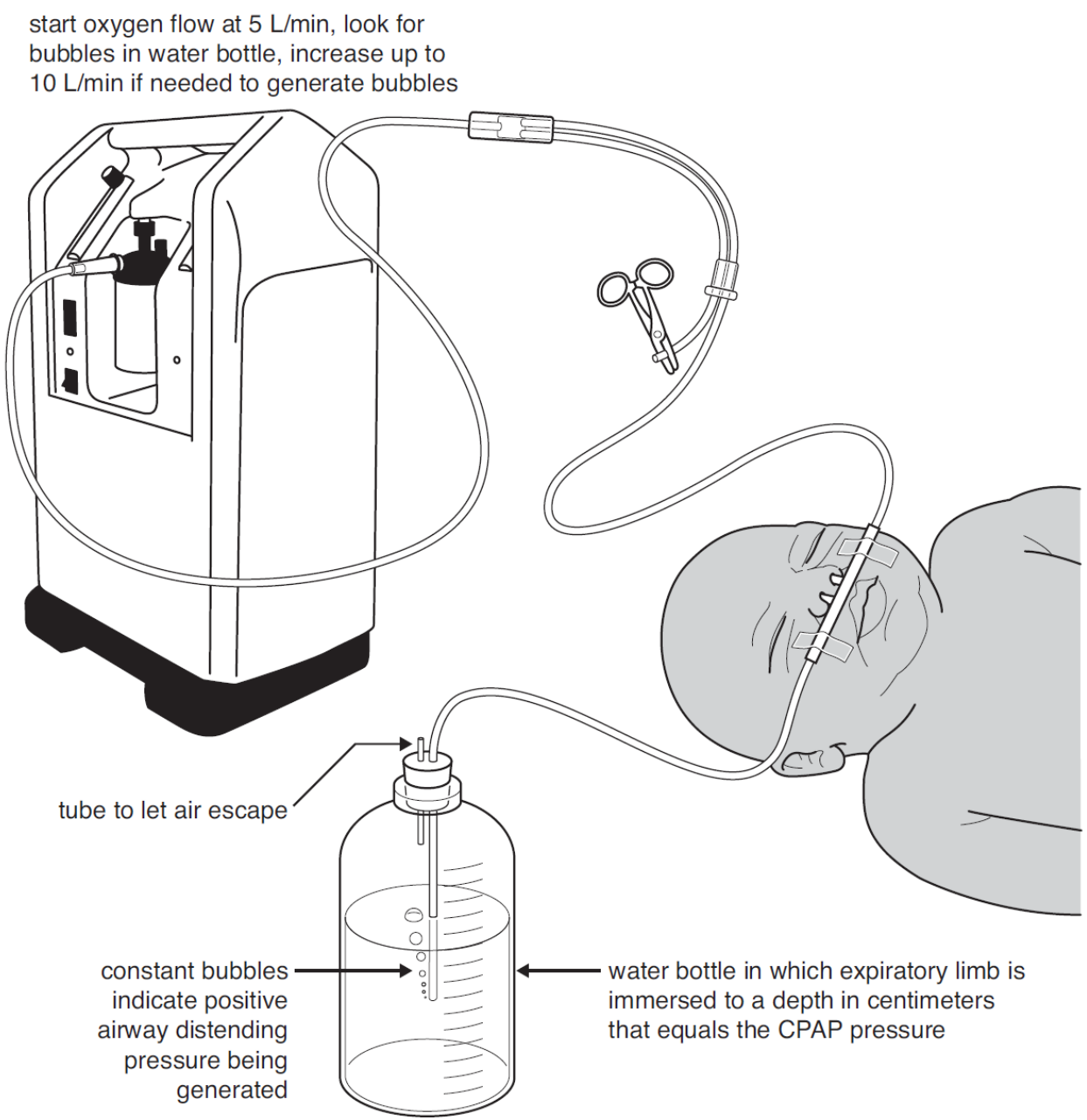
Management

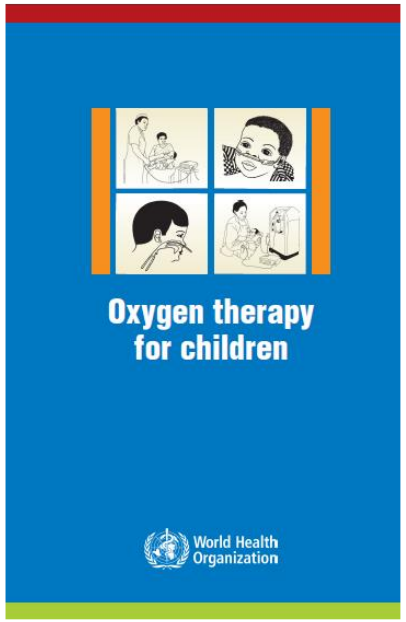
- SpO_2 50-60%
- Hypertensive: BP 158 / 105 (123)
- What does the chest x-ray show?
- Treatment
  - CPAP with 100% oxygen
  - Magnesium infusion
  - Correct acidosis
  - Antibiotics for aspiration
  - Time




O2
AIR


AIR
Diamedica Baby CPAP


start oxygen flow at 5 L/min, look for bubbles in water bottle, increase up to 10 L/min if needed to generate bubbles
tube to let air escape
constant bubbles indicate positive airway distending pressure being generated
water bottle in which expiratory limb is immersed to a depth in centimeters that equals the CPAP pressure


Oxygen therapy for children
World Health Organization